

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

NPC-486E

User's Manual

\ Adastra Systems
26232 Executive Place
Hayward, CA 94545
TEL (510) 732-6900
FAX (510) 732-7655

Copyright © 1992 - 1995 by Adastra Systems Corporation
Document MN0011-042595

Adastra Systems is a trademark of Adastra Systems Corporation. All other trademarks and registered trademarks contained herein are the property of their respective owners.

This document is designed to provide information about Adastra Systems Corporation products. No warranty of suitablility, purpose, or fitness is implied. While every attempt has been made to insure the information in this document is accurate, the information contained within is supplied "as-is" and is subject to change without notice.

Table of Contents

1. INTRODUCTION Error! Bookmark not defined.

1.1 FEATURE LIST Error! Bookmark not defined.
1.2 FUNCTIONAL SPECIFICATIONS Error! Bookmark not defined.
1.3 PHYSICAL SPECIFICATIONS Error! Bookmark not defined.
1.4 TECHNICAL SUPPORT Error! Bookmark not defined.

2. CPU Error! Bookmark not defined.

2.1 PROCESSOR UPGRADE Error! Bookmark not defined.
2.1.2 CPU TYPE JUMPER SETTINGS **Error! Bookmark not defined.**
2.2 CPU CLOCK SPEED AND POWER **Error! Bookmark not defined.**

3. SYSTEM MEMORY Error! Bookmark not defined.

3.1 PHYSICAL CONFIGURATIONS Error! Bookmark not defined.
3.1.1 INSTALLING SIMM MODULES **Error! Bookmark not defined.**
3.1.2 REMOVING SIMM MODULES **Error! Bookmark not defined.**
3.2 CHANGING MEMORY CONFIGURATION Error! Bookmark not defined.
3.3 LOGICAL CONFIGURATIONS Error! Bookmark not defined.
3.2.1 CONVENTIONAL MEMORY **Error! Bookmark not defined.**
3.2.2 EXPANDED MEMORY **Error! Bookmark not defined.**
3.2.3 EXTENDED MEMORY **Error! Bookmark not defined.**
3.2.4 SHADOW MEMORY **Error! Bookmark not defined.**

4. IDE HOST ADAPTER Error! Bookmark not defined.

4.1 CONNECTOR Error! Bookmark not defined.
4.2 PORT ADDRESS AND IRQ Error! Bookmark not defined.
4.3 DRIVE TYPE SPECIFICATION Error! Bookmark not defined.

5. FLOPPY DISK INTERFACE Error! Bookmark not defined.

5.1 CONNECTOR Error! Bookmark not defined.
5.2 DRIVE TYPE SPECIFICATION Error! Bookmark not defined.

6. KEYBOARD AND PS/2 MOUSE INTERFACE Error! Bookmark not defined.

6.1 CONNECTOR Error! Bookmark not defined.

6.2 NO-KEYBOARD OPERATION Error! Bookmark not defined.

7. FRONT PANEL INTERFACE Error! Bookmark not defined.

7.1 CONNECTOR Error! Bookmark not defined.
7.2 SPEAKER Error! Bookmark not defined.
7.3 LED INTERFACE Error! Bookmark not defined.
7.4 RESET SWITCH Error! Bookmark not defined.

8. SERIAL COMMUNICATION INTERFACE Error! Bookmark not defined.

8.1 CONNECTORS Error! Bookmark not defined.
8.1.1 DTE SIGNALS **Error! Bookmark not defined.**
8.2 PORT ADDRESSES AND ENABLES Error! Bookmark not defined.
8.3 RS-485 OPERATION Error! Bookmark not defined.

9. PARALLEL COMMUNICATION INTERFACE Error! Bookmark not defined.

9.1 CONNECTOR Error! Bookmark not defined.
9.2 PORT ADDRESS Error! Bookmark not defined.
9.3 INTERRUPT SELECTION Error! Bookmark not defined.
9.4 BI-DIRECTIONAL OPERATION Error! Bookmark not defined.

10. ETHERNET INTERFACE Error! Bookmark not defined.

10.1 CONNECTORS Error! Bookmark not defined.
10.2 10BASE-T OPERATION Error! Bookmark not defined.
10.2.1 RJ45 PIN-OUT **Error! Bookmark not defined.**
10.3 10BASE2 AND 10BASE5 OPERATION Error! Bookmark not defined.
10.4 I/O ADDRESS, INTERRUPT, AND DMA CONFIGURATION Error! Bookmark not defined.
10.5 INTERFACE ENABLE JUMPER Error! Bookmark not defined.
10.6 NETWORK SOFTWARE DRIVERS Error! Bookmark not defined.
10.7 NET BOOT ROM Error! Bookmark not defined.

