

Model Name **Model No.**

Magnavox/Headstart Models:

HeadStart 286	HS1200 GY01
HeadStart 286 CD	HS48CD GY01
HeadStart SX	HS1600 GY01
HeadStart SX CD	HS64CD GY01

Magnavox/Maxstation Models:

Maxstation 286	MX1200 GY01
Maxstation 286 CD	MX48CD GY01
Maxstation 386SX	MG1600 GY01
Maxstation 386SX CD	MX64CD GY01

Model Name **Model No.**

Magnavox/Magnum Models:

Magnum 286	MG1200 GY01
Magnum 286 CD	MG48CD GY01
Magnum 286SX	MG1600 GY01
Magnum 286SX CD	MG64CD GY01
Magnavox 386SX	MGP160 GY01

Magnavox/Professional Models:

Professional 286	PR1200 GY01
Professional 286 CD	PR48CD GY01
Professional 386SX	PR1600 GY01
Professional 386SX CD	PR64CD GY01
Magnavox 386SX CD	SR16CD GY01

Manual 8517

Magnavox/HeadStart

286/386SX Computer Systems



Technical Service Data

Service Company
Technical Publications Dept.
P.O. Box 555, Old Andrew Johnson Hwy.
Jefferson City, TN 37760

MAGNAVOX 286/386SX COMPUTER SYSTEMS SERVICE MANUAL

Magnavox Headstart Models:

HS1200 GY01
HS48CD GY01
HS1600 GY01
HS64CD GY01

Magnavox Maxstation Models:

MX1200 GY01
MX48CD GY01
MX1600 GY01
MX64CD GY01

Magnavox Magnum Models:

MG1200 GY01
MG48CD GY01
MG1600 GY01
MG64CD GY01
MPG160 GY01

Magnavox Professional Models:

PR1200 GY01
PR48CD GY01
PR1600 GY01
PR64CD GY01
SR16CD GY01

REFER TO FOLLOWING PAGES FOR IMPORTANT SAFETY NOTICE/GUIDELINES

SAFETY NOTICE

ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOLTAGES.

PHILIPS SAFETY GUIDELINES FOR THE PROFESSIONAL SERVICE TECHNICIAN

Important

Proper service and repair is important to the safe, reliable operation of all Philips equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

Safety Checks

After the original service problem has been corrected, a complete safety check should be made. Be sure to check over the entire set, not just the areas where you have worked. Some previous servicer may have left an unsafe condition, which could be unknowingly passed on to your customer. Be sure to check all of the following:

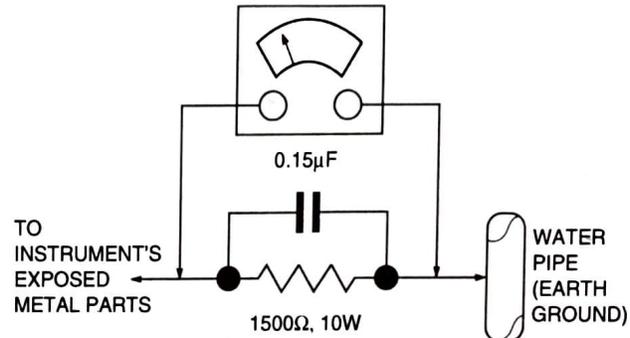
Fire and Shock Hazard

1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those units which are transported to and from the service shop.
2. Never release a repaired unit unless all protective devices such as insulators, barriers, covers, strain reliefs, and other hardware have been installed according to the original design.
3. Soldering and wiring must be inspected to locate possible cold solder joints, solder splashes, sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord). Be certain to remove loose solder balls and all other loose foreign particles.
4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length, and dress.
5. No lead or component should touch a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.
6. Critical components having special safety characteristics are identified with a \blacktriangle by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol \blacktriangle on the schematic diagrams and/or exploded views. Replacement parts without the same safety characteristics may create shock, fire, or other hazards.
7. When servicing any unit, always use a separate Isolation transformer for the chassis. Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.
8. Many electronic products use a polarized ac line cord (one wide pin on the plug). Defeating this safety feature may create a potential hazard to the servicer and the user. Extension cords which do not incorporate the polarizing feature should never be used.
9. After reassembly of the unit, always perform an ac leakage test or resistance test from the line cord to all exposed metal parts of the cabinet. Also, check all metal control shafts (with knobs removed), antenna terminals, handles, screws, etc. to be sure the unit is safe to operate without danger of electrical shock.

*Broken line 

Leakage Current Cold Check

1. Unplug the ac line cord and connect a jumper between the two prongs of the plug.
2. Turn on the power switch.
3. Measure the resistance value between the jumpered ac plug and all exposed cabinet parts of the receiver, such as screw heads, antennas, and control shafts. When the exposed metallic part has a return path to the chassis, the reading should be between 1 megohm and 5.2 megohms. When the exposed metal does not have a return path to the chassis, the reading must be infinity. Remove the jumper from the ac line cord.



Leakage Current Hot Check

1. Do not use an isolation transformer for this test. Plug the completely reassembled unit directly into the ac outlet.
2. Connect a 1.5k, 10W resistor paralleled by a 0.1 5uF. capacitor between each exposed metallic cabinet part and a good earth ground such as a water pipe, as shown above.
3. Use an ac voltmeter with at least 5000 ohms/volt sensitivity to measure the potential across the resistor.
4. The potential at any point should not exceed 0.75 volts. A leakage current tester may be used to make this test; leakage current must not exceed 0.5 milliamps. If a measurement is outside of the specified limits, there is a possibility of shock hazard. The receiver should be repaired and rechecked before returning it to the customer.
5. Repeat the above procedure with the ac plug reversed. (Note: An ac adapter is necessary when a polarized plug is used. Do not defeat the polarizing feature of the plug.)

Parts Replacement

1. Many electrical and mechanical parts in Philips equipment have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The use of a substitute part which does not have the same safety characteristics as the Philips recommended replacement part shown in this service manual may create shock, fire, or other hazards. Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.
2. All ICs and many other semiconductor parts are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce the life of the part drastically.

FOR PRODUCTS CONTAINING LASER:

DANGER - Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.

CAUTION - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CAUTION - The use of optical instruments with this product will increase eye hazard.

Technical Service Data

Service Company
Technical Publications Dept.
P.O. Box 555
401 East Old Andrew Johnson Hwy.
Jefferson City, TN 37760

File: 1992: 8517

HEADSTART 386SX 16MHZ COMPUTER SYSTEMS

THIS SUPPLEMENT INTRODUCES THE FOLLOWING NEW MODELS:

Magnavox/HeadStart - HS1800GY01

Magnavox/HeadStart - HS1900GY01

The HS1800GY01 and HS1900GY01 are electronically the same as the models described in the original manual 8517 except for the Replacement Parts listed below. For all other Replacement Parts, refer to the original manual 8517.

<u>Description</u>	<u>Part No.</u>
Mouse, 3 Btn.	4835 015 57109
SIMM, 1 Meg.	4835 209 87894
AC Power Cord	4835 321 17003
LED Cable Asm.	4835 321 27138
On/Off Btn.	4835 410 27142
FD Drive 3.5" 1.44M	4835 693 27061
FD Drive 5.25" 1.2M	4835 693 27063
Brkt. FDD 3.5"	4835 405 57026
Brkt. FDD 5.25"	4835 405 57023
Spring Retainer	4835 405 57027
Brkt. HDD (RH)	4835 405 57028
Brkt. HDD (LH)	4835 405 57029
Foot	4835 424 47077
DOS 5.0	4835 736 17161
Lotus 123 (HS1800 only)	4835 736 17146
Geoworks Ensemble (HS1800 only)	4835 736 17147
Modem CBA (HS1900 only)	4835 216 27073
Prodigy (HS1900 only)	4835 736 17113
Windows (HS1900 only)	4835 736 17162
Guide, Modem (HS1900 only)	4835 736 17177
Quicken (HS1900 only)	4835 736 17178
WinWorks (HS1900 only)	4835 736 17179

For any information not covered in this supplement, refer to original manual 8517.

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CAUTION

USE A SEPARATE ISOLATION TRANSFORMER FOR THIS UNIT WHEN SERVICING.

MODEL CONFIGURATIONS/FEATURES

HARDWARE:

HS1200 GY01 Magnavox HeadStart 286:

- 286 Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 5¼" 1.2 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- 3 Button Serial Mouse

HS48CD GY01 Magnavox HeadStart 286 CD:

- 286 Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- CD ROM, 680 Mbyte
- 3 Button Serial Mouse
- Headphones

HS1600 GY01 Magnavox Headstart SX:

- 386SX Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 5¼" 1.2 MByte Floppy disk drive
- 40 MByte Hard disk drive
- 3 Button Serial Mouse
- Embedded Super VGA
- 101 Keyboard
- Magnavox system kit

HS64CD GY01 Magnavox HeadStart SX CD:

- 386SX Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- CD ROM, 680 Mbyte
- 3 Button Serial Mouse
- Headphones

MX1200 GY01 Magnavox Maxstation 286:

MG1200 GY01 Magnavox Magnum 286:

PR1200 GY01 Magnavox Professional 286:

- 286 Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 5¼" 1.2 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- Magnavox system kit

MX48CD GY01 Magnavox Maxstation 286 CD:

MG48CD GY01 Magnavox Magnum 286 CD:

PR48CD GY01 Magnavox Professional 286 CD:

- 286 Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- Magnavox system kit
- CD ROM, 680 Mbyte

SOFTWARE:

- MS-DOS 4.01
- GEOS Ensemble
- Lotus 123 (V. 2.2)

- MS-DOS 4.01
- GEOS Ensemble
- Lotus 123 (V. 2.2)
- CD ROM Software:
- Groliers Encyclopedia
- Microsoft Bookshelf
- Microsoft Small Business/STAT
- PC Globe
- MANHOLE

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- Lotus Magellan
- CD ROM Software:
- Groliers Encyclopedia
- Microsoft Bookshelf
- Microsoft Small Business/STAT

MODEL CONFIGURATIONS/FEATURES (Continued)

HARDWARE:

MX1600 GY01 Magnavox Maxstation 386SX:
MG1600 GY01 Magnavox Magnum 386SX:
MGP160 GY01 Magnavox 386SX:
PR1600 GY01 Magnavox Professional 386SX:

- 386SX Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 5¼" 1.2 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- Magnavox system kit

MX64CD GY01 Magnavox Maxstation 386SX CD:
MG64CD GY01 Magnavox Magnum 386SX CD:
PR64CD GY01 Magnavox Professional 386SX CD:

- 386SX Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- CD ROM, 680 Mbyte

SR16CD GY01 Magnavox 386SX CD:

- 386SX Processor Module with 1 MByte DRAM
- 3½" 1.44 MByte Floppy disk drive
- 40 MByte Hard disk drive
- Embedded Super VGA
- 101 Keyboard
- CD ROM, 680 Mbyte
- Modem, 2400Bd Internal
- 3 Button Serial Mouse
- Headphones

SOFTWARE:

- MS-DOS 4.01
- Lotus Works "SIX-IN-ONE"
- Lotus Magellan

- MS-DOS 4.01
- Lotus Works "SIX-IN-ONE"
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- CD ROM Software:
- Groliers Encyclopedia
- Microsoft Bookshelf
- Microsoft Small Business/STAT

- MS-DOS 4.01
- GEOS Ensemble
- Lotus 123 (V. 2.2)
- Prodigy
- CD ROM Software:
- Groliers Encyclopedia
- Microsoft Bookshelf
- Microsoft Small Business/STAT
- PC Globe
- MANHOLE

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WARNING

Critical components having special safety characteristics are identified with a Δ by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol Δ on the schematics or exploded views.

Use of substitute replacement parts which do not have the same specified safety characteristics may create shock, fire, or other hazards.

Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.

* Broken Line 

CHAPTER 1. SYSTEM UNIT

1.1. Technical Specifications

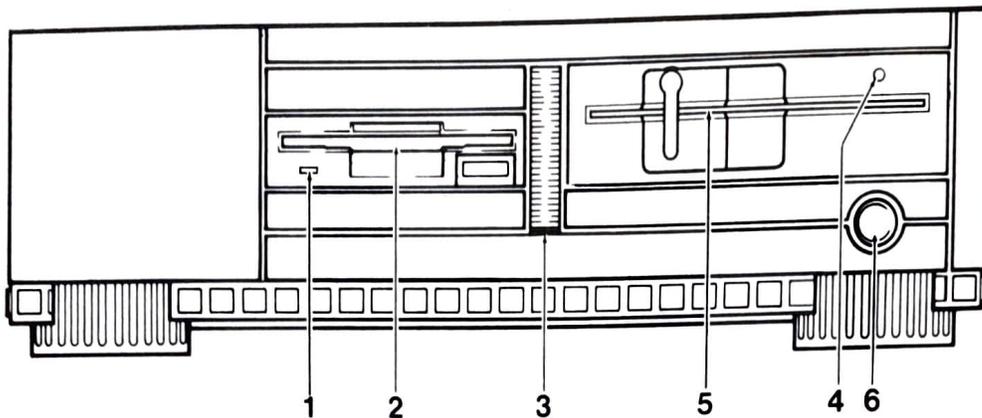
Both AT286 and AT386SX systems are designed using the modular processor concept. The system consists of three modules:-

- The motherboard module: this board has the system controller functions, memory, system and video BIOS, bus controller, expansion bus, VGA controller and the peripheral controller.
- The processor board module: this board has the Central Processing Unit (CPU), a 80286-12 (AT286 systems) or a 80386SX-16 (AT386SX systems) and a socket for the Numeric Coprocessor Unit (NPU) for installing an optional 80287-12 (AT286 systems) or 80387SX-16 NPU (AT386SX systems).
- The interconnect board module: this board has three expansion slots; 2 full-size/full-height AT and 1 half-length/full height AT.

AC voltage:	90-132V Maximum current: 4A 180-264V Maximum current: 2A
Power consumption:	145 W maximum
AC frequency:	47-63 Hz
Acoustic noise:	≤ 42dB(A)
Dimensions:	
Width:	385 mm (15 inches)
Depth:	400 mm (16 inches)
Height:	108 mm (4 inches)
Weight:	approx. 8 Kg (17.8 lbs)

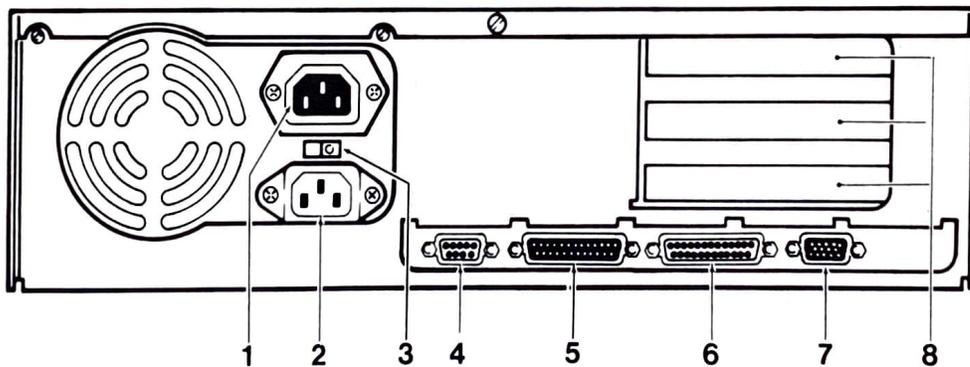
1.2.

Locator



Front Panel

1. 3½" diskette drive activity LED
2. 3½" diskette drive
3. Hard disk activity LED
4. 5¼" diskette drive
5. 5¼" diskette drive activity LED
6. Power On/Off switch



Rear Panel

1. AC Inlet
2. AC Outlet
3. Voltage Selection
4. 9-Pin Serial port connector
5. 25-Pin Serial port connector
6. 25-Pin parallel port connector
7. 15-Pin Analog video connector
8. Expansion Slot Covers

Note: A detailed connector description is given in section 8.1.3.

CHAPTER 2. GENERAL SYSTEM DESCRIPTION

2.1. Introduction

The systems feature a 12.5Mhz 80286 AT compatible main board (AT286 systems) or a 16MHz 80386SX AT compatible main board (AT386SX systems), placed in a Reduced Form Factor (RFF) desktop chassis. The system can operate under the MS-DOS, MS-OS/2 or NOVELL operating system.

Both basic systems include:-

- Microprocessor:
 - Intel 80286-12, 12.5MHz (AT286 systems)
 - Intel 80386SX-16, 16Mhz (AT386SX systems)
- 1MB of system board RAM, expandable to 8 Mbytes, with ROM shadowing and LIM-EMS 4.0 support
- Battery backed-up CMOS RAM (64KB) containing Real Time Clock and configuration information
- 3 ISA (Industry Standard Architecture) compatible expansion slots, 2 full-size/full-height AT and 1 half-size/full-height AT
- AT-bus Interface for AT-embedded hard disks
- Embedded VGA controller (VESA standard) with analog connector
- 2 Serial ports (9-pin male and 25-pin male)
- 1 Parallel port (25-pin female, Centronics compatible)
- Embedded flexible disk controller and interface with support for two flexible disk drives
- A 145-Watt power supply unit.
- Multilingual Setup in ROM (BIOS)
- CD-ROM host adaptor card occupying 1 expansion slot and a 680MB CD-ROM drive (for CD-ROM configurations only)

2.2. AT286 and AT386SX System Modules

The system consists of three modules:-

- Processor Board Modules:
 - AT286 Processor Board Module: This board contains the 80286-12 processor and a socket for an optional 80287-12 numeric co-processor.
 - AT386SX Processor Board Module: This board contains the 80386SX-16 processor and a socket for an optional 80387SX-16 numeric co-processor.
- Motherboard module: This board contains all major components.

- Interconnect Board: This board has three expansion slots of which 2 are for full height, full-length AT expansion boards and the other 1 for full height, half-length AT expansion boards.

The motherboard comprises the following logic:-

- 1MB of dynamic RAM soldered
- 1 SIMM socket, supporting 256KBx36 (1MByte), 1MBx36 (4 Mbyte) and 2MBx36 (8 Mbyte) PS/2 SIMM types.
- Memory management controller, supporting conventional, extended and expanded (LIM-EMS 4.0) memory. Also it provides the possibility to copy ROM contents into RAM for faster execution. This is called Shadow RAM.
- Peripheral controller, supporting two RS232 serial ports, DB-9P and DB25P, and one Centronics compatible parallel port, DB25S. It also contains an integrated keyboard controller, diskette drive controller and floppy/hard disk drive decoding logic.
- Real Time Clock, containing battery backed-up configuration information which is necessary to let the system start up properly.
- Integrated super VGA controller, supporting super VGA (VESA standard), VGA and having the capability of emulating EGA, CGA and MGA (Hercules).

2.3. Memory

The 80286 and 80386SX have a physical address space of 16MB in protected mode and 1MB in real mode. The figure, shown on the next page, shows how this address space is utilized. The protected mode additional address space is a continuation of the real mode address space with one exception, the BIOS ROM is present at the top of the 16MB address space (it has two locations in protected mode).

Addressable Memory Space

Optional Memory Features

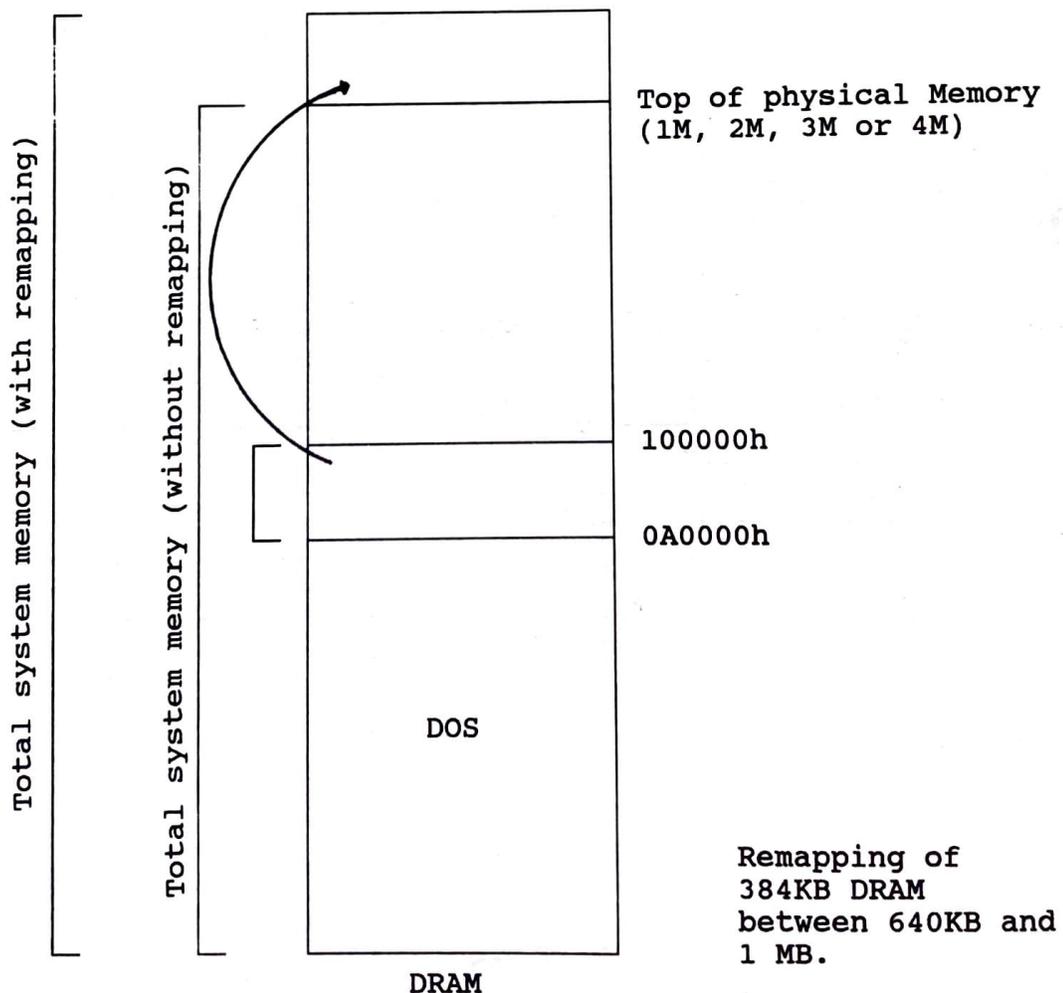
16MB	Max. of 16MB of extended memory on expansion boards	FFFFFFh	
8MB	Max. on-board Extended Memory of 7MB	800000h	Max. of 7168KB of On-board Expanded Memory
1MB	System BIOS VGA BIOS	100000h - - -	Shadow Memory
896KB	Reserved for Extension ROM	0E0000h - - -	Shadow Memory
768KB	Reserved for Video RAM	0C0000h - - -	Shadow Memory
640KB		0A0000h - - -	
0KB	Conventional Memory	000000h	

2.3.1. Remapping of Memory Range A0000h-0FFFFFFh

DOS utilizes 640KB of memory from 00000h to 9FFFFh. The memory range from A0000h to FFFFFh is used for Video RAM, BIOS ROM, Video BIOS, etc. If a system has more than 640KB DRAM, the DRAM between A0000h and FFFFFh can be accessed by enabling read and/or write shadow RAM. This 384KB of DRAM can be remapped to other memory range to also be utilized.

