EAGLE PC SERIES TECHNICAL NOTES

$1995

	PC-E	PC-1	PC-2	PC-XL
RAM	64KB	128KB	128KB	128KB
FLOPPY DISKS	1 D/S 48 TPI	1 D/S 48 TPI	2 D/S 48 TPI	1 D/S 48 TPI
HARD DISK	N/A	N/A	N/A	FILE - 10
MONITOR + CARD	OPT.	12" 720X352	12" 720X352	OPT.
AVAILABLE EXPANSION SLOTS 3	2	1	1	0
SOFTWARE	OPT.	INCLD.	INCLD.	OPT.

* All are 8088 based systems @ 4.7 Mhz.

* Available or standard expansion boards.
  1. Floppy disk controller board.
  2. Video/Graphics board.
  3. SASI board. (Std. in -XL model).

MUST HAVE FOR FILE I/O EXPANSION ←

* RAM is expandable to 512Kb, in 64Kb increments. The RAM provided is 65,536 words by 1-bit dynamic MOS RAM.

CP refresher

8088

* All systems come with two serial ports and one parallel port.

  The parallel ports' major device is a 8255A and is centronics compatible.

  The serial ports are asynchronous only and use two 8250s'.

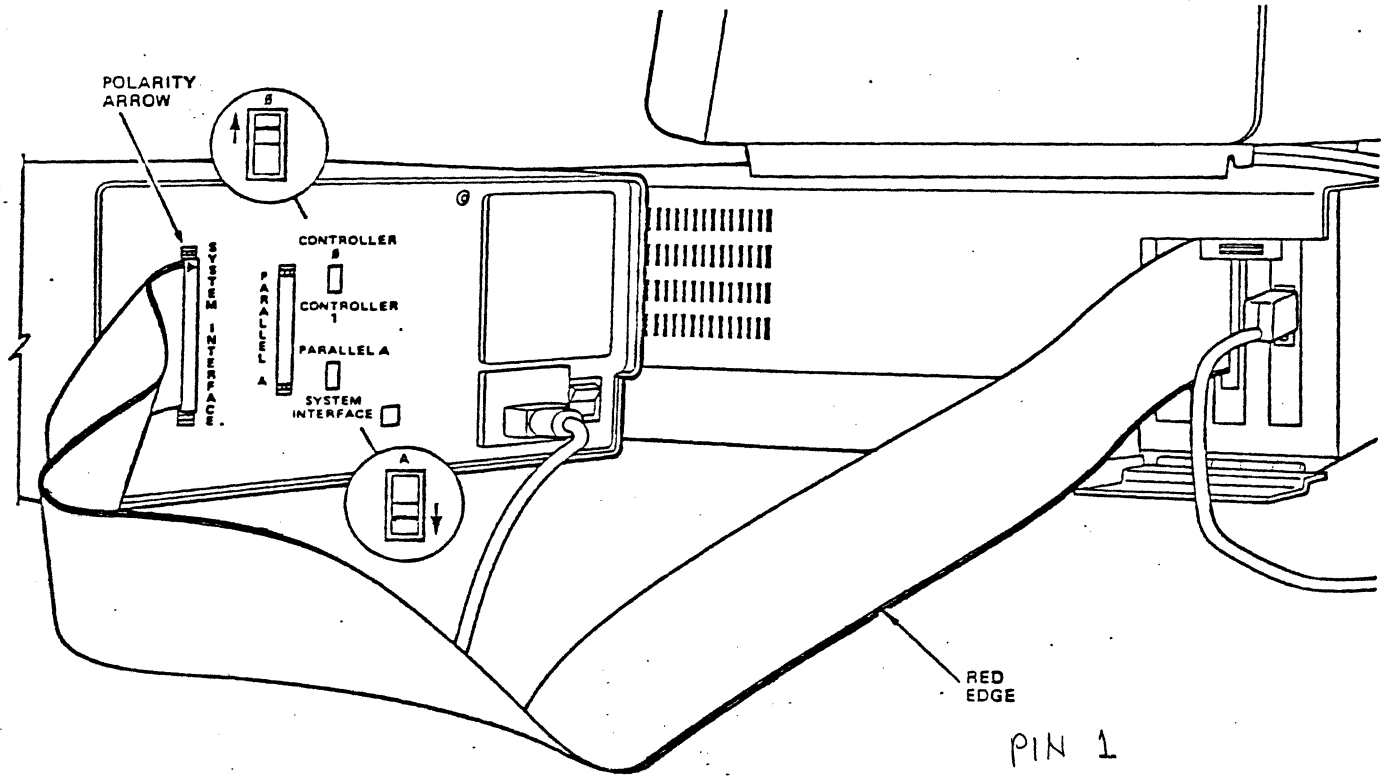
SERIAL PORT PIN-OUTS

Pin #	Signal Name
2	TX Data
3	RX Data
4	RTS
5	CTS
6	DSR
7	GND.
8	Carrier Detect
~~20~~	DTR
22	RI

may not have been mentioned in Customer manual

* The EPROMs are 2764s' and contain the boot routine and diagnostics.

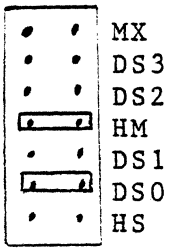
2 EPROM SYSTEM
PIAGONISTIC PROM



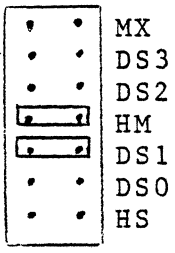
Eagle PC with a File 10/40 add-on.

H D LOADER XFERS DISKETTES MS DOS FORMATTED

Floppy disk drive strapping for a Teac FD-55B.



Drive "A".
Add 330 ohm resistor pack.



Drive "B".

EAGLE PC THEORY OF OPERATION

THE 8088 AND SUPPORTING CIRCUITS

The Eagle PC computers use an Intel 8088 microprocessor. The 8088 utilizes an 8-bit data bus, and, depending on the instructions used, can operate on either 8-bit or 16-bit data. The address bus is 20 bits which provides for 1Mb of addresses. The Eagle PC, however, reserves the upper 512k of addresses for system use, so the maximum amount of RAM that the PC can support is 512kb.

Because the 8088 package has only 40 pins, the address bus, data bus, and certain status lines have been multiplexed on 20 pins. Thus, latching of address, data, and status information is necessary in order to capture that information while it is present on those pins.

The Intel 8088 is set up in the "maximum mode" of operation, whereby certain processor functions are performed by another chip, the Intel 8288 Bus Controller. This allows the 8088 to provide information on pins otherwise used for those functions. By decoding the first three status lines from the microprocessor, the 8288 will broadcast the ALE (Address Latch Enable), DEN (Date Enable), and I/O and memory read/write command signals when it determines that the system is ready for the particular information transfer desired by the microprocessor.

