



Sun Moon Star

SMS PC-1116N /1112N

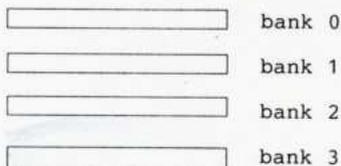
***NEAT MAINBOARD
USER'S MANUAL***

PREFACE

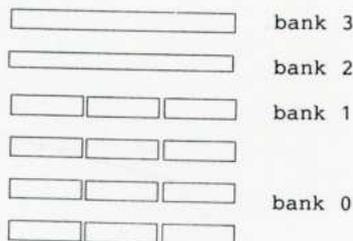
Preface:

SMS-PC-1116N/1112N has developed into two versions, one is the C4B version, and the other is the C45 version, the major difference between the two versions is Memory Configuration. Otherwise, both version are the same in concepts and operation. In this manual, the C45 version is called the revised version, and C4B version is standard version. The following figure illustrates the difference between their memory configurations.

SMS-PC-1116N/1112N (C4B Version)



SMS-PC-1116N/1112N (C45 Version)



NOTE:

This manual is written for both the SMS-PC-1116N and 1112N. The main difference between them is CPU speed, although their operating procedures and functions are identical.

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CHAPTER 1

SMS-1116N NEAT SPECIFICATIONS

1-1 STANDARD FEATURES:

- * 80286 running at dual speeds of 10/16 MHZ switchable by keyboard command, hardware, or software.
- * Landmark 0.99 SPEED running at 21 MHZ.
- * Socket for optional 80287 math coprocessor.
- * Intelligent Battery Protected Circuit (IBPC)
- * 8/10 MHZ 80287 numeric coprocessor hardware selectable.
- * Separate CPU and AT Bus Clock to maintain I/O compatibility
- * Up to 5MB of RAM on-board with slim type RAM MODULE & DIP RAM
- * Additional slot for memory card which can use 41256, 411024, or 44256 DIP type DRAM chips.
- * Page interleaved DRAM mode allowing usage of inexpensive DRAMS and increasing memory access speed.
- * Standard 64K (27256 x 2) of ROM.
- * 15 Level interrupt (IRQ).
- * 7 Channel Direct Memory Access (DMA).
- * Programmable Shadow RAM Capability. Shadow RAM for BIOS and VIDEO BIOS for up to 3-4 times performance improvement when using BIOS calls.
- * Supports Lotus/Intel/Microsoft Expanded Memory System (LIM-EMS V4.0) Address Translation Logic. Optimized for OS/2 operation.
- * Fully IBM PC/AT compatible bus architecture.
 - Six slots for IBM PC/AT 16-bit bus
 - Two slots for IBM PC 8-bit bus
- * Provides LED connector for speed indication.
- * Provides hardware reset function.
- * Real time clock/calendar and rechargeable battery on board.

1-2 ADVANCED FEATURE SUMMARY:

(1) RAM TYPE: (A) for C4B Version (Standard Version)

Provides both DIP DRAM & RAM MODULE TYPES
for use (available now)

On-board.....41256 or 411024 RAM MODULE
up to 8MB

Expansion Card.....41256 or 411024 DIP RAM
up to 8MB

(B) for C45 Version (Revised Version), you will be able to use.

On-board.....use 44256 & 41256 DIP RAM to
replace RAM MODULE at the
same mother board

(2) SPEED:

Separate CPU and AT Bus Clock
I/O Bus Clock.....8MHZ (10MHZ optional)
CPU Clock.....16MHZ/10MHZ/8MHZ/5MHZ

SMS-PC-1116N allows you to reduce the speed of CPU
50-25%. So, your system speed can be set as low
as 8MHZ, or 5MHZ by softkey.

(3) INTELLIGENT BATTERY PROTECTED CIRCUIT (IBPC)

Generally, a built-in battery is charged when the
power is on regardless of the voltage level of battery.
This action will damage the nickel battery after
100hrs.

SMS-pc-1116N provides an extra circuit using NE555
to hold the recharge voltage level thereby extending
the battery life.

(4) EMS (EXTENDED MEMORY SYSTEM):

Provides detailed information about how to set EMS parameters and shadow RAM function in our user's manual.

(5) 80287 SPEED:

3 Jumpers allow you to select either a 6MHZ, 8MHZ or 10MHZ clock to suit your co-processor operation.

CHAPTER 2

SYSTEM BOARD OVERVIEW

2.1 SYSTEM COMPONENTS:

This chapter introduces the SMS-PC-1116N NEAT Mainboard hardware and its built-in component functions.

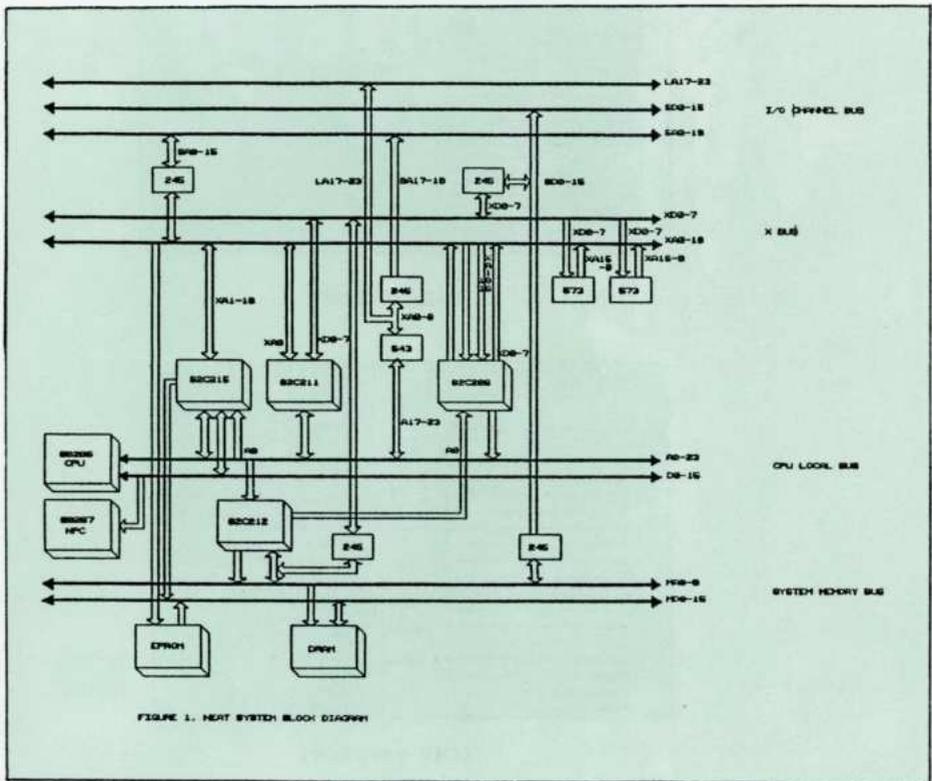
SMS-PC-1116N NEAT Mainboard was developed around VLSI modules such as the Harris or the Intel 80286-16 high performance CPU and the C&T CS8221 NEAT/286 chipset.

The following are major components of SMS-UPAC NEAT-286 Mainboard.

- * 80286-16 CPU
- * 82C211 CPU/Bus Controller
- * 82C212 Page/Interleave and EMS Memory Controller
- * 82C215 Data/Address buffer
- * 82C206 Integrated Peripherals Controller (IPC)
- * 8042 Keyboard controller

There are 4 chips on board excluding 80286 CPU and 8042.

2.2 BLOCK DIAGRAM:



3-2 ON-BOARD JUMPER/CONNECTOR SETTING:

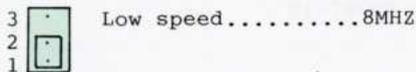
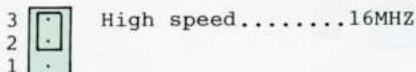
DISPLAY TYPE: JP1

JP1 is set according to the monitor display desired by the user.