Remapping of memory between A0000h and 0FFFFFFh is only allowed if the total amount of system DRAM (on-board and in SIMM U11) is 1MB, 2 MB, 3 MB or 4MB. The 384KB of memory is then remapped to the top of the system memory as shown in the figure below.

- NOTES:
1. EMS and Shadow RAM are unavailable in this mode if the system memory is 1MB.
 2. For 2, 3 and 4 MB memory, Shadow RAM is not available if this mode is enabled. However, EMS support is still available.
 3. Remapping is not possible if the SIMM bank U11 contains a 8MB PS/2 SIMM type.



2.3.2. ROM

The motherboard contains one 128K by 8-bit EPROM module. The ROM is not parity checked and has an access time of 200ns. The ROM is a combined BIOS, containing the system BIOS and video BIOS. It also contains the power on testing and boot loader and a multilingual SETUP program. To gain faster access, the BIOS can be copied to RAM during power on (refer to section 4.1.3.).

The system BIOS is present at the following locations:-

- At the top of the first 1MB of address space
(0F0000H - 0FFFFFFH)
- At the top of the 16MB address space
(FF0000H - FFFFFFFH)

The video BIOS is present at the following location:-

- In the area from 896KB to 960KB
(0E0000H - 0EFFFFH)

2.3.3. RAM

The standard system is delivered with 1 Mbytes of RAM soldered on the system board. To upgrade the total amount of memory, a SIMM can be installed in SIMM bank U41. The SIMM bank can be populated with either a 1MB, 4MB or 8MB SIMM (all PS/2 types). When using an 8MB SIMM, the on-board soldered memory must be disabled (refer to the strap settings in section 8.1.2.). The on-board RAM can be a maximum of 8 Mbyte and via expansion boards it can be extended up to 16 Mbyte.

Memory is divided into banks by the system controller with a maximum of 4 banks. The possible memory configurations for this system are:-

On Board Memory	Switch S1-1	SIMM in U41	Banks Used	Total amount of Memory
1 MB	Closed	-	0/1	1 Mbyte
1 MB	Closed	1 Mbyte	0/1/2/3	2 Mbytes
1 MB	Closed	4 Mbytes	0/1/2/3	5 Mbytes
Disabled	Open	8 Mbytes	0/1/2/3	8 Mbytes

The motherboard consists of the following memory types:-

- Conventional Memory :** This is the memory from 0KB to 640KB and is used in Real Mode by, e.g., DOS.
- Extended Memory:** This is all addressable memory above the 1MB border and can only be accessed by the CPU when it is working in protected mode.
- Expanded Memory:** Expanded memory is not addressable by the CPU, but must be mapped via I/O into addressable memory within the first 1MB of address space in memory page frames of 16KB. The chips in this system support LIM-EMS 4.0.
- Shadow Memory:** This is memory between 640KB and 1MB which is normally not accessible unless the chips in the system are programmed to enable this memory to copy ROM into. It can also be mapped to addressable memory for use as normal RAM.

NOTE: An expansion board with expanded memory can NOT co-exist with the on-board expanded memory. Only one of the two, together with its driver, may be installed.

2.3.4. Expanded Memory

The on-board chipset is fully hardware/software compatible with the Lotus Intel Microsoft Expanded Memory Specifications (LIM-EMS) version 4.0. This implementation allows a 64 Kbyte block in the area from 040000H - 09FFFFh (256K - 640 Kb) or from 0C000h to 0EFFFFh to be used as a window, allowing the complete 7552 Kbytes (maximum) of on-board RAM to be accessed. Accessing is accomplished by means of paging. The 64 Kbyte block is divided into four, 16 Kbyte pages which can access individual portions of the 7552 Kbyte area.

Expanded memory can be assigned by using the SETUP utility. The 'EMS' field in the SETUP program must be set to the correct value when using EMS memory. This field specifies the amount of memory to be used as expanded memory by an expanded memory driver, such as the QUAD_EMS.SYS driver provided on the utility diskette.

If EMS memory is being used on an expansion board, the 'EMS' field in the SETUP utility must be set to zero. The EMS driver delivered with expansion board should be used instead of the QUAD_EMS driver.

2.4. I/O Connections

On the interconnect module, the following Input/Output connections are provided:-

- J2,3,4: Expansion slot connectors.
These connectors are located on the interconnect board (T-connector). Slots J3 and J4 can contain full-height, full-length expansion boards. Slot J2 can only contain full-height, half-length expansion boards.

On the motherboard module, the following Input/Output connections are provided:-

- J1: 34-pin header, diskette drive control/data connector
- J2: 40-pin header, AT-bus connector, used to connect AT-embedded hard disk drives
- J5: DB-9P, serial port connector. Via the SETUP program this port can be disabled, or can be configured as PORT 1. PORT 1 has the base I/O address 3F8h. For COM port assignments, refer to subsection 2.2.4.1.
- J7: DP-25P, serial port connector. Via the SETUP program this port can be disabled, or can be configured as PORT 2. PORT 2 has the base I/O address of 2F8h. For COM port assignments, refer to subsection 2.2.4.1.
- J10: DB-25S, parallel port connector. Via the SETUP program this port can be disabled, or can be configured as PORT 2. PORT 2 has the base I/O address 378h. For LPT port assignments, refer to subsection 2.2.4.1.
- J12: DB-15S, analog video connector. This port can be disabled via strap W9 on the motherboard in case an external video card is used in one of the option slots.
- J13: 5-pin, D-type keyboard connector. This port supports 101/102 key keyboards (AT compatible type) only.

2.4.1. Serial And Parallel Port Assignments

The serial ports require eight consecutive I/O addresses for access to the control and status registers. COM1 is always assigned to the highest I/O address (when using only one port, this may be either on 2F8h or 3F8h). If two serial ports are installed COM2 is assigned to the next lower I/O address (COM1 is assigned to 3F8h and COM2 is assigned to 2F8h). The table on the next page gives the three possible configurations:-

Configuration	Base Address	Port	Base Address	Port
1	-	-	2F8h	COM1
2	3F8h	COM1	-	-
3	3F8h	COM1	2F8h	COM2

The parallel ports require three consecutive I/O addresses for access to the control, status and data registers. LPT1 is always assigned to the highest I/O address available (when using one parallel port, this may be on 278h, 378h or 3BCh). If two parallel ports are installed, LPT2 is assigned to a lower I/O address. If three parallel ports are installed, LPT3 is assigned to the lowest I/O address. The following table gives the seven possible configurations:-

Configuration	Base Addr.	Port	Base Addr.	Port	Base Addr.	Port
1	-	-	-	-	278h	LPT1
2	-	-	378h	LPT1	-	-
3	3BCh	LPT1	-	-	-	-
4	-	-	378h	LPT1	278h	LPT2
5	3BCh	LPT1	-	-	278h	LPT2
6	3BCh	LPT1	378h	LPT2	-	-
7	3BCh	LPT1	378h	LPT2	278h	LPT3

2.5. Video Graphics Adapter

The on-board video graphics capability is incorporated using a Cirrus CL-GD5320 graphics controller. The controller, with 256KB of video memory (2x256kx4 DRAM) supports VESA 1 (800x600 high resolution with 16 colors from a palette of 262,144 colors) and VGA resolutions and is also backwards compatible, emulating EGA, CGA, MDA and Hercules graphics standards.

The on-board VGA circuitry may be disabled by setting switch S1-3 in the ON (=closed) position (refer to section 8.1.2.).

2.5.1. Video BIOS ROM

The video BIOS is physically situated with the system BIOS in a 128KB EPROM on the motherboard. The logical address for this BIOS is located in system memory area E0000h to EFFFFh. The BIOS supports 132 column and 60 line text modes, 72x540 and 800x600 16-color graphics mode, and 800x600 16-color VESA 1 mode. The BIOS accesses are limited to 8-bit accesses unless the BIOS is shadowed into RAM using the SETUP program. Then the accesses are of 16-bits.

2.6. Power Supply

The power supply is a 145-Watt, switch mode power supply. The power supply can be switched, by means of the red switch at the rear of the system unit, for an AC voltage of 115 VAC or 230 VAC. The operating line frequency range is from 47 to 63 Hz.

For further product specifications, refer to chapter 7.1

2.7. Keyboard

The NMB 101/102 key keyboard model will be supported. By means of a switch on the bottom of the keyboard, the keyboard can operate in two different modes:-

Switch in PC position:

- MODE 1: PC/XT protocol (9-bit data stream)

Switch in AT position:

- MODE 2: PC/AT protocol (11-bit data stream)

Note: To use the full capabilities of the system, setting the switch in the AT position is highly recommended.

2.8. Video

Refer to 2.5.

2.9. Hard Disk Drives

2.9.1. Seagate 157A

The Seagate 157A is a 40MB, 3½" hard disk drive. The drive is mounted internally within the chassis of the system unit in the 3½" drive mounting bracket. In the SETUP program the hard disk should be configured as type 25.

For further product specifications, refer to chapter 9.2.

2.9.2. Miniscribe 8051A

The Miniscribe 8051A is a 40MB, 3½" hard disk drive. The drive is mounted internally within the chassis of the system unit in the 3½" drive mounting bracket. In the SETUP program the hard disk should be configured as type 24.

For further product specifications, refer to chapter 9.2.

2.10. Floppy Disk Drives

2.10.1. Epson SMD300

The Epson SMD300 is a 3½" floppy disk drive. The drive can work with either normal (720KB) or high density (1.44MB) floppy disks. The drive has a sensor to detect normal or high density. In the SETUP program the diskette drive should be configured as: 3½" 1.44MB

The drive is mounted internally within the chassis of the system unit in the 3½" drive mounting bracket.

For further product specifications, refer to chapter 9.1.

2.10.2. Sony MP-F17W

The Sony MP-F17W is a 3½" floppy disk drive. The drive can work with either normal (720KB) or high density (1.44MB) floppy disks. The drive has a sensor to detect normal or high density. In the SETUP program the diskette drive should be configured as: 3½" 1.44MB

The drive is mounted internally within the chassis of the system unit in the 3½" drive mounting bracket.

For further product specifications, refer to chapter 9.1.

2.10.3. Panasonic JU-475-4

The Panasonic JU-475-4 is a 5 " floppy disk drive. The drive can work with a high density (1.2MB) floppy disks. When using a normal density (360KB) floppy disk, the read function is supported only. Writing to a normal density floppy disk is not recommended. In the SETUP program the diskette drive should be configured as: 5½" 1.2MB

The drive is mounted internally within the chassis of the system unit in the 5½" drive mounting bracket.

For further product specifications, refer to chapter 9.1.

CHAPTER 3. CONFIGURATIONS

This chapter describes the upgrade options and the possible memory configurations of the system.

3.1. System Upgrades

Options that can be ordered to upgrade the system are the following:-

<u>Commercial 12NC</u>	<u>Description</u>
	5¼" 1.2MB diskette drive
	3½" 1.44MB diskette drive
	80287 Numeric Coprocessor (for AT286 systems only)
	80387SX Numeric Coprocessor (for AT386SX systems only)
	1MB SIMM (80ns)
	4MB SIMM (80ns)
	8MB SIMM (80ns)

CHAPTER 4. SYSTEM UTILITIES

In this chapter a description is given of the utilities delivered with the system on the utilities diskette.

4.1. SETUP

The SETUP consists of 5 display pages for the ROM version; there are 6 display pages for the disk version. To access the ROM BIOS SETUP, the following keys should be pressed simultaneously:-

<CTRL> + <ALT> + <INS>

This can be done at any time, provided that no running application has taken over the keyboard interrupt handlers. <CTRL>+<ALT>+<INS> may be pressed during Power On Diagnostics when the machine is first switched on to change the setup information prior to the machine booting. If a configuration error is detected during POD, an appropriate beep code and error message is displayed, then the following message is displayed:-

Press <F1> to resume, <F3> to enter Setup

If the <F1> key is pressed, the machine continues with its booting procedure. If <F3> is pressed, the SETUP program is immediately executed.

The SETUP consists of 5 display pages. Each page has a column "Current Setting", in which the current values of the CMOS RAM are displayed. In the "Modified" column, the current settings can be changed by using the <+> and the <-> keys. On each page, the use of the keyboard is identical:-

<PgUp> and <PgDn>: Selects a required page.

<↑>, <↓>, <←>, <→>, <Home> and <End>: Use to select the field(s) within the page whose values are to be changed.

<+> and <->: Used to change the field to the required value.

<F3>: Used to write the new configuration information to the CMOS and reboot the system.

<ESC>: Changes will not be saved into the CMOS RAM and the system will reboot. In the disk version of SETUP, pressing <ESC> will not reboot the system.

For a description of these fields, refer to the Master Password.

Keys that are not allowed for a password are the following:-

1. ESCAPE key
2. Function Keys
3. Numeric Pad and Cursor Keys
4. Control keys:
Back Space, Print Screen, Scroll Lock, Pause, Caps Lock, Tab, Shift, Ctrl, Alt, Home, End, Insert, Delete, Page Up, Page Down and Num Lock.

Floppy Disk Access: This option can be changed only if a user password is defined. The possible selections for this field are:-

Enabled
Disabled

Setting this field to Disabled prevents any access (boot, read, write) to floppy drives when the computer is in user mode.

Setup Access: This option can be changed only if a user password is defined. The possible selections for this field are:-

Enabled
Disabled

Setting this field to Disabled prevents entering the Setup program when the computer is in user mode.

4.1.2 SETUP Page 1

The different options will be described unless they speak for themselves. For the Setup, one of the following eight languages can be selected:-

- Deutch
- English
- Español
- Français
- Italiano
- Nederlands
- Português
- Svenska

The language chosen will be stored as part of the configuration information and will be automatically selected on subsequent usage of the program.

Deutsch English Español Français Italiano Nederlands Português Svenska

Option	Modified	Current Setting	1
Date (dd/mm/yy)	17/04/89	17/04/89	
Time	14:58:32	14:58:32	
Primary Video	On Board VGA	Color 80 (Fast)	
On Board VGA:		MGA [Hercules]	
Locked Mode	VGA	Reverse Video	
Text Display	Normal	Reverse Video	
Graphics Display	Normal		
Diskette 1	3½" 1.44MB	3½" 1.44MB	
Diskette 2	None	None	
Hard Disk 1	Type 1	Type 1	
Hard Disk 2	None	None	
On Board Controller	Enabled	Disabled	
Coprocessor	80287 Installed	None	

<ESC> - Abort & Reboot Cursor Keys to Select Field <PgUp> - Prev Page
 <F3> - Write & Reboot <+> or <-> to Change Value <PgDn> - Next Page

Time : The seconds can only be set to zero by pressing either the <+> or <-> key.

Primary Video : The possible selections for this field are:-

- On Board VGA :** Use the embedded VGA controller
- Color 40 (Slow):** 40 Columns, 25 rows. Choose slow mode only if snow is seen when the screen is changing. (Strap W8 on the motherboard must be in).
- Color 40 (Fast):** 40 Columns, 25 rows. (Strap W8 on the motherboard must be in).
- Color 80 (Slow):** 80 Columns, 25 rows. Choose slow mode only if snow is seen when the screen is changing. (Strap W8 on the motherboard must be in).
- Color 80 (Fast):** 80 Columns, 25 rows. (Strap W8 on the motherboard must be in).
- Monochrome:** 80 Columns, 25 rows monochrome mode. (Strap W8 on the motherboard must be out).
- Enhanced Option Card:** Choose only if another EGA/VGA card in one of the option slots is used. (Make sure that strap W9 on the motherboard is in).

Locked Mode : This feature allows an emulation mode to be locked during booting. This allows, for example, a CGA game diskette to be booted. The possible emulation modes are:-

VGA : Select if no emulation is required.
CGA
EGA
MGA (Hercules)

Text Display : The possible selections are:-

Normal
Reverse Video

When "CGA" is selected in the "Locked Mode" option, you cannot select "Reverse Video".

Diskette 1 and 2: The possible drive types are:-

None
5¼" 360KB
5¼" 1.2MB
3½" 720KB
3½" 1.44MB

Hard Disk 1 and 2: The manufacturers name is not displayed, instead a window opens when this option is selected. In this window the parameters of the current selected drive type are displayed. If no hard disk is selected the window is not displayed and the field is set to 'none'. When type 31 is selected, the parameters become user definable. An overview of the drive types 1 to 30 are shown on the next page. The parameters and valid ranges are:-

Cylinders	1 - 1024
Heads	1 - 255
Pre Comp	0 - 65535
Landing Zone	1 - 1024
Sectors / Track	1 - 63

Note: Use type 24 for Miniscribe 8051A Hard Disk
Use type 25 for Seagate ST147A Hard Disk

On Board Controller : This option enables or disables the on board hard disk controller. The possible selections for this field are:-

Enabled
Disabled

Coprocessor : Specify if a coprocessor is installed. The possible selections for this field are:

For the AT286 systems:

None
80287 Installed.

For the AT386SX systems:

None
80387SX Installed

The following table gives the hard disk parameters supported by the BIOS:

Type	Cyl	Hd	Precomp	Ldzone	Sect	Drive
1	306	4	128	306	17	Standard
2	615	4	300	615	17	Standard
3	615	6	300	615	17	Standard
4	1024	8	512	1024	17	Miniscribe 6085
5	872	6	650	872	17	Rodime 3055
6	1024	14	0	0	17	Seagate 1144A/Maxtor 7120A
7	512	8	256	512	17	Quantum Q540
8	578	5	256	578	17	Tandom TM703
9	615	4	128	663	17	Miniscribe 8425
10	1024	3	512	1024	17	Miniscribe 6032
11	1024	5	512	1024	17	Miniscribe 6053
12	1024	7	512	1024	17	Miniscribe 6074
13	754	7	OFFFFH	754	17	Fujitsu M2242AS
14	754	11	OFFFFH	754	17	Fujitsu M2243AS
15	0	0	0	0	0	Reserved
16	782	2	OFFFFH	862	27	West Dig WD93028-A/AD
17	782	4	OFFFFH	862	27	West Dig WD93048-A
18	745	2	OFFFFH	862	28	Miniscribe 8225AT
19	745	4	OFFFFH	862	28	Miniscribe 8450AT
20	868	3	OFFFFH	868	35	Rodime 3058A
21	868	5	OFFFFH	868	35	Rodime 3088A
22	868	7	OFFFFH	868	35	Rodime 3128A
23	776	8	OFFFFH	776	33	Conner CP3104A
24	745	4	OFFFFH	745	28	Miniscribe 8051A
25	539	6	OFFFFH	0	26	Seagate ST 157A
26	404	4	OFFFFH	0	26	Seagate ST 125A
27	923	5	0	0	34	Rodime 3095A
28	981	10	0	0	17	Maxtor 7080A/Minisc 7080AT
29	755	16	0	0	17	Quantum LPS105AT
30	615	4	128	663	26	Miniscribe 8435
31						User definable

Option	Modified	Current Setting	2
RAM CONFIGURATION			
Total on Option Cards	<u>0 KB</u>	0 KB	
Total on Motherboard	5120 KB	2048 KB	
Base	640 KB	640 KB	
EMS	288 KB	384 KB	
Shadow	96 KB	0 KB	
Extended	4096 KB	1024 KB	
SHADOW MAP			
System BIOS	F0000	RAM Shadowed	Not Mapped
VGA BIOS	E0000	RAM Shadowed	Not Mapped
	D8000	Not Mapped	Not Mapped
	D0000	Not Mapped	Not Mapped
	C8000	Not Mapped	Not Mapped
	C0000	RAM Shadowed	Not Mapped
640K to 704K	A0000	Video RAM	RAM Enabled

<ESC> - Abort & Reboot Cursor Keys to Select Field <PgUp> - Prev Page
 <F3> - Write & Reboot <+> or <-> to Change Value <PgDn> - Next Page

Total on Option Cards: The total amount of extended (not expanded) memory residing on option cards must be specified in this field. Valid ranges are from 0KB to 15MB.

Total on Motherboard: The total amount of memory installed on the system board must be specified. The supported configurations are (in MB): 1, 2, 5 and 8.

Base: This value is fixed to 640 Kbyte.

EMS: Expanded Memory Specification. Here the amount of expanded memory can be defined. The expanded memory is only accessible if a LIM4.0 expanded memory driver is installed in the CONFIG.SYS. The size of expanded memory is configurable in steps of 64KB.

Shadow: This field displays the total amount of memory allocated by the system for shadowing ROMs. This field can not be changed directly by the user. Changing the Shadow Map, described next, will automatically change this field.

Extended Memory: This is all memory that is located in the address space of the processor above 1MB. Its value is computed from:-

Extended Memory =

- Total memory on motherboard
- + Total Memory on Option Cards
- Base Memory
- Shadow Memory
- EMS Memory

SHADOW MAP: For the System BIOS and VGA BIOS only two choices can be made. These are:-

RAM Shadowed: The ROM contents are copied to write protected RAM for faster execution.

Not Mapped: Accesses to the System BIOS and VGA BIOS are ROM accesses.

In the area from C0000 to E0000 the following choices can be made:-

RAM Shadowed: Any ROM that resides in the specific area will be copied to write protected RAM to allow faster execution.

RAM Enabled: This allows access to system board RAM at the selected address range.

Not Mapped: No physical mapping takes place.

The area from 640K to 704K - A0000 is not a user changeable field but presents the usage of this range. If "On Board VGA" is selected on SETUP screen 1, this field will display "Video RAM". If "On Board VGA" is not selected, the selection defaults to "Not Mapped".

4.1.4. SETUP Page 3

Option	Modified	Current Setting	3
CPU/BUS/DMA SPEED			
Standard Speed	8/ 8/ 4 MHz	8/ 8/ 4 MHz	
Turbo Speed	<u>12.5/ 8/ 8 MHz</u>	<u>12.5/ 8/ 4 MHz</u>	
Boot Speed	Turbo	Standard	
9 Pin Serial	Port 1 (3F8)	Port 1 (3F8)	
25 Pin Serial	Port 2 (2F8)	Port 2 (2F8)	
Parallel Port	Port 2 (378)	Disabled	

<ESC> - Abort & Reboot Cursor Keys to Select Field <PgUp> - Prev Page
 <F3> - Write & Reboot <+> or <-> to Change Value <PgDn> - Next Page

Standard Speed: This field is fixed. The speed is set to:-

AT286 Systems:

CPU Speed : 8 Mhz
Bus Speed : 8 Mhz
DMA Speed : 4 Mhz

AT386SX Systems:

CPU Speed : 8 Mhz
Bus Speed : 8 Mhz
DMA Speed : 4 Mhz

This speed is required in cases where a particular option board or software is not designed to operate at the turbo clock speed but will work at the standard 'AT' speed. Some copy protected software fails when it is executed at the turbo speed.