The socket adjacent to the 8088 is intended for an Intel 8087 chip, which in conjunction with the 8088, will provide extremely fast mathematical processing. The Intel 8087 would be called upon by the Intel 8088 when special software commands are used. The most common use of the Intel 8087 chip is with medium and high resolution color displays.

THE INTEL 8259

The Intel 8259 Programmable Interrupt Controller provides the system with a set of prioritized interrupt signals with which peripheral devices can request servicing. When these devices issue interrupt signals, the 8259 determines the importance of the requests and whether it is appropiate to interrupt the microprocessor. After the microprocessor acknowledges an interrupt from the 8259, the 8259 provides the address of a subroutine which is appropriate for the type of interrupt and which subroutine it will attempt to follow. Before any interruption of the of the microprocessor takes place, the 8088 finishes performing the instruction it was on prior to receiving the interrupt and stores away all the information in the registers so that it can (if possible) resume its processing when the interrupt is concluded.

THE INTEL 8284

A 14.31818 MHZ crystal and an Intel 8284 Clock Generator provide the 8088 and the rest of the system with a 4.77 Mhz clock signal and a 3.58 Mhz signal for the color burst required for color monitors.

MEMORY / RAM & EPROMS

The 20 address pins of the Intel 8088 make it possible to address up to 1,048,576 locations. The upper 524,288 locations, though, have been reserved for special use. The Intel 8088 uses addresses FFFOH to FFFFH for initial system initialization. Thus upon starting up, or upon reset, the 8088 looks to the upper 16 addresses for its initial instructions. The Eagle PC uses other portions of the upper 512k for EPROM and color and monochrome display information.

EPROMS

The Eagle PC has two, 8K, 2764 EPROMs which contain the bootstrap loader, memory test diagnostics, and the BIOS (Basic Input/Output System) module. Up to four 2764 EPROMs can be installed on the Eagle PC mainboard. As long as the EPROM with the BIOS is installed the system will function normally, the EPROM containing the diagnostics are not necessary. Such diagnostics, if installed, are available to the user through booting and holding down the "T" key. IBM makes RAM diagnostics mandatory upon booting.

RAM

The Eagle PC can support up to 512k of RAM on the main board. The Eagle PC uses 64k 1-bit dynamic RAMs (DRAMs); eight are required for a full bank of 64Kb. The system has room for up to 8 banks. They are easily inserted, 8 devices at a time, starting with the lowest order of sockets.

Because the RAMs are dynamic, they require "refresh". To accomplish this, an Intel 8253 Programmable Interval Timer determines when a refresh cycle is due and has the DMA Controller perform a dummy read to refresh the DRAM.

A PE-21199, 20 - 100 nsec, Signal Delay line is used to provide the necessary delays between RAS and CAS signals and to provide the multiplexing strobe when supplying 16-bit addresses to the DRAMs.

I/O PORTS & EXPANSION SLOTS

SERIAL PORTS

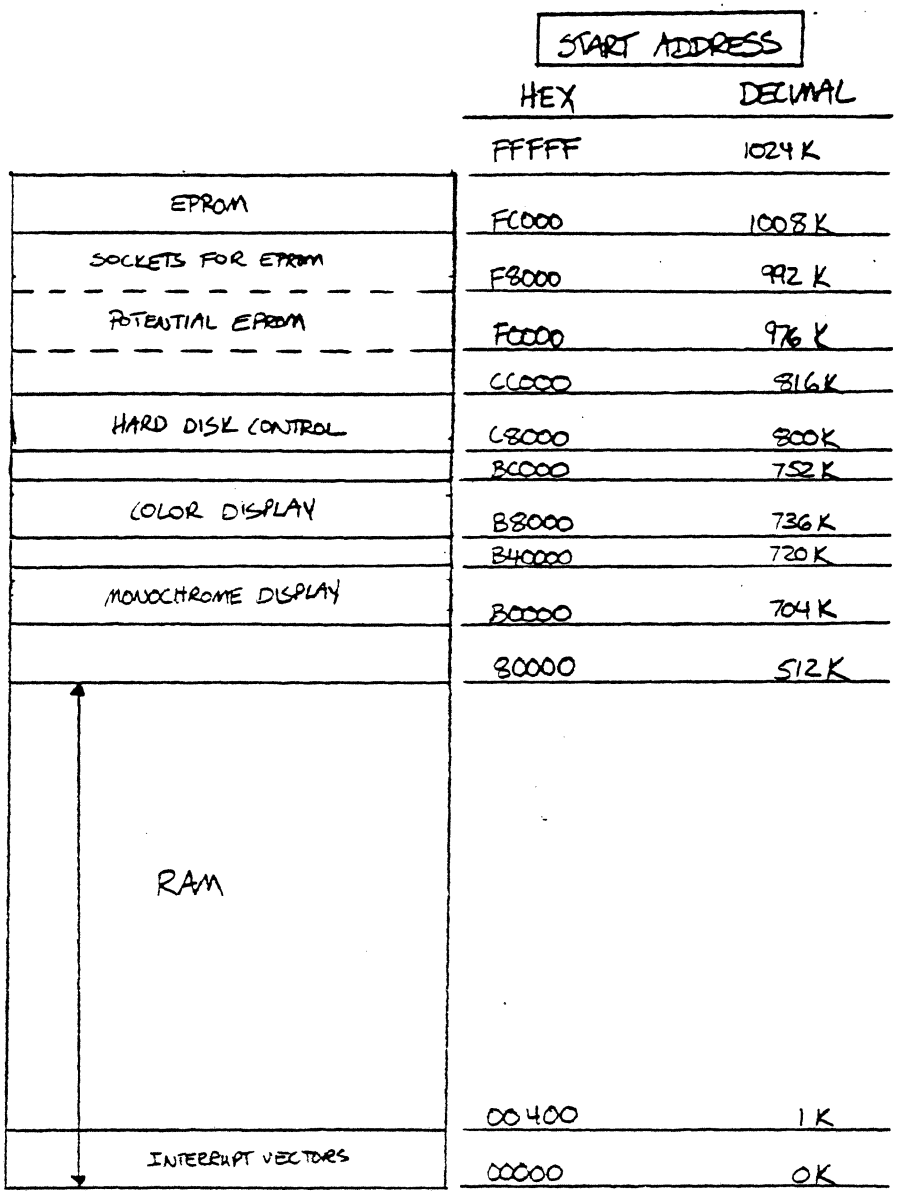
Each of the two serial ports utilize a National Semiconductor 8250 Programmable Asynchronous Communications device to receive and transmit data. Baud rates from 50 to 9600 are permissible. The keyboard also interfaces through the 8250.

PARALLEL PORT

An Intel 8255 Programmable Peripheral Interface is used to configure and control data traffic through the parallel port. The parallel port is a standard, Centronics type, 36 pin connector.

