

NEATSM

USER'S MANUAL

NEATSX
System Board
User's Manual

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Checklist

Your NEATsx package should contain the following:

- The NEATsx mainboard
- One NEATsx floppy disk
- This manual

Important !

If you do not intend to read this manual completely be certain to at least review the Operation section. The NEATsx chip set requires correct configuration information and if incorrectly setup can disfunction. This section covers what to do in such an event. It is also advisable to review the information on Software Setup.

Introduction

The NEATsx system board is an cost-effective compromise between the power of a 32-bit internal architecture and the convenience of full compatibility with the IBM PC/AT and OS/2. The board therefore allows the microprocessor to operate with all the advantages of a '386 system, with multi-tasking and multi-user capabilities.

This manual has been designed to be useful for two purposes. If your NEATsx is already set up in a functioning system you may want to review the manual to familiarize yourself with the features of the board and where things are. This will be helpful in the unlikely event that you should ever have a problem with your NEATsx.

For those who want to alter the board's configuration or upgrade it, the manual will serve as a guide to both procedure and specifications. While the necessary information is included in the manual, we recommend that unless you feel confident of your ability to do the work, it would be best to have your dealer or a local service shop do it for you. If you decide to make alterations to the system yourself, check to see that doing so will not violate your system warranty. If it does you may want to have the work done by an authorized dealer.

Introduction

Board Layout

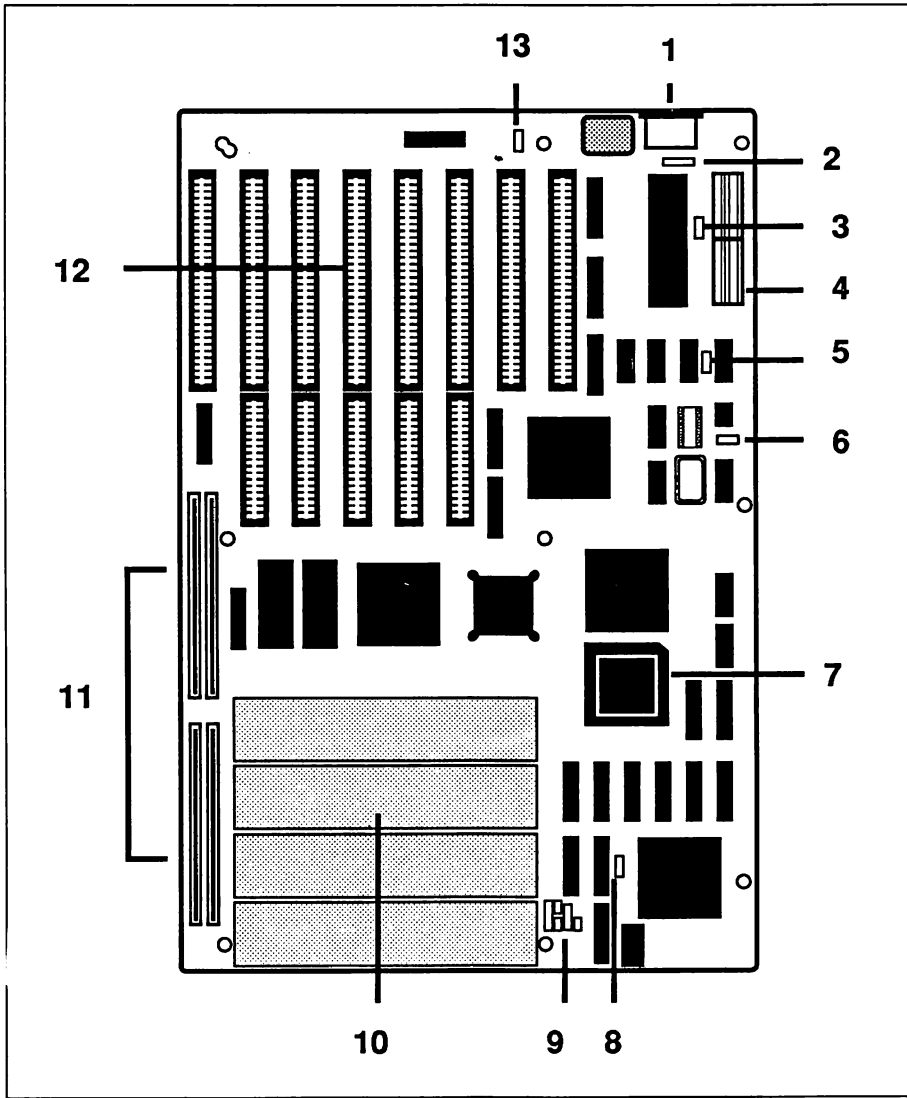
The diagrams on the next two pages shows the layout of the NEATsx and the location of important components on the board.

NEATsx Board Layout Key

- 1: Keyboard Connector**
- 2: J3: Battery connector**
- 3: JP1: Video Mode selector**
- 4: Power Supply Connectors**
- 5: JP2: Oscillator selector (preset at factory)**
- 6: JP4: On board/external Power Good signal selector**
- 7: 387SX Numeric Coprocessor socket**
- 8: JP6: Memory bank number assignment selector**
- 9: Case connectors (Keylock, Turbo LED, Reset, Speaker, Turbo)**
- 10: DIP memory banks; normally Banks 0/1**
- 11: SIP memory banks; normally Banks 2/3**
- 12: Expansion slots**
- 13: J2: On board/external battery source selector**

Note: Multiple elements are listed left to right. Also note that all graphics in this manual are oriented to this diagram unless otherwise stated.

Introduction



Neat SX Board Layout

Introduction

Notes:

Hardware Specifications

Hardware

Specifications

The NEATsx is an 80386SX-based mainboard that can run at either 16 or 20 Mhz depending on the speed of installed memory chips. It is a four-layer board sized to fit in virtually any system unit case from standard AT to tower cases. It can use any version of MS-DOS above version 3.0, in addition to the OS/2 and Xenix/Unix operating systems. The NEATsx supports versions 3.2 and 4.0 of the Lotus-Intel-Microsoft (LIM) Expanded Memory Specification, more commonly called EMS.

General Specifications

Size

The NEATsx measures approximately 8.5 x 13 inches (22.5 x 33 cm) and has nine mounting holes placed so that the board can be mounted in as wide a variety of cases as possible. The printed circuit board is constructed with four layers to minimize radio frequency interference.

Hardware Specifications

80386SX CPU

The NEATsx uses an 80386sx microprocessor that operates with 0.5 to 0.7 wait states at 16 Mhz with 100ns (100 nanosecond) DRAMs and at 20 Mhz with 80ns DRAMs. The system can also be software switched between low (8/10 Mhz) and high (16/20 Mhz) speed modes. The operating speeds depend on the speed of DRAM installed. By using the Quickset program provided on the NEATsx floppy disk, you can select the desired microprocessor clock speed.

80387SX Math Coprocessor

The NEATsx has a socket for an 80387SX math coprocessor. If an 80387SX chip is to be installed, make sure that it is clock speed compatible with the NEATsx. The 80387SX-16 is required if the system is to operate at 16 Mhz.

Refer to the section on component installation for guidance regarding the installation of the chip if you intend to do it yourself. Before beginning a job, check whether or not doing the work yourself will void your warranty.

Hardware Specifications

The Expansion Bus

The NEATsx uses a modified eight slot AT expansion bus. The bus is comprised of three 8-bit expansion slots and five 16-bit expansion slots. These will accept all the common expansion cards that conform to the standard slots. You should check to make sure that any cards added are speed compatible with the NEATsx.

The slots each have two parallel rows of connecting pins. When the connecting edge of an expansion card (the “golden fingers”) is inserted between them, the slot pins grip the fingers and establish the connection between the board and the card. It is important to keep these connectors clean and dust free so that a proper connection can be made. Look in the Care and Maintenance section for information relating to this.

The Expansion Slots

8-bit XT Compatible

The three XT type eight-bit expansion slots can be used for expansion cards that do not require a sixteen-bit data path. An example of this type of card would be certain video display cards. These cards are shorter than AT style cards; they have 62 pins divided into two rows of 31 each.

Hardware Specifications

16-bit Slots

The five sixteen-bit expansion slots provide a wider data transmission pathway and will commonly be used by cards such as hard disk controllers, network cards and many I/O expansion cards. The slots are of two-piece construction with one long section and one short. The long sections are the same as the 8-bit slots. The additional short sections have 36 pins divided into two rows of 18 each. These two sections together make up a 16-bit data path. Cards that use these slots must be plugged fully into both sections of the slot.

Hardware Specifications

Memory Subsystem

This section covers types of memory applicable to the NEATsx and the structure of the memory subsystem.

The NEATsx can have up to eight megabytes of memory installed on the mainboard. A number of different kinds of memory chips or modules can be used. All of the memory on the mainboard uses a 16-bit data path to connect to the microprocessor.

There are four memory banks on the NEATsx main board. Two of these receive DIP DRAMs. The other two are for SIP memory modules. Using jumper JP6 you can designate whether the SIP modules or the DIP DRAMs should be banks zero and one. If you intend to use DIP DRAMs, those sections of the memory subsystem must be defined as banks zero and one. The other two SIP banks would then be banks two and three. It's not necessary, however, that these two SIP banks be utilized. The point is that if you do use both DRAM chips and SIP modules, it is the DRAM chips that must be designated as banks zero and one.

If, however, only SIP modules will be used on the NEATsx main board, then those must be defined as banks zero and one. Jumper JP6 is for designating bank numbers. The physical banks obviously do not change. The only change is in bank designations.

Hardware Specifications

Types Of Memory

The NEATsx accepts two different DRAM sizes. The memory subsystem accepts the following types of memory:

- 256 Kbit DIP DRAM. 512KB per bank. Configured as two sets of two 44256 chips and one 41256 chip
See memory diagram for correct placement.
- 1 Mbit DIP DRAM. A full bank of eighteen 41000 chips totals 2 megabytes of memory.
- 256 Kbit SIP (Single In-line Package) modules.
A full bank of two modules totals 512 kilobytes.
- 1 Mbit SIP modules. A full bank of two modules totals 2 megabytes.

There are two forms of RAM noted above. The DIP DRAM chips are single units that are installed individually. SIP modules are mounted on a strip that plugs in as one unit. The two sections of each SIP bank are physically in line, i.e., the two SIP modules for a bank allign vertically. The side-by-side sections are of two different banks.