Turbo Speed: The possible selections for this field are:-

AT286 Systems:

CPU / BUS / DMA SPEED

12.5 8 8 Mhz
12.5 8 4 Mhz

AT386SX Systems:

CPU / BUS / DMA SPEED

16 8 8 Mhz
16 8 4 Mhz

Boot Speed: The possible selections for this field are:-

Standard
Turbo

9 Pin Serial: This is used to specify the base I/O address of the serial port connected to the 9-pin connector. The possible selections for this field are:-

Port 1 (3F8)
Disabled

25 Pin Serial: This is used to specify the base I/O address of the serial port connected to the 25-pin connector. The possible selections for this field are:-

Port 2 (2F8)
Disabled

Parallel Port: This is used to specify the base I/O address of the parallel port. The possible selections for this field are:-

Port 2 (378)
Disabled

Standard Speed: This field is fixed. The speed is set to:-

AT286 Systems:
CPU Speed : 8 Mhz
Bus Speed : 8 Mhz
DMA Speed : 4 Mhz

AT386SX Systems:
CPU Speed : 8 Mhz
Bus Speed : 8 Mhz
DMA Speed : 4 Mhz

This speed is required in cases where a particular option board or software is not designed to operate at the turbo clock speed but will work at the standard 'AT' speed. Some copy protected software fails when it is executed at the turbo speed.

Turbo Speed: The possible selections for this field are:-

AT286 Systems:

AT386SX Systems:

CPU / BUS / DMA SPEED

CPU / BUS / DMA SPEED

12.5 8 8 Mhz
12.5 8 4 Mhz

16 8 8 Mhz
16 8 4 Mhz

Boot Speed: The possible selections for this field are:-

Standard
Turbo

9 Pin Serial: This is used to specify the base I/O address of the serial port connected to the 9-pin connector. The possible selections for this field are:-

Port 1 (3F8)
Disabled

25 Pin Serial: This is used to specify the base I/O address of the serial port connected to the 25-pin connector. The possible selections for this field are:-

Port 2 (2F8)
Disabled

Parallel Port: This is used to specify the base I/O address of the parallel port. The possible selections for this field are:-

Port 2 (378)
Disabled

Option	Modified	Current Setting	4
KEYBOARD			
Numlock	<u>ON</u>	OFF	
Click	Enabled	Disabled	
Repeat Rate	10 cps	20 cps	
BOOT			
Floppy Drive	A:	A: or B:	
Memory Test	Enabled	Disabled	

<ESC> - Abort & Reboot Cursor Keys to Select Field <PgUp> - Prev Page
 <F3> - Write & Reboot <+> or <-> to Change Value <PgDn> - Next Page

Numlock: This is used to specify the initial Num Lock state at boot time. This option is not applicable for XT keyboards, or when the switch at the bottom of the 101/102 key keyboard is set in the "PC" position. The possible selections for this field are:-

ON
OFF

Click: This will generate an audible keyboard click. The possible selections for this field are:-

Disabled
Enabled

Repeat Rate: The auto-repeat rate of the keyboard is specified here. This option is not applicable for XT keyboards, or when the switch at the bottom of the 101/102 key keyboard is set in the "PC" position. The possible values for this field are:-

2 cps	15 cps
5 cps	20 cps
8 cps	24 cps
10 cps	30 cps

Floppy Drive: This field is used to specify which floppy drive can be used at boot time. The possible selections for this field are:-

Disabled:	Boot from floppy is disabled
A:	Boot only possible from drive A:
A: or B:	Boot is also possible from B: if drive is different than A:

Memory Test: With this field, the user can specify whether or not the system's memory will be tested during power on diagnostics. Skipping the test will allow the system to boot quicker; however, the memory will be untested. This implies that any memory which may be failing will not be reported to the user at boot time. The possible selections for this field are:-

Enabled
Disabled

4.1.6. **SETUP Page 5**

Option	Modified	Current Setting	5
ADVANCED FEATURE SETTINGS			
Operating Mode	<u>Terminal Server Mode</u>	Normal PC	
Keyboard	Not Required	Required	
Video Card	Not Required	Required	
Video Redirection	9 Pin Serial	25 Pin Serial	
Characteristics:			
Baud Rate	4800	9600	
Parity	Odd	Even	
Stop Bits	2	1	
Character Length	8 bits	7 bits	

<ESC> - Abort & Reboot Cursor Keys to Select Field <PgUp> - Prev Page
<F3> - Write & Reboot <+> or <-> to Change Value <PgDn> - Next Page

Operating Mode: The following choices can be made:-

Normal PC:

No other configuration parameters on this page can be changed, and their settings have no effect.

Terminal Server Mode:

Configures the system for use in terminal server and LAN server applications. All other configuration parameters on this display page are in effect and can be modified.

Keyboard: The possible selections for this field are:-

Required: The POD tests for presence of a keyboard, and if one is not found, an error is displayed.

Not Required: No error message is displayed if no keyboard is detected during POD.

Video Card: The possible selections for this field are:-

Required: The POD tests for presence of a video card, and if one is not found, an error is displayed.

Not Required: No error message is displayed if no video card is detected during POD.

Video Redirection: This field allows the system to be configured so that all messages displayed by the BIOS and POD are output to one of the serial ports. The possible selections are:-

Disabled
9 Pin Serial
25 Pin Serial

Note: When his option is used, make sure that the ANSI.SYS driver is not installed. If ANSI.SYS is installed in the CONFIG.SYS file as part of the operationg system, it does not allow you to redirect screen messages to one of the serial ports.

Baud Rate, Parity, Stop Bits and Character Length: These fields can only be changed if video redirection is enabled. The settings must comply with the settings of the serial device.

Note: SETUP configures the communication port to transmit at the baud rate that is selected. However, during booting of the MS-DOS operating system, a peculiarity of MS-DOS sets the serial port to 2400 baud thus overriding the selection. If it is intended to use a speed other than 2400 baud, you must include a command line in the AUTOEXEC.BAT file to reset the serial port to the speed you want, e.g. 9600 baud.

4.2. INITHD.EXE

This utility is used to perform a low level format of the ST506 / IDE hard disk(s) in the system. Take note that all data on the hard disk will be lost when this program is executed.

4.3. PARK.COM

This command is used to park the read/write heads of the hard disk on the landing zone, which will prevent any loss of data or damage to the drive during transit. The Seagate 157A, or Miniscribe 8051A drive, which are delivered in all configurations, do not require this command, as these drives are autoparking drives. However, if a second drive is being used, then it may be necessary to use the PARK command. This is particularly true for drives with ST-506 / IDE interfaces.

4.4. SPEED.COM

For AT286 Systems: - Turbo Speed = 12.5Mhz
- Standard Speed = 6 Mhz

For AT386SX Systems: - Turbo Speed = 16Mhz
- Standard Speed = 8 Mhz

The processor can operate at standard or turbo. There are two ways to select one of these speeds.

- When pressing [ALT][LEFT SHIFT][RIGHT SHIFT] simultaneously, the system will toggle between the turbo and standard speeds. One beep indicates a switch from turbo to standard speed, 2 beeps indicate a switch from standard to turbo speed.
- Using the SPEED.COM utility

```
SPEED STANDARD
SPEED TURBO
```

Note: The standard and turbo speed of the system are defined in page 3 of the SETUP program.

4.5. MOUSE.COM / MOUSE.SYS

This mouse driver is for using the Z-NIX mouse (Headstart configurations only).

4.6. QUAD_EMS.SYS

This program interfaces with the PC's hardware to provide full LIM (Lotus Intel Microsoft) 4.0 features. The memory used by this driver for Expanded Memory Specifications (EMS) is taken from the top of the main board extended memory. This reduces the amount of extended memory available by the amount of EMS requested. The QUAD_EMS (Expanded Memory Manager) device driver is a standard MS DOS device driver that gets loaded at boot time by the CONFIG.SYS file. It should be installed in the CONFIG.SYS as the first driver.

The syntax of the expanded memory driver is as follows:-

```
DEVICE=QUAD EMS.SYS [Contexts=nnn][Depth=nn]
  [Exclude=xxxx-yyyy][Frame=xxxx][Handles=nnn]
  [Include=xxxx-yyyy][Test][Fullldisplay][Showoptions][Zero]
```

All mentioned parameters are optional.
Below is a description of each of the EMS parameters.

PARAMETER DESCRIPTION:

Contexts=nnn:

The context parameter specifies the number of contexts for windows 0-3 which can be saved by processes using EMS memory. The default number of contexts is equal to the number of handles which are allocated. The maximum number of contexts is 255; the minimum number is 3.

Depth=nn:

The Depth parameter specifies the number of consecutive contexts that can be saved for a given handle before a restore must be initiated. The maximum depth is 32, the minimum is 1
The default value is 1

Exclude=xxxx-yyyy:

Sets an address range which should be EXCLUDED from EMS paging. The exclusion option can be used to prevent special RAM sections from being banked out. The memory manager will automatically exclude address ranges used by ROM and video RAM; these do not need to be specified. The numbers entered are a hexadecimal segment address where those segments to reserve begin and it must fall on a page (16K) boundary.

Frame=xxxx:

Sets the start of page frame address in paragraph. This is the address at which EMS pages will appear as they are mapped in. The address must be beyond the DOS memory range and the contiguous 4 pages from it must all be in the mappable region of system memory which is often referred to as the EMS window. The number specified should be a hexadecimal segment address on a 16 Kbyte boundary where no ROM or RAM resides.

Handles=nnn:

Sets the maximum number of handles the EMM will open at any time. This number must be in the range [3-255] including the OS handle (handle 0).
The default value is 255.

Test:

The Test parameter specifies that memory should always be tested during initialization of the driver.

Fulldisplay:

The Fulldisplay parameter specifies that the memory manager displays information about the EMS configuration after its initialization.

Showoptions:

The Showoptions parameter specifies that the memory manager show its command line options after its initialization.

Zero:

The Zero parameter specifies that memory should never be tested during initialization.

4.7. Video Utilities

The Video Utilities and drivers are found on the Video Utilities diskette and the Supplemental Drivers diskette.

On the Video Utilities diskette there are two text files that contain a complete description of the video utilities and video drivers that are supplied with the system. These two text files are:-

README.VGA : This file tells the user how to view or print the VGA manual.

MANUAL.VGA : This file contains the VGA manual and describes the operation and installation of the programs. This manual has a full description of all the video utilities.

A short description about the main video utilities can be found in the next subsections.

4.7.1. RAMBIOS.SYS

This utility allows you to execute the VGA BIOS out of 16 bit memory, instead of out of ROM through an 8-bit bus. This permits most operations that use the VGA BIOS to run much faster. Since the VGA BIOS can be copied into shadow RAM at power-on (refer to the description of the SETUP program), and BIOS routines are already executing out of 16-bit memory, the RAMBIOS utility is not necessary.

4.7.2. EAGLE.COM

This utility allows the user to change the warm-boot configuration. If the system's current graphics configuration has to be changed while the system is in operation, the EAGLE utility can be used.

4.7.3. **MXW.COM**

This utility allows programs such as Wordstar 4.0 or WordPerfect 5.0 to run in 100- or 132-column modes. MXW is intended for programs that do not use display drivers.

CHAPTER 5. SYSTEM UNIT ASSEMBLY/DISASSEMBLY

In this chapter the disassembly procedure for the system can be found. Also an exploded view of the system is given as well as a parts list. Furthermore a drawing of the interconnections in the system is given.

5.1 Assembly/Disassembly

In this section a description of the disassembly procedure of the system is given. Assembling these items is done in the reverse order.

Note: When adding any new devices or memory to the system, or when removing any devices or memory from the system, make sure that the SETUP program is altered to support the new configuration. For the SETUP program, refer to chapter 4.1.

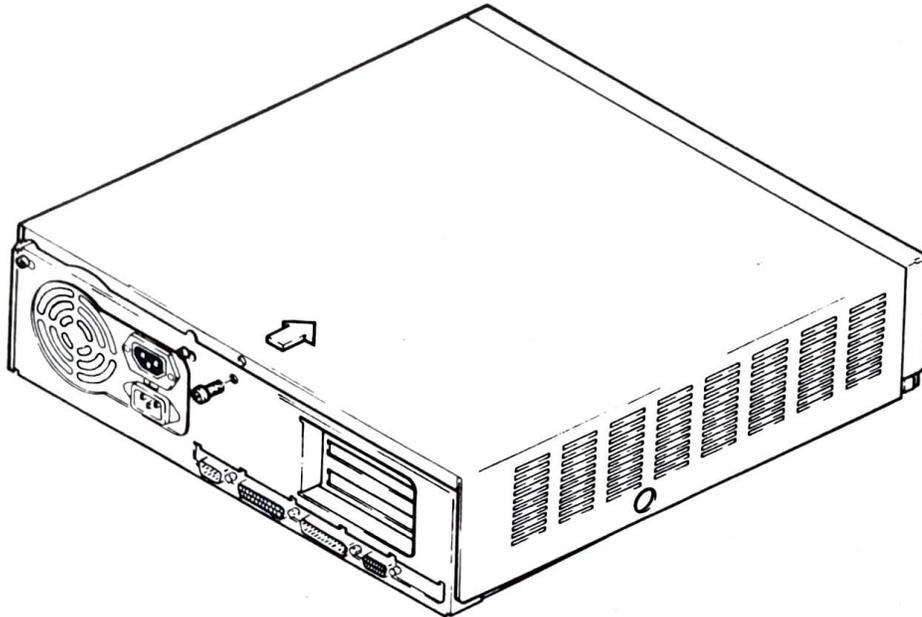
Warning: The integrated circuits in the system, drives and on memory modules are extremely sensitive to static electricity. Before opening a system, be sure you are properly grounded.

Caution: The Seagate 157A or Miniscribe 8051A hard disk drives, which are delivered in all configurations are autoparking drives. However, if another or second drive is used, and it is not sure if this drive is autoparking at power-off, then it is advised to use the PARK command. Not using this command (with non-autoparking drives) can cause loss of data or damage to the drive during transit.

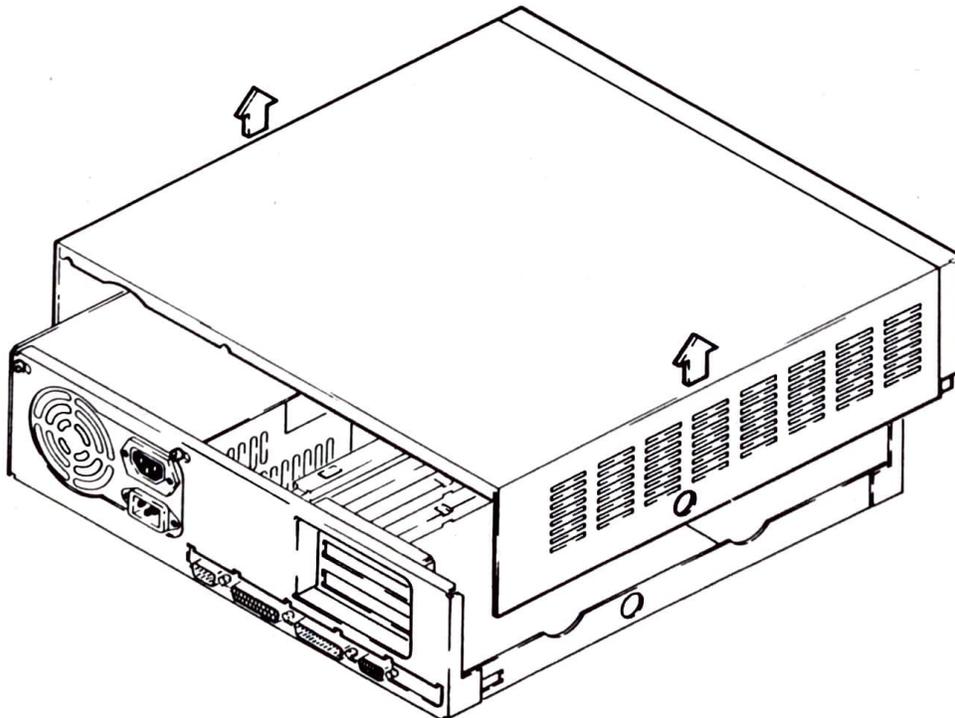
5.1.1. Cover

- Before removing the cover make sure all the cables are disconnected from the system.
- Remove the mounting screws at the rear panel.
- Lift the cover slightly and move it in the direction indicated by the arrows.

I.



II.

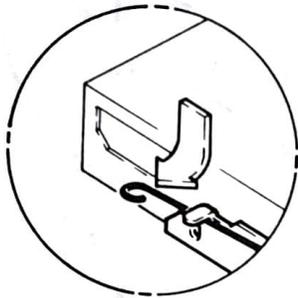


5.1.2. Floppy Disk Drive(s)

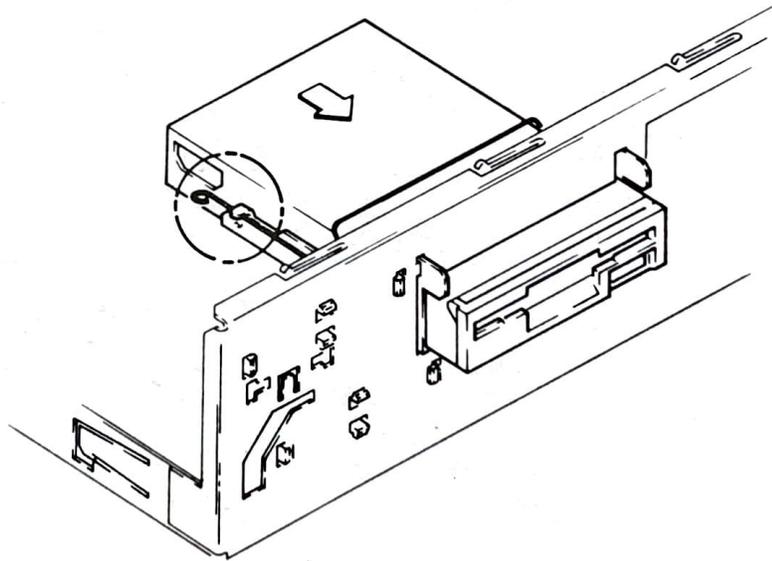
To remove the 3½" diskette drive, perform the following steps:-

- Remove the cover (refer to 5.1.1.).
- Remove the power and data cables from the rear of the floppy disk drives.
- Press the end of the retainer spring slightly downward and remove it from its holding clip (see I.)
- Lift the rear of the diskette drive and slide the drive out of the system in the direction indicated by the arrow (see II.)

I.



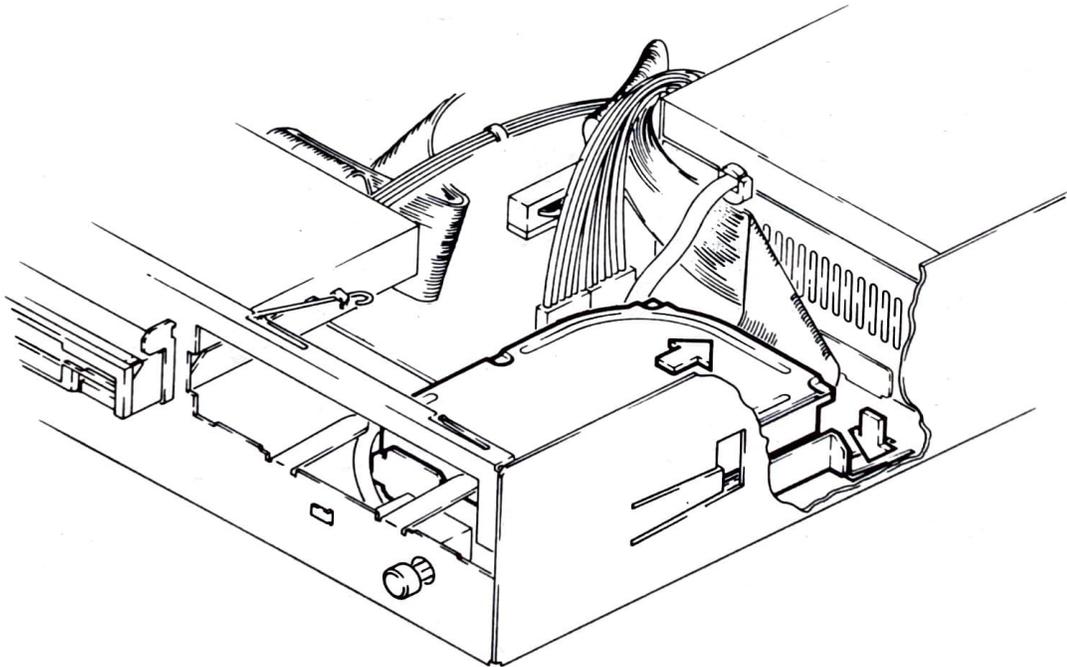
II.



5.1.3. Hard Disk Drive(s)

- Remove the cover (refer to 5.1.1.).
- Remove the 3½" floppy disk drive (refer to 5.1.2.).
- Remove the power and data cables from the rear of the hard disk.
- Lift the bracket that holds down the 3½" devices slightly upwards and remove it from the system by pulling it to the rear of the system.
- Remove the four mounting screws from the bottom of the bracket.
- Remove the hard disk from the bracket.

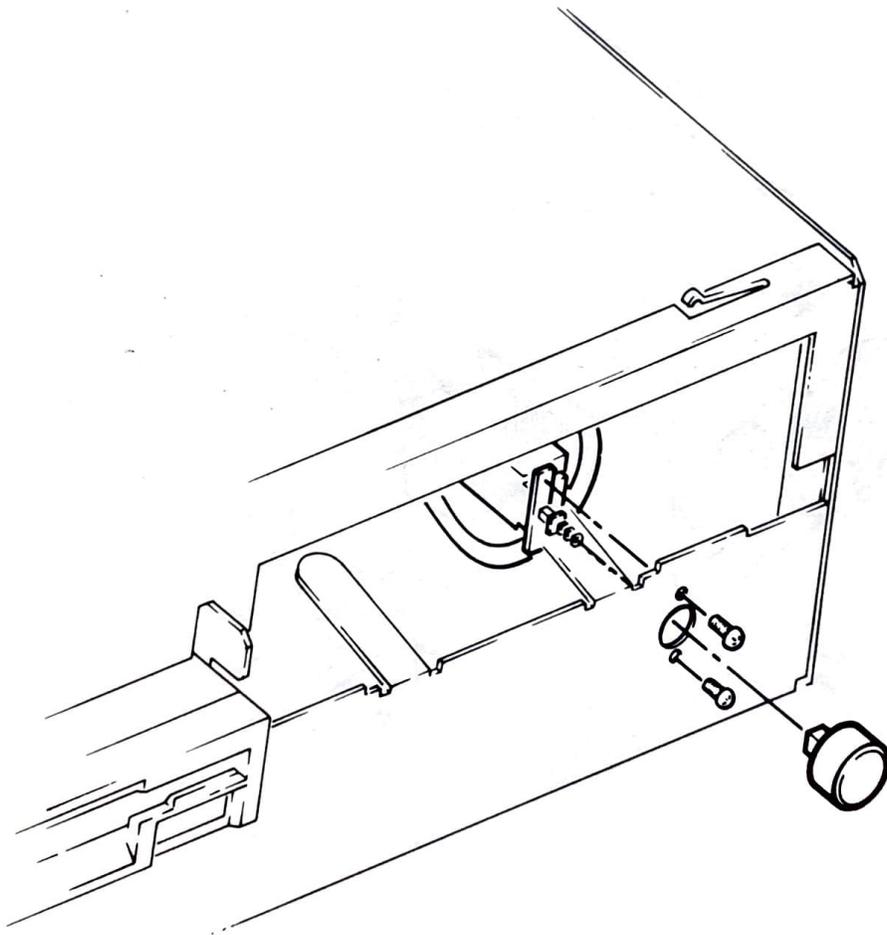
NOTE: If you have a 5¼" hard disk drive, the disassembly procedure is the same as for the 5¼" floppy disk drive (refer to 5.1.2.).