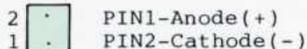


TURBO SW:

It allows you to change the CPU speed easily.



TURBO LED:



RESET JUMPER:

Shorting these pins will reset system

SPEAKER:

- 1 Speaker data out
- 2 GND
- 3 N.C.
- 4 +5V DC

COPROCESSOR SPEED SELECTING: JP4

JP4 allows users to select from different speeds to suit their 80287 coprocessor.



10M
8M



10M
8M

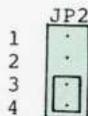
for 80287-8

for 80287-10

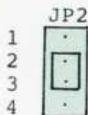
EXTERNAL BATTERY: JP2

- 1 +DC (External)
- 2 GND (Internal)
- 3 GND
- 4 GND

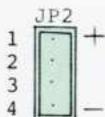
To take advantage of our newly designed Intelligent Battery Protected Circuit (IBPC), the external battery signals are defined differently.



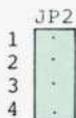
3-4 close,
Factory setting



2-3 close,
Normal setting



If you want to use an external battery, remove the mini-Jumper, and plug 4 pins External Battery Jumper to JP2.



To discharge the real-time CMOS RAM and lose the previous data installed on 82C206 chips, please remove the mini-Jumper on pins 2-3.

* 2-3 close = means shorting both pins.

POWER LED/KEYLOCK:

1. POWER LED(+)
2. N.C.
3. GND
4. KEYLOCK
5. GND

Turning the Keylock to the Locked position will inhibit the hardware reset function.

KEYBOARD CONNECTOR:

1. KEYBOARD CLOCK
2. KEYBOARD DATA
3. N.C.
4. GND
5. +5V DC

POWER SUPPLY CONNECTOR:

PS1

1	POWER GOOD
2	+5V
3	+12V
4	-12V
5	GND
6	GND

PS2

1	GND
2	GND
3	-5V
4	+5V
5	+5V
6	+5V

3-3 CHANGING CPU SPEED:

SMS-PC-1116N Mainboard will boot up at the speed set by the set-up program. The user may toggle the CPU speed by pressing "CTRL", "ALT", "+", or "CTRL", "ALT", "-" simultaneously.

Press:

"CTRL", "ALT", "+".....divide clock signal by 2.
"CTRL", "ALT", "-".....switch to low speed.

FOR EXAMPLE: current speed = 16MHZ

1. Press "CTRL", "ALT", "-"..... 10MHZ
(If you want to retain 16MHZ, press the same keys again)
2. Press "CTRL", "ALT", "+"..... 5MHZ
(If you press "CTRL", "ALT", "+" after this action, speed = 8MHZ)
3. Press "CTRL", "ALT", "+" again..... 10MHZ
4. Press "CTRL", "ALT", "-".....16MHZ

CHAPTER 4 MEMORY INSTALLATION

4.1 INTRODUCING:

The SMS-PC-1116N NEAT Mainboard uses a version of the DRAM MODULE called a sip (Single In-line Pin) that is equivalent in function to the more common SIM (Single In-line Memory) Module. The SIP modules used by SMS-PC-1116N can be either 256KB or 1MB size and can be combined in a variety of ways to obtain a total system memory capacity from 1MB up to 8MB on board.

In addition, the mainboard provides two sixty-two pin expansion slots (J8 & J15) for Memory Expansion to upgrade the memory capacity by using the normal DIP (Dual In-line package) DRAM.

Both 41256 and 411024 DIP DRAM can be used on memory card depending on your requirements. The maximum capacity on a card can be up to 8MB by using 1MB DRAM.

Revised Version(C45 Version)

SMS-PC-1116N/1112N revised version named C45 version provides both DIP RAM & SIP RAM MODULE on-board to meet the flexibility of RAM type. Bank 0 & bank 1 are designed to use 44256(20 pins socket) & 41256(18 pins socket) DIP RAM to configure 1MB basic memory. Bank2 & bank 3 can use either 1MB or 256KB RAM MODULE to upgrade on-board memory up to 5MB.

bank 0 ----- U51,U52(18 pins) for prity check bit(41256)
U55,U56,U59,U60(20 pins) - for 44256

bank 1 ----- U49,U50(18 pins) for parity check bit
U53,U54,U57,U58(20 pins) - for 44256

4.2 ON-BOARD MEMORY CONFIGURATION: (C4B Version)

The memory section of the system board is divided into four banks numbered 0,1,2,3. Each bank consists of two SIP sockets.

bank0.....U42
bank1.....U43
bank2.....U44
bank3.....U45

Each bank will therefore contain either 512K or 2MB of DRAM depending on whether 256KB or 1MB SIP modules have been installed.

NOTE: Be sure both sockets in each bank contain the same kind of modules.

To take advantage of the Page/Interleaving function provided by NEAT Chips, we recommend that users who want to upgrade memory capacity or change memory size by using the following standard combinations:

TOTAL MEMORY	DRAM SIZE			
	BANK 0	BANK 1	BANK 2	BANK 3
2MB	256K	256K	256K	256K
8MB	1MB	1MB	1MB	1MB
1MB	256K	256K	no	no
4MB	1MB	1MB	no	no

* Each Memory Bank is implemented with 18 * 1 bit wide SIP RAM. (16 bits wide plus two bits for parity)

ON-BOARD MEMORY CONFIGURATION: (C45 Version)

Revised Version:

Bank 0 & bank 1 - Using 4*44256 and 2*41256 DIP RAM, and can be configured as 512KB for each bank. Bank 0 & bank 1 must be installed for 1MB Base Memory, before you install bank 2 & 3.

Bank 2 & bank 3 - Before you install bank 2 & bank 3. Be sure that bank 0 & 1 has been installed completely, otherwise, bank 2 & 3 will not be accepted by system.

Standard Combinations:

Total Memory	DRAM SIZE			
	Bank 0	Bank 1	Bank 2	Bank 3
1MB	256K	256K	NO	NO
2MB	256K	256K	256K	256K
5MB	256K	256K	1MB	1MB

- * Each Bank 0 & bank 1 is implemented with 4*44256 and 2*41256 DIP RAM.
- * Bank 2 & bank 3 are implemented with 256K*9 bit or 1MB*9 bit SIP RAM MODULE.

4-3 RAM INSTALLATION PROCEDURE:

To install the SIP modules on board, please check some key-points as described below:

1. It is better to install additional memory before installing the SMS-PC-1116N Mainboard in the system case. If upgrading, remove the board from the case. Trying to insert memory modules while the board is still in the case may damage the module or the memory section.
2. Align the pins with the individual pin sockets on the board so that all the pins have a matching socket and none are left over (Fig4-1). Keep the module in a vertical position to avoid bending the pins.

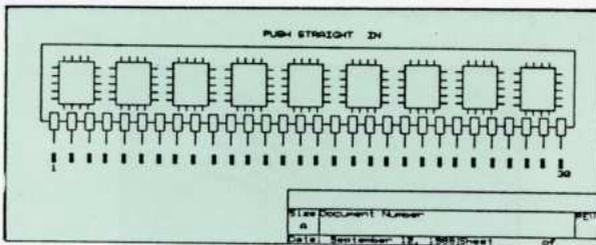


Fig4-1

3. Be sure that PIN 1 of SIP Modules matches PIN 1 of the system board (see Fig.4-1). If you are not confident about the location of PIN 1 of the SIP Module, please contact your dealer.