Hardware Specifications

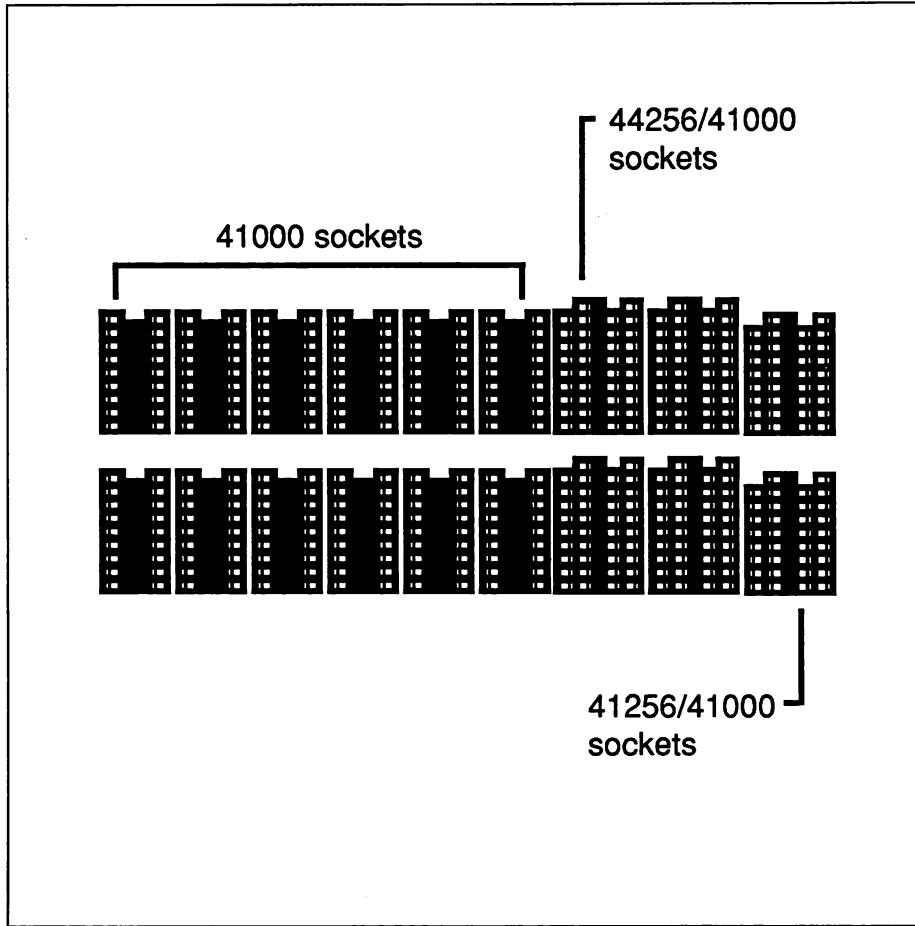
Notice that there are two sizes of RAM chips; 256 Kbit, and 1 Mbit. It is important to distinguish between bits and bytes here. The bit measurement is for individual chips; the byte measurement is for total memory size for a set of nine chips.

All the RAM chips function in sets of nine whether they are installed individually or are part of a module. The individual chip measurement, e.g., 256 Kbit, represents the total amount of memory in one chip. Eight chips for memory plus one for parity checking make up a set of nine.

A set of nine 256 Kbit chips or their equivalent will therefore total 256 kilobytes of memory. The configuration of two 44256 chips and one 41256 chip noted previously is equal to the configuration of nine 256 Kbit chips. Both have a total memory of 256KB. One 44256 chip has the memory capacity of four 41256 chips. Nine 1 Mbit chips will equal one megabyte of memory. Each DIP RAM bank on the NEATsx has two sets of nine sockets. The figure on the next page shows the socket configuration of the DIP RAM banks.

SIP modules come in two memory capacities: 256KB or 1MB per module. One SIP module is equivalent to nine DRAM chips. Two modules, therefore, are necessary for one memory bank.

Hardware Specifications

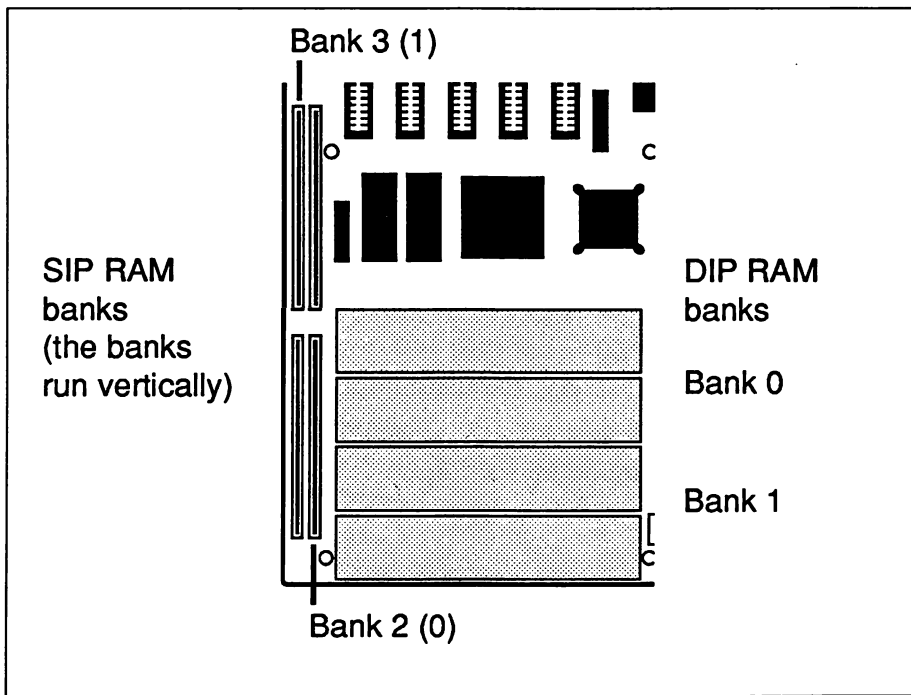


NEATsx DIP RAM memory banks

Hardware Specifications

Physical Organization

The NEATsx's memory subsystem is divided into two parts which in turn have two sections. The sections are called banks. There are four banks on the board, each with a capacity of two nine-chip sets. Two of the banks are for DIP DRAM chips, and two are for SIP modules. The banks are numbered 0, 1, 2, and 3, but their designations depend on the setting of jumper JP6. The figures below show the possible bank designations.



NEATsx memory bank organization

Hardware Specifications

The NEATsx allows the installation of several types of RAM in the same system. Six of the sockets for each DIP DRAM bank have a dual design. The SIP banks are standard SIP sockets that will accept modules with either 256 Kbit or 1 Mbit chips.

The result is a high degree of flexibility to install precisely the amount and kind of memory desired. There are numerous possible configurations. The table below lists the possible choices.

When installing or adding memory, the banks must be filled beginning with bank zero, then bank one, and so on. Each bank can contain only one kind of chip. Different types of chips can not be mixed in the same bank except for the 44256/41256 configuration mentioned earlier. A bank must be completely full to function.

Another nice feature of the NEATsx is that bank numbers can be reassigned so that SIP modules can be used first. Normally the DIP DRAM banks are assigned the zero and one positions. If you want to use SIP modules exclusively, the bank numbering can be changed by altering the setting of jumper JP6. The procedure to do this is explained in the Hardware Setup section.

Hardware Specifications

Page/Interleave Memory

Memory access for the NEATsx can be through single bank page mode or page/interleave page mode, 2-way or 4-way. Page/interleave means information stored in the memory subsystem is divided up, some of it going to one bank and some to another. This allows faster memory access than single bank page mode.

In order for the system to perform interleaving, at least two banks must be filled. Therefore, a minimum of 1MB of RAM is necessary for the NEATsx to utilize this feature. Memory interleaving is a special feature of the NEATsx that is setup before you receive the board. It is built into the board, and is not user selectable.

A chart in the QuickSet program and in the Quickset section of this manual displays which memory configurations will be interleaved. Since interleaving maximizes the performance of a system, it's best to install a memory configuration that allows interleaving. Check the Quickset section for more information.

Hardware Specifications

Wait States

One of the main things that distinguishes high-speed '286 and '386 system boards from earlier, slower designs is the way in which memory access is handled. At a slower clock speed, the common DRAM memory design had sufficient speed to provide memory access for the microprocessor at zero wait states.

With the advent of faster clock speeds, the microprocessor's speed began to exceed the former configuration's capacity to provide zero-wait memory access. The page/interleave design is a solution to this problem that allows for zero-wait operation without requiring the use of very fast memory chips.

The maximum CPU clock speed, the number of wait states, and the interleaving factor all depend on the speed of the memory installed. Listed below are the memory speed requirements for eight possible system configurations.

16MHz INTERLEAVE:

1. 0 WAIT STATE, memory requirement is 100NS
2. 1 WAIT STATE, memory requirement is 120NS

Hardware Specifications

16MHz NON-INTERLEAVE:

- 3. 0 WAIT STATE, memory requirement is 60NS
- 4. 1 WAIT STATE, memory requirement is 80NS

20MHz INTERLEAVE:

- 5. 0 WAIT STATE, memory requirement is 80NS
- 6. 1 WAIT STATE, memory requirement is 100NS

20MHz NON-INTERLEAVE:

- 7. 0 WAIT STATE, memory requirement is 60NS
- 8. 1 WAIT STATE, memory requirement is 80NS

Shadow RAM

If you have 1MB or more of memory installed, it is possible to use a feature of the NEATsx's chip set called "Shadow RAM." This allows the relocation of the contents of ROM BIOS to RAM above 640K. This feature increases overall system speed. Bear in mind that this can only be enabled if there is at least 1MB of memory present. It must be used if more memory is present. Turning on the Shadow RAM feature is done by using the Quickset program described in Software Setup. This feature cannot be used at the same time as the Expanded Memory Specification noted below if only 1MB is installed.

Hardware Specifications

Expanded Memory

If at least 1MB of memory is installed on the NEATsx, the expanded memory feature can be used. The NEAT ChipSet has a built-in memory controller for the LIM (Lotus-Intel-Microsoft) Expanded Memory Specification Version 3.2. When the driver EMM.SYS is loaded through the CONFIG.SYS file, the system supports EMS 4.0. Either allows up to eight megabytes of memory to be configured without requiring a separate EMS Card. The QuickSet program described later enables and configures the EMS function of the board. If you use EMS version 4.0, you will also need to copy the EMS driver file from the NEATsx disk to your start-up disk. Instructions on how to complete these procedures are provided in the Software Setup section.

The CS8281 NEATsx CHIPSet

The NEAT Chip Set from Chips and Technologies allows the programming of many system board functions. The set is comprised of four LSI (Large Scale Integration) chips that enable the CPU and AT bus clock rates to be programmed as well as memory, I/O wait states and command delays. The DRAM type, Shadow RAM capability and DMA wait states can also be programmed. The set also contains 114 bytes of CMOS RAM for storage of the additional configuration information created by the QuickSet program.