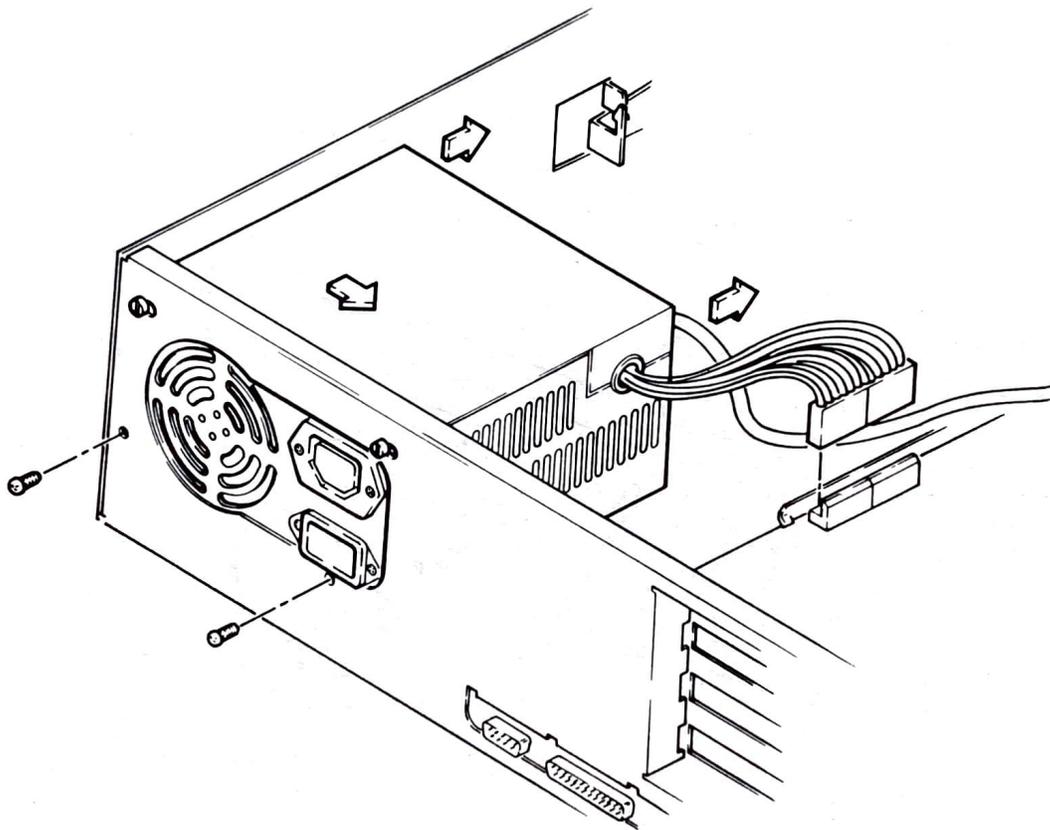
5.1.4.

Power Supply

- Remove the cover (refer to 5.1.1.).
- Remove all the power cables that are connected to the system. These are connections to the system board, hard disk drive(s), floppy disk drive(s) and other options that might be connected.
- Remove the power on/off button at the front of the system unit.
- Remove the bottom two mounting screws that are holding the power on/off switch.



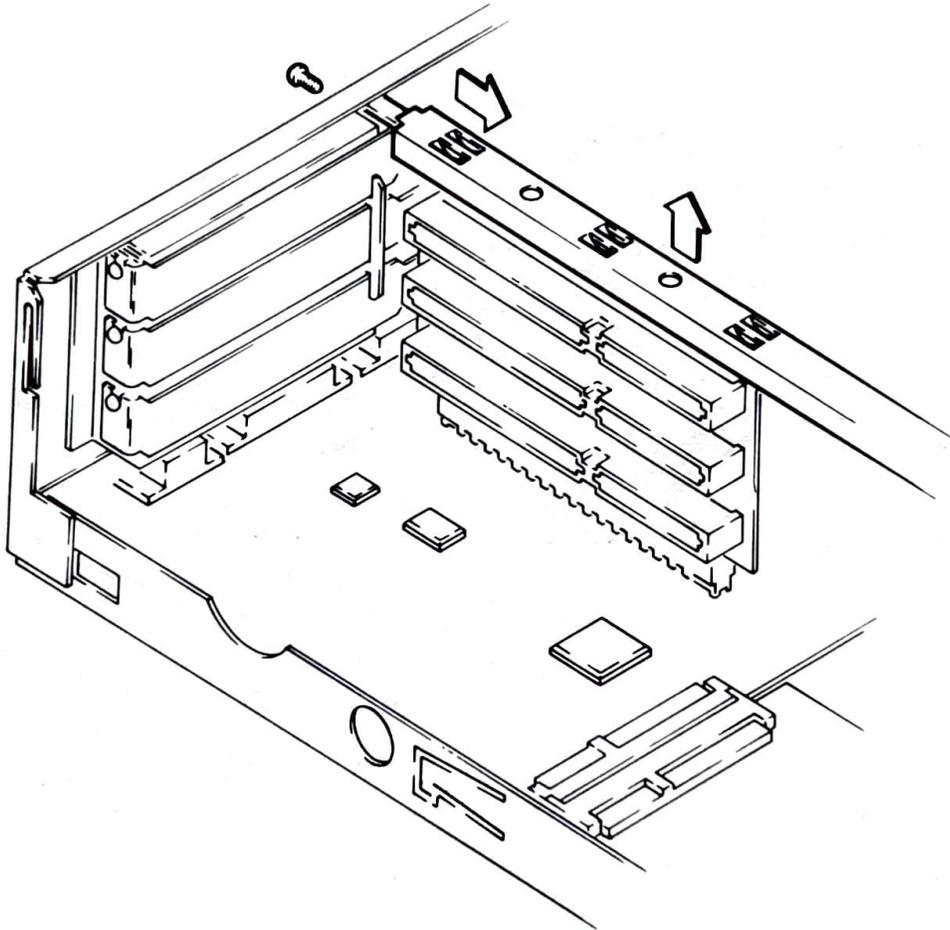
- Remove the bottom two mounting screws at the rear of the system unit.
- Loosen (do not remove) the top two mounting screws at the rear of the system unit.
- Shift the power supply slightly to the right, in such a position that the two top mounting screws are free and remove the power supply in the direction indicated by the arrow.



5.1.5.

Interconnect Board

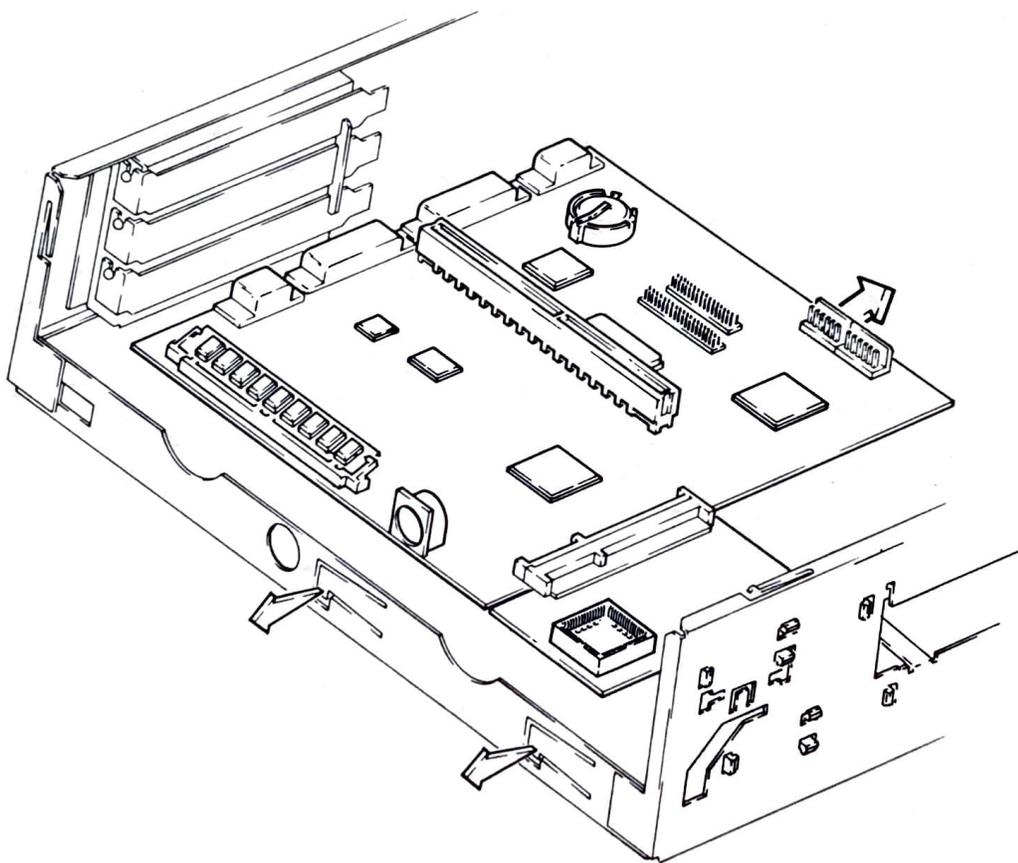
- Remove the cover (refer to 5.1.1.).
- Remove any expansion cards.
- Remove the retaining screw at the rear of the system unit.
- Move the PCB holder toward the front of the system and lift the holder in the direction shown by the arrow.



5.1.6.

Main Board

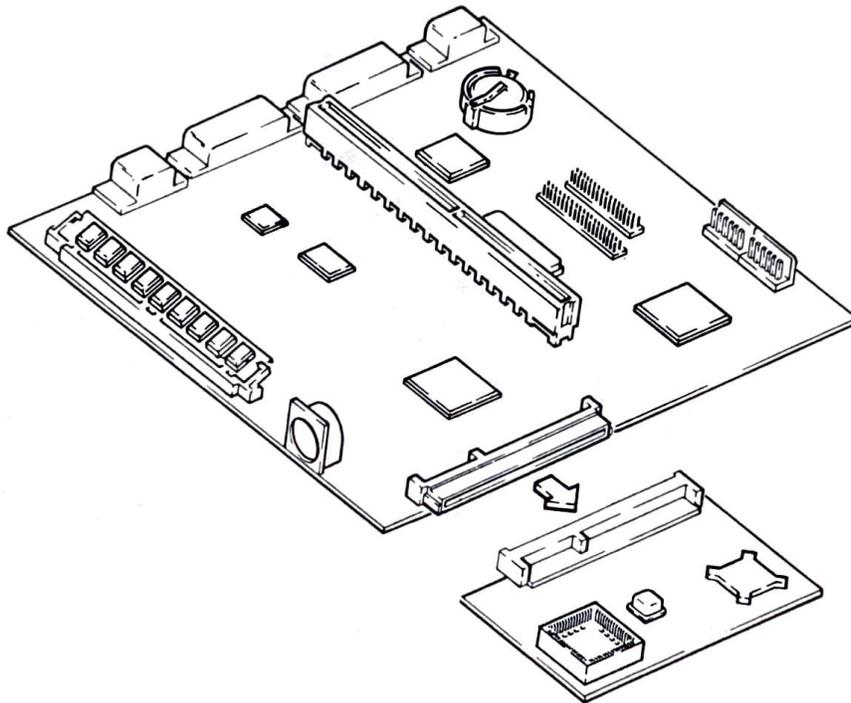
- Remove the interconnect board (refer to 5.1.5.).
- Remove all cables connected to the main board.
- Push the two retaining clips slightly outwards and lift the main board out as indicated in the drawing.



5.1.7.

Processor Board

- Remove the cover (refer to 5.1.1.).
- Remove, if necessary, expansion cards.
- Remove the processor board as indicated in the drawing.



0
REVISED

6 DIAGNOSTICS

7
POWER SUPPLY

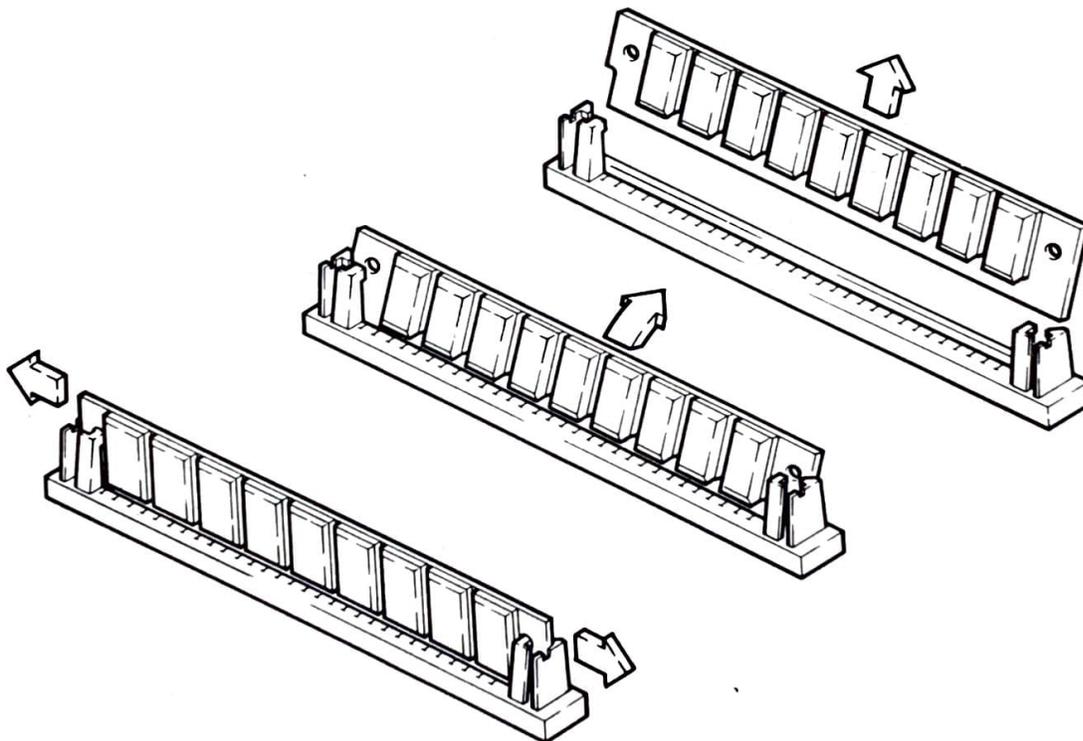
8 CBA's

5.1.8.

SIMM

- Remove the cover (refer to 5.1.1.).
- Remove, if necessary, expansion cards.
- Remove the SIMM (at position U41) as indicated in the drawing.

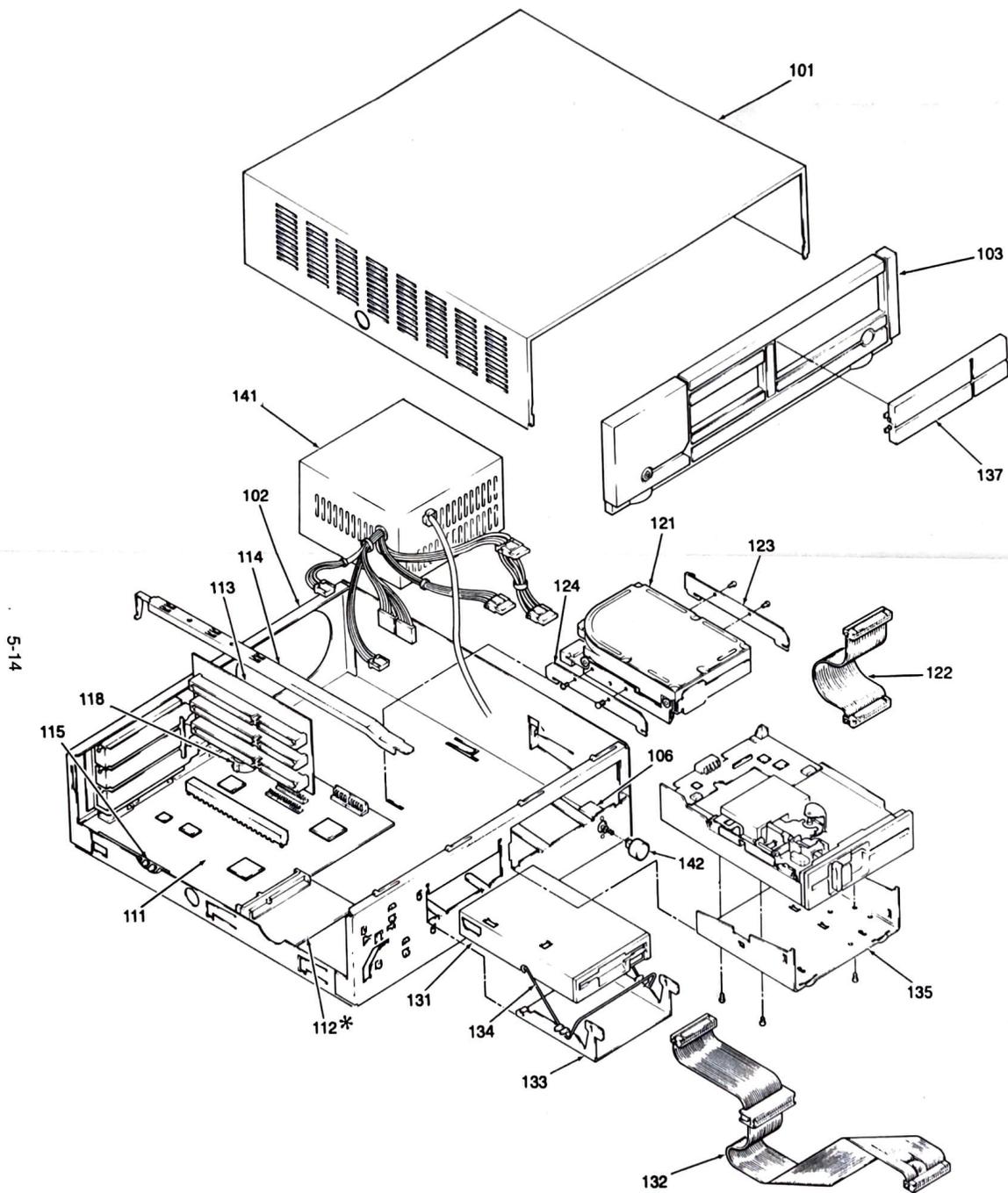
Caution: Apply only enough pressure on the retaining clips to release the SIMM. If too much pressure is used, the clips might break or the socket could be damaged.



5.2. Exploded View/Parts List

All parts in the exploded view have been provided with a position number. In the exploded view four types of position numbers have been used:-

- A. The numbers 1 to 99 of small size relate to standard fixing material. The parts list belonging to the exploded view mentions the kind, the dimensions and code number (if applicable).
- B. The position numbers of the specific parts are of a larger size. The description and the code numbers have been printed in the parts list belonging to the exploded view. These numbers go from 100 up to 199.
- C. The numbers 500 to 599 are not mentioned in the parts list. It is supposed that the parts indicated by these numbers are not subject to wear or damage. These parts are not stocked. Supply of these parts is possible, as long as the system is being produced. The purpose of these position numbers is to be able to indicate the relevant parts in correspondence.
- D. Parts indicated by a letter/figure combination. This category of numbers is used for those parts which have been drawn in the exploded view to indicate their position in the set. The code number and the description of the part are mentioned in another parts list.



5-14

**5.2.1. REPLACEMENT PARTS LIST: 286/386SX SYSTEMS
(P3239/P3346 SYSTEMS)**

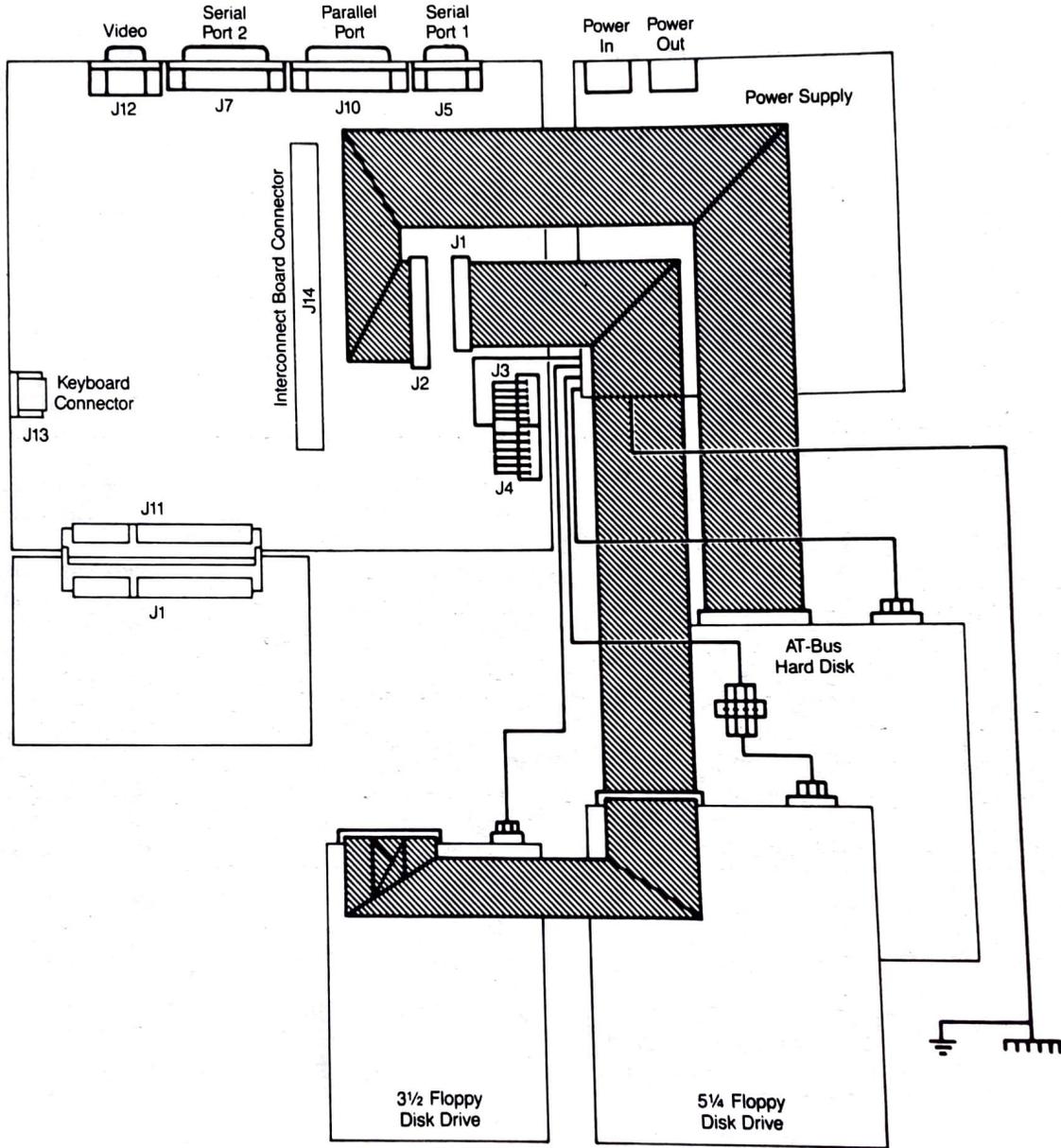
Ref.	Description	Part No.
101	Housing Cover	-----
102	Rear Mounting Bracket	-----
103	Front Bezel Asm.	4835 447 87059
106	On/Off Switch	-----
111	Main Controller Board	4835 216 27099
112	12.5MHz. 286 Processor Module	4835 216 27101
112	16MHz. 386SX Processor Module	4835 216 27105
113	Interconnect Module	4835 216 27102
114	Center Support Bracket	-----
115	DRAM, PS/2 SIMM Types	-----
118	Battery, 3V (2430 type, 2 used)	-----
121	Hard Disk Drive, 40 Mbyte	4835 693 27004
122	40 Pin Cable Asm. f/Hard Disk Drive	4835 321 27145
123	LH Mounting Rail f/Hard Drive	-----
124	RH Mounting Rail f/Hard Drive	-----
131	Floppy Disk Drive, 3½", 1.44 Mbyte	5322 693 21983
132	34 Pin Cable Asm. f/Floppy Drive	4835 321 27144
133	Drive Mounting Bay, f/3½" Drives	-----
134	Retainer Spring, f/3½" Drives	-----
135	Drive Mounting Bay, f/5¼" Drives	-----
137	Blanking Plate	-----
141	Power Supply, 145W	4835 216 27094
142	On/Off Button	4835 447 87061
	Floppy Disk Drive, 5¼", 1.2 Mbyte (Not used on models featuring CD ROM)	5322 693 21983
	Slide Rails f/Drive Mtg. Bays	4835 405 57008
	Keyboard, 101 Keys	4835 693 27053
	Adapter Cable, f/Monitor	4835 321 27104
	DOS 4.01 Manual	4835 736 17136
	AC Power Cord	4835 321 27105
	System Kit	4835 736 17145
	3 Button Serial Mouse (HeadStart Models only)	4835 015 57107
	LotusWorks (Magnavox Models only)	4835 736 17138
	Lotus Magellan (Magnavox Models only)	4835 736 17137
	Lotus 123 (Ver. 2.2; HeadStart Models only)	4835 736 17146
	GeoWorks Ensemble (HeadStart Models only)	4835 736 17147

THE FOLLOWING ITEMS ARE SUPPLIED ONLY ON MODELS FEATURING A CD ROM DRIVE:

CD ROM Controller Card	4835 216 27093
CD ROM Drive, 680 Mbytes	4835 693 27059
CD ROM Cable Asm.	4835 321 27086
Headphones (HeadStart Models only)	4835 015 57108
CD Caddie	4835 015 57052
CD - Microsoft Bookshelf	
CD - Manhole	4835 736 17141
CD - Small Business Consultant/STAT	4835 736 17142
CD - PC Globe (HeadStart Models only)	4835 736 17143
CD - Groliers Encyclopedia	4835 736 17144
Manual - Small Business Consultant	4835 736 17148
Manual - CD Booklet	4835 736 17149
Manual - Groliers Encyclopedia	4835 736 17151
Manual - Microsoft Bookshelf	4835 736 17152
Manual - PC Globe (HeadStart only)	4835 736 17153

----- Indicates a not normally stocked item.