CHAPTER 5 SYSTEM INSTALLATION

5.1 DEVICE REQUIREMENTS:

- * SMS-PC-1116N Mainboard (W/2MB Memory)
- * 180W or 200W switching power supply
- * AT Keyboard or compatible
- * CGA/MGA/EGA/VGA display card
- * A Monitor that corresponds to the display card
- * At least one floppy disk drive (360K, 720K, 1.2M, 1.44M)
- * MS-DOS or PC-DOS or OS/2

5.2 INSTALLATION PROCEDURES:

1. Check that the mainboard Jumpers are set properly.
2. Attach power supply connectors to J16 as marked (Fig.5-1)

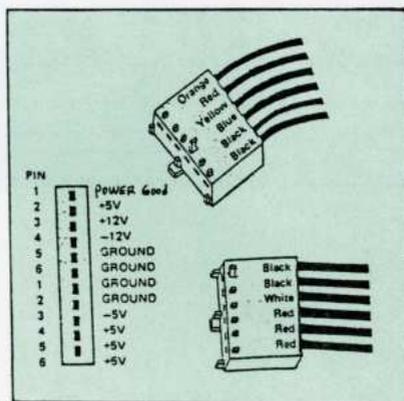


Fig5-1

3. Connect driver cable, panel indicators, keylock and speaker wire connectors.
4. Plug in the printer, display adapter or other peripherals into the I/O slots as shown in figure 5-2.

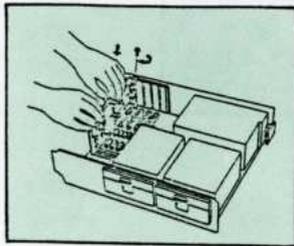


Fig5-2

5. Refer to the adapter installation guide to check if any switch or jumpers need to be adjusted on the adapter.
 - * To operate your system properly, the jumpers & switches on the mainboard and peripherals should be correctly set.
6. Before closing the top cover of the system unit, remember to check the wires and cables in the system unit to prevent them from being pinched by the cover.
7. Put the top cover back on the system unit and secure it with the back panel screws.

8. Plug the keyboard cable into the round keyboard socket on the rear panel, as shown in the figure 5-3.

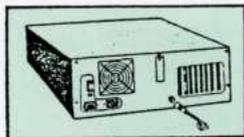


Fig.5-3

CAUTION: Before making the connections, make sure that the power is to the system unit, the printer, and the video display is turned OFF. Connecting your system while the power is on may damage your computer system or peripheral devices.

9. Connect the monitor's signal cable to the adapter's 9-pin connector located at the back of system unit. Then connect the monitor's power cable to the socket just below the power selector switch. (see figure 5-4).

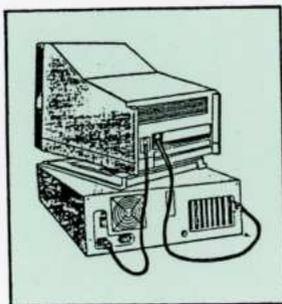


Fig. 5-4

CHAPTER 6

SYSTEM CONFIGURATION SETTING

This chapter discusses details on three items to configure your system:

1. Set-up procedure in normal condition.
2. Set-up the shadow RAM & relocation.
3. EMS (Expansion memory system) driver set-up.

To set-up the above three functions properly, you need three programs; including MS-DOS/PC-DOS, EMS driver diskette and the set-up program. The set-up utility is resident in the Phoenix 286 BIOS (Version 3.10XX), EMS driver diskette is bound-up with your system.

6-1 SET-UP PROCEDURE:

You need to set up the data, time and installed options when you.

- a: Install your system unit for the first time
- b: Add an additional device
- c: Replace the battery
- d: Re-identify a certain function (such as EMS, shadow RAM)

NOTE: Be sure what options are installed on your system, if you don't know, please contact your dealer to get the packing-list.

Step1: You will get the following prompts on the screen after power-up.

```
Phoenix 80286 ROM BIOS PLUS Version 3.10
Copyright (c) 1985-1988 phoenix technology Ltd.
All Rights Reserved

.
.
.
Invalid configuration information-please run setup
Strike the F1 key to continue,F2 to run the setup
utility.
```

- * If any error message appears on the screen,please ignore it by pressing (F2) key at this moment.
- * Whenever you want to enter set-up utility again, just press CTRL,ALT,"S" simultaneously.

STEP2 : Dose the screen presentation correctly list all the installed device and options?

```
Phoenix Technologies Ltd.  
System Configuration Setup V4.0  
  
Time: 17:06:38  
Date: Tue. Aug. 09, 1988  
  
Diskette A:           5.25 Inch, 360 KB  
Diskette B:           Not Installed  
Hard Disk 1:          Not Installed  
Hard Disk 2:          Not Installed  
Base Memory:          640 KB  
Extended Memory:     Not Installed  
Display:              MONO  
Keyboard:             Installed  
CPU Speed:            XX MHZ  
  
Coprocessor:          Not Installed
```

To select entries or input parameters, please read the function keys listed below:

```
Up and Down Arrow to select entries  
Left and Right Arrow to change entries  
PgUp for CHIP set options  
F1 for help. F10 to Exit. ESC to reboot.
```

Yes---Press (ESC) to reboot system. The setup program has loaded successfully.

No ---Go to next step.

NOTE: Be sure that the "NUM LOCK" key is off, otherwise the function key (from the numeric keypad) will fail.

STEP3 : In this step, please follow the screen prompts step by step. You will be presented with the following device installation questions:

1. Time & Data:

To this question, enter correct time & data into the formatted form on the screen.

Your computer maintains the time of day and date in battery-backed memory. This enables your computer to know the correct time whenever you turn on your system.

EX: Time: 16:16:48
Date: Tue. Aug. 09, 1988

2. Diskette:

This setting is used to help your computer identify the type of diskette drives you have. Errors in formatting may result if this information is not correct.

Select the correct type your system uses.

5.25	inch,	360KB
5.25	inch,	1.2MB
3.5	inch,	720KB
3.5	inch,	1.44MB

EX: Diskette A: 5.25 Inch, 360 KB
Diskette B: 5.25 Inch, 1.2 MB

5. Extended Memory:

This setting is used by the POST in your computer to identify the amount of extended memory available.

The equation listed below is to help you calculate amount of extended memory in your system.

$$\begin{aligned} &(\text{System memory} - 1\text{MB}) * 1024 = \text{Extended memory} \\ &\text{System memory} = \text{on-board memory} + \text{memory on card} \\ \text{EX: } &(4\text{MB} - 1\text{MB}) * 1024 = 3072\text{K} \end{aligned}$$

As shown, the other 384Kb of memory is not used at this time. For more details how to use the other 384K, Please read chapter 6-2 on how to change or input data. Please use the numeric key directly.

6. Display:

4 types of display modes can be selected:

- ...EGA/VGA
- ...CGA 40
- ...CGA 80
- ...MONO
- ...NOT INSTALLED

Select the correct display type that is attached to your computer.

Selecting "not installed" will suppress the error message related to the video monitor during the POST.

7. KEYBOARD:

Select " Not Installed" option, no keyboard error message will be displayed.

Select " Installed" option, error message will be displayed.

8. CPU Speed:

This setting is used to set the default CPU speed. This is the clock speed that your computer will use each time you turn you computer on.

CPU speed = 5/6/10/12MHZ for 1112N

= 5/8/10/16MHZ for 1116N

To select clock speed, please use right arrow key.

9. Coprocessor:

Whether the coprocessor is installed or not will be detected automatically during POST.

STEP 4: If you are convinced that all the information you have entered up to this point is correct. Press (ESC), ending setup procedures. When you do this the BIOS activates to boot up the system with the information specified.

The following figure shows the completed setup examples.

EXAMPLE

```
Phoenix Technologies Ltd.  
System Configuration Setup V4.0  
  
Time: 16:59:04  
Date: Tue.Aug.09, 1988  
  
Diskette A:          5.25 Inch, 360 KB  
Diskette B:          Not Installed  
Hard Disk 1:         Type 2  
Hard Disk 2:         Not Installed  
Base Memory:         640 KB  
Extended Memory:    1024 KB  
Display:             MONO  
Keyboard:            Installed  
CPU Speed:           6MHZ  
  
Coprocessor:        Not Installed  
  
Up and Down Arrow to select entries  
Left and Right Arrow to change entries  
PgUp for NEAT CHIP Set options  
F1 for help. F10 to Exit. Esc to reboot.
```

6-2 SHADOW RAM FEATURE:

For efficient execution of BIOS, it is preferable to execute BIOS code through RAM rather than through slower EPROMs. SMS-PC-1116N provides the shadow RAM resident at the same physical address as the BIOS ROM.