Hardware Specifications

The chip set consists of the 82C811 CPU/bus controller, the 82C812 page/interleave and EMS controller, the 82C215 address/data buffer and the 82C206 integrated peripherals controller (IPC). The descriptions below are somewhat technical and are provided for those interested in the specific functions the individual chips in the set. It is not necessary to understand this information to use QuickSet to setup the board.

The 811 Chip

The 82C811 is the bus controller for the CS8281 NEATsx CHIPSet. It provides synchronization and control signals for all buses. The 82C811 also provides an independent AT bus clock and allows for dynamic selection between the processor clock and a user-selectable AT bus clock.

Because command delays and wait states are software configurable, peripheral boards are provided with maximum flexibility. The chip is programmable via the setup programs provided.

The features are as follows:

- Clock generation with software speed selection

Hardware Specifications

- Optional independent AT bus clock
- CPU interface and bus control
- Programmable command delays and wait state generation
- Port B register

The 812 Chip

The 82C812 is the page/interleave and EMS memory controller for the CS8281 NEATsx CHIPSet. It provides an interleaved memory subsystem design with page mode operation. It supports up to 8MB of DRAM with combinations of 256Kb and 1Mb DRAMS. The processor can operate at 16 Mhz with 0.5 to 0.7 wait state memory accesses using 100ns DRAMs and at 20 Mhz with 80ns DRAMs.

This is possible through a page interleaved memory scheme. A RAM shadowing feature allows faster execution of EPROM stored BIOS code by downloading and executing code from RAM. In a DOS environment, memory above 1MB can be used as EMS memory. The chip is programmable via the setup program provided.

Hardware Specifications

The programmable features are as follows:

- Wait State selection
- Selection of DRAM type (256K, or 1MB)
- Interleave and Page Mode operation
- Enabling/disabling of Shadow RAM

The 215 Chip

The 82C215 Address/Data buffer provides the buffering and latching between the local CPU address bus and the Peripheral address bus. It also provides buffering between the local CPU data bus and the memory data bus (M data bus).

The parity bit generation and error detection logic resides in the 82C215. The 82C215 is an address/data buffer and is not programmable.

Hardware Specifications

The 206 Chip

The 82C206 Integrated Peripherals controller contains the CMOS RAM that stores the configuration information created by the setup programs. It has the following features. The chip has the following functions:

- Programmable 8/10 Mhz DMA capability
- Programmable DMA Wait States
- Fast I/O Recovery Time
- Additional 64 bytes of CMOS RAM

ROM BIOS

All microcomputer systems use a Basic Input Output System. This is software that has been permanently recorded in a ROM (Read Only Memory) chip and functions as the fundamental point of communication between the system board and the rest of the computer.

Hardware Specifications

The NEATsx currently uses the AMI BIOS from American Megatrends Inc. The Shadow RAM feature mentioned previously takes the information in the BIOS chips and places a copy of it in the computer's RAM. This speeds up operation of the system because the microprocessor can access the information more quickly.

AMI BIOS

The AMI BIOS, in addition to the BIOS program itself, contains two setup programs that are called up when the system boots up. These programs are called Setup and Extended Setup. The Setup program records information about the hardware configuration of your system. The Extended Setup is a program included to enable the programming of the NEAT chip set.

The NEATsx, however, does not need to use the Extended Setup program that is provided in the AMI BIOS. The QuickSet program provided on your NEATsx disk replaces the AMI extended setup. Do not use the AMI Extended Setup program to setup your NEATsx unless you fully understand it. It is much more difficult to use correctly. You might lock yourself out of your system if the wrong configuration is entered. The QuickSet documentation on the NEATsx disk explains what to do if this happens. If you haven't printed a copy you won't be able to read this file. Simply put, if you have a problem, turn the computer off, hold down the Ins key, turn the computer on and keep the key pressed until the computer boots up.

Hardware Specifications

Peripheral Connections

Keyboard

The NEATsx has a standard keyboard connection port at the rear of the board. The jack from the keyboard plugs into the port once the board has been installed in the case.

Power Supply

The NEATsx requires a power supply of at least 180 Watts in order to be used in a fully configured system. Such a system includes a hard disk drive and more than a minimum number of expansion cards. The power supply should preferably be of the type that has a “power good” signal. The power supply commonly supplied for AT-type system boards has this feature.

If you wish to use a power supply that does not have a “power good” signal, you can do so by setting a jumper on the NEATsx board. Full details of this procedure are given in the Hardware Setup section. If you are purchasing a unit yourself, ask the dealer for advice if you are in doubt as to the correct choice.

Hardware Specifications

Case Connections

The NEATsx has on-board connectors for several features that are commonly mounted on the front panel or in many system cases. These include:

- A Reset button connector
- A Keylock/Power-On LED indicator connector
- A speed selection button connector
- A Turbo speed LED indicator connector
- A Speaker connector

Information on how to connect these functions to the NEATsx can be found in the Hardware Setup section.

Hardware Specifications

Real-Time Clock Battery

The NEATsx has an onboard nickel cadmium battery (nicad) that maintains the system configuration information in the CMOS RAM. The battery automatically recharges while the power is on. It can be circumvented by using a battery pack of four “AA” batteries or a battery especially designed for this purpose, either of which are purchased separately.

Since the onboard battery recharges when your system is in use, the main reason you may want to supplement it is if you know that the system will not be in use for a month or more. If this will be the case, the onboard battery will discharge, resulting in the loss of your system configuration. If you attach an auxiliary battery during this period, the information will be retained. You will, however, need to leave the system on for six to twelve hours to recharge the onboard battery the first time the system is turned on again.

The external pack or battery will have wire leads to connect it to the battery connector on the board. Instructions on how to connect the battery pack to the board are given in the next section. See the Software section if a battery-related problem arises with the CMOS RAM configuration information.

Setup

This section is for setting up the NEATsx before installing it in a system case. If your NEATsx is already installed in a system this section can be ignored unless a change in the system configuration needs to be made.

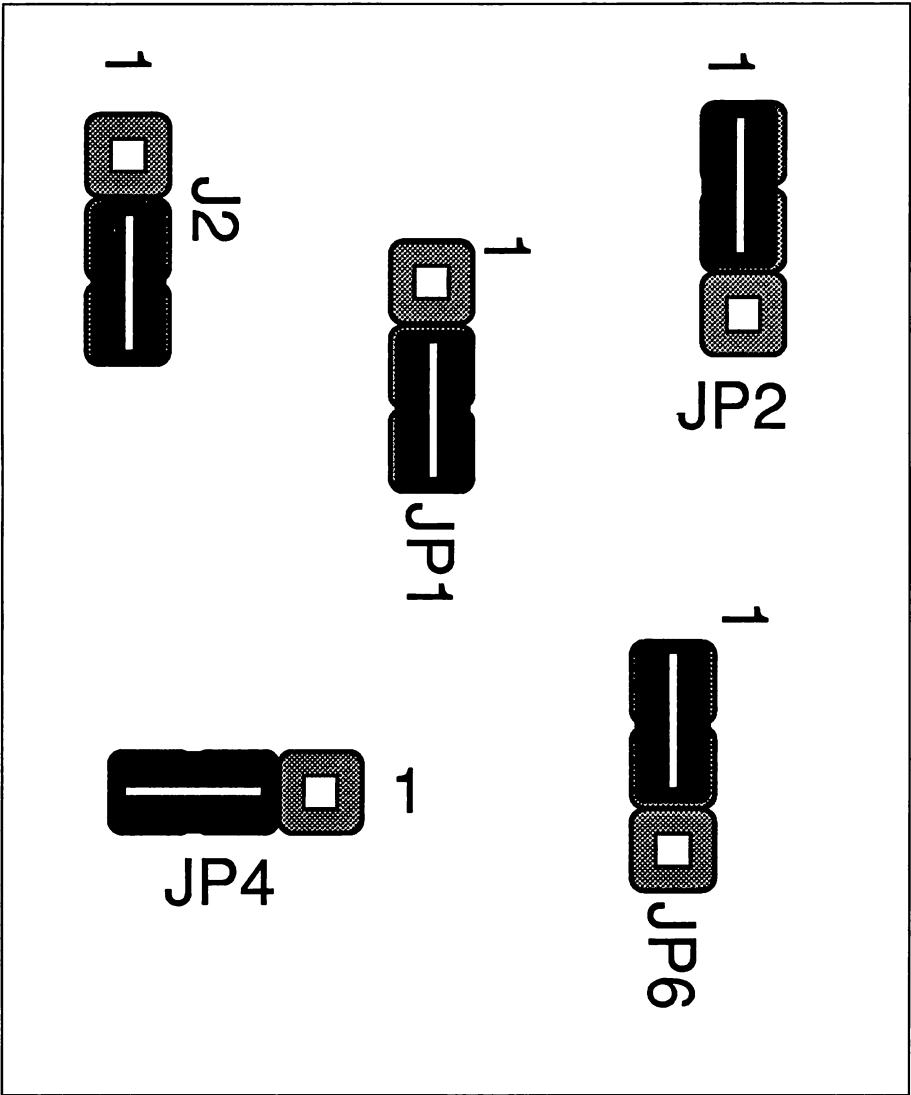
Jumper Switches

The NEATsx has several jumper switches that must be set to define part of both the board and system configurations. These switches are three-pin components that are turned on and off by placing or removing a cover cap over the pins. To turn a switch setting “on”, place a cap over two pins. This is called “shorting” the jumper. All the jumpers must be set to one of two possible settings.

The location of the jumpers is noted on the Board Layout diagram at the beginning of the manual. Their functions and settings are noted in the following pages.

The NEATsx comes with the jumpers preset. The factory settings are shown in the diagram on the following page.