EXPANSION SLOTS

The I/O Bus has three 62 pin connectors on the main board. In all models of the PC, at least one is taken up by a floppy disk controller board.



	QTY REQD	FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS = DECIMALS .XX = .XXX = ANGLES =

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN A.L WILKINSON	7-26-83
CHECKED	
ISSUED	

EAGLE COMPUTER
11570 Martens River Circle
Fountain Valley, CA 92708
(714) 957-1711

EAGLE PC
MEMORY MAP

SIZE	FSCM NO.	DWG. NO.	REV.
C			

SCALE | SHEET

DWG. NO. | SH | REV.

C

A

EAGLE MONOCHROME DISPLAY AND GRAPHIC ADAPTER

This adapter has dual functions; it provides the interface to the Eagle Monochrome Display and is a 720x352 graphics adapter.

The monitor interface is designed around the Motorola 6845 CRT Controller module. There are 16 kilobytes of dynamic memory on the card which are used for the display buffer. The memory is dual ported and may be accessed directly by the CPU. No parity is provided on the display.

The characteristics of the adapter are listed below:

TEXT MODE	GRAPHICS MODE
- 80x25 screen	- 720x352 pixels
- direct drive output	- 8x16 graphic box
- 9x14 character box	- direct drive output
- 18 KHz monitor	- 18 KHz monitor
- character attributes	

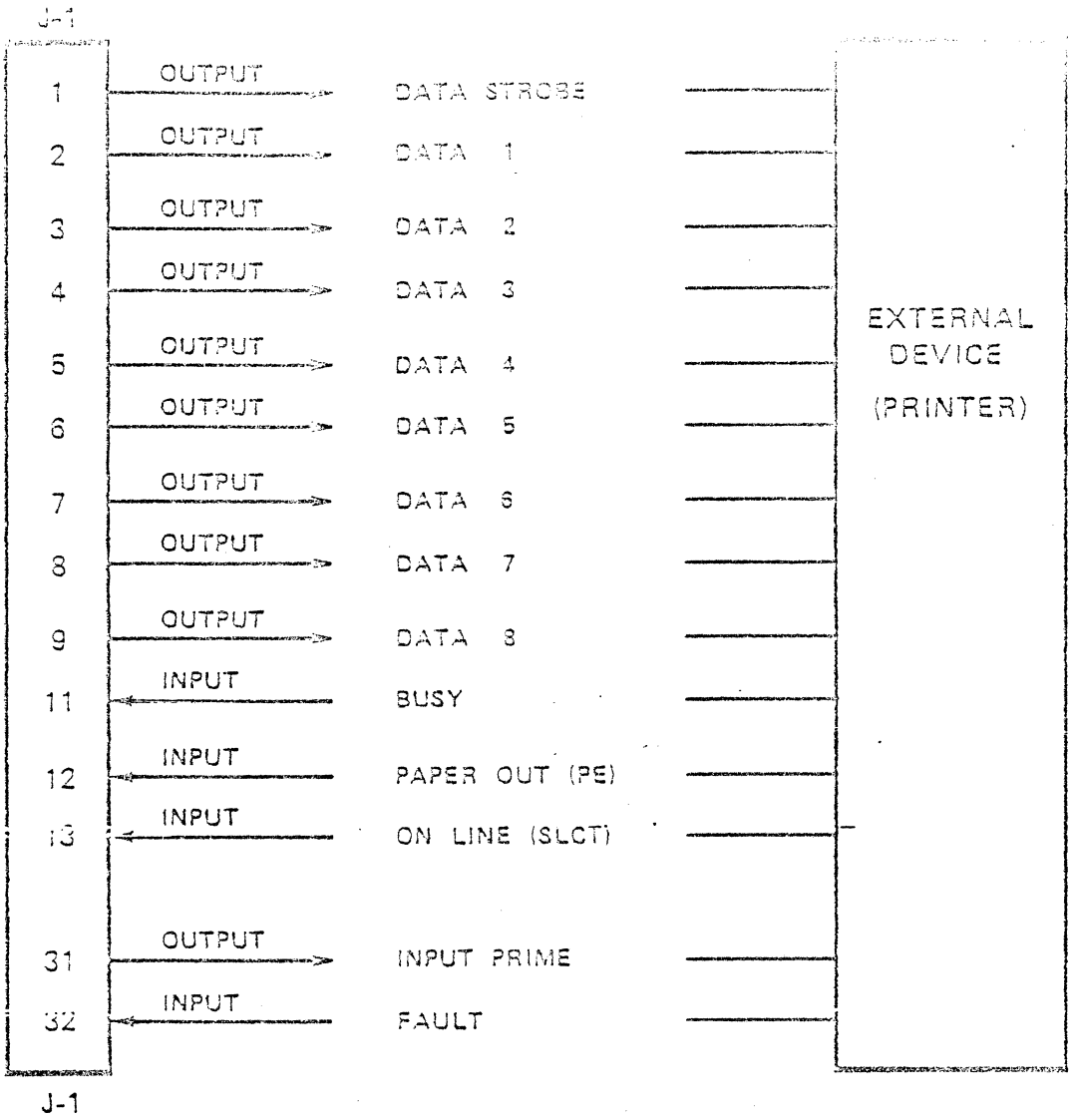
The adapter supports 256 character codes. A 4 kilobyte character generator contains the fonts for the character codes.

PARALLEL PRINTER PORT

The Parallel Printer Port provides Centronics compatible interfacing for a parallel printer. The main board contains an AM 8255A-5 Programmable Peripheral Interface device and associated circuits.

The following is a list of signal names and functions used by the Parallel Port. The list indicates input or output from the Eagle system.

DATA STROBE (Output)	Indicates that DATA 1 to DATA 8 are effective. Pulse width requires 1 micro sec. MIN. HIGH --- normal condition LOW --- readout of data
DATA 1 to DATA 8 (Output)	Indicates information from 1 bit to 8 bits. (8th bit is ignored.) DATA 1 --- HIGH DATA 0 --- LOW
BUSY (Input)	DC level signal which indicates whether printer is available or not. LOW --- Data Input HIGH --- Only DC 1 code is inputted.
PE (Input)	DC level signal which becomes "HIGH" when paper is short.
SLOT (Input)	DC level signal which is "HIGH" when printer is selected.
INPUT PRIME (Output)	Puts printer to initial condition.
FAULT (Input)	DC level signal which becomes "LOW" when printer is in the following condition: * At PE * Character selection error, carriage error, PF error * Select Off


J-1
1
OUTPUT
DATA STROBE
2
OUTPUT
DATA 1
3
OUTPUT
DATA 2
4
OUTPUT
DATA 3
5
OUTPUT
DATA 4
6
OUTPUT
DATA 5
7
OUTPUT
DATA 6
8
OUTPUT
DATA 7
9
OUTPUT
DATA 8
11
INPUT
BUSY
12
INPUT
PAPER OUT (PE)
13
INPUT
ON LINE (SLCT)
31
OUTPUT
INPUT PRIME
32
INPUT
FAULT
EXTERNAL DEVICE
(PRINTER)
J-1