When more than 1MB of system RAM exists, it is mapped as shown in fig.6-1 & fig.6-2.

(1) Shadow RAM.....Disable (see Fig 6-1)

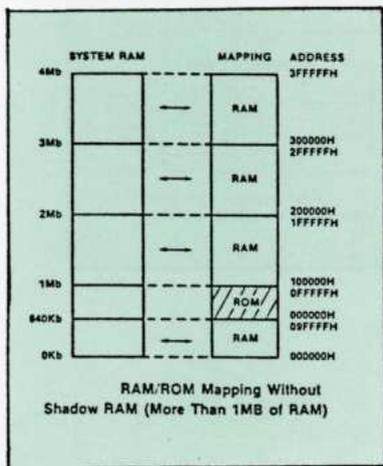


Fig 6-1

This means that the RAM in the 640KB TO 1MB area can not be accessed.

(2) Shadow RAM.....Enable (see Fig.6-2)

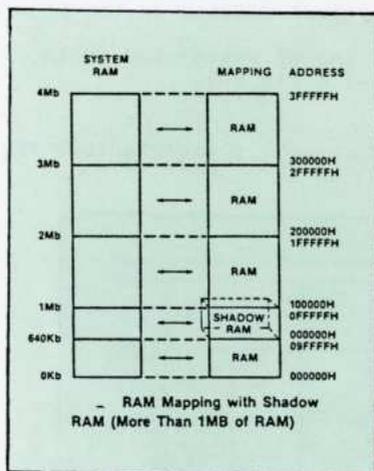


Fig 6-2

When shadow RAM is enabled, then the RAM is mapped overlapping or shadowing the EPROM area. In this case, for accesses beyond the 1MB address range, the processor is switched from real to protected mode from BIOS.

6.2.1 SETTING SHADOW RAM:

To execute shadow RAM function, you need at least 1MB RAM on board.

SET-UP PROCEDURE:

- (1) There are two ways to launch the set-up program:
 - a: Boot system again
 - b: press "CTRL", "ALT", "s" simultaneously.
- (2) Switch the current screen (standard set-up options) to NEAT CHIPSET OPTIONS by pressing "PgUp" key. (see Table 6-1)

Phoenix Technologies Ltd.
C&T NEAT CHIPSet Feature Control

Time: 19:05:23
Date: Fri.Jan.01, 1988

Shadow BIOS ROM:	Enabled	Shadow 16K at EC000:	Disabled
Shadow Video ROM:	Enabled	Memory Wait States:	1 Wait State
Shadow 16K at C4000:	Disabled	ROM Wait States:	not use
Shadow 16K at C8000:	Disabled	640-1024K Relocation:	Disabled
Shadow 16K at CC000:	Disabled	EMS Base Memory Address:	Segment CC00:
Shadow 16K at D0000:	Disabled	EMS Base I/O Address:	208h/209h
Shadow 16K at D4000:	Disabled	EMS Page 0 Reg Extension:	1M to 2M
Shadow 16K at D8000:	Disabled	EMS Page 1 Reg Extension:	1M to 2M
Shadow 16K at DC000:	Disabled	EMS Page 2 Reg Extension:	1M to 2M
Shadow 16K at E0000:	Disabled	EMS Page 3 Reg Extension:	1M to 2M
Shadow 16K at E4000:	Disabled	EMS Memory Size:	1.0M
Shadow 16K at E8000:	Disabled	EMS Wait States:	0 Wait States
		EMS Memory:	Enabled

[Table 6-1]

- (3) Now, move the cursor to "Shadow BIOS ROM" and the parameter to "Enable". Do the same for "Shadow Video ROM."

Press "ESC" to reboot system, then the Shadow BIOS ROM function will be executed.

SUMMARY OF SHADOW ROM:

In this section, you needn't set the parameters because they will not influence the shadow Rom feature. The following table is for your reference and tells you which parameters should be identified properly and which ones accept any setting.

ITEM	PARAMETER
Shadow BIOS ROM:	Enabled (must be enabled)
Shadow VIDEO ROM:	Any setting (depending on your requirements)
Shadow 16K at xxxxx:	Any setting
640-1024K Relocation:	Disabled (must be disabled)
EMS xx...xxxxx: (Note: all EMS function listed in Table 6-3)	Any setting

6-3 SET-UP THE RELOCATION:

If you have only 1MB RAM on board, the relocate function lets you use the memory in the 640K-1024K area. (see next section for details).

To use the 640K-1024K relocate function, the procedures are as follows:

- (1) After power up, enter the standard set-up program by pressing "CTRL", "ALT", "S".
- (2) Set the memory parameter as follows:

Base Memory: 640KB
Extended Memory: 384KB (Configuration error appears
after booting, providing the 384K
not specified).

- (3) Switch the current screen to "NEAT CHIPSET OPTION" screen by pressing "PgUp" key.
- (4) Enable the Item of "640-1024K Relocation".

Before you press "ESC" to Re-boot the system and install 384K for extended memory use, be sure the following parameters are set properly to prevent conflict each other.

ITEM	PARAMETER
Shadow BIOS ROM:	Disabled
Shadow Video ROM:	Disabled
EMS Memory :	Disabled
640-1024K Relocation:	Enabled

Press "ESC" key to boot system. The relocation program should load successfully. The additional 384K is now installed under "protected Mode 80286".

3.1 Concepts of relocation:

This section discusses how the relocation function operates, and how the 384K memory be used as extended memory by mapping to the EPROM areas.

The 82C212 has an extensive set of memory mapping registers for various memory configurations. Through the memory mapping logic, for up to 1MB of system RAM, it is possible to map RAM that overlaps the EPROM area (640K-1MB) above the 1MB area, as shown in Fig.6-3. Hence, for 1MB of onboard RAM, the software can address it from 0 to 640KB and from 1Mbyte to 1.384 Mbytes. The EPROM can be addressed from 640Kbyte area to the 1Mbyte area.

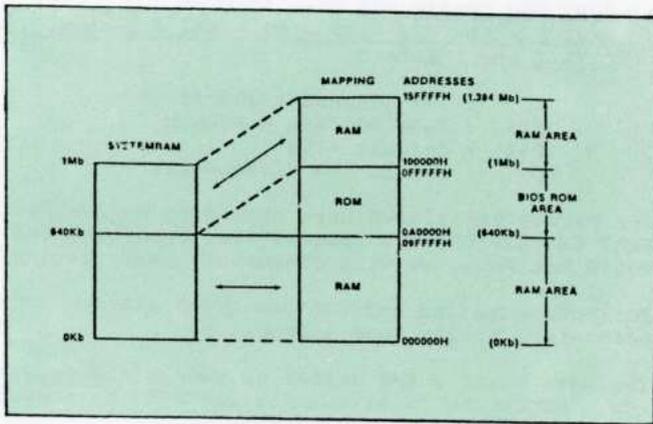


Fig 6-3 System RAM/ROM Mapping for 1MB System RAM

6-4 EMS DRIVER SETTING:

This section discusses details of EMS. Depending on the memory size of the system, it is divided into two parts:

- (A) on board memory = 1MB
- (B) on board memory > 1MB (Ex = 2MB)

Before discussing how to set EMS parameter, we must install EMS driver first.

STEP:

- (1) Boot PC system by using DOS and the system will prompt you with A >.
- (2) Copy EMM. SYS file on your DOS diskette.
- (3) Type:

```
A > COPY CON CONFIG.SYS then "Enter"  
DEVICE = EMM.SYS - I0 - M1 - P64 - D then "Enter"  
CTRL Z then "Enter"
```

```
      I0   : I/O address = 208h/209h  
      M1   : Page Address = C0000H  
      P64  : default = 64  
      D    : Enable EMS diagnostics
```

The parameters listed here should be correspond to the "NEAT CHIPSET OPTIONS" parameters, otherwise EMS function would not work, we will discuss in next section.