Hardware Setup

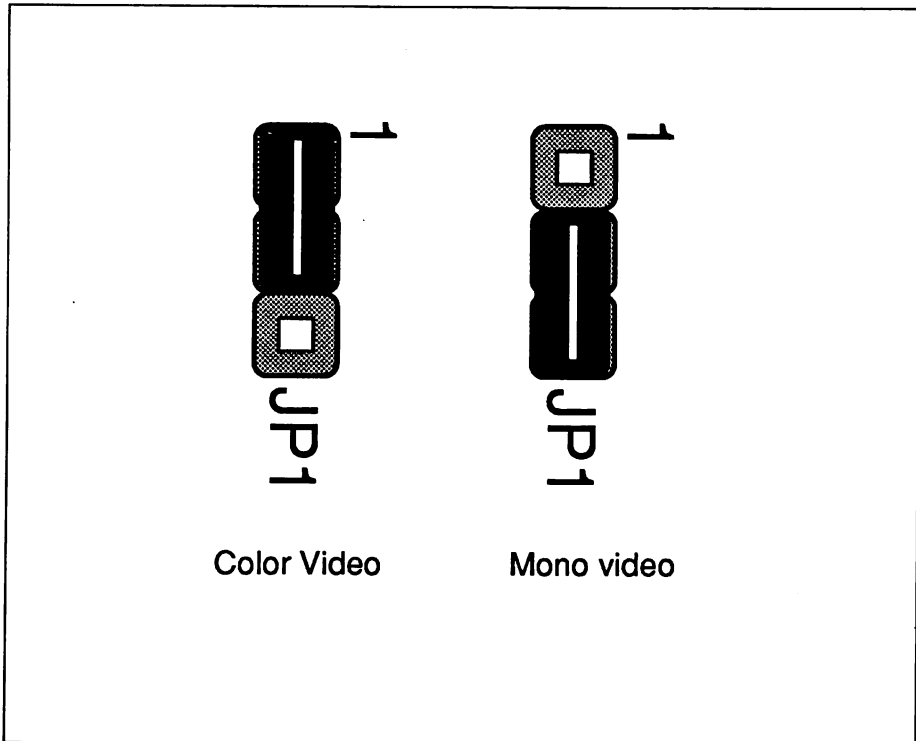


NEATsx default jumper settings

Hardware Setup

Video Mode Selection

Jumper JP1 controls the video mode setting. The factory setting is for monochrome mode. Alternatively, the NEATsx can be configured for color mode. Short pins 1-2 for color; 2-3 (default) for monochrome. The figure below illustrates the settings.

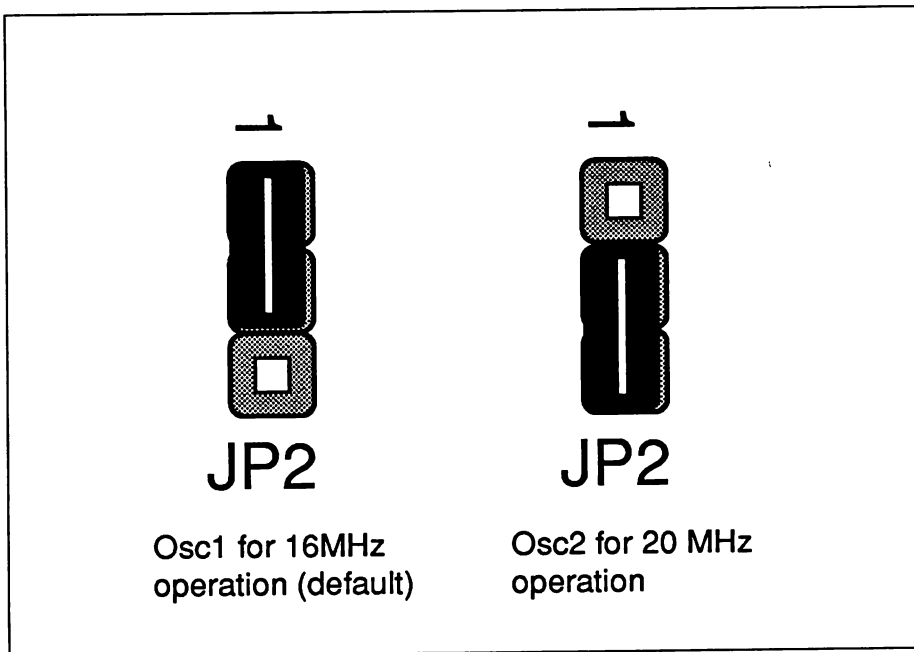


NEATsx video mode factory setting

Hardware Setup

CPU Oscillator

Jumper JP2 selects the oscillator that will be used by the microprocessor. The setting is based on the speed of the microprocessor. The jumper is factory set for the 32 Mhz oscillator, the setting for the 16 Mhz microprocessor. This default setting will not need adjustment. In a 20MHz CPU model the board will operate at 20MHz by adding an oscillator. Short pins 1-2 (default) for 32 Mhz, OSC1; pins 2-3 for option oscillator, OSC2. The factory setting (short 1-2) is shown in the figure below.

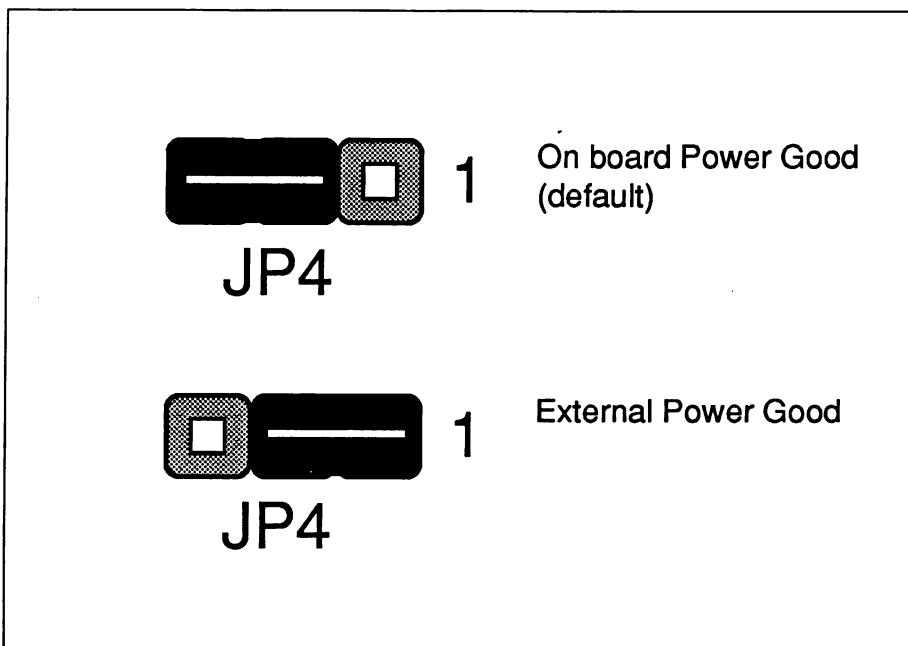


NEATsx CPU oscillator settings

Hardware Setup

Power Good Signal

The jumper JP4 controls the origin of the power good signal, either from the power supply or from the board circuit. The factory setting is from the board circuit. AT power supplies have a power good signal output. However, other power supplies may not and the alternative setting of JP4 allows for these types of power supplies to be used with the NEATsx. Short 1-2 for power good signal from the power supply; 2-3 (default) for on board power good signal. The figure below illustrates the appropriate settings.

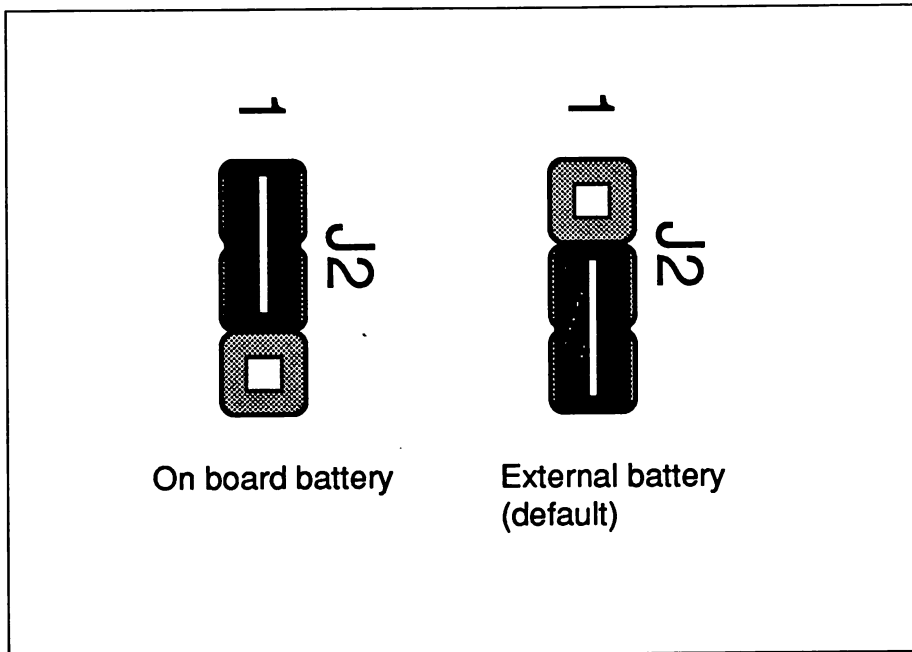


NEATsx power good settings

Hardware Setup

Battery

Short pins 1-2 of jumper J2 to select the internal battery. Short 2-3 (default) for an external battery.

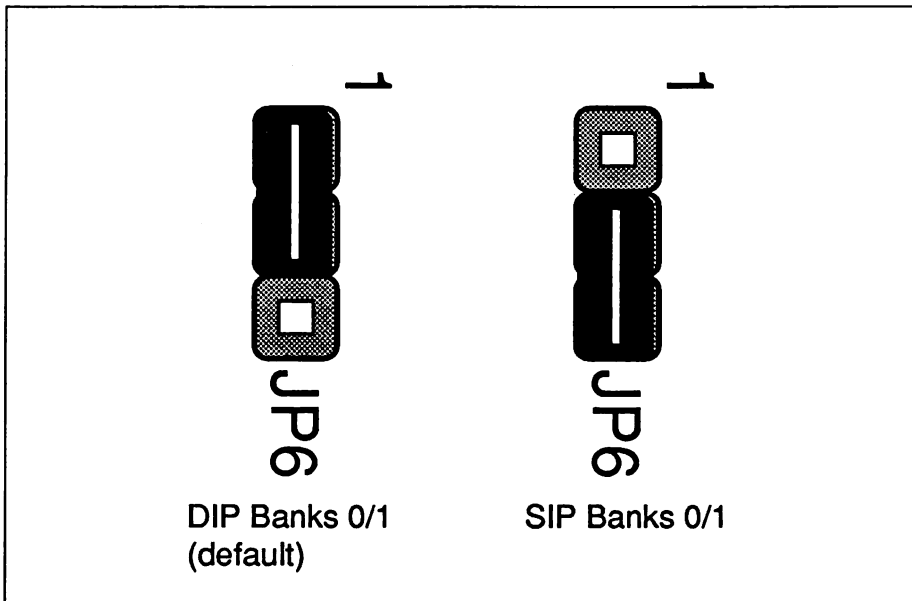


NEATsx memory bank assignments

Hardware Setup

Memory Bank Selection

Jumper JP6 determines the assignment of memory bank numbers. If the SIP banks are assigned as Banks 0 and 1, the DIP socket banks cannot be used. Short 1-2: Bank 0, 1 DIP DRAM Socket; Bank 2, 3 SIP Socket. Short 2-3: SIP sockets are banks 0 and 1



NEATsx memory bank assignments

Hardware Setup

Before Installation Setup

Before installing the NEATsx there may be some adjustments to make on the board. Check to see that the various jumpers are correctly set for your requirements. Refer to the section above on factory settings if there is any doubt as to the correct setting for your system configuration.