Interconnections



CHAPTER 6. DIAGNOSTICS

In this chapter a description of the diagnostic functions available for this system is given.

6.1. Power On Diagnostics

After a reset, the system BIOS performs a number of tests. These tests are known as the Power On Diagnostics (POD). During these tests, the BIOS initializes the system and tests the memory and various logic circuits, such as DMA, Interrupt controller, Timer and so on. If the BIOS finds any error, an error code will be heard and/or an indication is shown on the screen. In the CODE column a '1' represents a long beep and a '0' represents a short beep.

ID	CODE	FAULT DESCRIPTION
0A	1010	DMA page registers error
10	1 0000	CMOS RAM read/write error
11	1 0001	System ROM checksum error
12	1 0010	Timer A error
13	1 0011	DMA A error (byte DMA controller)
14	1 0100	DMA B error (word DMA controller)
15	1 0101	Memory refresh error
16	1 0110	Keyboard controller error
17	1 0111	Keyboard controller error
19	1 1001	Keyboard controller error
1C	1 1100	Base 64K RAM error
1D	1 1101	Base 64K RAM parity error
21	10 0001	PVAM register error
25	10 0101	System options error
2B	10 1011	Video sync error (run SETUP)
2C	10 1100	Video PROM error
2D	10 1101	Monochrome/colour configuration error
2E	10 1110	No video memory error
35	11 0101	Interrupt controller error
36	11 0110	Byteswapper error
37	11 0111	NMI error
38	11 1000	Timer interrupt
39	11 1001	LSI timer halted
3A	11 1010	Main memory test error
3B	11 1011	Keyboard error
3C	11 1100	Keyboard interrupt error
40	100 0000	Diskette error
48	100 1000	Adapter card error
4C	100 1100	CMOS battery/checksum error (run SETUP)
4D	100 1101	System options error (run SETUP)
52	101 0010	Keyboard controller error
6A	110 1010	Failure shadowing ROM BIOS
70	111 0000	Memory size configuration error (run SETUP)
80	1000 0000	System Option error

CHAPTER 7. POWER SUPPLIES

The Power supply used in this system is the API8069.

7.1. Introduction: PSU API8069

The power supply is a 145 Watt, switch mode power supply. The power supply can be switched, by means of the red switch at the rear, for an AC voltage of 115 VAC or 230 VAC. The operating line frequency range is from 47 to 63 Hz.

Electrical Input Specifications:-

Voltage Range (VAC) :	180 - 264
Max. Current (A) :	2
Voltage Range (VAC) :	90 - 132
Max. Current (A) :	4

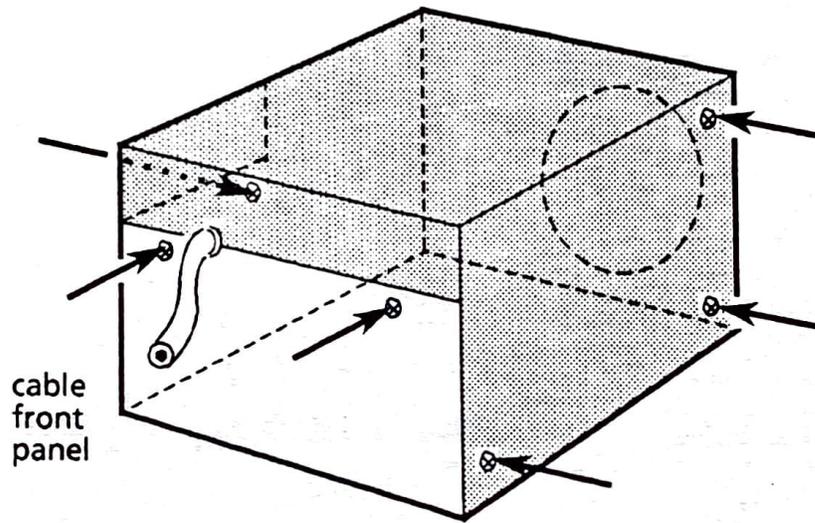
Electrical Output Specifications:-

<u>Output Voltage</u>	<u>Min. Load Range</u>	<u>Max. Load Range</u>
+ 5V	1.0 A	18.0 A
+ 12V	0.2 A	4.0 A
- 5V	0.0 A	0.3 A
- 12V	0.0 A	0.3 A

7.1.1. **Assembly/Disassembly**

To remove the power supply, perform the following steps:-

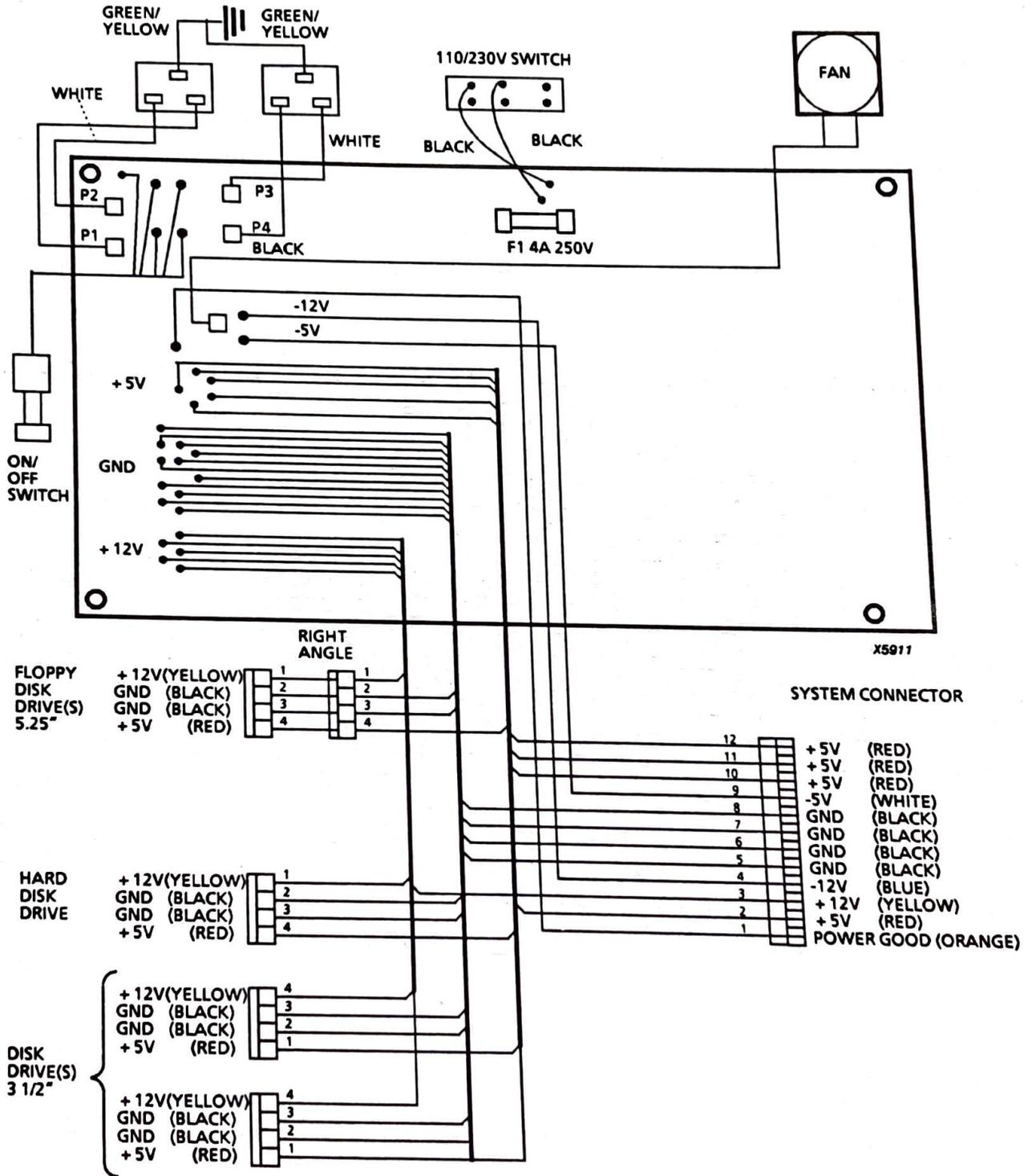
- Remove power supply out of the cabinet (refer to 5.1.4.).
- Remove the six retaining screws indicated in the drawing to gain access to the inside of the power supply.



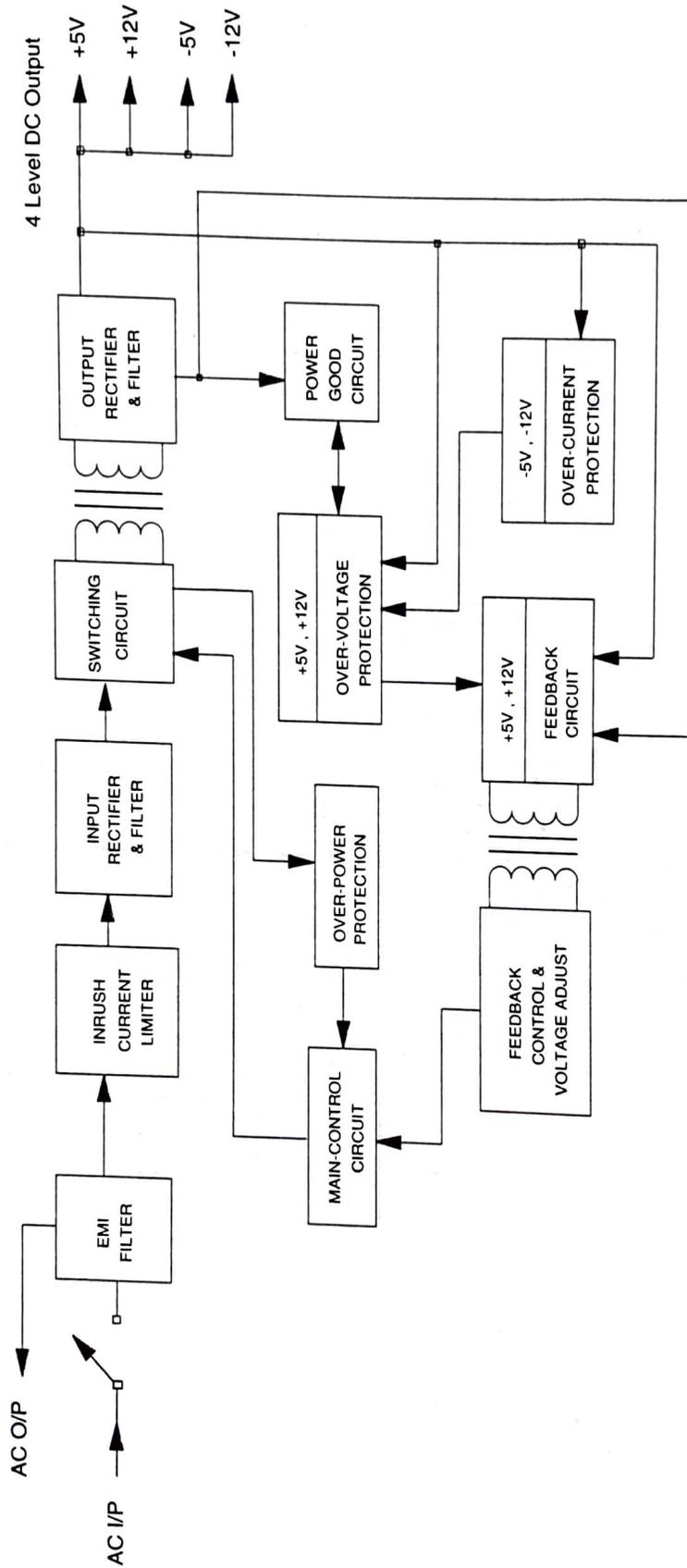
Unit seen from front

7.1.2. Interconnections

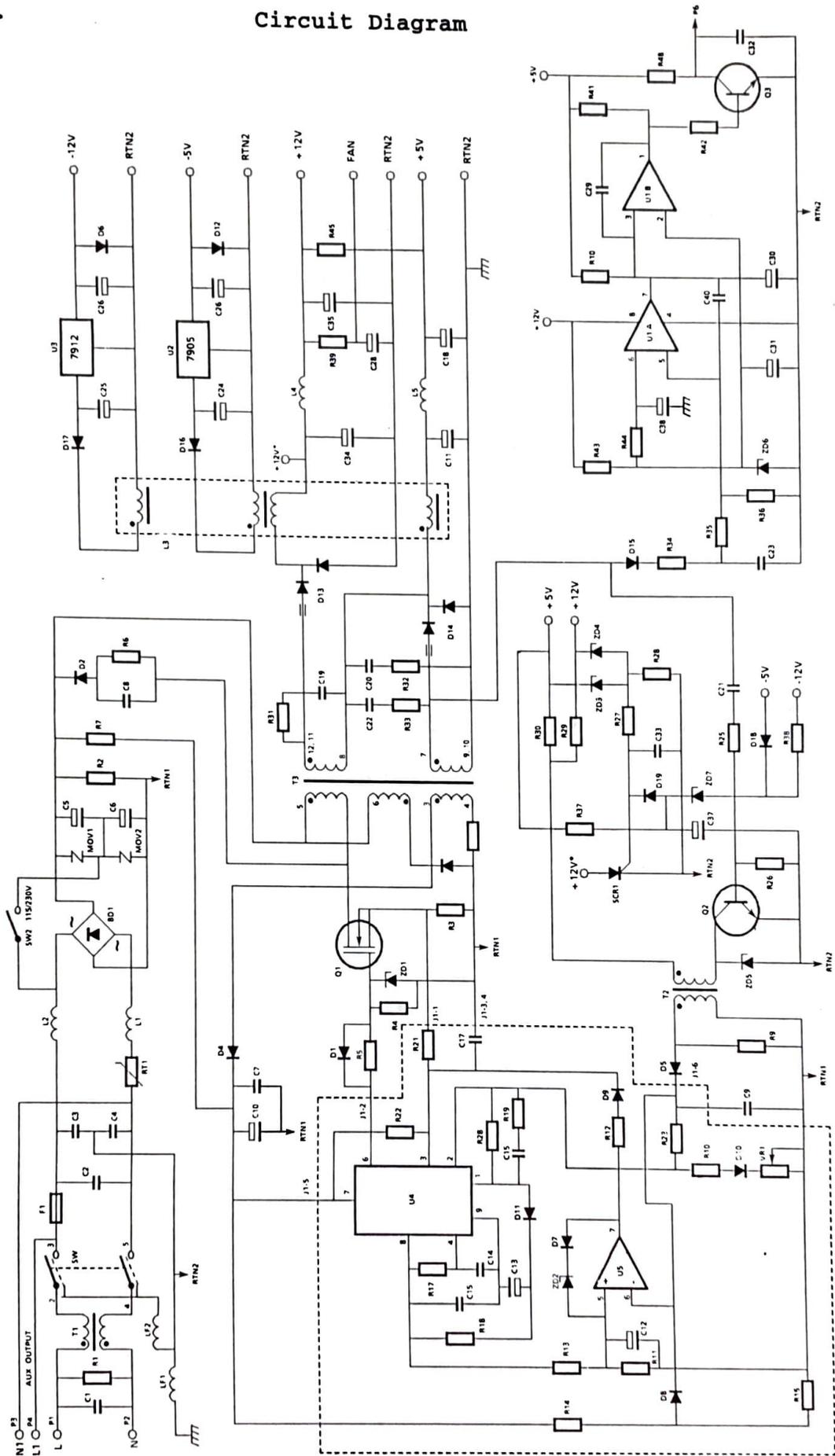
In the next figure a connector pin description is given as well as an interconnection diagram:-



Block Diagram



Circuit Diagram



7.1.5. Adjustments

The tolerances of the output voltages are given in the following table:-

<u>Output Voltage</u>	<u>Min</u>	<u>Normal</u>	<u>Max</u>
+ 5V	+ 4.80V	+ 5.00V	+ 5.25V
+ 12V	+ 11.40V	+ 12.00V	+ 12.60V
- 5V	- 4.75V	- 5.00V	- 5.25V
- 12V	- 11.40V	- 12.00V	- 12.60V

The next table shows the DC output ripple and noise voltage:-

<u>Output Voltage</u>	<u>Max</u>
+ 5V	75mV
+ 12V	120mV
- 5V	150mV
- 12V	240mV

The power supply provides a TTL level power-good signal to indicate proper operation of the power supply:-

Turn on delay time: 100ms min.
500ms max.

CHAPTER 8. CIRCUIT BOARD ASSEMBLIES (CBA)

In this chapter a description can be found of all the boards that are in the machine. In this case:-

- Motherboard
- Processor board
- Interconnect board

8.1. System Board

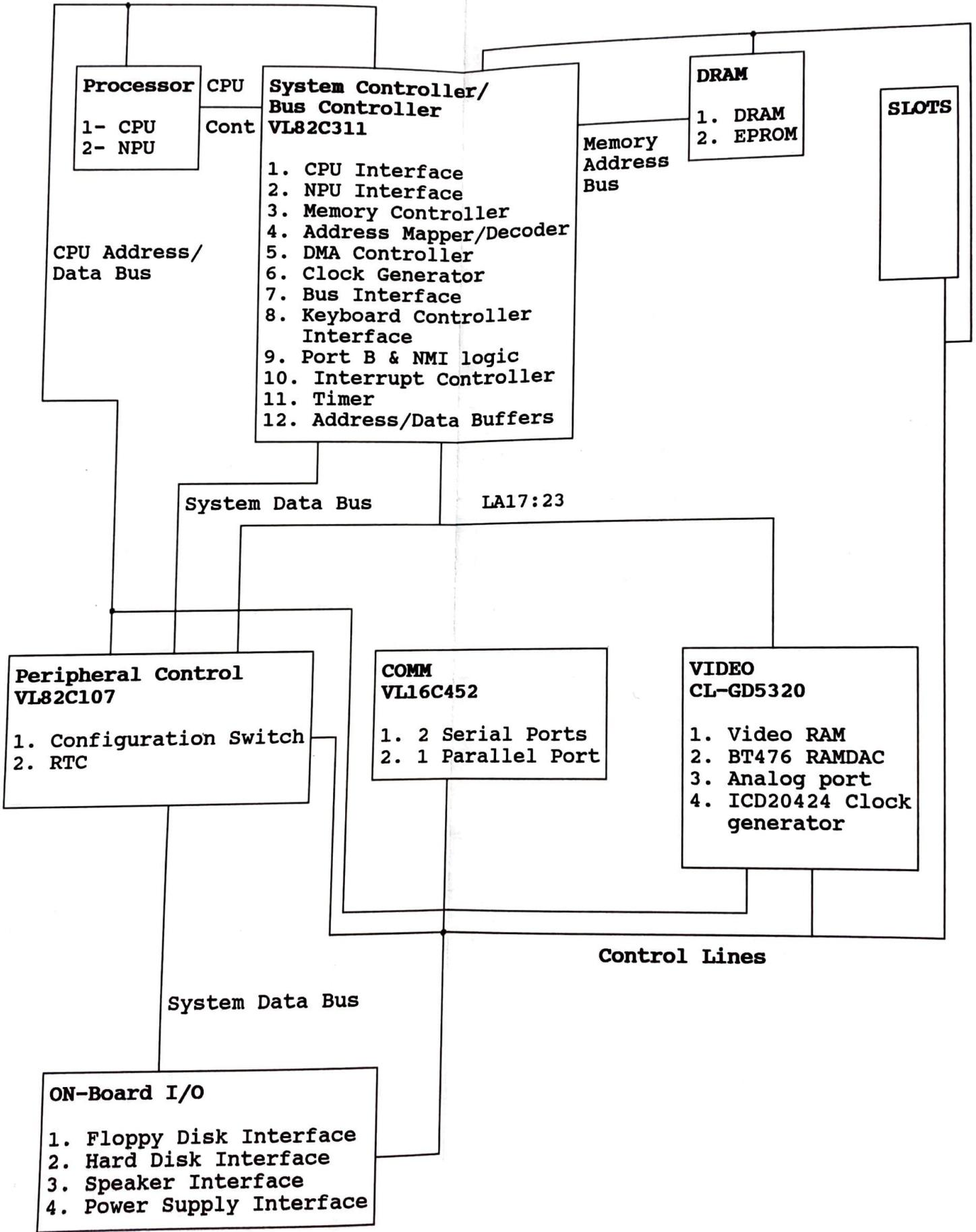
8.1.1. Functional Description / Technical Data