For more detailed information about the EMS driver parameter, please read Appendix B.

- (4) You have built a EMS driver on your diskette with DOS, and now, enter the "NEAT CHIPSET OPTIONS" by pressing "CTRL", "ALT", "S" simultaneously.

NOTE: If EGA or VGA CARD installed, please change the M1 parameter (Page Address) to M5 which will prevent using the same address that both display CARDS have used.

Table 6-3

NO.	PARAMETERS ITEM	ON-BOARD MEMORY				
		1MB	1.5M 2M	2M 4M	4M 6M	6M 8M
1	640-1024 Relocation	Enable	Disable	Disable	Disable	Disable
2	EMS Memory	Enable	Enable	Enable	Enable	Enable
3	EMS Page 0 Reg. Extension	1-2M	1-2M	1-2M	1-2M	1-2M
4	EMS Page 1 Reg. Extension	X	X	2-4M	2-4M	2-4M
5	EMS Page 2 Reg. Extension	X	X	X	4-6M	4-6M
6	EMS Page 3 Reg. Extension	X	X	X	X	6-8M
7	EMS Memory Size	0.5M	1M	1, 2 or 3M	3, 4 or 5M	5, 6 or 7M

*X = means any setting.

* EXAMPLE Table 6-3: If on board 1MB, you want to use 384K as an EMS, you must select 1 = Enable, 2 = Enable, 3 = 1-2M, 7 = 0.5M, the same of 1.5M - 8M.

- (5) Please follow Table 6-3 to set the correct lists various memory sizes on the board and tells you how to set the parameters.
- (6) In step(3), we built a Config. SYS file. The parameters should correspond to these options correctly, otherwise the error message will occur (see Appendix B)

```
EMS BASE MEMORY ADDRESS: segment C000
EMS I/O ADDRESS       : 208h/209h
```

- (7) The following is an example of EMS parameters setting depending on 2MB on board:

Shadow BIOS ROM:	Disabled	Shadow 16K at EC0000:	Disabled
Shadow Video ROM:	Disabled	Memory Wait States:	1 Wait State not use
Shadow 16K at C4000:	Disabled	ROM Wait States:	Disabled
Shadow 16K at C8000:	Disabled	640-1024K Relocation:	Disabled
Shadow 16K at CC000:	Disabled	EMS Base Memory Address:	Segment C000:
Shadow 16K at D0000:	Disabled	EMS Base I/O Address:	208h/209h
Shadow 16K at D4000:	Disabled	EMS Page 0 Reg Extension:	1M to 2M
Shadow 16K at D8000:	Disabled	EMS Page 1 Reg Extension:	1M to 2M
Shadow 16K at DC000:	Disabled	EMS Page 2 Reg Extension:	1M to 2M
Shadow 16K at E0000:	Disabled	EMS Page 3 Reg Extension:	1M to 2M
Shadow 16K at E4000:	Disabled	EMS Memory Size:	1.0M
Shadow 16K at E8000:	Disabled	EMS Wait States:	0 Wait States
		EMS Memory:	Enabled

*Be sure the "Extended Memory = 1024K" in standard setup options, otherwise the configuration error message will occur after power up.

- (8) Make sure the DOS with EMS driver diskette is inside the disk drive, then reboot your system, the screen will display the following:

```
EMS Expanded Memory Device Driver Ver. 4.0D
Copyright (c) Chips and Technologies Inc., 1987
For Evaluation Only - Not For Sale or Distribution
```

```
The EMS Handle Limit has been changed.
```

```
Testing EMS Expanded Memory Page Number: 1
EMS Pages PASSED: 64
```

```
EMS Pages FAILED: 0
```

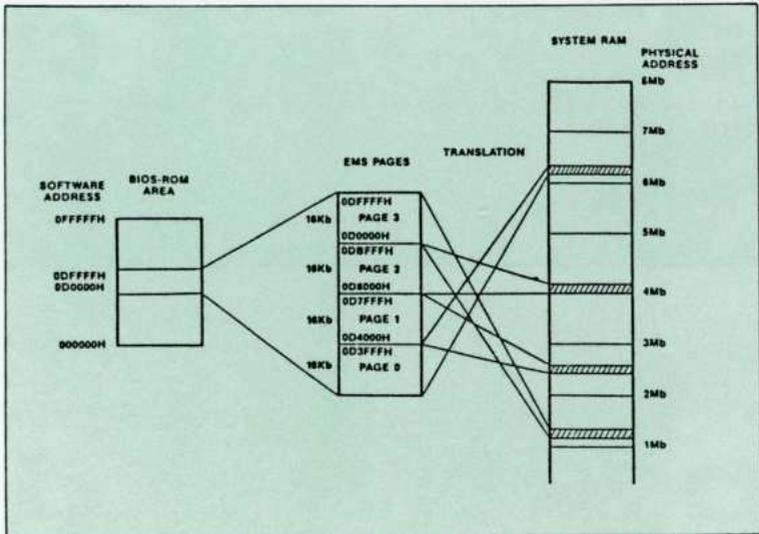
```
There are 64 pages, or 1024 Kbytes of EMS Expanded Memory on the
system.
```

```
A prompt $p$g
```

```
A:
```

6-4.1 EMS MAPPING DESCRIPTION:

Expanded Memory System or EMS is a memory mapping scheme used to map a 64 Kbyte block of memory from the EPROM area D0000H-DffffH to anywhere in the 1 Mbyte-8 Mbyte area. This 64 Kbyte memory block is segmented into four 16 Kbyte pages. Through a translation table, each 16 Kbyte can be mapped anywhere in the 1Mbyte to 8 Mbyte area. Since the 82C212 uses the translation table in the EMS mode, address lines A14 to A22 are translated by the appropriate EMS mapping register. Hence, this scheme does not require switching between user and protected mode. Figure 6-4 shows the EMS organization with a possibility for the 82C212 to map this 64 Kbyte block to anywhere in the 0 to 8 Mbyte area. However, it is desirable to map this block above the 1 Mbyte area in order not to use the RAM space in the 0 to 640 Kbyte area. Although the EMS scheme translates the 64 Kbyte block in the D0000H-DFFFFH area, it is possible to select a 64 Kbyte block from any other area.



[Fig 6-4] EMS MAPPING

CHAPTER 7

SMS-PC-1116N NEAT SYSTEM BOARD DATA SHEET

This chapter briefly describes the major features of the Mainboard. It contains the following topics.

- * DMA controller
- * Interrupt controller
- * Timers
- * Real-time clock with battery back up
- * I/O port address map
- * I/O channel pin assignments
- * I/O channel signal description

7-1 DMA CONTROLLER

The equivalents of two 8237 A DMA Controllers are implemented in the 82C206. Each controller is a four-channel DMA device which will generate the memory addresses and control signals necessary to transfer information between a peripheral device and memory directly. This allows high speed information transfer with less CPU intervention.

The two DMA Controllers are internally cascaded to provide four DMA channels for transferring to 8-bit peripherals (DMA1), and three channels for transferring to 16-bit peripherals (DMA2). DMA2 Channel 0 provides the cascaded interconnection of the two DMA devices, thereby maintaining IBM PC/AT compatibility.

DMA Channel 0: spare
DMA Channel 1: IBM SDLC
DMA Channel 2: diskette adapter
DMA Channel 3: spare
DMA Channel 4: cascade for DMA controller 1
DMA Channel 5: spare
DMA Channel 6: spare
DMA Channel 7: spare

7-2 INTERRUPT CONTROLLER

The equivalents of two 8259 Programmable Interrupt Controllers (PIC) are included in the 82C206. They accept requests from peripherals, resolve priority on pending interrupts and interrupts in service, issue an interrupt request to the CPU, and provide a vector which is used as an index by the CPU to determine which interrupt service routine executes.