Memory Banks

The figure below illustrates the layout of the memory subsystem on the NEATsx board.

The NEATsx onboard memory subsystem has four banks that use DIP RAM chips and SIP modules. Detailed information about this is located under Specifications in the Hardware section.

Several configurations are possible when setting up the memory subsystem. It is important that memory banks be filled in pairs so that the page interleave function be enabled.

The NEATsx can use up to four memory banks. The banks are numbered 0, 1, 2 and 3. There are a number of possible memory configurations as noted in the following chart.

Hardware Setup

	DRAM TYPE				TOTAL	
	BANK0	BANK1	BANK2	BANK3	MEMORY	INTERLEAVE
1.	256K	0	0	0	512KB	
2.	1M	0	0	0	2MB	
3.	256K	256K	0	0	1MB	YES
4.	1M	1M	0	0	4MB	YES
5.	256K	256K	256K	0	1.5MB	
6.	256K	256K	1M	0	3MB	
7.	1M	1M	1M	0	6MB	
8.	256K	256K	256K	256K	2MB	YES
9.	256K	256K	1M	1M	5MB	YES
10.	1M	1M	1M	1M	8MB	YES

NOTE:

1. 256K means 256Kbit DRAM (Two sets 2 x 44256 & 1 x 41256)
1M means 1Mbit DRAM (Two sets 9 x 41000)
2. (YES) means memory configuration allows user to run page/interleave option

Hardware Setup

After Board Installation Setup

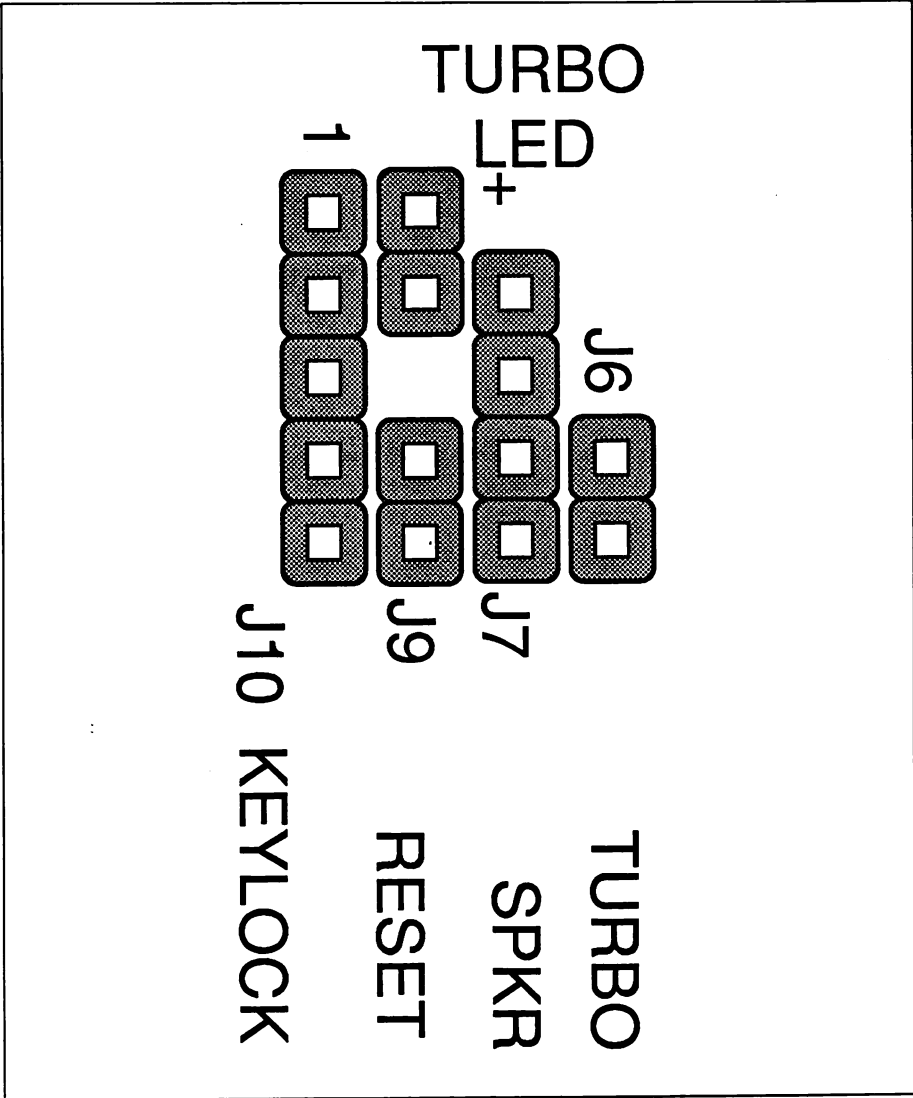
After the NEATsx has been installed in a system case there are some additional connections that may be made to the board. The Installation section contains a brief description of how to install the NEATsx system board in a case.

Case Connections

There are five connectors on the NEATsx that can be attached to indicators or devices on a system case if they are present. They are:

- Keylock/Power LED connector (J10)
 PIN 1: +5V PIN 4: Keylock
 PIN 2: NC PIN 5: Ground
 PIN 3: Ground
- H/W Reset Switch connector (J9). ON: RESET
- Processing Speed (or Turbo) Switch connector (J6)
 ON: NORMAL OFF: TURBO
- Processing Speed (or Turbo) LED connector (J8)
- Speaker connector (J7)

Hardware Setup



NEATsx case connectors

Hardware Setup

These connectors look similar to jumper switches and vary in number of pins. The indicators present on the case will have wire leads extending from them with plastic female connectors attached. The connectors should be plugged to the appropriate connecting pins on the board.

The sets of connecting pins are clearly labeled. If the lead requires a specific orientation, the pin 1 wire will generally be separated from the other wires by a space. You should then orient the connector so that this wire plugs onto pin 1 of the connecting pins on the board. The pin 1 position is clearly marked beside the keylock connector.

Hardware Setup

Power Supply

The power supply connector on the NEATsx is made up of two six-pin male components in a line. Dual connectors from the power supply plug directly onto the connectors at the right rear of the board.

The two female connectors from the power supply must be attached in the correct order. They can only plug in one way. Each has multiple wires extending from it. The black wires on each connector should be placed so that they are to the inside.

Keyboard

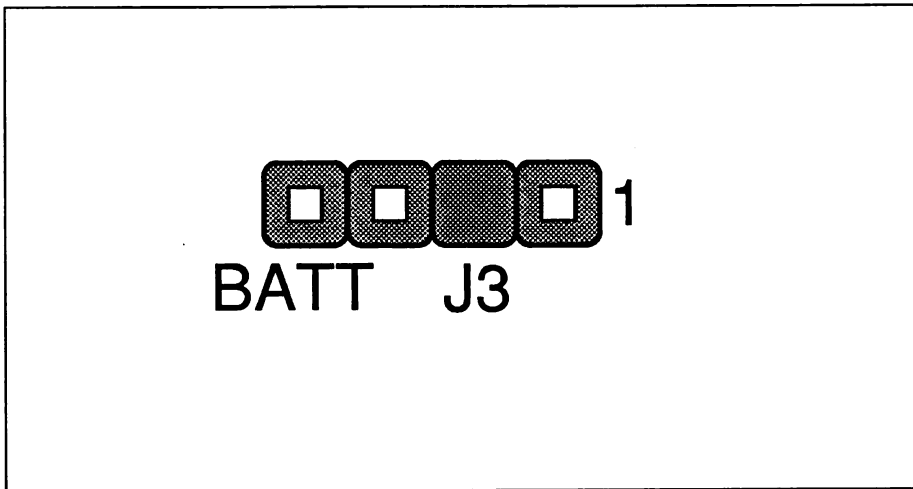
The NEATsx has a AT-compatible keyboard connector located at the right rear of the board as noted in the board diagram. The connecting jack from the keyboard plugs directly into it after the board has been installed in the system unit case.

Hardware Setup

Switching the Battery Source

Jumper J2 controls the setting for either an internal or an external battery. The NEATsx will normally be set to run off its on-board battery if it is already installed in a system. Therefore, the factory setting is for an internal battery. If an external battery source is attached (to connector J1), the jumper J2 must be re-set. The figure below illustrates the appropriate settings.

As mentioned previously, it is recommended that this be done only if your system will not be in use for several weeks. Since the system when on will automatically recharge the internal battery, it's best to use this battery if you're using your system regularly.



NEATsx battery connector

Software Specifications

Specifications

AMI BIOS Setup Programs

The AMI BIOS firmware contains two hardware setup programs. One is for recording your system configuration and the other is for the NEAT chip set. They can be run after the system has been turned on and the memory test has finished. On-screen messages clearly explain what to do and how to use the first program. The second program also has instructions but is more complex to use.

The Setup Program

The hardware setup program records information about the structure of your system. It asks you to enter the time, date and information about peripherals attached to the NEATsx. This includes display type and disk drive types. The program prompts for the information it requires and its use is self-evident.

Software Specifications

The Extended Setup Program

The second setup program in the AMI BIOS is an extension used to program the NEAT chip set. It is not necessary to use this program. The QuickSet program provided on the NEATsx disk replaces it and is considerably easier to use. It is recommended that the QuickSet program be used to avoid confusion in setting up the NEATsx.

The NEATsx Disk

QuickSet

The QuickSet setup utility is on the disk provided with the NEATsx. It is used to record information about the memory size, operating speed, and overall configuration.

QuickSet Documentation

QuickSet comes with a document file on the disk that explains how to use the program and gives examples of possible memory configurations. You can read this file from the computer screen or print it using standard DOS commands.

Software Specifications

EMS Driver File (EMM.SYS)

In addition to the files mentioned above, the NEATsx disk has an EMS driver file that must be copied to the root directory of your operating system disk if EMS 4.0 is to be implemented.

For information on how to copy the EMS driver file to the root directory of your system disk and make other modifications, see the following section on software setup.

Software Specifications

Software Setup

AMI BIOS

The AMI BIOS setup program mentioned previously is used to establish the system hardware setup. If your NEATsx is already installed in a working system, you will not need to use this program unless you desire to modify the current configuration already in CMOS RAM. Should the information be lost due to battery failure, you will need to rerun the setup and re-enter data for the configuration.