SYSTEM BOARD	
AT286 Systems: - Microprocessor - Clock frequency AT386SX Systems: - Microprocessor - Clock frequency	80286-12 12.5MHz 80386SX-16 16Mhz
AT286 Systems: - Coprocessor - Clock frequency AT386SX Systems: - Coprocessor - Clock frequency	Intel 80287 12.5MHz Intel 80387SX-16 16Mhz
System/Bus controller - CPU interface - NPU interface - DRAM controller - Address Mapper/Decoder - Memory controller - Clock Generation - Bus Interface - Keyboard interface - PORT B - NMI logic - Interrupt controller - DMA controller - Timer/counter - Address and Data buffers	VL 82C311
Peripheral controller - Keyboard controller - Real Time Clock - DMA-Acknowledge decoders - IDE chip select decoders - FDC chip select decoders	VL 82C107

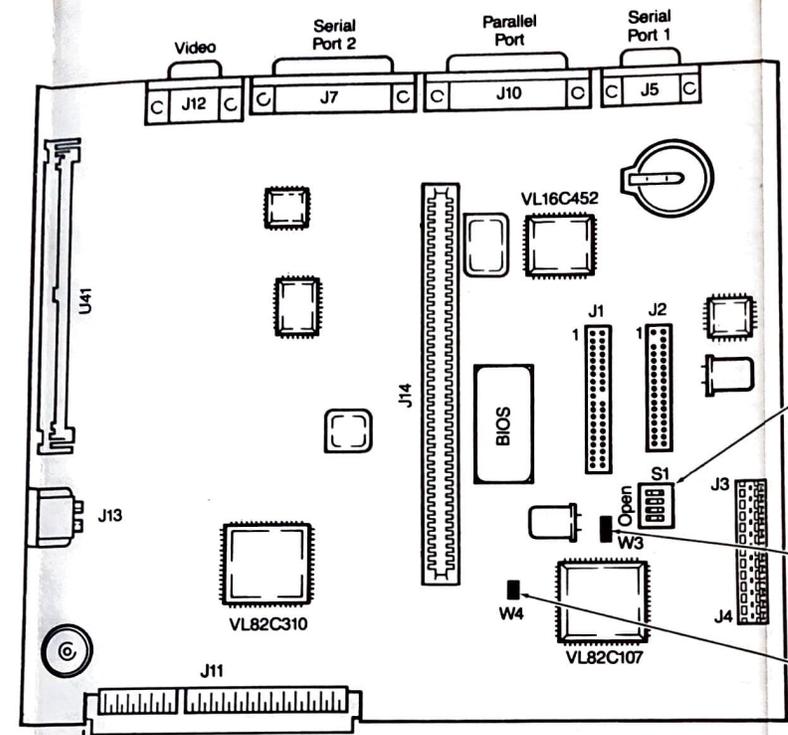
SYSTEM BOARD (continued)	
Communication Controller - 2 Serial Ports - 1 Parallel Port - Serial port decoding logic - Parallel port decoding logic	VL16C452
VGA controller	CIRRUS LOGIC CL-GD5320
Floppy Disk Drive controller	WD37C65
Hard Disk interface	AT-BUS
BIOS ROM (system and VGA) Access time	Intel 27C010 200 ns
System RAM - Standard - Optional - Access time - SIMM connectors	1MB soldered on mother motherboard Up to 8MB 80ns 2
ISA expansion slots	3: 2 full length 1 half length
Dimensions:- - System board:- Length Width Height - Processor board:- Length Width Height - Interconnect board:- Length Width Height	 242 mm 240 mm 17 mm 82 mm 121 mm 8 mm 152 mm 86 mm 18 mm

The items discussed in the previous table are shown in the following block diagram:-

Block diagram

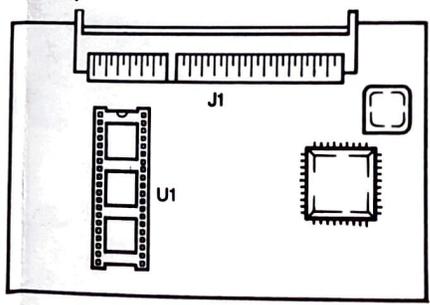


Strap Settings

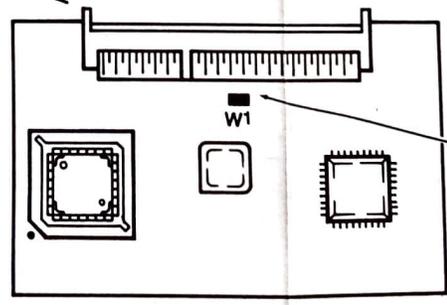


Switch	Closed	Open
S1-1	On-Board Memory Enabled	On-Board Memory Disabled
S1-2	On-Board Floppy Disabled	On-Board Floppy Disabled
S1-3	On-Board Video Disabled	On-Board Video Enabled
S1-4	Password Feature Enabled	Password Feature Disabled

- W3 Video Mode (Only for External CGA/MDA Card)
- Monochrome Mode
- Color Mode
- W4 Not Used



286 Module



386 Module

- W1 80387 SX Coprocessor
- Not Installed
- Installed

8.1.3. Connector Pin Assignment

J1 Floppy Disk Drive Connector (34-pin header)

Pin	Description
1	Ground
2	High density signal - HDI-n
3	Key
4	Loads the drive head - HDL-n
5	Ground
6	Not connected
7	Ground
8	Indicates head is at beginning of track - INDEX-n
9	Ground
10	Enables drive A motor - ROTA-n
11	Ground
12	Selects drive B - SELB-n
13	Ground
14	Selects drive A - SELA-n
15	Ground
16	Enables drive B motor - ROTB-n
17	Ground
18	Head direction, 0=in 1=out - DIR-n
19	Ground
20	Moves the head one track - STEP-n
21	Ground
22	Serial data to be written - WRDATA-n
23	Ground
24	Write gate - WRGATE
25	Ground
26	Indicates head is at track 0 - TRK0-n
27	Ground
28	Diskette is write protected - WRPROT-n
29	Ground
30	Serial data to be read - RDDATA-n
31	Ground
32	Selects head 0 or head 1 - SIDE-n
33	Ground
34	Indicates if drive door has been opened - DSKCHG

J2 Hard Disk Drive Connector (40-pin header)

Pin	Description
1	Initializes the Controller - HDRST-n
2	Ground
3	Hard Disk Drive System Data bus - HDS7 This bus is 16-bits wide, bidirectional and used for transferring status, data and control information between CPU and embedded hard disk drive controller.
4	Hard Disk Drive System Data bus - HDS8
5	Hard Disk Drive System Data bus - HDS6
6	Hard Disk Drive System Data bus - HDS9
7	Hard Disk Drive System Data bus - HDS5
8	Hard Disk Drive System Data bus - HDS10
9	Hard Disk Drive System Data bus - HDS4
10	Hard Disk Drive System Data bus - HDS11
11	Hard Disk Drive System Data bus - HDS3
12	Hard Disk Drive System Data bus - HDS12
13	Hard Disk Drive System Data bus - HDS2
14	Hard Disk Drive System Data bus - HDS13
15	Hard Disk Drive System Data bus - HSD1
16	Hard Disk Drive System Data bus - HSD14
17	Hard Disk Drive System Data bus - HSD0
18	Hard Disk Drive System Data bus - HSD15
19	Ground
20	Key
21	Not connected
22	Ground
23	Data is transferred to the disk - HDIOW-n
24	Ground
25	Data is transferred from the disk - HDIOR-n
26	Ground
27	Pulled low to lengthen cycles - HDIOCHRDY
28	Used to latch address HDA0-2 - HDALE
29	Not connected
30	Ground
31	Interrupt request - IDINT
32	Identifies width of the data - IOCS16-n
33	Used to address I/O ports 0-7 - HDA1
34	Not connected/ P-DIAG in master/slave mode
35	Used to address I/O ports 0-7 - HDA0
36	Used to select a task file - HDA2
37	Enables communication with registers - BHDCS0-n
38	Enables communication with registers - BHDCS1-n
39	Hard disk drive activity indicator - ACTIVE-n
40	Ground

J3 Power Connector (6-pin connector)

Pin	Description
1-2	Ground
3	- 5 V Power supply - Vee
4	+ 5 V Power supply - Vcc
5	+ 5 V Power supply - Vcc
6	+ 5 V Power Supply - Vcc

J4 Power Connector (6-pin connector)

Pin	Description
1	Power is good indication - PWRGOOD
2	+ 5 V Power supply - Vcc
3	+ 12 V Power supply - Vdd
4	- 12 V Power supply - Vgg
5-6	Ground

J5 Serial Port (9-pin D-type male connector)

Pin	Description
1	Data carrier detect - CD1
2	Receive data - RXDATA
3	Transmit data - TXDATA
4	Data terminal ready - DTR1
5	Ground
6	Data set ready - DSR1
7	Request to send - RTS1
8	Clear to send - CTS1
9	Ring indicator - RI1

J6 Optional Hard Disk LED Connector (2-pin)

Pin	Description
1	Not connected
2	LED driver external hard Disk controller - ACTIVE-n

J7 Serial Port (25-pin D-type male connector)

Pin	Description
1	Ground
2	Transmit data - TXDATA
3	Receive data - RXDATA
4	Request to send - RTS2
5	Clear to send - CTS2
6	Data set ready - DSR2
7	Ground
8	Data carrier detect - CD2
20	Data terminal ready - DTR2
22	Ring indicator - RI2

The pin numbers 9-19, 21, 23-25 are not connected

J8 Front Bezel Connector (8-pin connector)

Pin	Description
1-2	Output to power LED - PWRLED
3-4	Output to hard disk drive LED - HDLED
5-6	Output to external reset switch - EXTRESET
7-8	Output to Keyboard inhibit switch - KYBINHB

J9 Interconnect Board Connector

Pin	Description	Pin	Description
AM4	I/O channel check	BM4	Ground
AM3	Ground	BM3	Ground
AM2	System data 7	BM2	Hardware reset signal
AM1	+ 5 V Power supply	BM1	+ 5 V Power supply
A1	System data 6	B1	+ 5 V Power supply
A2	Ground	B2	Ground
A3	System data 5	B3	Interrupt request 9
A4	Ground	B4	Ground
A5	System data 4	B5	- 5 V Power supply
A6	- 5 V Power supply	B6	- 5 V Power supply
A7	System data 3	B7	DMA request 2
A8	Ground	B8	Ground
A9	System data 2	B9	- 12 V Power supply
A10	- 12 V Power supply	B10	- 12 V Power supply
A11	System data 1	B11	No extra wait states
A12	+ 12 V Power supply	B12	+ 12 V Power supply
A13	System data 0	B13	+ 12 V Power supply
A14	+ 12 V Power supply	B14	+ 12 V Power supply
A15	I/O channel ready	B15	Select
A16	Ground	B16	Ground
A17	Address enable	B17	System memory write
A18	Ground	B18	Ground
A19	System address 19	B19	System memory read
A20	+ 5 V Power supply	B20	+ 5 V Power supply
A21	System address 18	B21	I/O write action
A22	Ground	B22	Ground
A23	System address 17	B23	I/O read action
A24	Ground	B24	Ground
A25	System address 16	B25	DMA acknowledge 3
A26	+ 5 V Power supply	B26	+ 5 V Power supply
A27	System address 15	B27	DMA request 3
A28	Ground	B28	Ground
A29	System address 14	B29	DMA acknowledge 1
A30	Ground	B30	Ground
A31	System address 13	B31	DMA request 1
A32	+ 5 V Power supply	B32	+ 5 V Power supply
A33	System address 12	B33	Refresh trigger
A34	Ground	B34	Ground
A35	System address 11	B35	Clock
A36	Ground	B36	Ground
A37	System address 10	B37	Interrupt request 7
A38	+ 5 V Power supply	B38	+ 5 V Power supply
A39	System address 9	B39	Interrupt request 6
A40	Ground	B40	Ground
A41	System address 8	B41	Interrupt request 5
A42	Ground	B42	Ground
A43	System address 7	B43	Interrupt request 4
A44	+ 5 V Power supply	B44	+ 5 V Power supply
A45	System address 6	B45	Interrupt request 3
A46	Not connected	B46	Not connected
A47	Not connected	B47	Not connected
A48	System address 5	B48	DMA acknowledge 2
A49	System address 4	B49	Terminal count

A50	Ground	B50	Ground
A51	System address 3	B51	Address latch enable
A52	Ground	B52	Ground
A53	System address 2	B53	+ 5 V Power supply
A54	+ 5 V Power supply	B54	+ 5 V Power supply
A55	System address 1	B55	Oscillator 14.31818 MHz
A56	Ground	B56	Ground
A57	System address 0	B57	Ground
A58	Ground	B58	Ground
A59	System bus high enable	B59	Memory chip select 16
A60	+ 5 V Power supply	B60	+ 5 V Power supply
A61	Latchable address 23	B61	I/O chip select 16
A62	Ground	B62	Ground
A63	Latchable address 22	B63	Interrupt request 10
A64	Ground	B64	Ground
A65	Latchable address 21	B65	Interrupt request 11
A66	+ 5 V Power supply	B66	+ 5 V Power supply
A67	Latchable address 20	B67	Interrupt request 12
A68	Ground	B68	Ground
A69	Latchable address 19	B69	Interrupt request 15
A70	Ground	B70	Ground
A71	Latchable address 18	B71	Interrupt request 14
A72	+ 5 V Power supply	B72	+ 5 V Power supply
A73	Latchable address 17	B73	DMA acknowledge 0
A74	Ground	B74	Ground
A75	Memory read indication	B75	DMA request 0
A76	Ground	B76	Ground
A77	Memory write indication	B77	DMA acknowledge 5
A78	+ 5 V Power supply	B78	+ 5 V Power supply
A79	System data 8	B79	DMA request 5
A80	System data 9	B80	DMA acknowledge 6
A81	Ground	B81	Ground
A82	System data 10	B82	DMA request 6
A83	System data 11	B83	DMA acknowledge 7
A84	Ground	B84	Ground
A85	System data 12	B85	DMA request 7
A86	System data 13	B86	+ 5 V Power supply
A87	+ 5 V Power supply	B87	+ 5 V Power supply
A88	System data 14	B88	Master indication
A89	System data 15	B89	Ground
A90	Not connected	B90	Not connected

J10 Parallel Port (25-pin D-type female connector)

Pin	Description
1	Pulse that indicates the presence of data - STROBE-n
2	Parallel data bit 0 - PD0
3	Parallel data bit 1 - PD1
4	Parallel data bit 2 - PD2
5	Parallel data bit 3 - PD3
6	Parallel data bit 4 - PD4
7	Parallel data bit 5 - PD5
8	Parallel data bit 6 - PD6
9	Parallel data bit 7 - PD7
10	Printer acknowledge - PACK-n
11	Printer not ready to receive data - PBUSY
12	Printer is out of paper - PPE
13	Printer is selected - PSLCT
14	Indicates when to form feed the paper - AUTOFDXT
15	Indicates an error has been encountered - PERROR-n
16	Initializes the printer - INIT-n
17	Indicates the printer is selected - SLCTIN-n
18-25	Ground

J11 Processor Board Connector

Pin	Description	Pin	Description
1A	Bidir. CPU data bus 15	1B	+ 5 V Power supply
2A	Bidir. CPU data bus 14	2B	Ground
3A	Bidir. CPU data bus 13	3B	Coproc. chip select (286)
4A	Bidir. CPU data bus 12	4B	Ground
5A	Bidir. CPU data bus 11	5B	System address 4 (286)
6A	Bidir. CPU data bus 10	6B	Ground
7A	Bidir. CPU data bus 9	7B	+ 5 V Power supply
8A	Bidir. CPU data bus 8	8B	Ground
9A	Bidir. CPU data bus 7	9B	System address 2 (286)
10A	Bidir. CPU data bus 6	10B	Ground
11A	Bidir. CPU data bus 5	11B	System address 1 (286)
12A	Bidir. CPU data bus 4	12B	Ground
13A	Bidir. CPU data bus 3	13B	+ 5 V Power supply
14A	Bidir. CPU data bus 2	14B	Ground
15A	Bidir. CPU data bus 1	15B	I/O write action (286)
16A	Bidir. CPU data bus 0	16B	Ground
17A	Coprocessor busy	17B	I/O read action (286)
18A	Coprocessor reset	18B	Ground
19A	Coprocessor error status	19B	+ 5 V Power supply
20A	Coprocessor ext request	20B	I/O channel check (486)
21A	Memory read (486)	21B	A20 gate (386SX cache)
22A	Module ID bit 2	22B	Ground
23A	Hold request	23B	+ 5 V Power supply
24A	286/386SX ID bit	24B	Ground
25A	Powergood (386SX cache)	25B	CPU address bus 1
26A	Mem. write (386SX cache)	26B	Ground
27A	System ready indication	27B	SCAMP support
28A	Hold acknowledge	28B	Ground
29A	VL82C320 ready signal	29B	+ 5 V Power supply
30A	Interrupt request	30B	Ground

31A	CPU busy indication	31B	SCAMP support
32A	Processor ext request	32B	Ground
33A	386SX CPU reset	33B	Byte high enable
34A	Data/control indication	34B	Ground
35A	Write/read indication	35B	+ 5 V Power supply
36A	Memory/IO indication	36B	Ground
37A	Address status signal	37B	Refresh trigger (486)
38A	Module ID bit 1	38B	Ground
39A	CPU address bus 23	39B	Byte low enable (286 A0)
40A	CPU address bus 22	40B	Ground
41A	CPU address bus 21	41B	+ 5 V Power supply
42A	CPU address bus 20	42B	Ground
43A	CPU address bus 19	43B	Non maskable interrupt
44A	CPU address bus 18	44B	Ground
45A	CPU address bus 17	45B	Reset (486)
46A	CPU address bus 16	46B	Ground
47A	CPU address bus 15	47B	+ 5 V Power supply
48A	CPU address bus 14	48B	Ground
49A	CPU address bus 13	49B	Clock
50A	CPU address bus 12	50B	Ground
51A	CPU address bus 11	51B	Clock
52A	CPU address bus 10	52B	Ground
53A	CPU address bus 9	53B	+ 5 V Power supply
54A	CPU address bus 8	54B	Ground
55A	CPU address bus 7	55B	Tclock
56A	CPU address bus 6	56B	Ground
57A	CPU address bus 5	57B	Reserved
58A	CPU address bus 4	58B	Ground
59A	CPU address bus 3	59B	+ 5 V Power supply
60A	CPU address bus 2	60B	Ground

J12 Video Connector (15-pin D-type female connector)

Pin	Description
1	Red signal from DAC to monitor - RED_V
2	Green signal from DAC to monitor - GREEN_V
3	Blue signal from DAC to monitor - BLUE_V
4	Monitor ID Bit 2 - ID2
5-7	Ground
8-10	Not connected
11	Monitor ID bit 0 - ID0
12	Monitor ID bit 1 - ID1
13	Horizontal sync to monitor - HSYNC_V
14	Vertical sync to monitor - VSYNC_V
15	Not connected

J13 Keyboard Connector (5-pin DIN type female connector)

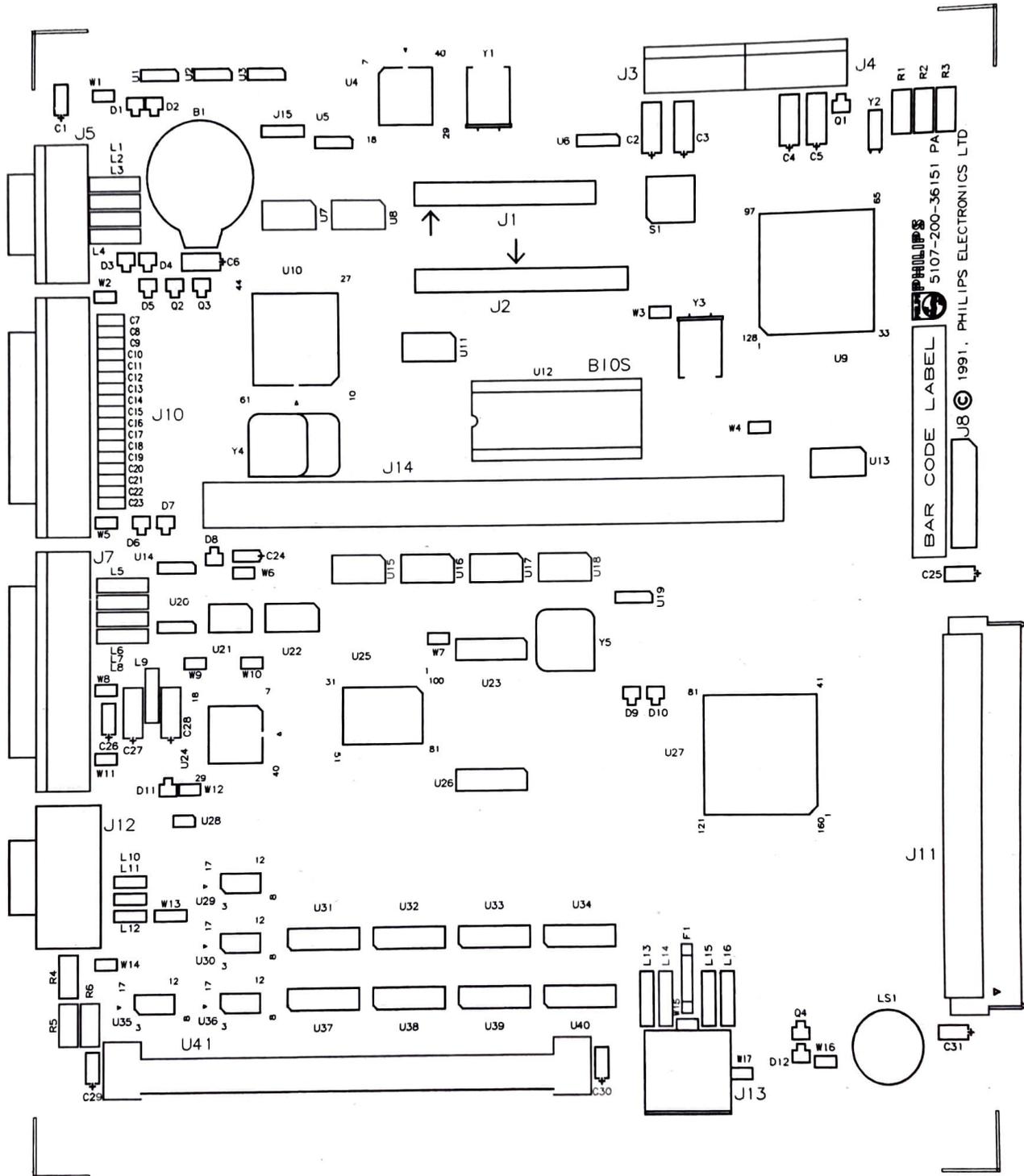
Pin	Description
1	Keyboard clock - KB_CLK
2	Serial data - KB_DATA
3	General reset - KB_RST
4	Ground
5	Power +5 Volts - Vcc

8.1.4.

Component Locator

8.1.4.1.