Interrupt Level	Description
NMI	Parity check error
IRQ0	System timer interrupt from timer 8254-2
IRQ1	Keyboard output buffer full
IRQ2	Interrupt rerouting from IRQ8 through IRQ15
IRQ3	Serial port 2
IRQ4	Serial port 1
IRQ5	Parallel printer port 2
IRQ6	Floppy disk adapter
IRQ7	Parallel printer port 1
IRQ8	Clock/calendar
IRQ9	Recounting to INT 10 from hardware IRQ2
IRQ10	Spare
IRQ11	Spare
IRQ12	Spare
IRQ13	Math Coprocessor 80287
IRQ14	Hard disk adapter
IRQ15	Spare

7-3 TIMERS

The chip 82C206 can provide three programmable timers, each with the same timing frequency of 1.19 MHz.

Timer 0 The output of this timer is tied to interrupt request 0 (IRQ0)

Timer 1 This timer is used to trigger memory refresh cycles.

Timer 2 This timer provides the speaker tone. Application programs can load different counts into this timer to generate various sound frequencies.

7-4 REAL-TIME CLOCK AND NONVOLATILE RAM

The chip 82C206 contains a real-time clock component that maintains data and time information in addition to storing configuration information about the computer system. It contains 14 bytes of clock and control registers and 50 bytes of general purpose RAM. Because of the use of CMOS technology, it consumes very little power and can be maintained for long periods of time with an inexpensive battery (one rechargeable battery and one 6V external battery connector on the main board).

Address	Description	Address	Description
00	Seconds	10	Diskette drive type byte- drives A and B
01	Second alarm	11	Reserved
02	Minutes	12	Mixed disk type byte-drives C and D
03	Minute alarm	13	Reserved
04	Hours	14	Equipment byte
05	Hour alarm	15	Low-base memory
06	Day of week	16	High-base memory byte
07	Data of month	17	Low-expansion memory
08	Month	18	High-expansion memory byte
09	Year	19	High-expansion memory byte
0A	Status Register A	19-2D	Reserved
0B	Status Register B	2E-2F	2-byte CMOS checksum
0C	Status Register C	30	Low-expansion memory byte
0D	Status Register D	31	High-expansion memory byte
0E	Diagnostic status byte	32	Data century byte
0F	Shutdown	33	Information flags (set during power on)
		34-3F	Reserved

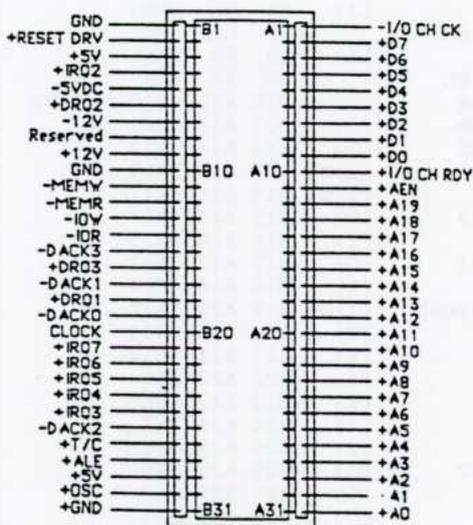
7.5 I/O ADDRESS MAP

Hex Range	Devices	Usage
000-01F	DMA controller 1.8237A-5	System
020-03F	Interrupt controller 1.8259A	System
040-05F	Timer, 8254-2	System
060-06F	Keyboard I/O	System
060-07F	Real time clock, MNI mask	System
080-09F	DMA page register, 74LS612	System
0A0-0BF	Interrupt controller 2*8259A	System
0C0-0DF	DMA controller 2*8237A-5	System
0F0	Clear Math Coprocessor Busy	System
0F1	Reset Math Coprocessor	System
0F8-0FF	Math Coprocessor	System

Hex Range	Devices	Usage
1F0-1F8	Fixed Disk	I/O
200-207	Game I/O	I/O
278-27F	Parallel Printer port 2	I/O
2F8-2FF	Serial port 2	I/O
300-31F	Prototype card	I/O
360-36F	Reserved	I/O
378-37F	Parallel printer port 1	I/O
380-38F	SDLC, bisynchronous 2	I/O
3A0-3AF	Bisynchronous 1	I/O
3B0-3BF	Monochrome display, printer adapter	I/O
3C0-3CF	Reserved	I/O
3D0-3DF	Color/Graphic monitor adapter	I/O
3F0-3F7	Floppy diskette controller	I/O
3F8-3FF	Serial port 1	I/O

7-6 I/O CHANNEL PIN ASSIGNMENTS

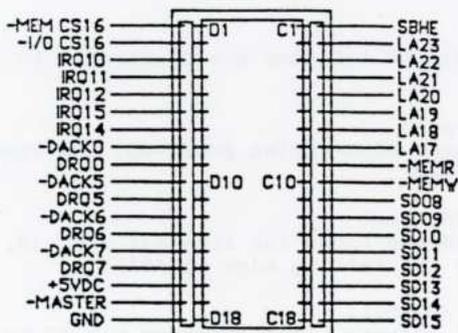
(1) SIXTY-TWO PIN EXPANSION PINOUT:



(1-2) PIN-OUT SPECIFICATIONS FOR 8-BIT EXPANSION SLOTS

Signals	I/O	Pin No.	Signals	I/O
Ground		B1	A1 -I/O	CH CK (I)
Reset Drive	(O)	B2	A2 SD7	(I/O)
+5V DC		B3	A3 SD6	(I/O)
IRQ9	(I)	B4	A4 SD5	(I/O)
-5V DC		B5	A5 SD4	(I/O)
DRQ2	(I)	B6	A6 SD3	(I/O)
-12V DC		B7	A7 SD2	(I/O)
CWS	(I)	B8	A8 SD1	(I/O)
+12V DC		B9	A9 SD0	(I/O)
Ground		B10	A10 -I/O	CH DRY (I)
-SMEMW	(O)	B11	A11 AEN	(O)
-SMEMR	(O)	B12	A12 SA19	(I/O)
-IOW	(I/O)	B13	A13 SA18	(I/O)
-IOR	(I/O)	B14	A14 SA17	(I/O)
-DACK3	(O)	B15	A15 SA16	(I/O)
DRQ3	(I)	B16	A16 SA15	(I/O)
-DACK1	(O)	B17	A17 SA14	(I/O)
DRQ1	(I)	B18	A18 SA13	(I/O)
-Referesh	(I/O)	B19	A19 SA12	(I/O)
CLK	(O)	B20	A20 SA11	(I/O)
IRQ7	(I)	B21	A21 SA10	(I/O)
IRQ6	(I)	B22	A22 SA9	(I/O)
IRQ5	(I)	B23	A23 SA8	(I/O)
IRQ4	(I)	B24	A24 SA7	(I/O)
IRQ3	(I)	B25	A25 SA6	(I/O)
-DACK2	(O)	B26	A26 SA5	(I/O)
T/C	(O)	B27	A27 SA4	(I/O)
BALE	(O)	B28	A28 SA3	(I/O)
+5V DC		B29	A29 SA2	(I/O)
OSC	(O)	B30	A30 SA1	(I/O)
Ground		B31	A31 SA0	(I/O)

(2) THIRTY-SIX PIN EXPANSION SLOTS PINOUT



(2-1) PINOUT SPECIFICATIONS FOR 16-BIT EXPANSION SLOTS

Signals	I/O	Pin No.	Signals	I/O
-MEMCS16	(I)	D1 C1	SBHE	(I/O)
-I/O CS16	(I)	D2 C2	LA23	(I/O)
IRQ10	(I)	D3 C3	LA22	(I/O)
IRQ11	(I)	D4 C4	LA21	(I/O)
IRQ12	(I)	D5 C5	LA20	(I/O)
IRQ15	(I)	D6 C6	LA19	(I/O)
IRQ14	(I)	D7 C7	LA18	(I/O)
-DACK0	(O)	D8 C8	LA17	(I/O)
DRQ0	(I)	D9 C9	-MEMR	(I/O)
-DACK5	(O)	D10 C10	-MEMW	(I/O)
DRQ5	(I)	D11 C11	SD8	(I/O)
-DACK6	(O)	D12 C12	SD9	(I/O)
DRQ6	(I)	D13 C13	SD10	(I/O)
-DACK7	(O)	D14 C14	SD11	(I/O)
DRQ7	(I)	D15 C15	SD12	(I/O)
+5V DC		D16 C16	SD13	(I/O)
-Master	(I)	D17 C17	SD14	(I/O)
Ground		D18 C18	SD15	(I/O)

7-7 I/O CHANNEL SIGNAL DESCRIPTION

All signal lines are TTL-compatible with a maximum loading of two Low-Power Schottky(LS) devices.