To complete the procedure, follow the instructions on the screen as they appear. The initial prompt after turning on the computer (or booting up) tells you to press the key if you want to run the setup program. It is displayed briefly just after the RAM test. If it disappears before you have a chance to respond, turn the system off then on again to cause the message to reappear, or just press the three keys <CTRL>, <ALT>, and simultaneously. The initial screen prompt is:

Press key to run SETUP/EXTD-SET

Software Setup

Press the Del key on the numeric keypad when you see the above message. The following screen will appear:

Exit for Boot
Run CMOS Setup
Run XCMOS Setup

Press the arrow keys to cycle through the three command choices. To reboot the system without running the Setup Program, select the first option, **Exit for Boot**. To enter the Setup Program, choose the second option, **Run CMOS Setup**. Select the third option to enter the **Extended Setup Program**. Press **Enter** when the correct command is highlighted and follow the prompts thereafter.

QuickSet

QuickSet is a copyrighted program supplied for use with the NEATsx system board. It is not public domain software and is not to be distributed or sold separately from the NEATsx board.

The QuickSet setup program is designed to provide an easy way to record setup configuration for the NEAT ChipSet™ in the extended CMOS memory of the 206 chip. The main purpose of QuickSet is to record memory-related information. The other programmable features of the NEAT ChipSet™ are not intended to be user modified and are not accessible from QuickSet.

Software Setup

If your system is already set up, you will not need to use QuickSet unless you want to make a change in the hardware configuration. If EMS memory will be added, the appropriate information must be entered using section 3 (SET EMS MEMORY) of QuickSet.

To use QuickSet the NEATsx board must be installed in a fully functioning system with a minimum of one floppy disk drive.

How To Use QuickSet

The Quickset main menu lists six items. The program is structured as a hierarchy with successive levels within each section. Movement between or within different sections of the program is accomplished using the cursor (arrow) keys and the PgUp/PgDn keys. There's a note at the bottom of each screen in Quickset regarding these.

The <Enter> or <Return> key is used to move between levels of the program and to select settings. The <Esc> key lets you abort settings and/or retreat to higher (or previous) levels of the program.

Software Setup

The following is the main menu as it appears when you first run Quickset.

NEAT QUICK SETUP UTILITY V1.0
FOR 811,812

1. SET MEMORY TYPE AND SIZE.
2. SET MEMORY WAIT STATE.
3. SET EMS MEMORY.
4. SET SHADOW MEMORY.
5. WRITE TO CMOS AND REBOOT.
6. EXIT.

QuickSet has on-screen instructions on how to use the program. The following is a brief explanation of each section's function. Each section can be opened by highlighting its title (with the cursor keys) and then pressing <Enter>. When using the program the first time, go through the sections sequentially. Following is the first item on the main menu followed by a brief explanation.

1. SET MEMORY TYPE AND SIZE

Opening this section displays the memory selection chart. The chart contains more memory configurations than are possible for the NEATsx and identifies which ones can use the interleave feature.

Software Setup

The similar chart in the Memory Subsystem portion of this manual lists only the allowable NEATsx configurations. Listed below for your reference is the memory selection chart from the Quickset program.

BANK0	DRAM TYPE			TOTAL	INTERLEAVE
	BANK1	BANK2	BANK3	MEMORY	
256K	0	0	0	512KB	
1M	0	0	0	2MB	
256K	64K	0	0	640KB	
256K	256K	0	0	1MB	YES
1M	1M	0	0	4MB	YES
256K	256K	256K	0	1.5MB	
256K	256K	1M	0	3MB	
1M	1M	1M	0	6MB	
256K	64K	256K	256K	1.64MB	
256K	256K	256K	256K	2MB	YES
256K	64K	1M	1M	4.64MB	
256K	256K	1M	1M	5MB	YES
1M	1M	1M	1M	8MB	

NOTE:

- 64K means 64Kbit * 1 DRAM (4164)
 256K means 256Kbit * 1 DRAM (41256)
 1M means 1Mbit * 1 DRAM (41000)
- (YES) means memory configuration allows user to run page/interleave option
 : Moves items, Enter: Select, ESC: Abort

Software Setup

2. SET MEMORY WAIT STATE

Opening this section displays a list of available processor speeds as shown below.

SYSTEM SPEED IS:

1. 12MHz
2. 16MHz
3. 20MHz

Select the appropriate speed for your system. (16 or 20 Mhz), then a wait-state selection list will appear. Lists for both 16 and 20 Mhz processor speeds are shown.

16MHz INTERLEAVE:

1. 0 WAIT STATE, memory requirement is 100NS
2. 1 WAIT STATE, memory requirement is 120NS

16MHz NON-INTERLEAVE:

3. 0 WAIT STATE, memory requirement is 60NS
4. 1 WAIT STATE, memory requirement is 80NS

20MHz INTERLEAVE:

1. 0 WAIT STATE, memory requirement is 80NS
2. 1 WAIT STATE, memory requirement is 100NS

Software Setup

20MHz NON-INTERLEAVE:

3. 0 WAIT STATE, memory requirement is 60NS
4. 1 WAIT STATE, memory requirement is 80NS

The wait-state is dependent on both the speed of RAM and the processor operating speed, determined by jumper JP2. The list notes the required RAM speed to use a particular wait-state setting. The RAM speed used and the selected wait state must be compatible; otherwise, the system may halt when rebooting. If such occurs, press <INS> as the system power is turned on to clear the erroneous settings. Run Quickset again to establish desired settings.

3. SET EMS MEMORY

This section requests information about EMS memory. The following is the SET EMS MEMORY menu as it appears on the screen.

1. Disable LIM EMS (no EMS function)
2. Enable LIM EMS (select memory in EMS function)

LIM EMS: Lotus-Intel-Microsoft Expanded Memory Specification
V4.0

Software Setup

Disabling EMS returns you to the previous level. Enabling it will cause another menu to appear. The next and more detailed menu requests particular information required by the EMS setup. The next menu is as follows:

1. Select I/O port address for EMS use
2. Set starting Address for EMS use
3. Set EMS Page 0 Address Extension
4. Set EMS Page 1 Address Extension
5. Set EMS Page 2 Address Extension
6. Set EMS Page 3 Address Extension
7. Select total Memory Size for EMS

Items 3 through 6 on the menu are the same, except that they concern different memory pages. Each section has a default setting that is automatically highlighted when opened. If the default setting does not work, you can try another.

Software Setup

1. Select I/O port address for EMS use

This item when selected will display the following list of port addresses.

1. 208H/209H
2. 218H/219H
3. 258H/259H
4. 268H/269H
5. 2A8H/2A9H
6. 2B8H/2B9H
7. 2E8H/2E9H

Set I/O port Address, which is used for the EMS page register I/O base Address.

If the EMS driver message does not have the right message or lists no EMS available then the selected I/O address needs to be changed. The default setting is number 1, port address 208H/209H. If it does not work, select another and retry.

Software Setup

2. Set Starting Address for EMS Use

This item when chosen will display the following list of base addresses.

Set EMS base Address

1. C0000H - CFFFFH
2. C4000H - D3FFFFH
3. C8000H - D7FFFFH
4. CC000H - DBFFFFH
5. D0000H - DFFFFFFH
6. D4000H - E3FFFFH
7. D8000H - E7FFFFH
8. DC000H - EBFFFFH
9. E0000H - EFFFFFFH

Select 64K memory address location used for EMS base address.

The default setting for the base address is number 5 on the list. Some LAN (Local Area Network) cards may use this address. If so, number 9 on the list is the next best choice. Numbers 1 through 4 are generally used by EGA cards and disk drive controllers.

Software Setup

3. Set EMS Page 0 Address Extension
4. Set EMS Page 1 Address Extension
5. Set EMS Page 2 Address Extension
6. Set EMS Page 3 Address Extension

Each of these four pages need to be set to one of four ranges. The choices will appear when an EMS Page Address Extension section is opened:

Set EMS Page 0 Address Extension

1. 1 Mbyte to 2 Mbyte
2. 2 Mbyte to 4 Mbyte
3. 4 Mbyte to 6 Mbyte
4. 6 Mbyte to 8 Mbyte

All the pages must be in the same range (1-2MB) if there is only 1MB of expanded memory. Page 0 must always be in the 1-2MB range. If there is more than 1MB available, the other pages can be set in the same or other ranges. Each Page must have an address extension range set. The ranges are not influenced by the total memory size.

Software Setup

7. Select Total Memory Size for EMS

Choosing this menu item displays the following list.

Specify the Memory Size for EMS use

1. 0.5 MB
2. 1 MB
3. 2 MB
4. 3 MB
5. 4 MB
6. 5 MB
7. 6 MB
8. 7 MB

This section displays a list of the total memory available for EMS use. The range is from 0.5MB to 7MB. Memory available for EMS is always total memory minus 1MB except where total memory is less than 1MB. In this case, 0.5MB is available for expanded memory. For example:

- If you have 4MB of memory, 3MB can be used for EMS.
- If you have 1MB of memory, 512KB can be used for EMS.

Once you complete the above you can proceed to the next section on the Quickset main menu.

Software Setup

4. SET SHADOW MEMORY

Opening this section displays the following information.

Set SHADOW memory

SHADOW memory for ROM BIOS

SHADOW memory for VIDEO BIOS

Selecting one of the above causes another message to appear requesting whether or not to enable shadow RAM for ROM or VIDEO BIOS. Remember that Shadow RAM and EMS cannot be used at the same time if your system has only 1MB of memory. With more than 1MB of memory, the 384KB above the 640KB of base memory can be reserved for Shadow RAM.

5. WRITE TO CMOS AND REBOOT

If you select this and press <Enter>, the new settings will be recorded in extended CMOS memory of the NEAT ChipSet. This information will be used by the system every time it boots up.

Software Setup

6. EXIT

Selecting this option and pressing <Enter> lets you exit Quick-Set without recording any new values or changing old ones. If you want to save a new configuration do not use Exit to get out of Quick-Set. If you do use Exit, none of the settings you've made will be recorded. To make settings permanent, you must select #5 on the main menu, WRITE TO CMOS AND REBOOT.

Other Configurations

The QuickSet documentation file on the NEATsx disk goes through an example of one full configuration procedure using Quick-Set. This example and the instructions built into the program should provide adequate guidelines for establishing other configurations. This type of setup procedure is fairly complex and requires that you have at least a basic understanding of the functions involved. If you want to make changes in your system and are not confident of your understanding of these matters, it is best to seek the help of a knowledgeable individual. Barring this, it is best to have a dealer or service center do the work for you. Always remember to check whether working on your computer yourself will void the warranty.