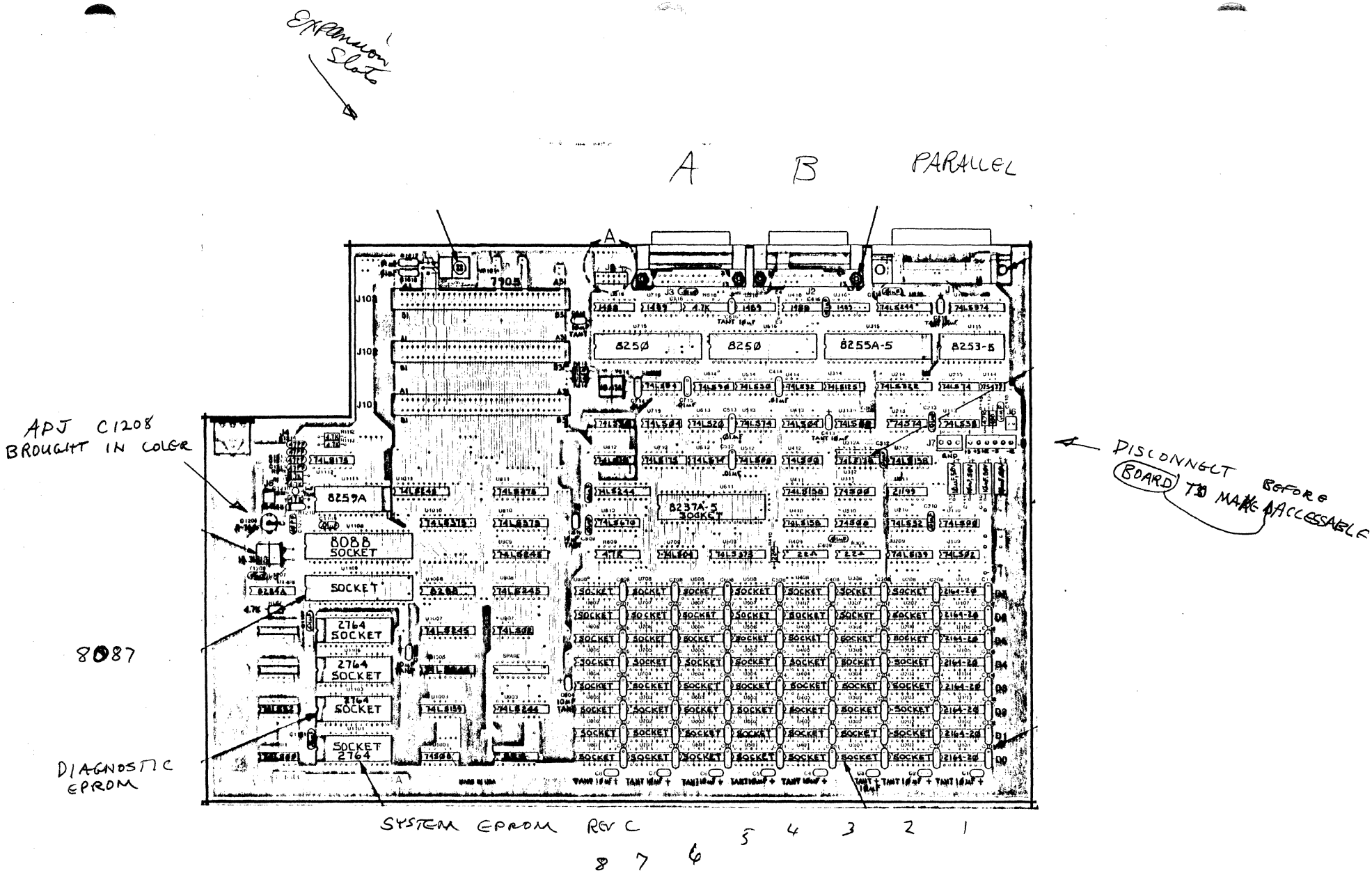
KEYBOARD

The keyboard is a separate device from the main unit and is attached via a serial interface cable to the right side of the Main Enclosure.

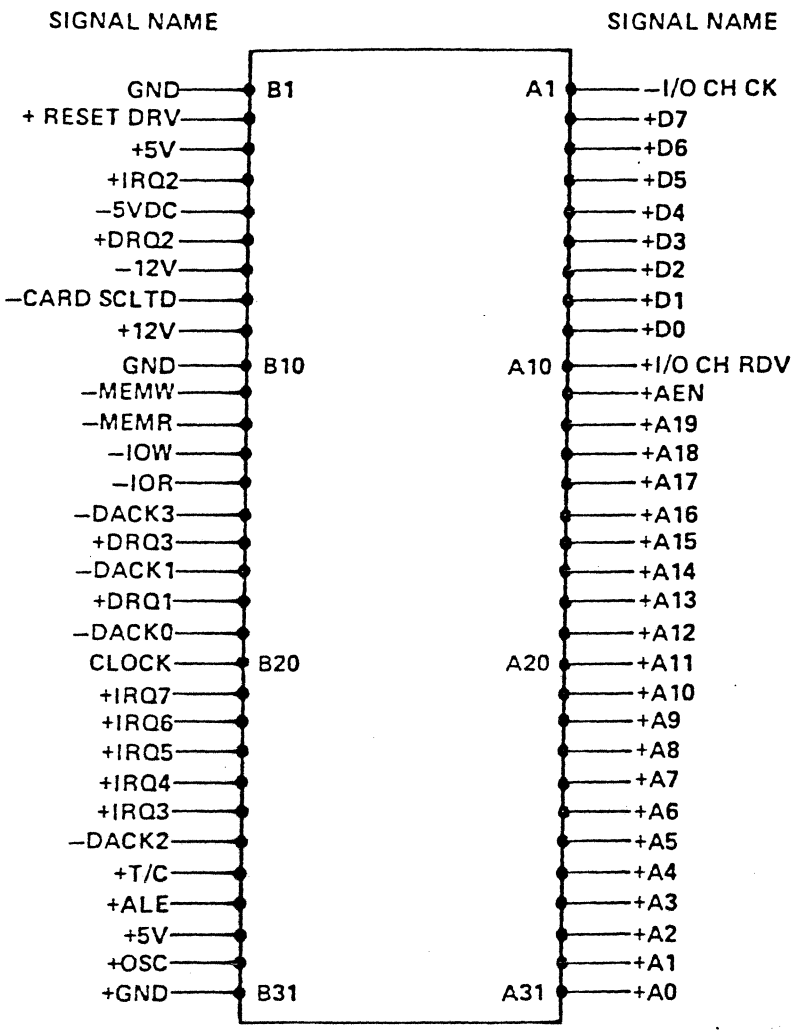
The keyboard is of a low profile, capacitive microprocessor design. The microprocessor is contained in the keyboard and is an Intel-8084, which returns scan codes to the Main Processor Board. There are 105 keys total, with 24 dedicated function keys.