CLK(Output)

The CLK signals of I/O slot are synchronal to those of CPU CLK.

RESET DRV(Output)

This signal goes high during power-on, low line-voltage, or hardware reset.

SA0-19(Input/Output)

The System Address Lines run from bit 0 to 19. They are latched on to the falling edge of "BALE".

LA17-23(Input/Output)

The Unlatched Address Lines run from bit 17 to 23.

SDO-15(Input/Output)

System data bits 0 to 15.

BALE(Output)

The Buffered Address Latch Enable is used to latch SA0-SA19 on the falling edge. This signal is forced high during DMA cycles.

I/O CH CK (Input)

The I/O Channel Check is an active low signal which indicates that a parity error exists in I/O board.

I/O CH RDY(Input)

This signal lengthens the I/O or memory read/write cycle and should be held low with valid address. It can only be held low for a maximum of 2.5 microseconds.

IRQ3-7,9-12,14-15(Input)

The Interrupt Request signals which indicate I/O service request attention. They are prioritized in the following sequences: Highest IRQ9,10,11,12,14,15,3,4,5,6,7Lowest.

-I/OR(Input/Output)

The I/O write is an active low signal which instructs the I/O device to drive its data onto the data bus.

-I/OW(Input/Output)

The I/O write is an active low signal which instructs the I/O device to read data from the data bus.

-SMEMR(Output)

The System Memory Read is low while the low 1 megabyte of memory is being used.

-MEMR(Input/Output)

The memory Read Signal is low while any memory location is being read.

-SMEMW(Output)

The System Memory Write is low while the low 1 megabyte of memory is being written.

-MEMW(Input/Output)

Memory Write is low while any memory location is being written.

DRQ 0-3,5-7 (Input)

DMA Request channel 0 to 3 are for 8-bit data transfer.

DMA Request Channel 5 to 7 are for 16-bit data transfer.

DMA Request Channel 4 is used internally on the system board.

DMA Request should be held high until it corresponds with the DMA.

Their priority is in the following sequence:

Highest DRQ0,1,2,3,5,6,7Lowest.

-DACK 0-3,5-7 (Output)

The DMA acknowledges signals for DRQ 0 to 3, 5-7.

AEN(Output)

The DMA Address Enable is high when the DMA controller is driving the address bus. It is low when the 80286 CPU is driving the address bus.

-REFRESH(Input/Output)

This signal is used to indicate a memory refresh cycle and can be driven by a microprocessor on the I/O channel.

T/C(Output)

Terminal Count provides a pulse when the terminal counting for any DMA channel is reached.

SBHE(Input/Output)

The System Bus High Enable indicates the high byte SD8-SD15 on the data bus.

-MASTER(input)

The Master is the signal from the I/O processor which gains control as the master and should be held low for a maximum of 15 microseconds or the system memory may be lost due to the lack of refresh.

-MEM CS16(Input, Open collector)

The memory chip Select 16 indicates that the present data transfer is a 1 Wait State 16-bit data memory operation.

-I/O CS16(Input, Open collector)

The I/O Chip Select indicates the present data transfer is a 1-Wait State 16-bit data I/O operation.

OSC(Output)

The Oscillator is a 14.31818 MHz signal used for the color graphic board.

OWS(Input, Open collector)

The 0-Wait State indicates to the microprocessor that the present bus cycle can be completed without inserting any additional wait cycles.

APPENDIX A: FIXED DRIVER TYPE

The system BIOS supports two fixed drivers. Each drive can be one of the types listed in the following table:

Drive Type	Cylinders	Heads	Write Precomp	Landing Zone	Sectors	Megabytes
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	30
4	940	8	512	940	17	62
5	940	6	512	940	17	46
6	615	4	-1	615	17	20
7	462	8	256	511	17	30
8	733	5	-1	733	17	30
9	900	15	-1	901	17	112
10	820	3	-1	820	17	20
11	855	5	-1	855	17	35
12	855	7	-1	855	17	49
13	306	8	128	319	17	20
14	733	7	-1	733	17	42
16	612	4	0	663	17	20
17	977	5	300	977	17	40
18	977	7	-1	977	17	56
19	1024	7	512	1023	17	59
20	733	5	300	732	17	30
21	733	7	300	732	17	42
22	733	5	300	733	17	30
23	306	4	0	336	17	10
25	615	4	0	615	17	20
26	1024	4	-1	1023	17	34
27	1024	5	-1	1023	17	42
28	1024	8	-1	1023	17	68
29	512	8	256	512	17	34
30	615	2	615	615	17	10
31	989	5	0	989	17	41
32	1020	15	-1	1024	17	127
35	1024	9	1024	1024	17	76
36	1024	5	512	1024	17	42
37	830	10	-1	830	17	68
38	823	10	256	824	17	68
39	615	4	128	664	17	20
40	615	8	128	664	17	40
41	917	15	-1	918	17	114
42	1023	15	-1	1024	17	127
43	823	10	512	823	17	68
44	820	6	-1	820	17	40
45	1024	8	-1	1024	17	68
46	925	9	-1	925	17	69
47	699	7	256	700	17	40

The following lists are the most popular fixed driver type for reference:

ITEM:	Phoenix BIOS TYPE	AMI BIOS TYPE
ST225	2	2
ST251-0	44	40
ST251-1	44	40
ST4096	35	35

APPENDIX B.

The EMS (Expanded Memory Specification) Version 4.0 device driver is a standard MS DOS device driver that gets loaded at boot time by the CONFIG.SYS file. Because EMS 4.0 is a device driver, it should look like this in the CONFIG.SYS file:

```
DEVICE = EMM.SYS
```

Without anything else included in this command line, the EMS driver will get loaded with the default hardware values of the I/O address that enables the EMS and the memory address used for EMS paging. These default values are dependent on the NEAT implementation of EMS.

To change these default values as well as to add a few extra features, the EMS device driver command line can look like this:

```
DEVICE = EMM.SYS -Ix-My-Pzz-D
```

where

I = I/O address to enable EMS pages

```
x = 0 == 208h
  = 1 == 218h
  = 5 == 258h
  = 6 == 268h
  = A == 2A8h
  = B == 2B8h
  = E == 2E8h
```

M = page frame address
(address of 64K window)

```
y = 1 == C000h
  = 2 == C400h
  = 3 == C800h
  = 4 == CC00h
  = 5 == D000h
```

p = maximum number of open
processes (defaults to 64)

zz = number of processes(1-128)

D = enable EMS diagnostics

The command line parameters can be in either upper or lower case.

When the EMS driver is first executed, a title and copyright notice will appear on the screen as follows:

```
"EMS Expanded Memory Device Driver Ver.4.0"  
"Copyright(c) Chips and Technologies inc.,1987"
```

If the EMS driver detects that a previous EMS driver has been loaded, it will put this message on the screen:

"An Expanded Memory Manager has already been installed."

The EMS driver gets loaded by MS.DOS, an internal check is done on the EMS configuration in hardware. If the driver detects any conflicts that would cause EMS not to function properly, the message:

"The EMS setup has been incorrectly specified.
No EMS is available."

will appear on the screen after the EMS copyright notice and EMS will be disabled. If the EMS hardware is configured properly and the I/O address is overridden by the command line parameter, the screen will show this message:

"The EMS I/O address has been changed."