Software Setup

EMS Driver Installation

If you are going to use the EMS 4.0, the EMS driver file must be installed on your operating system disk. Copy the file EMM.SYS to the root directory of your boot-up disk. The EMS driver file comes with a document file that gives more information about the driver and its use.

A line must also be added to the CONFIG.SYS file in the root directory of your boot-up disk. If this file does not currently exist, you will need to create it. At the very least, it must have the following line:

```
DEVICE = EMM.SYS/d
```

If you do not know how to amend or create a CONFIG.SYS file, refer to the instructions below.

1) To copy the device driver to your system disk, do the following:

If your system has two floppy disk drives and no hard disk drive, put the NEATsx disk in drive B, the system disk in drive A and type:

```
COPY B:EMM.SYS A:
```

Software Setup

If your system has a hard disk drive, put the NEATsx disk in drive A and type:

```
COPY A:EMM.SYS C:
```

You can also copy the document files in the same way by substituting their file names for EMM.SYS.

2) To add the required line to the CONFIG.SYS file, type:

```
EDLIN CONFIG.SYS
*I
    1.DEVICE=EMM.SYS/d
    «CONTROL C»
*E
```

This will correctly modify the CONFIG.SYS file or will create one with this line included, where necessary.

Your DOS User's Guide and User's Reference Manual also contain information on this subject. Look in the appendices under "How to Configure Your System" and "Installable Device Drivers" for a more comprehensive explanation.

Installation & Operation

Installation & Operation

Installation

If your NEATsx is not installed in a computer system, then the following basic information will be of use. Due to the wide variety of cases the NEATsx can be installed in, it is not possible to provide exact instructions for every case. This section covers the factors common to installing the board in most situations.

The NEATsx has mounting holes that accommodate the standard mounting points for the IBM PC/XT, PC/AT and compatible cases. Most cases use these configurations or some compatible variation of them. Before removing the board from its anti-static bag, read the section below on static electricity precautions.

Static Precautions

Static electricity is a constant danger to computer systems. The charge that can build up in your body may be more than sufficient to damage integrated circuits on the system board. It is therefore important to observe basic precautions whenever you are going to handle or use computer components.

Installation & Operation

Although areas with a humid climate are much less prone to static build-up, it is always best to safeguard against accidental damage that may result in expensive repairs. The following measures should generally be sufficient to protect your equipment from static discharge:

- Discharge any static electric charge that may have built-up in your body by touching a grounded (earthed) or anti-static surface. Commonly available anti-static pads are one example. If nothing else, touch the silver expansion slot covers at the left rear of the system unit case. After opening the case, touch the power supply. This assumes that the system unit is plugged in, thus grounding the case. Be certain to do this before removing components from their protective anti-static covering.

- When handling individual cards, boards or modules, be careful to avoid contact with the components on them wherever possible and also with the “golden finger” connectors that plug into the expansion bus. It is best to handle system components either by their edges or by the mounting bracket that attaches to the slot opening in the case.

In following these recommendations, it is not necessary to be excessively cautious. The idea is just to take reasonable care. Always make certain that everything that connects to the system case, including the power supply, is unplugged before doing the installation.

Installation & Operation

Mounting Holes

The NEATsx has nine mounting holes drilled in the printed circuit board. These will line up with some or all of the mounting points on your case. Some form of mounting hardware is used to fasten the board to the case. In some cases, the long inside edge of the board fits under metal flanges in the case frame rather than being screwed to the case.

Mounting Fasteners

Cases can come with a variety of mounting fasteners, some made of metal and some of plastic. In general the metal type will screw into the case with another piece that screws the board to the fastener. Plastic mounting fasteners usually use pressure fitting, snapping first to the case and then to the board. One case may have both types, the metal fasteners serving mainly to ground the board to the case.

Installation & Operation

Operation

General

When a NEATsx system first boots up several messages will appear on the screen. These messages come from BIOS and the NEATsx software. They include:

- RAM test
- BIOS Setup/Extended Setup program message
- EMS status message if driver is installed on boot-up disk

These messages include instructions on their use where applicable and other information. The Setup programs are discussed in the Software section.

Installation & Operation

Reset Switch

The NEATsx has a connector for a Reset button. If this has been connected to the front panel of your system case the button can be used to restart your system without turning the power off. Pushing the button will cause your system to restart from the memory test. It is then necessary to reboot your operating system software before you can continue.

Changing Processing Speed

Hardware Switch

The NEATsx has a connector for a hardware processor speed switch. If this has been connected to the front panel of your system you can use it to switch between the maximum processing speed (often referred to as “Turbo”) and the secondary slower processing speed. Pushing the switch on the panel changes the speed. If the higher speed is in use and your front panel has the appropriate indicator light, the LED indicator will light up while the high-speed mode is in use.

Installation & Operation

Keyboard Switch

The processing speed can also be changed using a keyboard command sequence. To use this feature do the following:

- Hold down the <Ctrl> and <Alt> keys simultaneously and press:

a + (plus) for the high speed, or
a - (minus) for the low speed

In practice you will probably always want to use the high speed mode unless you encounter software compatibility problems. These might occur with some older software that is speed dependent and must run at the lower speed. This is a common concern of dual high-speed mainboards.

Installation & Operation

Clearing The CMOS RAM

If incorrect setup values are recorded using the Quickset program, it is possible the NEATsx will “hang”, i.e., the screen image will freeze and the system will not function even if you turn it off and on again. If this happens you must use the following procedure to rectify the problem. This procedure clears the incorrect information stored in the CMOS RAM and allows you to re-enter the correct information.

- To clear the CMOS RAM do the following:
- Turn the system off (power off)
- Press the <INS> key and turn the system back on (power on). Hold down the <INS> key until the screen display appears and then release it.

Having done this to clear the CMOS RAM, you must now re-enter correct configuration values using the Quickset program as described in the Software Setup section.

Installation & Operation

Care & Maintenance

Care & Maintenance

Backing up the NEATsx Disk

As with any program disk, a back-up copy should be made and the program run from the copy. The master disk should be stored in a safe place. The NEATsx disk is not copy protected. If your system has a hard disk drive the contents of the NEATsx disk can be copied to it and run from there.

To make a back-up copy of the NEATsx, use the standard DOS COPY command. This should be used as follows (with some variation depending on the disk drives being used). The following command line will copy the contents of the disk in drive A (in this case the NEATsx, disk) to the disk in drive B. After placing the NEATsx disk in drive A of your system, type:

```
COPY A:*.* B:
```

This will copy the contents of the source disk to the disk in Drive B. If your system has only one floppy disk drive, a message will appear during the procedure, asking you to replace the source disk (the disk you are copying from) with the destination disk (the disk you wish to copy to).

Care & Maintenance

If you wish to copy to a hard disk or an alternative floppy drive, type in the appropriate drive's letter in place of B in the above example.

Occasional Cleaning

Computer systems are sensitive to dust and dirt and can become contaminated. Most computer users are familiar with the need to clean and maintain floppy disk drives.

Your NEATsx is much less sensitive to contamination but it is nevertheless a good idea to examine the board and the devices connected to it once or twice a year and clean them if necessary. How often this is necessary depends on how clean your environment is.

Cleaning can generally be limited to a thorough vacuuming. Do not attempt to open your system if it will void the warranty.

Care & Maintenance

If you undertake the work yourself rather than taking the system to a dealer or service center, do the following:

- Turn off and disconnect all connections to the system.
- Observe static precautions as covered in a previous section.
- Open the case according the directions in your manual.
- Examine the interior for obvious irregularities. If something does not look right, stop. Close the system and take it to a dealer or service center. If there is no evidence of a problem, continue.
- Use a miniature vacuum designed for cleaning this type of equipment to clean the interior. Be careful not to loosen or disconnect anything. When finished, check that all connections are intact then close the case and re-attach the peripheral connections.

Care & Maintenance

Extended Non-Use of the System

If your system will be out of use for a number of weeks or more it is highly recommended that the back-up battery system described earlier be used. This requires changing the jumper setting as described and connecting a battery pack or specially designed battery. These accessories are available at many computer stores and computer supply dealers.

Using the battery will preserve the setup information in the CMOS memory. When you begin to use the system again the information will be available. If you do not preserve the information in this way it will be necessary to re-enter the configuration data before the system can be used. Remember to reset the jumper J2 for the internal battery and leave your system on for 12 to 24 hours when you first begin to use the system again. This will recharge the on-board battery.

This procedure should be repeated whenever the system will not be used for an extended period. It is also a good idea to use a dust cover to prevent the interior of the computer from excessive deposits of dust. The keyboard should be similarly protected.

Installing Upgrades

Installing Upgrades

This section deals with ways in which you might want to upgrade the NEATsx mainboard. There are two ways to upgrade the board. One is to add memory, and the other is to add a math coprocessor.

Memory Upgrades

You may at some point want to change the original configuration of your NEATsx by adding memory. There are a variety of ways to configure the NEATsx's memory subsystem. As mentioned previously the NEATsx can use three different forms of DRAM.

This section gives general guidelines on the installation of RAM chips. It does not explain how to configure the memory bank arrangement or other memory related subjects covered elsewhere in the manual.

Installing Upgrades

Installing Memory Chips

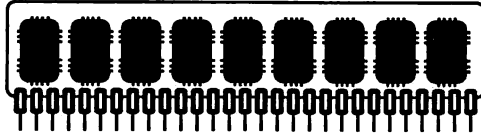
There are several points to remember when installing memory chips. As mentioned previously, do not attempt to modify the NEATsx if it is already installed in a system and doing the work yourself will void your system warranty.

These instructions assume a degree of technical knowledge and competence, and will not cover in detail anything other than the information related to chip installation. Seek help if necessary or have the work done by your dealer or local computer service center. When installing chips, be certain to do so as follows.

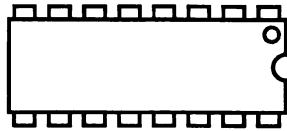
- Always observe static electricity precautions as mentioned earlier in the manual.
- Choose your new memory configuration carefully before purchasing new chips. A memory upgrade should be based on your needs and a careful review of the memory configuration information in this manual. Make certain you get the right kind of memory chips.

The figure on the following page shows the different types of memory that can be used in on the NEATsx.