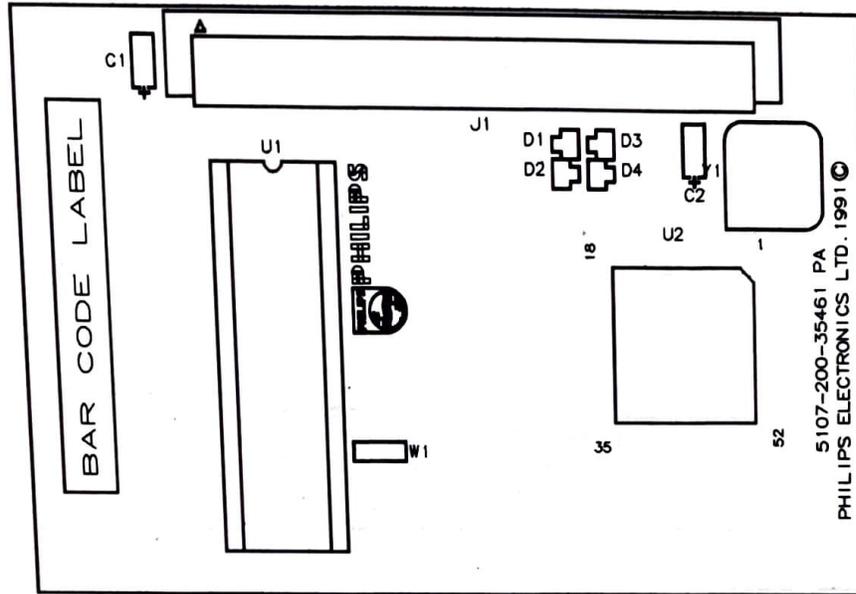
Motherboard



LOCATOR (TOP)

8.1.4.2.

Processor Module AT286/AT386SX-16



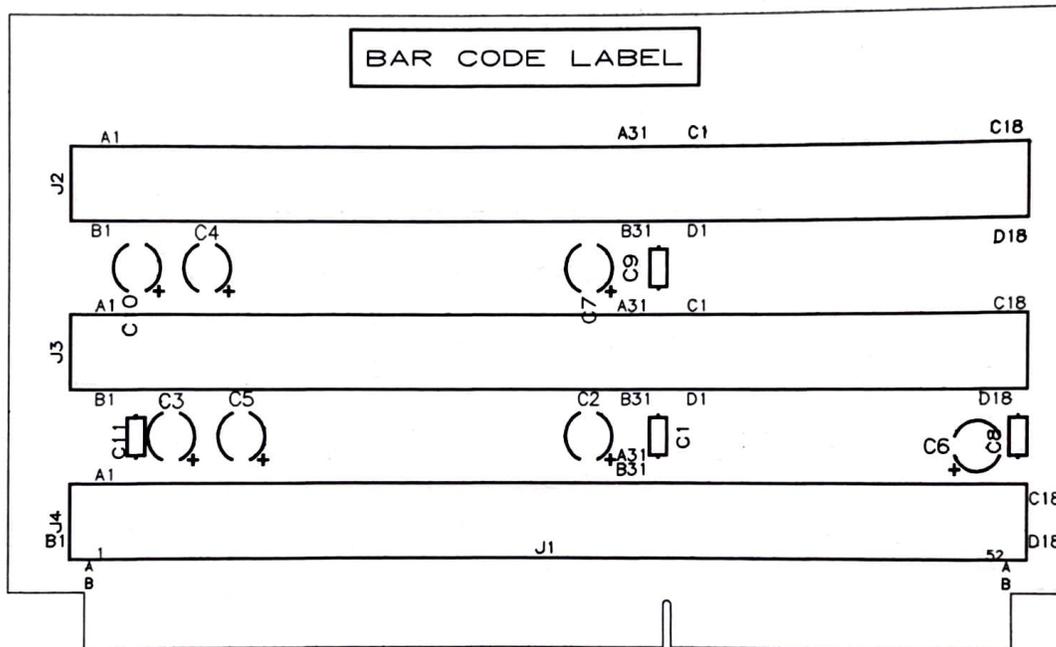
AT286-12 CPU module (top)

NOT AVAILABLE AT TIME OF PRINTING

AT386-16 CPU module (top)

8.1.4.3.

Interconnect Board Module



Interconnect Board (component side)

Note: This interconnect board module locator is applicable for AT286 and AT386SX systems.

CHAPTER 9. DEVICES

This section describes the floppy disk drives and hard disk drives that are used in the system.

9.1. Floppy Disk Drives

9.1.1. EPSON SMD300

The Epson SMD300 is a 3½ inch, high density drive that can handle normal density as well as high density diskettes. In the SETUP program the drive should be defined as: 3½" 1.44MB.

To format a normal density diskette, use one of the following commands (assumption is made that the 3½" drive is defined as drive A: and the operating system is MS-DOS 4.0):-

```
FORMAT A: /f:720
      or
FORMAT A: /n:9 /t:80
```

To format a high density diskette, use the following command (assumption is made that the 3½" drive is defined as drive A: and the operating system is MS-DOS 4.0):-

```
FORMAT A:
```

9.1.1.1. Technical Specifications: Epson SMD300

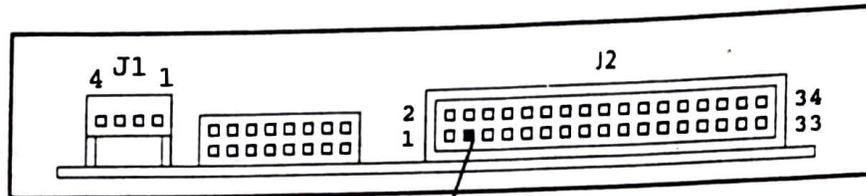
<u>SPECIFICATIONS</u>	<u>NORMAL DENSITY</u>	<u>HIGH DENSITY</u>
Unformatted Capacity (KB) :	1000	2000
Formatted Capacity (KB) :	720	1440
Nr of Sides :	2	2
Nr of Tracks :	80	80
Nr of Sectors :	18	9
Nr of Bytes/Sector :	512	512
Media Used :	3½ inch DD	3½ inch HD
Rotational Speed (RPM) :	300	300
Transfer Rate (Kbits/s) :	500	500
Track Density (TPI) :	135	135
Rec. Method :	MFM	MFM
Track to Track time (ms) :	3	3
Average Latency (ms) :	100	100
Settling Time (ms) :	15	15
Motor Start Time (ms) :	500	500
+5V power consumption (A) :	0.9	0.9
Dimensions (mm) :	101.5 x 149.5 x 25.4 mm	
Weight (mm) :	395 grams	

9.1.1.2. Connections: Epson SMD300

The Epson SMD 300 has two connectors:-

- J1 Power cable connector
- J2 Signal Interface Connector

Rear View:



Pin 3 is removed to prevent incorrect insertion

Connector J1: Power Connector

Pin	Description
1	+ 5 V Power Supply
2	+ 5 V Ground Return
3	Ground
4	not connected

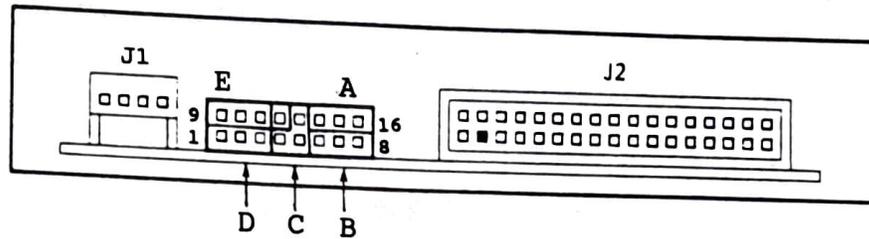
Connector J2: Control/Data Cable Connector

Pin	Description
2	Mode select
4	Spare/ In Use-n
6	Drive Select 4-n (not used)
8	Indicates the first sector of a track - INDEX-n
10	Drive Select 1-n (used)
12	Drive Select 2-n (not used)
14	Drive Select 3-n (not used)
16	Motor On-n
18	Head direction, 0=in 1=out - DIRECTION-n
20	Moves the head one track - STEP-n
22	Serial data to be written - WRITE DATA-n
24	Enables writes to disk - WRITE GATE-n
26	Indicates head is at track 0 - TRACK0-n
28	Diskette is write protected - WRITE PROTECT-n
30	Serial data that is read - READ DATA-n
32	Selects head 0 or head 1 - SIDE-n
34	Gives drive status - DISK CHANGE

All odd pins are used for ground return. Pin 3 is the KEY.

9.1.1.3. Strap Settings: Epson SMD300

The drive should always be strapped (strap 15-16) as drive 1.



- Block A: 14 15 16
 • ● ● Drive Select 1*
 ● ● ● Drive Select 0
- Block B: 6 7 8
 • ● ● Drive Select 2
 ● ● ● Drive Select 3
- Block C: 4 5 13
 • ● ● 1 MB / 2 MB from sensor*
 ● ● ● 1 MB / 2 MB from HDI input
- Block D: 1 2 3
 • ● ● 2 MB mode set by HDI = HI
 ● ● ● 2 MB mode set by HDI = LO*
- Block E: 9 Ground
 10,11 Read data test point
- Pin 12: Factory used test point

*= default

9.1.2. **SONY MP-F17W**

The Sony MP-F17W is a 3½ inch, high density drive that can handle normal density as well as high density diskettes. In the SETUP program the drive should be defined as: 3½" 1.44MB.

To format a normal density diskette, use one of the following commands (assumption is made that the 3½" drive is defined as drive A: and the operating system is MS-DOS 4.0):-

FORMAT A: /f:720
 or
FORMAT A: /n:9 /t:80

To format a high density diskette, use the following command (assumption is made that the 3½" drive is defined as drive A: and the operating system is MS-DOS 4.0):-

FORMAT A:

9.1.2.1. **Technical Specifications: Sony MP-F17W**

<u>SPECIFICATIONS</u>	<u>NORMAL DENSITY</u>	<u>HIGH DENSITY</u>
Unformatted Capacity (KB) :	1000	2000
Formatted Capacity (KB) :	720	1440
Nr of Sides :	2	2
Nr of Tracks :	80	80
Nr of Sectors :	18	9
Nr of Bytes/Sector :	512	512
Media used :	3½ inch DD	3½ inch HD
Rotational Speed (RPM) :	300	300
Transfer Rate (Kbits/s) :	500	500
Track Density (TPI) :	135	135
Rec. Density (Bits/inch) :	8717	17434
Rec. Method :	MFM	MFM
Dimensions (mm) :	101.5 x 149.5 x 25.4 mm	
Weight (mm) :	395 grams	

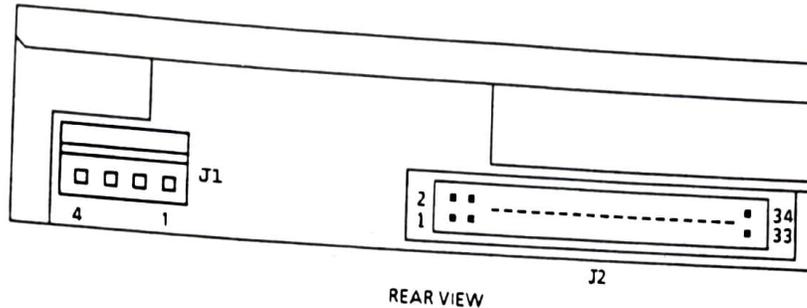
9.1.2.2.

Connections: Sony MP-F17W

The Sony MP-F17W has two connectors:-

- J1 Power cable connector
- J2 Signal Interface Connector

Rear View:



Connector J1: Power Connector

Pin	Description
1	+ 5 V Power Supply
2	+ 5 V Ground Return
3	Ground
4	not connected

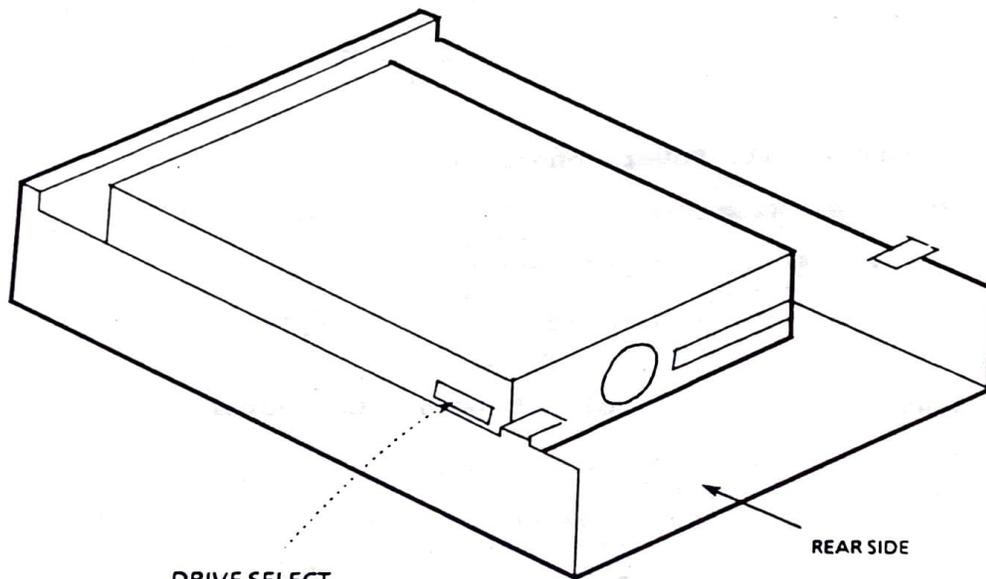
Connector J2: Control/Data Cable Connector

Pin	Description
2	Mode select
4	Spare/ In Use-n
6	Drive Select 4-n (not used)
8	Indicates the first sector of a track - INDEX-n
10	Drive Select 1-n (used)
12	Drive Select 2-n (not used)
14	Drive Select 3-n (not used)
16	Motor On-n
18	Head direction, 0=in 1=out - DIRECTION-n
20	Moves the head one track - STEP-n
22	Serial data to be written - WRITE DATA-n
24	Enables writes to disk - WRITE GATE-n
26	Indicates head is at track 0 - TRACK0-n
28	Diskette is write protected - WRITE PROTECT-n
30	Serial data that is read - READ DATA-n
32	Selects head 0 or head 1 - SIDE-n
34	Gives drive status - DISK CHANGE

All odd pins are used for ground return. Pin 3 is the KEY.

9.1.2.3. Strap Settings: Sony MP-F17W

Note: The drive should always be strapped as drive 1.



DRIVE SELECT



3 2 1 0

*

* DEFAULT

9.1.3. PANASONIC JU-475-4

The Panasonic JU-475-4 is a 5 1/4 inch, high density drive. In the SETUP program the drive should be defined as: 5 1/4" 1.2MB. It is not recommended that normal density diskettes (360 Kb) should be formatted or be written to in a high density, 5 1/4 inch drive. High density diskettes should be used when format or write functions are performed. In the following table the recommendation for diskette types is given:-

Disk Operation	360KB (DD) Diskette	1.2MB (HD) Diskette
Read	YES	YES
Write	NO	YES
Format	NO	YES

9.1.3.1. Technical Specifications: Panasonic JU-475-4

SPECIFICATIONS
 Unformatted Capacity : **HIGH DENSITY**
 Formatted Capacity : 1.6 MB
 1.2 MB

Nr of Sides : 2
 Nr of Tracks : 80
 Nr of Sectors : 15
 Nr of Bytes/Sector : 512

Used Media : 5 1/4 inch HD
 Rotational Speed : 360 RPM
 Transfer Rate : 500 Kbits/s
 Track Density : 96 TPI
 Recording Density : 9870 Bits/inch
 Recording Method : MFM

Track to Track access time : 3 msec
 Average Latency : 83 msec
 Settling Time : 15 msec
 Motor Start Time : 500 msec
 +5V power consumption : 0.5 A
 Weight : 1300 grams

Mechanical Dimensions Excluding front plate:-
 Width : 146.0 ± 0.5 mm
 Height : 41.8 mm (1.65 inches)
 Depth : 202 mm (7.95 inches)

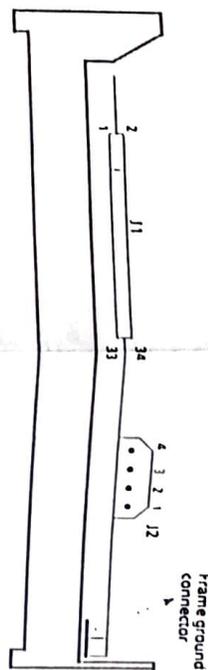
Mechanical Dimensions Including front plate:-
 Width : 194.4±0.5 mm
 Height : 41.5 ± 0.5 mm
 Depth : 207 mm (8.15 inches)

9.1.3.2. Connections: Panasonic JU-475-4

The Panasonic JU-475-4 has three connectors:-

- J1 Signal Interface Connector
- J2 AMP power cable connector
- Frame ground connector

Rear View:-



Connector J2: AMP power cable connector

- | Pin | Description |
|-----|----------------------|
| 1 | + 12 V Power Supply |
| 2 | + 12 V Ground Return |
| 3 | + 5 V Ground Return |
| 4 | + 5 V Power Supply |

Connector J1: Signal Interface Connector

- | Pin | Description |
|-----|---|
| 2 | Mode select |
| 4 | Spare/ In Use-n |
| 6 | Drive Select 4-n (not used) |
| 8 | Indicates the first sector of a track - INDEX-n |
| 10 | Drive Select 1-n (used) |
| 12 | Drive Select 2-n (not used) |
| 14 | Drive Select 3-n (not used) |
| 16 | Motor On-n |
| 18 | Head direction, 0=in 1=out - DIRECTION-n |
| 20 | Moves the head one track - STEP-n |
| 22 | Serial data to be written - WRITE DATA-n |
| 24 | Enables writes to disk - WRITE GATE-n |
| 26 | Indicates head is at track 0 - TRACK0-n |
| 28 | Diskette is write protected - WRITE PROTECT-n |
| 30 | Serial data that is read - READ DATA-n |
| 32 | Selects head 0 or head 1 - SIDE-n |
| 34 | Gives drive status - DISK CHANGE |

All odd pins are used for ground return.

9.2. Hard Disk Drives

9.2.1. SEAGATE ST157A

The Seagate ST157A hard disk drive is a 1" high, 3½" random access storage device incorporating an IDE interface. The drive is autoparked/locked when the system is powered down. To have this drive operate in the system, drive type 25 must be chosen in the SETUP program.

9.2.1.1. Technical Specifications: Seagate ST157A

PHYSICAL CONFIGURATION:-

Formatted Capacity :	43MB
Nr. of sectors :	84084
Sectors per track :	26
Sectors per cylinder :	156
Bytes per sector :	512
Bytes per track :	13312
Bytes per Cylinder :	79872
Tracks :	3234
Cylinders :	539
Read/Write heads :	6
Nr. of disks :	3

TRANSLATE CONFIGURATION:-

Formatted Capacity :	42.5MB
Nr. of sectors :	83215
Sectors per track :	17
Sectors per cylinder :	85
Bytes per sector :	512
Bytes per track :	8704
Bytes per Cylinder :	43520
Tracks :	4895
Cylinders :	977
Read/Write heads :	5
Nr. of disks :	3

FUNCTIONAL SPECIFICATIONS:-

Interface :	Embedded AT (IDE)
Recording Method :	2,7 RLL
Spindle Speed :	3600 RPM ±0.5%
Track density :	824

PHYSICAL DIMENSIONS:-

Height :	41.4 mm (1.63 inches)
Width :	102.1 mm (4.02 inches)
Depth :	146.6 mm (5.77 inches)
Weight :	0.73 Kg (1.6 lbs)

PERFORMANCE SPECIFICATIONS:-

Track to track seek :	8 msec (10 msec. max)
Average seek :	28 msec (30 msec. max)
Full-stroke seek :	70 msec (75 msec. max)
Average Latency :	8.33 msec

DC POWER REQUIREMENTS:-

Voltage :	<u>12 VDC ±5%</u>	<u>5 VDC ±5%</u>
Max. Current at power-up :	2.0 Amps	-
RMS current at power-up :	1.5 Amps	-
Peak max. (seeking) :	1.4 Amps	1.4 Amps
RMS max. (seeking) :	0.9 Amps	1.2 Amps
RMS typ. (seeking) :	0.6 Amps	1.0 Amps
RMS max. (non-seeking) :	0.5 Amps	1.1 Amps
RMS typ. (non-seeking) :	0.35 Amps	0.9 Amps
Power typical:	-	9 Watts

9.2.1.2. Connections: Seagate ST157A

The Seagate ST157A has two connectors:-

- J1 AT-Bus Interface Connector
- J3 Power Supply Connector

Connector J3: Power Supply Connector

Pin	Description
1	+ 12V Power Supply
2	+ 12V Ground Return
3	+ 5V Ground Return
4	+ 5V Power Supply

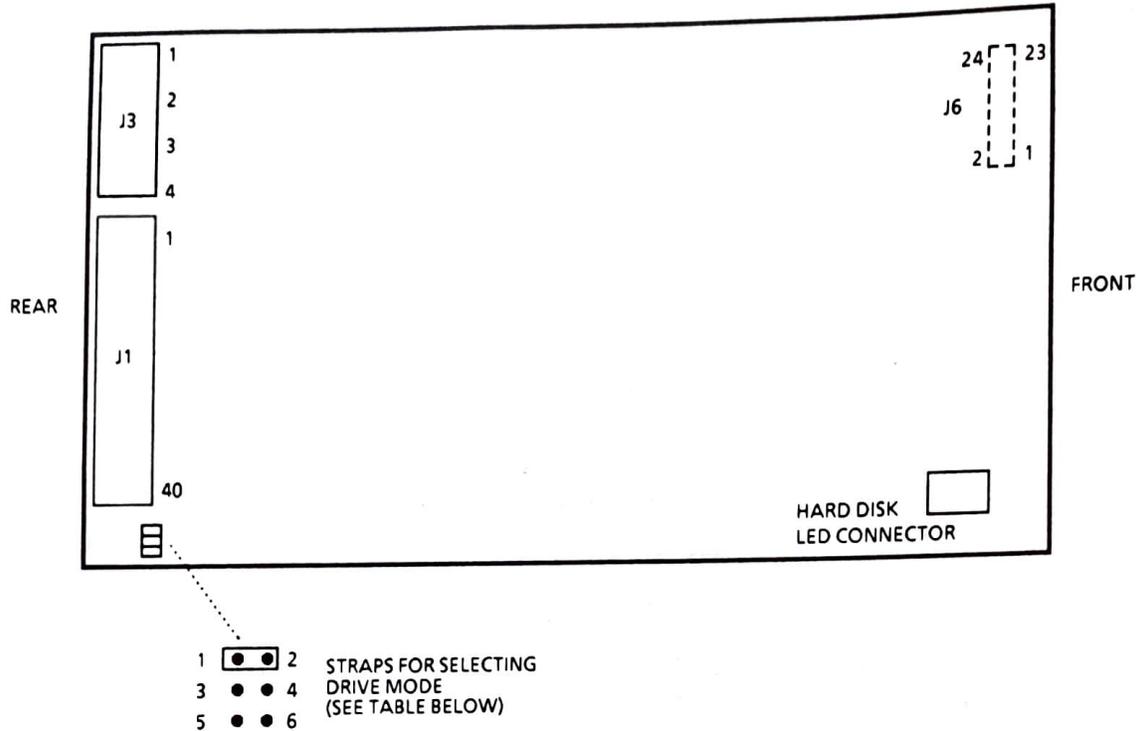
Connector J1: AT-Bus Interface Connector

Pin	Description
1	Initializes the Controller - RESET-n
3	Hard Disk Drive System Data bus - HD7
4	Hard Disk Drive System Data bus - HD8
5	Hard Disk Drive System Data bus - HD6
6	Hard Disk Drive System Data bus - HD9
7	Hard Disk Drive System Data bus - HD5
8	Hard Disk Drive System Data bus - HD10
9	Hard Disk Drive System Data bus - HD4
10	Hard Disk Drive System Data bus - HD11
11	Hard Disk Drive System Data bus - HD3
12	Hard Disk Drive System Data bus - HD12
13	Hard Disk Drive System Data bus - HD2
14	Hard Disk Drive System Data bus - HD13
15	Hard Disk Drive System Data bus - HD1
16	Hard Disk Drive System Data bus - HD14
17	Hard Disk Drive System Data bus - HD0
18	Hard Disk Drive System Data bus - HD15
20	Key
21	Not connected
23	Data is transferred to the disk - HDIOW-n
25	Data is transferred from the disk - HDIOR-n
27	Pulled low to lengthen cycles - HDIOCHRDY
28	Used to latch address HDA0-2 - HDALE
29	Not connected
31	Interrupt request - IDINT
32	Identifies width of the data - IOCS16-n
33	Used to address I/O ports 0-7 - HDA1
34	Not connected/ P-DIAG in master/slave mode
35	Used to address I/O ports 0-7 - HDA0
36	Used to select a task file - HDA2
37	Enables communication with registers - BHDCS0-n
38	Enables communication with registers - BHDCS1-n
39	Hard disk drive activity indicator - ACTIVE-n

Pins 2, 19, 22, 24, 26 and 30 are used for ground return.