The keyboard is considered a separate module and if a problem occurs it is simply unplugged and replaced.

WARNING
Do not unplug the keyboard with the power on.

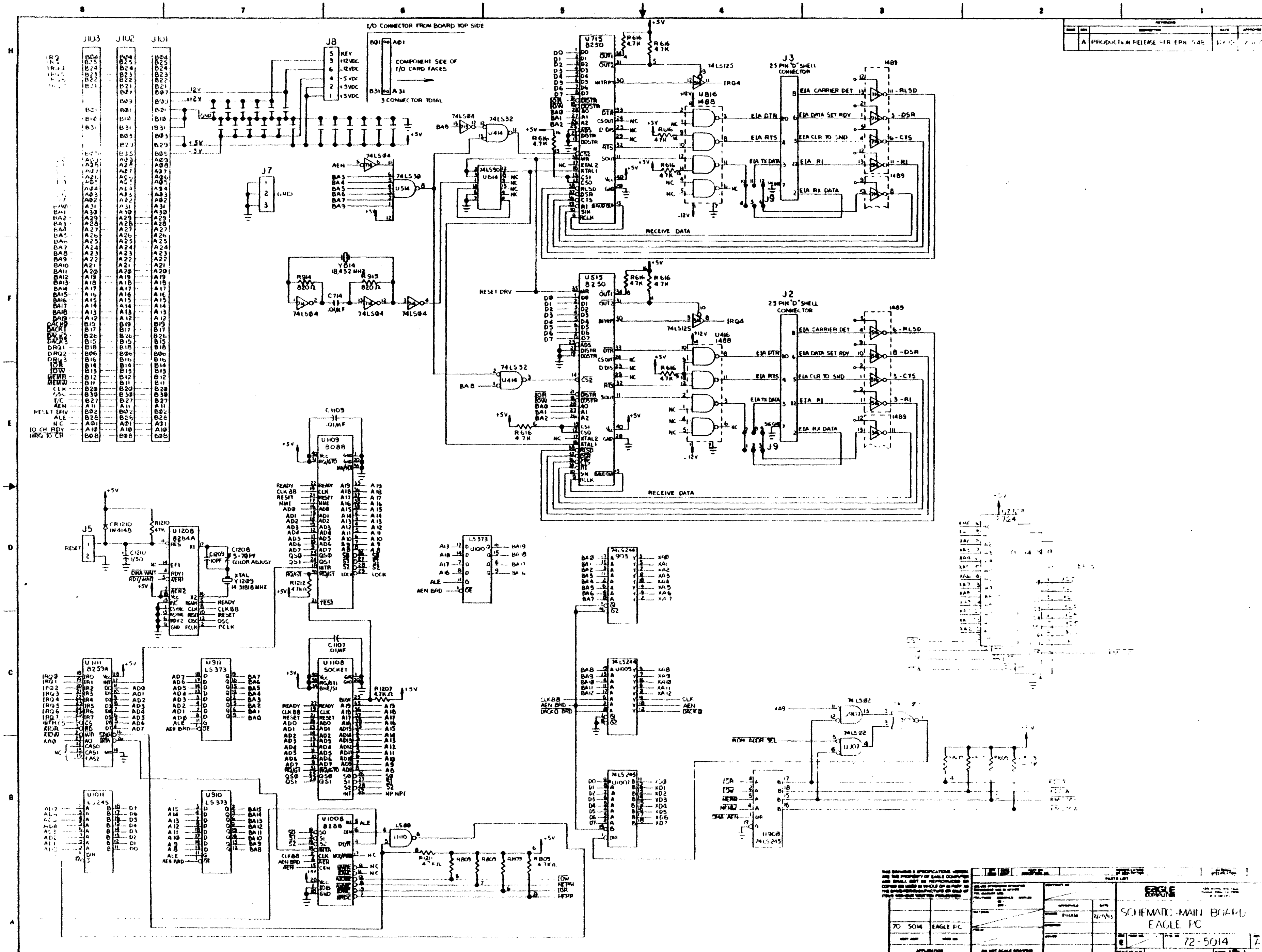


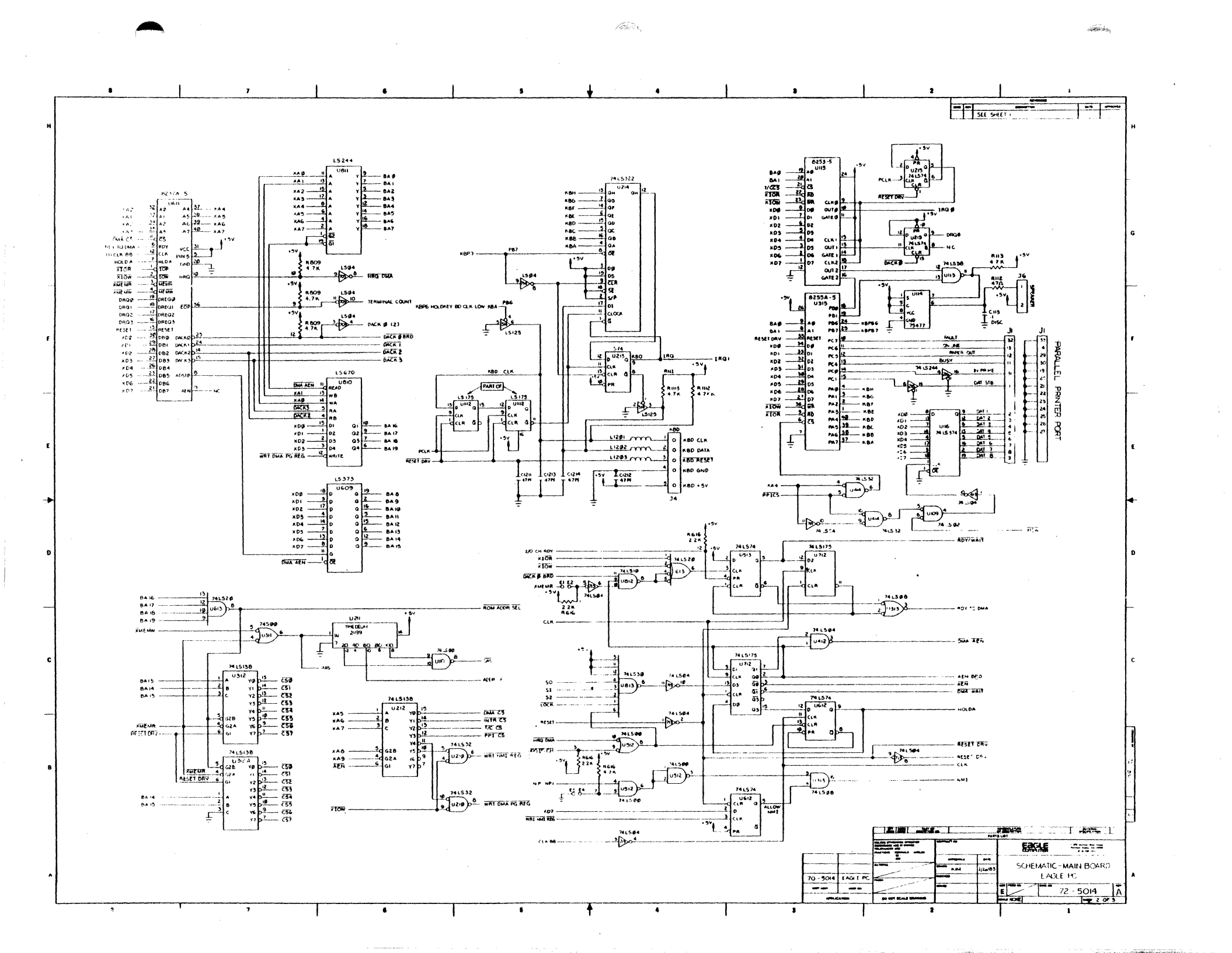
Eagle PC
Main Assy. Drawing

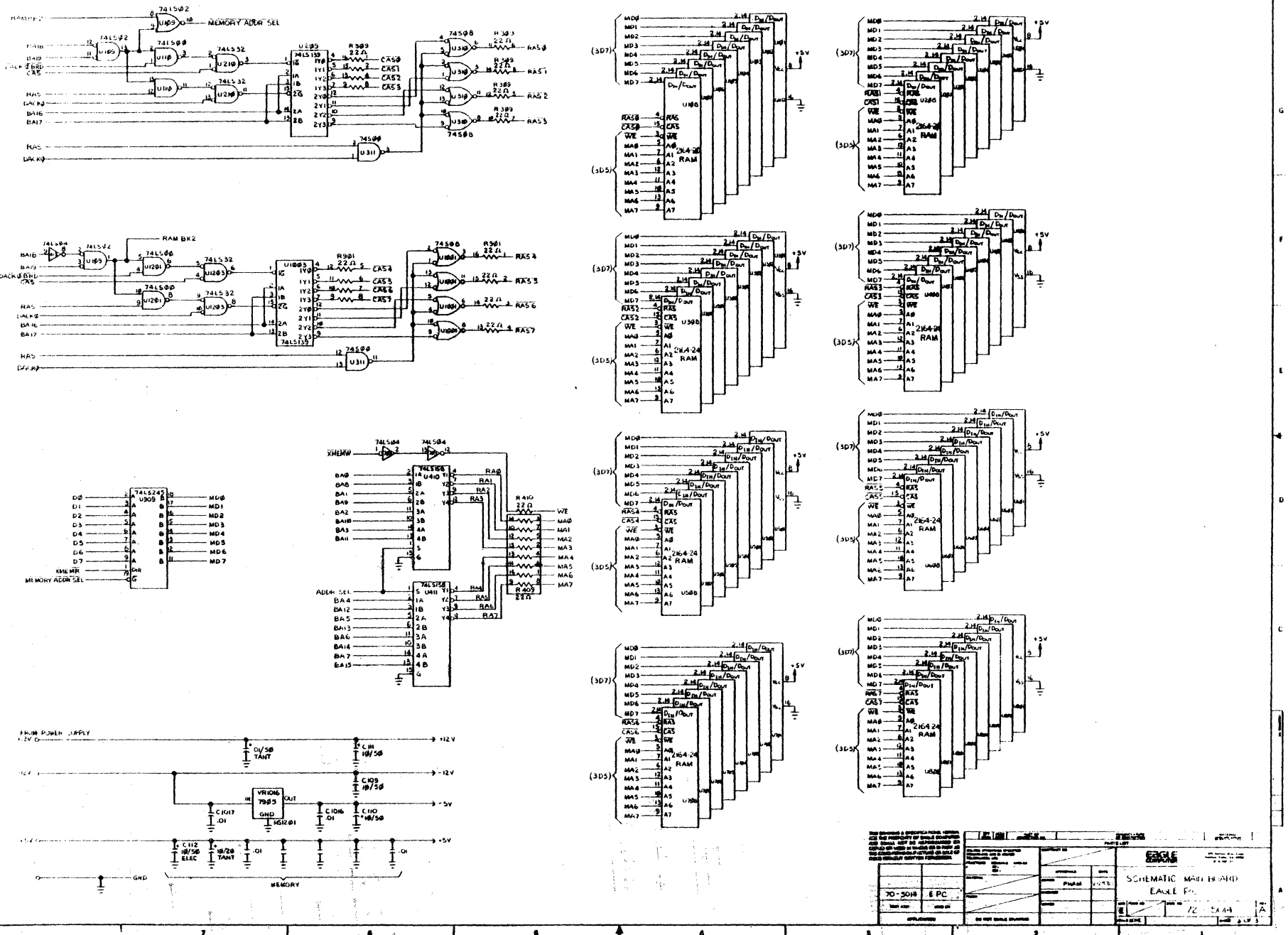


I/O Expansion Slot / Pins

IDENTICAL TO IBM


I/O CONNECTOR FROM BOARD TOP SIDE
COMPONENT SIDE OF I/O CARD FACES
3 CONNECTOR TOTAL
25 PIN 'D' SHELL CONNECTOR
RECEIVE DATA
RESET DRV
A PRODUCTION RELEASE
SCHEMATIC, MAIN BOARD
EAGLE PC
72-5014
70 5014
EAGLE PC
DO NOT SCALE DRAWING


SEE SHEET 1
8237A-5
LS244
LS670
LS373
74LS322
8253-5
8255A-5
74LS244
74LS574
74LS175
74LS32
74LS00
74LS04
74LS08
74LS20
74LS30
74LS38
74LS74
74LS175
74LS158
74LS138
TIME DELAY 2MSEC
PARALLEL PRINTER PORT
KBD CLK
KBD DATA
KBD RESET
KBD GND
KBD +5V
ROM ADDR SEL
WRT TIME REG
WRT DMA PG REG
DMA CS
INTR CS
I/C CS
PPI CS
DMA AEN
AEN DEO
HOLDA
RESET DRV
ALLOW NMI
RDY/WAIT
RDY TO DMA
IRQ1
DRQ0
TERMINAL COUNT
DACK 0 (2)
SPEAKER
DISC
FAULT
BUSY
PAPER OUT
IN PRIME
DAT STB
SCHEMATIC - MAIN BOARD
EAGLE PC
70-5014 EAGLE PC
72-5014 A
SHEET 2 OF 3