If the EMS page frame address is being overwritten from the command line, the following message will appear:

"The EMS Frame Segment has been changed."

If the diagnostics option is selected, this message will appear on the screen:

"Testing EMS Expanded Memory Page Number: NNN."

The nnn represents the page number currently under testing. If the diagnostics fail, the EMS will be disabled and the following message appears on the screen:

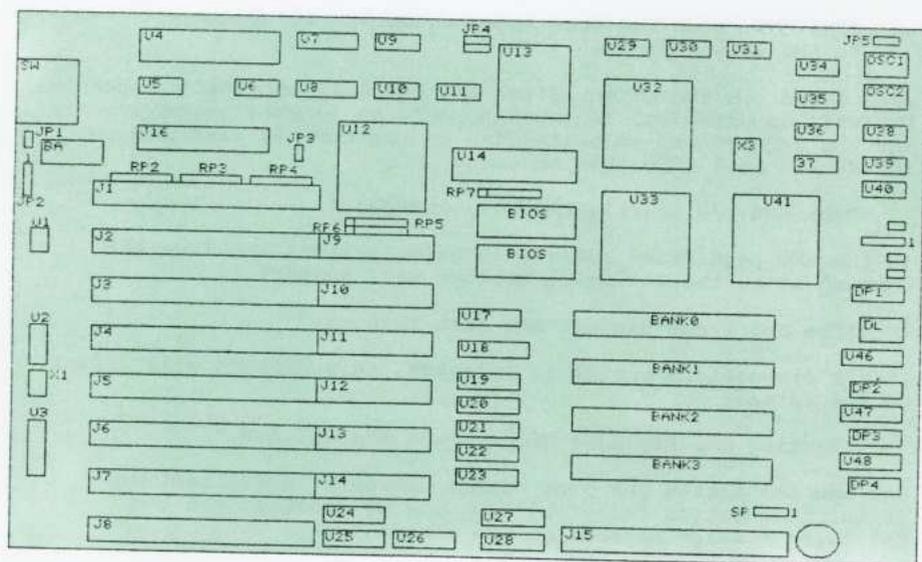
"Expanded Memory FAILED diagnostics test."

If the diagnostics pass, or if diagnostics were not specified on the command line, the EMS driver has been loaded correctly and EMS is enabled. The final message to appear on the screen is:

"There are XXX pages, or YYYY Kbytes of EMS
Expanded Memory on the system."

The system can now be used to support Lotus/Intel/Microsoft EMS 4.0 in the same manner as standard EMS cards.

APPENDIX C MAINBOARD OUTLINE :



APPENDIX D : 206/211/212 Chips parameter Reference

SETUP FOR THE 206	
XIOR/XIOW WAIT STATES	11
16 BIT DMA WAIT STATES	00
8 BIT DMA WAIT STATES	00
EMR BIT	0
CLK BIT	0
PRESS PGUP/PGDN TO SCROLL	
PRESS ESC TO RETURN TO MENU	

SETUP FOR THE 211	
PROCESSOR CLOCK SELECT	0
READY TIMEOUT ENABLE	0
ADDRESS ADD. HOLD TIME	0
QUICK MODE	1
AT BUS 16BIT CMND DELAY	00
AT BUS 8 BIT CMND DELAY	01
AT BUS I/O CMND DELAY	01
16 BIT AT BUS WAIT STATES	11
8 BIT AT BUS WAIT STATES	11
AT BUS CLOCK SOURCE	00
PRESS PGUP/PGDN TO SCROLL	
PRESS ESC TO RETURN TO MENU	

SETUP FOR THE 212			
RAM/ROM CONFIGURATION	0000	EMS ENABLE	0
RAM/ROM CONTROL	1110	EMS WAIT STATES	10
512K - 640K ADDRESS MAP	0	RW-ROM WAIT STATES	11
MAP RAM AT 0A0000-0BFFFFH	00000000	EMS BASE ADDRESS (HEX)	1
MAP RAM AT 0C0000-0DFFFFH	00000000	EMS PAGE REG.IO-BASE (HEX)	0
MAP RAM AT 0E0000-0FFFFFFH	00000000	EMS PAGE 0 - POSITION	11
BANK 0/1 DRAM TYPE	10	EMS PAGE 1 - POSITION	11
BANK 0/1 NUMBER OF BANKS	0	EMS PAGE 2 - POSITION	11
BANK 2/3 DRAM TYPE	00	EMS PAGE 3 - POSITION	11
BANK 2/3 NUMBER OF BANKS	0	EMS SIZE (HEX)	7
DRAM ACCESS WAIT STATES	1	DTO - RAS T/O ENABLE	0
INTERLEAVED PAGE MODE	0	PGA20 - GATE A20 CONTROL	0
RELOCATE DRAM AT 604K-1MB	0		

APPENDIX E: MEMORY EXPANSION CARD

(1) MEMORY CARD SPECIFICATIONS

SMS-PC-1116N/1112N supports two memory cards

1. SMS-PC-1100 RAM-A (long card)
2. SMS-PC-1100 RAM-B (short card)

SMS-PC-1100 RAM-A can be plugged into J8 & J15 slots

SMS-PC-1100 RAM-B can be plugged into J15 slot
(which are located near the buzzer)

(2) SMS-PC-1100 RAM-A OUTLINE



BANK 0 : U7 - U15
U16 - U24

BANK 1 : U25 - U33 (U33 LOCATED ON THE LEFT SIDE OF U25)
U34 - U42

BANK 2 : U43 - U51
U52 - U60

BANK 3 : U61 - U69
U70 - U78 (78 LOCATED ON THE LEFT SIDE OF U52)

(3) SMS-PC-1100 RAM-A INSTALLATION:

Both 256KB or 1MB RAM type can be used on this card, When running 12 MHz or 16 MHz, We recommend your purchasing 120 ns dram.

Each bank can be installed with either 512KB or 2MB depending on the dram capacity. so, the total capacity on the card can be 2MB or 8MB.

NOTE:

If on board memory is 2MB (use 41256) or 8MB (use 411000) the extra memory installed in the memory card will be ignored, because it uses the same area.

To use the memory card, please follow the example below:

EX1: Using 256K RAM

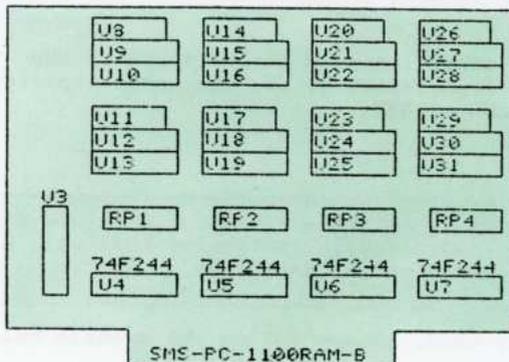
TOTAL	ON BOARD	MEMORY CARD
2MB	512K (ON BANK 0)	1.5M (BANK 0 SHOULD BE BLANK)

EX2: Using 256K RAM

TOTAL	ON BOARD	MEMORY CARD
2MB	1M (ON BANK 0,1)	1M (BANK 0,1 SHOULD BE BLANK)

NOTE: In EX2, the memory card should be installed starting with bank 2 & 3, if you put the 1MB on bank 0,1, the system will ignore their existence.

(4) SMS-PC-1100 RAM-B OUTLINE



BANK 0 : U8 - U10
 U11 - U13

BANK 1 : U14 - U16
 U17 - U19

BANK 2 : U20 - U22
 U23 - U25

BANK 3 : U26 - U28
 U29 - U31

(5) SMS-PC-1100 RAM-B INSTALLATION

With this memory card is recommended to use two pieces 44256 & one 41256 dram to replace nine pieces 41256.

The maximum capacity on the card is 2MB, The RAM chips installation is the same as SMS-PC-1100 RAM-A.
(please refer to item 3 in this section)

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