9.2.1.3.

Strap Settings: Seagate ST157A



The three straps on the drive are used to configure the drive in one of three possible modes. These modes are detailed in the following table:-

Jumper	Only Drive in the system *	Master in dual drive configuration	Slave in dual drive configuration
1-2	in	in	out
3-4	out	in	in
5-6	out	out	out

Note: * = default

9.2.2.

MINISCRIBE 8051A

The Miniscribe 8051A hard disk drive is a 42MB (formatted), half-height 3½" random access storage device with an integrated AT controller. The drive is autoparked/locked when the system is powered down. To have this drive operate in the system, drive type 24 must be chosen in the SETUP program.

9.2.2.1.

Technical Specifications: Miniscribe 8051A

Format Specifications:

Unformatted capacity:	51,315,600 bytes
Formatted capacity:	42,721,280 bytes
Formatted Bytes per sector:	512
Formatted Bytes per track:	14,336
Sectors per track:	28
Number of Disks:	2
Recording Heads:	4
Cylinders:	745
Sectors:	83,440
Tracks:	2,980

Functional Specifications:

Track density:	1,109 TPI
Flux density:	15,468 FCI
Recording density:	23,202 BPI
Data encoding:	2,7 RLL

Performance Specifications:

Rotational rate:	3,484 RPM
Data transfer rate (host):	Max. 4.0MB per sec
Data transfer rate (disk):	1.0MB per sec
Average rot. latency:	8.61 msec
Single track seek:	8 msec
Average seek:	28 msec
Full stroke seek:	50 msec
Max. head switch time:	5 msec
Start-up time:	15 sec
Stop time:	15 sec

Power Requirements:

Voltage:	+12V DC	+5V DC
Tolerance:	±5%	±5%
Start Surge:	1.5 Amps	-
Current:		
Typical (idle)	.45 Amps	.45 Amps
Power Dissipation:		8.0 Watts

Physical Characteristics:

Height:	41.3 mm (1.625 inches)
Width:	101.6 mm (4.0 inches)
Depth:	146.0 mm (5.75 inches)
Weight:	0.88 kg (1.5 lbs)

9.2.2.2. Connections: Miniscribe 8051A

The Miniscribe 8051A has three connectors:-

- J1 AT-Bus Interface Connector
- J3 Power Supply Connector
- J9 LED Activity Indicator Connector

Connector J1: AT-Bus Interface Connector

Pin	Description
1	Initializes the Controller - RESET-n
3	Hard Disk Drive System Data bus - HD7
4	Hard Disk Drive System Data bus - HD8
5	Hard Disk Drive System Data bus - HD6
6	Hard Disk Drive System Data bus - HD9
7	Hard Disk Drive System Data bus - HD5
8	Hard Disk Drive System Data bus - HD10
9	Hard Disk Drive System Data bus - HD4
10	Hard Disk Drive System Data bus - HD11
11	Hard Disk Drive System Data bus - HD3
12	Hard Disk Drive System Data bus - HD12
13	Hard Disk Drive System Data bus - HD2
14	Hard Disk Drive System Data bus - HD13
15	Hard Disk Drive System Data bus - HD1
16	Hard Disk Drive System Data bus - HD14
17	Hard Disk Drive System Data bus - HD0
18	Hard Disk Drive System Data bus - HD15
20	Key
21	Not connected
23	Data is transferred to the disk - HDIOW-n
25	Data is transferred from the disk - HDIOR-n
27	Pulled low to lengthen cycles - HDIOCHRDY
28	Used to latch address HDA0-2 - HDALE
29	Not connected
31	Interrupt request - IDINT
32	Identifies width of the data - IOCS16-n
33	Used to address I/O ports 0-7 - HDA1
34	Not connected/ P-DIAG in master/slave mode
35	Used to address I/O ports 0-7 - HDA0
36	Used to select a task file - HDA2
37	Enables communication with registers - BHDCS0-n
38	Enables communication with registers - BHDCS1-n
39	Hard disk drive activity indicator - ACTIVE-n

Pins 2, 19, 22, 24, 26 and 30 are used for ground return.

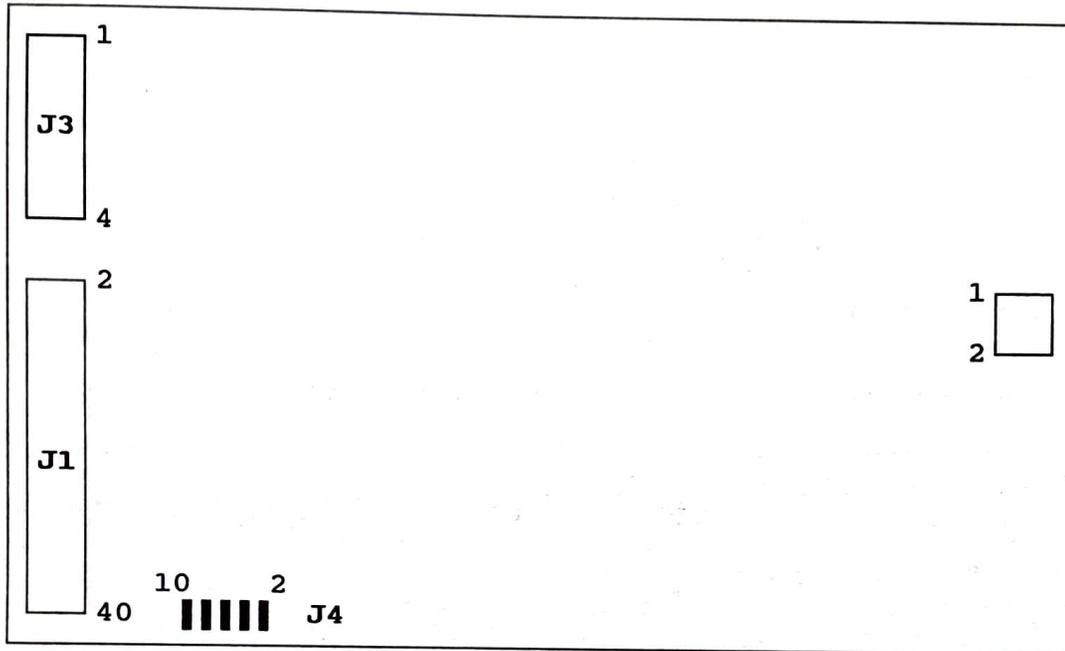
Connector J3: Power Supply Connector

Pin	Description
1	+ 12V Power Supply
2	+ 12V Ground Return
3	+ 5V Ground Return
4	+ 5V Power Supply

Connector J9: LED Activity Indicator Connector

Pin	Description
1	Active-N
2	+ 5V

9.2.2.3. Strap Settings: Miniscribe 8051A



Description	Jumper Block J4				
	9-10	7-8	5-6	3-4	1-2
I/O Channel Ready: Not connected to Host Connected to Host	out* in				
Reserved		out*			
Dual Drive Master Dual Drive Slave Only Drive in System			in out out*		
Normal Interleave 2:1 Interleave Emulation				out* in	
Drive is Master Drive is Slave					out* in

- Notes:
- * indicates default
 - A spare jumper may be shipped between J4.1 and J4.3

9.3. CD-ROM Drives

9.3.1. CDU-531

The CDU-531 is a drive unit for CD-ROM discs, which store 540MB of digital data.

9.3.1.1. Technical Specifications CDU-531

Software Specifications:

The data on discs should be in one of the following formats:-

- High Sierra Group (HSG)
- ISO-9660

Hardware Specifications:

General:-

Disc Diameters: 12 cm or 8 cm

Drive Performance:-

Rotation Speed inner track: 530 rpm at CLV = 1.4 m/sec
Rotation Speed outer track: 200 rpm at CLV = 1.2 m/sec
Access time full stroke: 0.7 sec
Access time average: 0.4 sec
Data transfer sustained rate: 150 KB/sec
Data transfer burst rate: 600 KB/sec

Reliability:-

Read error rate (including 5 retries)

L-EC on: 1 Block / 10^{12} bits
L-EC off: 1 Block / 10^9 bits

Audio:-

Output level Line Out: 0.5 V at 47Ω
Output level Headphone: 0.55 V at 32Ω

Dimensions and weight:-

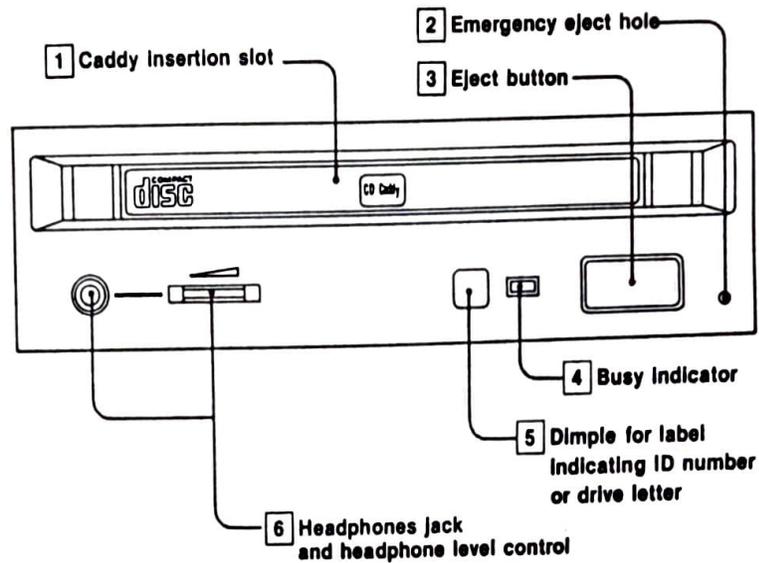
Dimensions (w/h/d): 146x41x203 mm
Weight: 1.3 Kg

Power Requirements:-

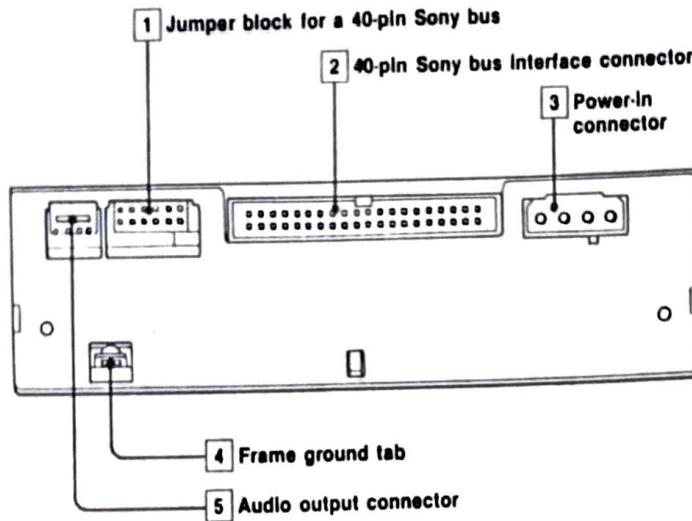
Voltage: +5V \pm 5% DC and +12V DC +10%, -5%
Ripple: +5V: 0.05Vp-p at 500mA
+12V: 0.1Vp-p at 800mA
Current: +5V: 500mA
+12V: 800mA at Read and Seek
1500mA at Spin-up

9.3.1.2.

Front Panel CDU-531

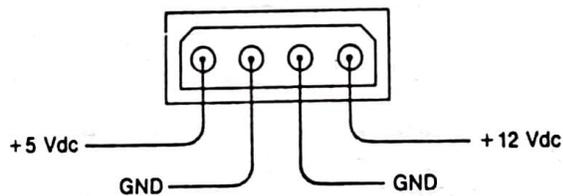


1. **Caddie insertion slot:** Accepts a caddie loaded with a CD-ROM disc.
2. **Emergency eject hole:** Insert a rod here to eject a caddie manually.
3. **Eject button:** Ejects the caddie from the drive unit.
4. **Busy indicator:** Lights while data is read from the disc; blinks during seek operations
5. **Dimple for label indicating ID number or drive letter:** Place the supplied drive number label here.
6. **Headphones jack and headphone level control:** Connect headphones to the headphones jack and adjust the volume with this headphone level control.



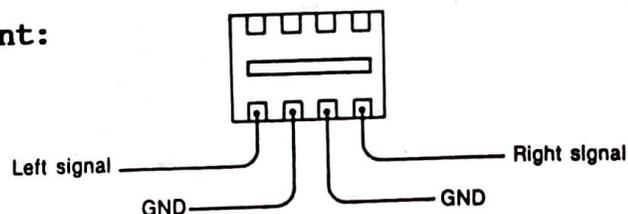
1. **Jumper block for a 40-pin Sony bus:** Specify assignment of the Sony bus.
2. **40-pin Sony bus interface connector:** Connects the CDU-531 to the host adapter using a connecting cable.
Cable Type: RK-B70F or RK-B20F
3. **Power-in Connector:** Connects the CDU-531 to the power supply within the computer
Contacts: Molex 89880-03
Housing: Molex 8981-04P

Pin Assignment:



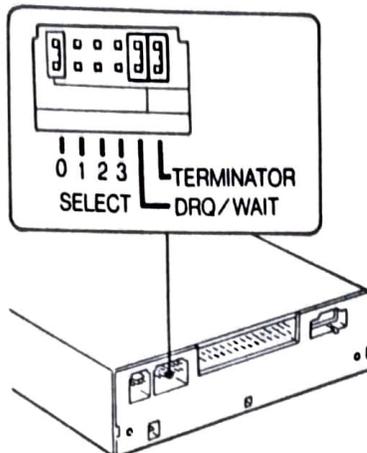
4. **Frame ground tab:** Grounds the CDU-531 to the host computer when the drive frame itself is not in direct contact with the computer
5. **Audio output connector:** Audio Output for the CDB-241 host adapter card (refer to 9.4.).
Type: Molex 08-50-0113

Pin Assignment:



9.3.1.4. Strap Settings: CDU-531

Default strap settings for a one drive unit:



SELECT 0, 1, 2, 3:

It is important that only one jumper is set to ON per drive. If more than one CD-ROM drive is used, not more than one drive should have the same number jumper ON.

Drive Number	Jumper Settings			
	SELECT 0	SELECT 1	SELECT 2	SELECT 3
0	ON	OFF	OFF	OFF
1	OFF	ON	OFF	OFF
2	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	ON

DRQ/WAIT:

Set to ON unless otherwise instructed by the manual of your application software

TERMINATOR:

Set to ON, when you install one drive in the system. When more than one internal drive in a daisy-chain is installed, set to ON for the last drive and to OFF for all other drives.

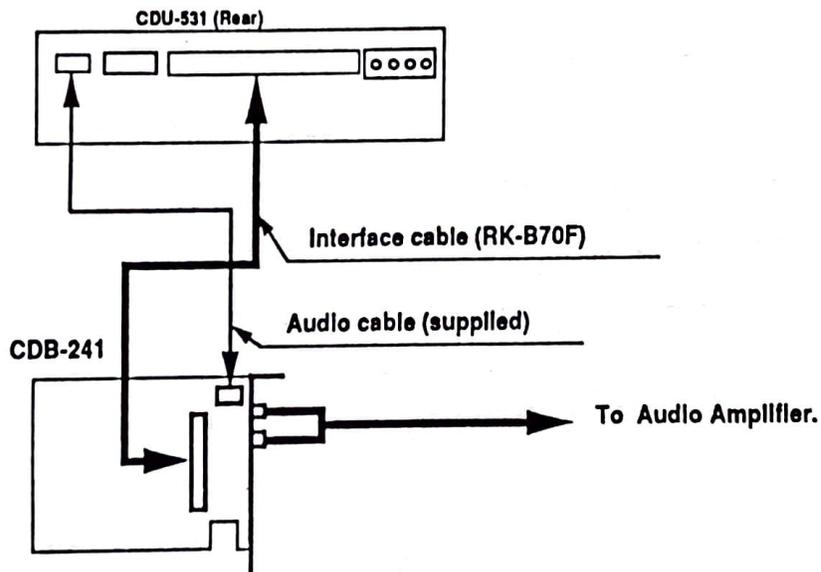
9.4. CDB-241 CD-ROM Host Adapter Card

The CDB-241 is a half-size printed circuit board connecting a SONY CDU-531 CD-ROM drive to a host computer.

9.4.1. Connections CDB-241

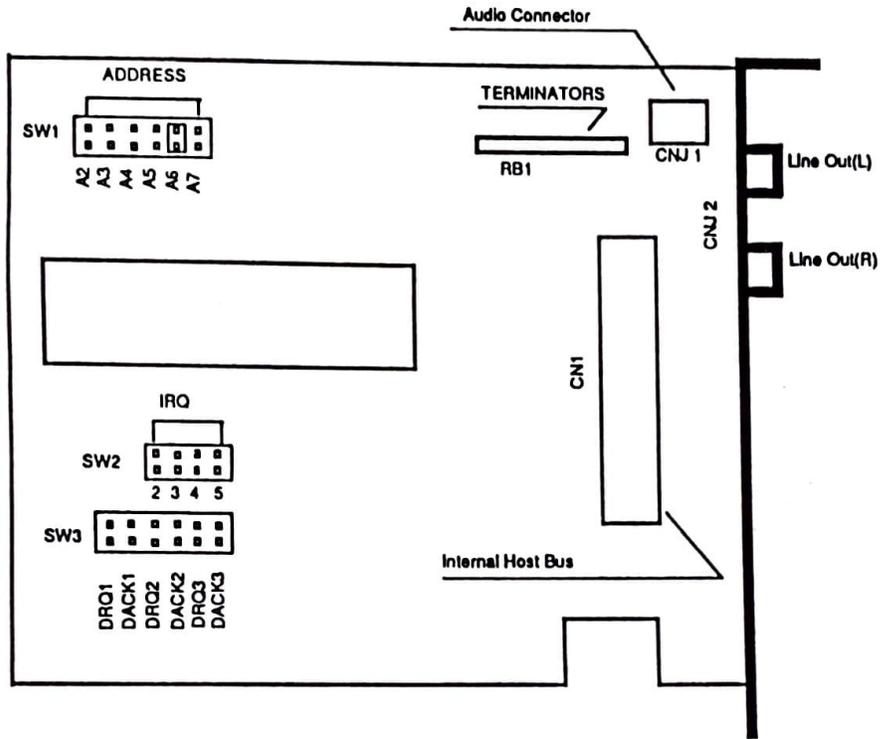
After installing the drive and this card, connect the drive and the card as follow:-

1. Connect the AUDIO OUT connector of the drive and CNJ1 of the card using a supplied audio cable.
2. Connect the INTERFACE CONNECTOR of the drive and the CN1 of the card using an optional Interface cable (type RK-B70F or RK-B20F).



9.4.1.1

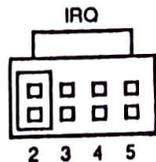
Strap Settings CBD-241.



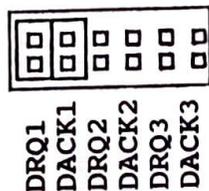
SW1: I/O Base Address

	I/O 300h		I/O 350h
	I/O 310h		I/O 360h
	I/O 320h		I/O 370h
	I/O 330h		I/O 380h
	I/O 340h (default)		I/O 390h

SW2: IRQ Select



SW3: DRQ / DACK Select

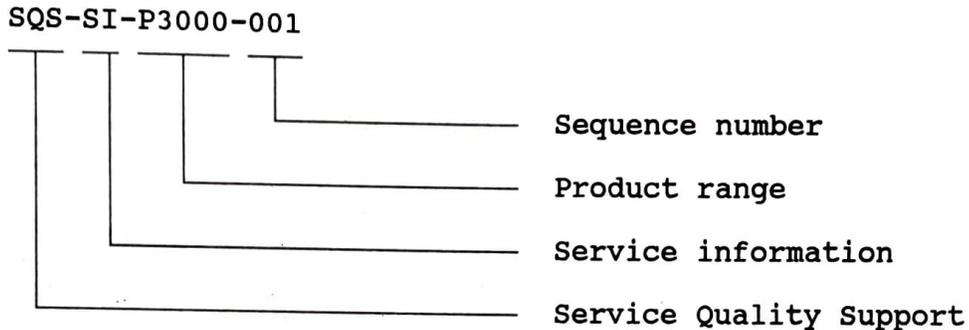


CHAPTER 10. MODIFICATION

In this chapter a description of the procedure used for publishing modification data and supplements to the service manual is given as well as a modification history about the system itself.

10.1. General Information

All modification data and supplements to the service manual are published via Service Information bulletins. Each Service Information has a unique number, for example:



A Service Information bulletin consists of a yellow front sheet which can be followed by supplementary and/or replacement sheets.

Replacement sheets replace existing sheets in the service manual. These sheets are identified by an additional letter after the page number, for example 5-1a. Page 5-1a in this case takes the place of Page 5-1.

Supplementary sheets are inserted between the existing sheets in the service manual. These sheets can be identified by an additional figure after the page number, for example 5-1-1. Sheet 5-1-1 should then be inserted after page 5-1.

Each Service Information also contains an updated table of contents as well as a new modification history, which keeps track of all the modifications that were implemented.

The boards in a complete system all have a 12NC number. If something is changed in the design of one of these boards, the last digit of the 12NC number of that board is increased by one. In the case of a complete revision (new artwork) of the board, the 12NC number can change completely.

Examples:

5107 200 35242	_____	Original 12NC
5107 200 35243	_____	New revision level
5107 200 36401	_____	New artwork