70-5018	6 PC	

EAGLE

SCHEMATIC MAIN BOARD
EAGLE PC

PHAM

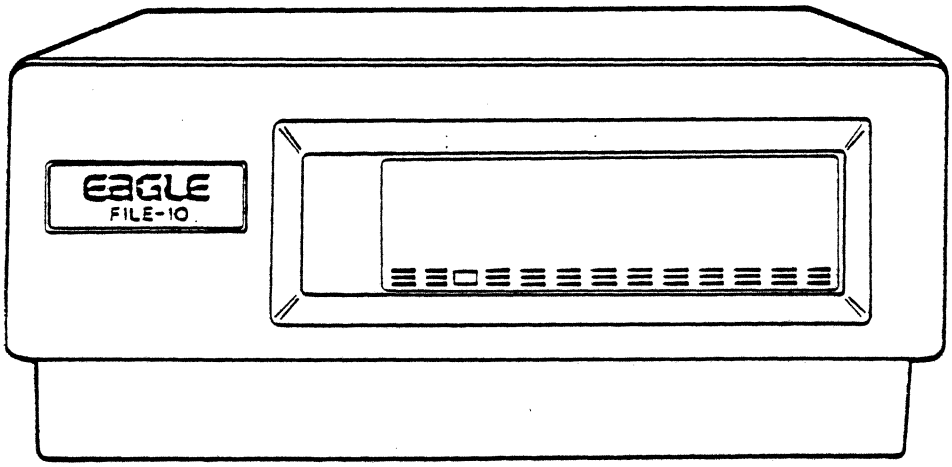
72 SA A4

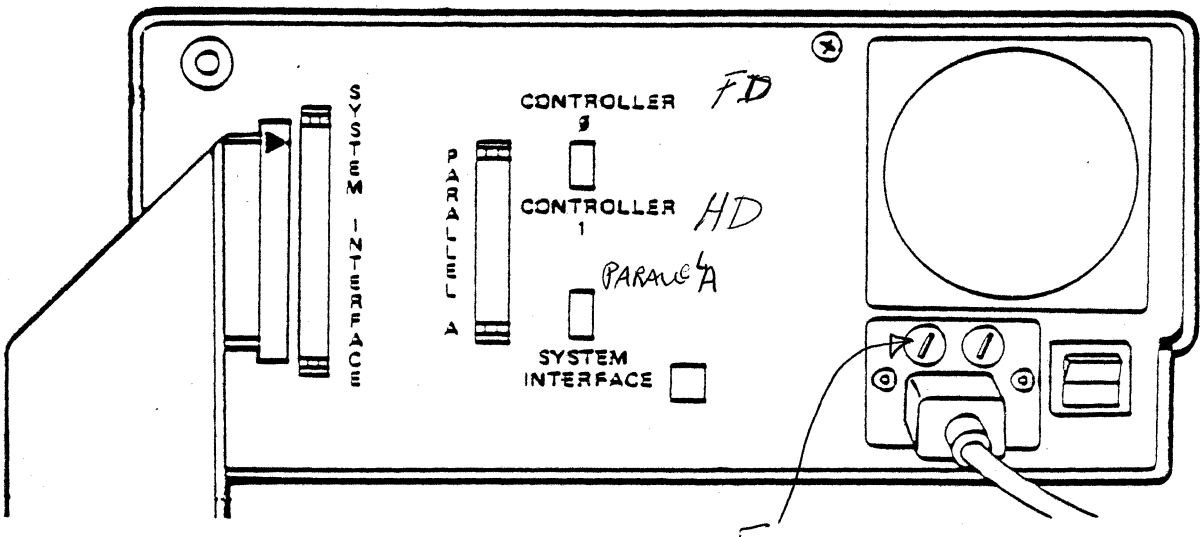
File 10

One 5 1/4" hard disk drive
Stores 12.75 M bytes
(10 M bytes formatted)
3600 rpm rotational speed
Two platters, four heads,
1224 tracks
85 milliseconds average access time
CMI - 5512
AT CASE - MINISCRIBE 2012] FORMAT IS DIFFERENT

File 40

One 5 1/4" hard disk drive
Stores 40 M bytes
(32 M bytes formatted)
3600 rpm rotational speed
Three platters, six heads,
3840 tracks
85 milliseconds average access time
CMI - 6640





FILE 10 & FILE 40 2A SLO-BLO

EAGLE COMPUTER MODEL	DISK DRIVE CONFIGURATIONS			
	Left Drive	Hard Disk Drive	Right Drive	File 10
Eagle 1600 Floppy Disk OR PC	C	n/a	D	A
Eagle 1600 10Mbyte Hard Disk	n/a	A	C	B
Eagle 1600 40Mbyte Hard Disk	n/a	A	C	B

MS-DOS Designations

EAGLE COMPUTER MODEL	DISK DRIVE CONFIGURATIONS			
	Left Drive	Hard Disk Drive	Right Drive	File 40
Eagle 1600 Floppy Disk OR PC	C	n/a	D	A
Eagle 1600 10Mbyte Hard Disk	n/a	A	C	B
Eagle 1600 40Mbyte Hard Disk	n/a	A	C	B

MS-DOS Designations

EAGLE COMPUTER MODEL	DISK DRIVE CONFIGURATIONS				
	Upper or Left Drive	Hard Disk Drive	Lower or Right Drive	File 10	2nd File 10
Eagle II	I	n/a	J	A,B	C,D
Eagle III	E≡,I †	n/a	F≡,J †	A,B	C,D
Eagle IV	E≡,I †	A,B	n/a	C,D	n/a
Eagle 1600 Floppy Disk	E	n/a	F	A,B	C,D
Eagle 1600 10Mbyte Hard Disk	n/a	A,B	E	C,D	n/a
Eagle 1600 40Mbyte Hard Disk	n/a	A,B,C,D	E	n/a	n/a
Eagle PC Floppy Disk	E	n/a	F	A,B	C,D

CP/M-80 & CP/M-86 Designations

EAGLE COMPUTER MODEL	DISK DRIVE CONFIGURATIONS			
	Upper or Left Drive	Hard Disk Drive	Lower or Right Drive	File 40
Eagle II	I	n/a	J	A,B,C,D
Eagle III	E≡,I †	n/a	F≡,J †	A,B,C,D
Eagle IV	E≡,I †	A,B	n/a	n/a
Eagle 1600 Floppy Disk	E	n/a	F	A,B,C,D
Eagle 1600 10Mbyte Hard Disk	n/a	A,B	E	n/a
Eagle 1600 40Mbyte Hard Disk	n/a	A,B,C,D	E	n/a
Eagle PC Floppy Disk	E	n/a	F	A,B,C,D

CP/M-80 & CP/M-86 Designations

LEGEND:

≡ = when using double-sided diskettes
† = when using single-sided diskettes
n/a = not applicable

QUESTIONS AND ANSWERS

1. What software comes on the File 10/40?

Standard system files, including TRANS.COM, which is a file users must use to initially move floppy disk information to the hard disk.