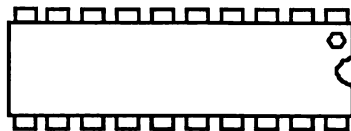
Installing Upgrades



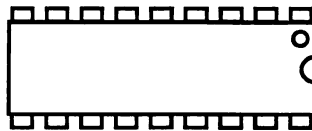
SIP module



256Kbit 41256 chip



44256 chip (=4 x 41256)



1Mbit 41000 chip

NEATsx RAM chip types

Installing Upgrades

Installing DIP RAM and SIP Modules

The NEATsx uses DIP DRAM chips and SIP modules on the main board. All chips require proper orientation when they are installed. DIP DRAM chips have a curved notch, a dot, or both at one end. This must be matched to the corresponding notch in the chip socket when the chip is installed. Aligning the notches correctly orients the chip.

The DRAM sockets on the board are standard notched sockets. To install chips, place the NEATsx board on a stable surface. Be very careful to safeguard against static electricity damage when installing chips. Install the chips individually as follows:

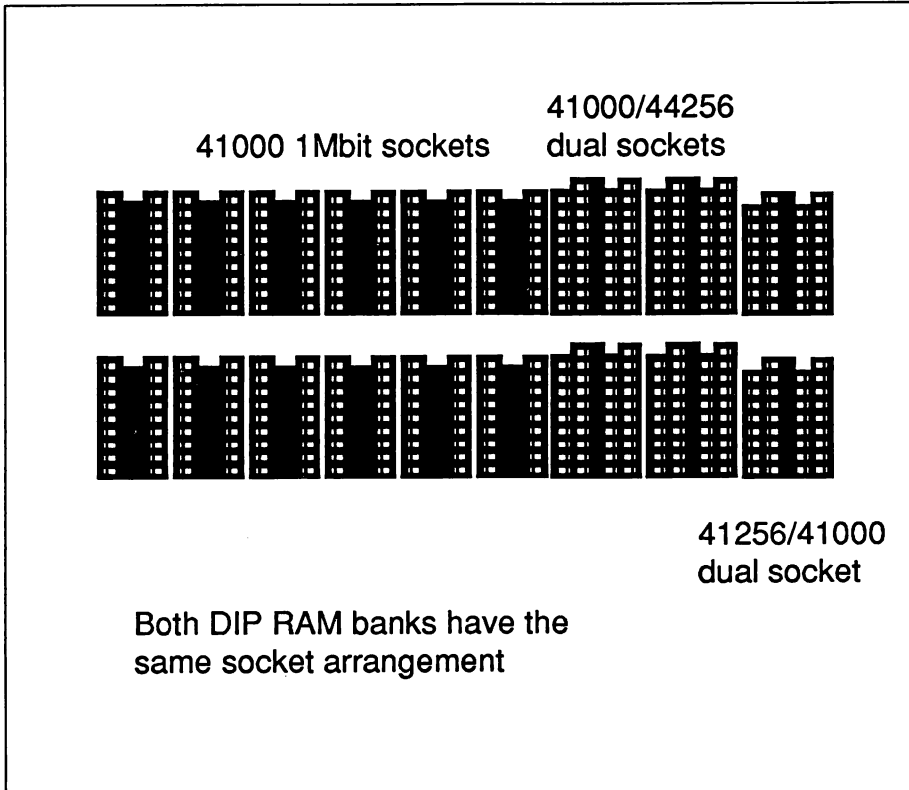
- Align the notches of the chip and socket

As you place the chip into the socket make sure the notched end of the chip is at the uneven side of the socket.

Installing Upgrades

- Align chip pins to the socket

Place the chip on the socket so that all pins align with receptacles in the socket. Make certain that you match the chip to a socket with the correct number of receptacles. If you use the wrong socket, the chip won't work.



NEATsx DIP RAM sockets

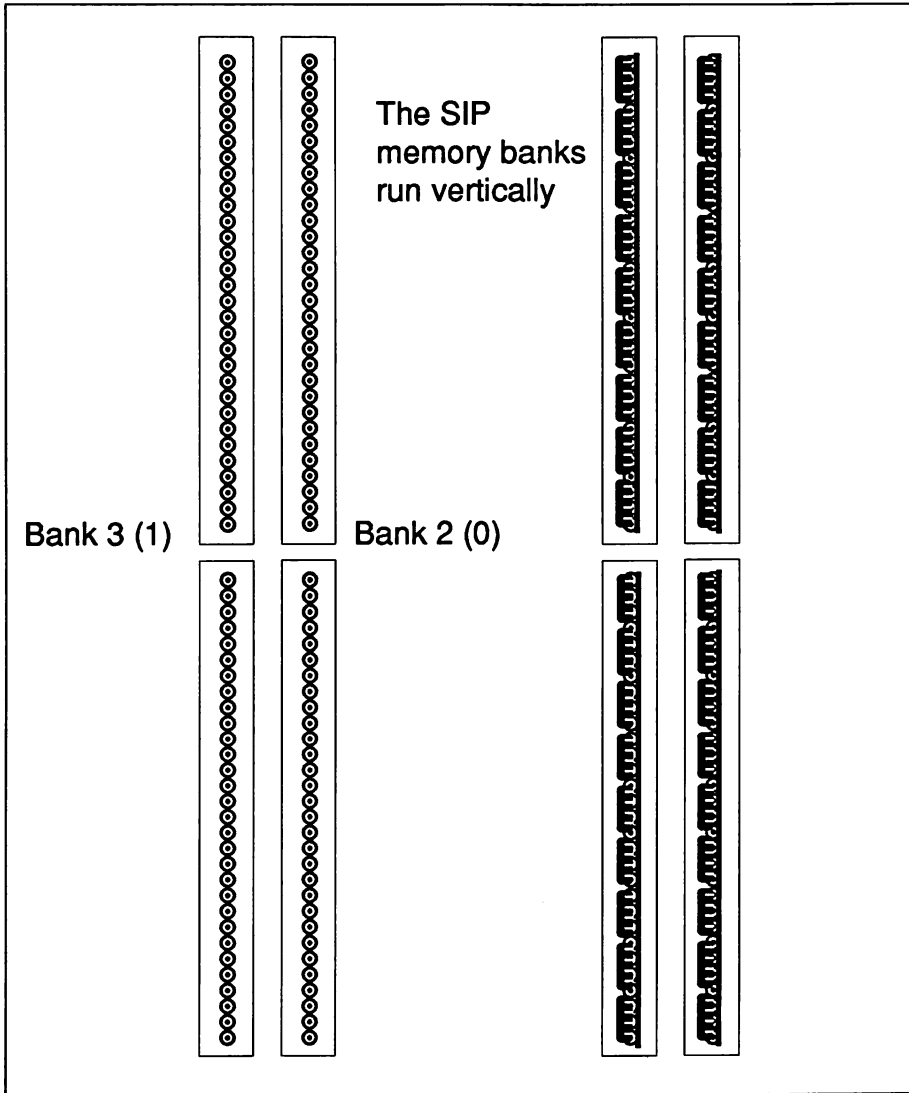
Installing Upgrades

- Press chip into the socket

Using either your fingers or a special chip inserting tool, press the chip into the socket. First gently press the chip in just a little; then check that all pins are going into the receptacles without bending. If the chip doesn't go in smoothly, improve the alignment of the pins within the socket. You can bend the pins slightly with gentle pressure if necessary, but be careful when doing this. Finally, firmly press the chip into the socket as far as it will go using moderate force. Repeat the previous sequence until you have installed all the chips required.

The SIP modules are installed similarly. First be sure that the modules are oriented correctly. Inserting the modules is only slightly different than with DIP DRAMs. Just make sure that all pins insert directly into the correct holes, and that none of them are bent in the process.

Installing Upgrades



NEATsx SIP banks

Installing Upgrades

Math Coprocessor Installation

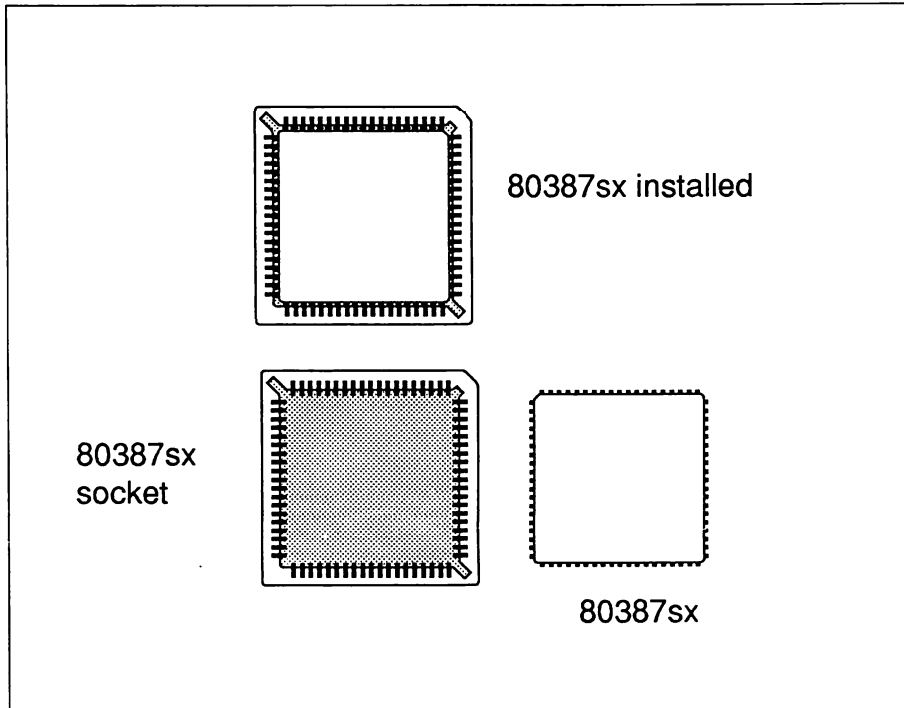
A math coprocessor can be installed on the NEATsx to speed up calculation intensive operations. To do this, follow the standard chip installation procedures outlined earlier. The main difference lies in the means by which the correct orientation is determined.

The 80387sx is a square chip that does not have the notch common to RAM chips. The Pin 1 position of the chip is indicated by a dot on the surface and that corner is also slightly cut off. This corner should be aligned with the notched corner printed on the board. The socket has a beveled edge at this corner.

The NEATsx 80387sx socket is a box-like component into which the 80387sx chip is pressed. The inside of each edge of the box has a row of pins. When purchasing an 80387sx chip make certain that it will mount in this type of socket rather than having pins on its underside.

The figure on the next page illustrates the points above.

Installing Upgrades



NEATsx 80387SX math chip installation

The 80387sx chip has many pins which are all mounted on the sides of the chip. It is important to align the chip with the socket and care must be taken to avoid misalignment of the pins. For this reason you may wish to have the chip installed professionally. If you want to do the work yourself, take special care to see that the chip is properly oriented before pressing it into the socket. Once it has been pressed into the socket, a special tool is required to get it out.

Installing Upgrades