2. Why is Drive A eight megabytes and Drive B two megabytes? Can this be changed?

CP/M cannot address more than eight megabytes of storage. The storage structure was selected as the most common drive designator orientation. It cannot be changed.

3. What are the drive designations for an additional File 10/40 hooked to another hard disk?

For an additional File 10 the drive designators are C and D. Refer to Tables 1 and 2 in the text titled "ACCESSING THE FILE 10/40". The File 40 will not hookup to a File 10.

4. What is a "Drive A Error Detected" message?

This error message indicates a possible hardware problem with the File 10/40. Contact your authorized Eagle dealer.

PROBLEMS AND SOLUTIONS

1. **When trying to back up or copy diskettes, a "Drive E Error Detected" message appears on the screen.**

   The system is assuming that the floppy disk or drive is double-sided, when in fact either or both are single-sided. To correct the situation exit to CP/M, and enter:

   A>SETSIDE

   Select single-sided (Eagle II) diskettes. This will permanently orient your disk drives to single-sided.

2. **Why can't I PIP (copy) files to the hard disk?**

   You can, but you run the risk of writing over crucial files necessary for normal operation. The most critical is called "HELLO.COM". All Eagle disks (except the CP/M disk) contain this hidden file, and it is this file that gives you the main menu when you re-boot (turn on) the system.

   If you copy over the hard disk HELLO.COM with a floppy version, you lose access to options on the hard disk and to the operating system. To repair this problem with no harm to your data files a special disk named "Menu Restore/System Regeneration" is needed. Menu Restore/System Regeneration is contained in the 8 bit Service Kit available at Eagle distributors. Contact your dealer for this special disk.

3. **When I downloaded my backup diskettes to the hard disk using the Restore routine, only the first part of a split file, contained on a diskette, transferred to hard disk and the rest of the split file transferred from the next diskette was lost.**

   When you originally backed up your hard disk to diskettes, the computer copied files until it ran out of space on a diskette. If it had only copied part of a file before it ran out of space, it continues to copy the rest of the file on the next diskette.

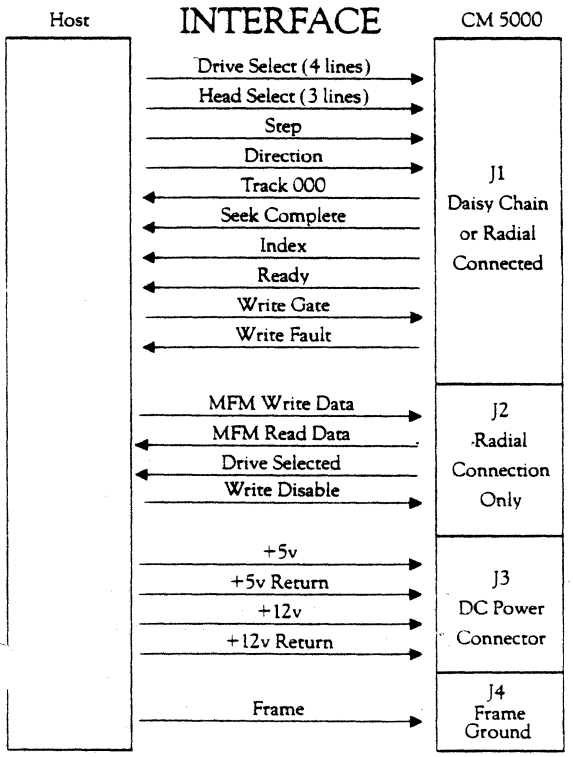
   All of that file's information is complete on the backup diskettes, however; when you restore the information to the hard disk, the second half of the split file is overlooked, and not copied. The files are copied only from the beginning of the next file on. This problem occurs with systems which have not been updated, and can be easily corrected by obtaining an Eagle system update through your dealer.

6640

CM 5640 disk drive, product information. The Computer Memories series of Winchester technology disk drives offer the highest storage capacity currently available in a minifloppy size package. The CM 5640, at 40 Mbytes, offers the lowest cost/Mbyte in its capacity range. By means of a combination of Winchester technology and proven design techniques, the OEM is assured of the ultimate in quality and reliability.

In order to ease system integration, the CM 5640 has the same physical dimensions and mounting hole locations as a standard 5¼" floppy disk drive. DC voltage requirements are also the same as a mini-floppy drive thus enabling the use of a single power supply for both types of drives.

The high capacities of the CM 5640 are achieved by the utilization of a closed loop servo positioning system, on-board microprocessor, and manganese-zinc heads — unique in such a small device. The combination of the swing-arm actuator, associated electronics, and head allow the CM 5640 to achieve a track density of 690 TPI and bit density of 9650 BPI.



CM 5640 Specifications

Performance Specifications:

Capacity

Unformatted	
Per Drive	40 Mbytes
Per Surface	6.67 Mbytes
Per Track	10.4 Kbytes
Formatted	
Per Drive	31.5 Mbytes
Per Surface	5.24 Mbytes
Per Track	8.2 Kbytes
Per Sector	256 bytes
Sectors/Track	32
Transfer Rate	5.00 Mbits/sec
Average Seek Time	40 msec
Average Latency	8.3 msec

Functional Specifications:

Rotational Speed	3,600 rpm
Recording Density	9,650 bpi
Flux Density	9,650 fci
Track Density	690 tpi
Cylinders	640
Tracks	3840
R/W Heads	6
Disks	3

Physical Specifications:

Environmental Limits

Ambient Temperature = 50°F to 115°F (10°C to 46°C)

Relative Humidity = 8% to 80%

DC Power Requirements

+12 VDC ±10% 2.0A typical, 3.5A max

+5 VDC ±5% 0.9A typical, 1.0A max

Mechanical Dimensions:

Height = 3.25 in. (82.6 mm)

Width = 5.75 in. (146.1 mm)

Depth = 8.00 in. (203 mm)

Weight = 5 lbs. (2.3 Kg)

Heat Dissipation = 100BTU/hr. typical (28.5 watts)

Reliability Specifications:

MTBF: 8000 POH typical usage

PM: Not required

MTTR: 30 minutes

Component Life: 5 years

Error Rates:

Soft Read Errors: 1 per 10^{10} bits read

Hard Read Errors: 1 per 10^{12} bits read

Seek Errors: 1 per 10^{6} seeks

Computer Memories, Inc.
9216 Eton Avenue, Chatsworth, California 91311
Telephone (213) 709-6445 TWX: 910 494-4834