11. VGA INTERFACE Error! Bookmark not defined.

11.1 CONNECTORS Error! Bookmark not defined.
11.2 FLAT-PANEL DISPLAY SELECTION Error! Bookmark not defined.
11.3 PANEL POWER SEQUENCING Error! Bookmark not defined.
11.4 LCD BIAS VOLTAGE AND CONTRAST CONTROL Error! Bookmark not defined.
11.5 VGA ENABLE Error! Bookmark not defined.
11.6 VGA VIDEO MODES Error! Bookmark not defined.
11.7 PC VIDEO OVERLAY Error! Bookmark not defined.

12. WATCHDOG TIMER Error! Bookmark not defined.

12.1 ENABLE Error! Bookmark not defined.
12.2 OPERATION Error! Bookmark not defined.

13. PC/104 ISA BUS EXPANSION Error! Bookmark not defined.

13.1 CONNECTOR Error! Bookmark not defined.
13.2 ADAPTER CARD MOUNTING Error! Bookmark not defined.

14. SOLID STATE DISKS Error! Bookmark not defined.

14.1 MEMORY CONFIGURATION Error! Bookmark not defined.
14. 2 SOCKET SSD CONFIGURATION Error! Bookmark not defined.
14.2.1 SOCKET SSD BATTERY CONNECTION **Error! Bookmark not defined.**
14.2.2 SOCKET SSD PAGE SELECTION **Error! Bookmark not defined.**
14.2.3 SOCKET SSD WRITE ENABLE **Error! Bookmark not defined.**
14. 3 FACTORY SSD CONFIGURATION Error! Bookmark not defined.
14.3.1 FACTORY SSD PAGE SELECTION **Error! Bookmark not defined.**
14.3.2 FACTORY SSD WRITE ENABLE **Error! Bookmark not defined.**
14.3.3 FACTORY SSD POWER CONTROL **Error! Bookmark not defined.**
14.4 SSD PAGE ADDRESS CALCULATIONS Error! Bookmark not defined.

15. BIOS Error! Bookmark not defined.

15.1 FLASH*FUSION*™ FLASH BIOS UPDATE UTILITY Error! Bookmark not defined.
15.2 SOLID STATE DISK DRIVER Error! Bookmark not defined.
15.3 NETWORK BOOT DRIVER Error! Bookmark not defined.

16. POWER Error! Bookmark not defined.

16.1 MAIN POWER CONNECTOR Error! Bookmark not defined.
16.2 PERIPHERAL POWER CONNECTOR Error! Bookmark not defined.
16.3 LCD BIAS ADJUST AND FAN POWER CONNECTOR Error! Bookmark not defined.
16.4 POWER CONSUMPTION Error! Bookmark not defined.

APPENDIX A: OPTIONS AND ADAPTERS Error! Bookmark not defined.

A.1. CABLES Error! Bookmark not defined.
A.2 MEMORY Error! Bookmark not defined.
A.3 NETWORK AUI Error! Bookmark not defined.
A.4 DISK DRIVES Error! Bookmark not defined.
A.5 SOFTWARE, OPERATING SYSTEMS Error! Bookmark not defined.
A.6 SOFTWARE, UTILITIES Error! Bookmark not defined.

A.7 SOFTWARE, NETWORK DRIVERS Error! Bookmark not defined.

APPENDIX B: HARDWARE INTERRUPT ASSIGNMENT Error! Bookmark not defined.

APPENDIX C: I/O PORT ASSIGNMENT Error! Bookmark not defined.

C.1 STANDARD PC/AT I/O ADDRESS RANGE 000 - 3FFH Error! Bookmark not defined.
C.2 NPC-486 EXTENDED I/O Error! Bookmark not defined.

APPENDIX D: MECHANICAL SPECIFICATION 81

APPENDIX E: JUMPER SETTINGS Error! Bookmark not defined.

E.1 JUMPER LOCATIONS Error! Bookmark not defined.
E.2 JUMPER DEFINITIONS (BY NUMERICAL ORDER) Error! Bookmark not defined.

APPENDIX F: CONNECTORS Error! Bookmark not defined.

F.1 CONNECTOR LAYOUT Error! Bookmark not defined.
F.2 MATING CONNECTOR SPECIFICATIONS Error! Bookmark not defined.

APPENDIX G: AMINSTAL UTILITY Error! Bookmark not defined.

G.1 RUNNING AMINSTAL Error! Bookmark not defined.
G.2 CONFIGURATION Error! Bookmark not defined.
G.2.1 PNP ISA MODE ENABLED **Error! Bookmark not defined.**
G.2.2 PNP ISA MODE DISABLED **Error! Bookmark not defined.**
G.3 DRIVER INSTALLATION Error! Bookmark not defined.
G.3.1 NOVELL NETWARE DOS ODI CLIENT **Error! Bookmark not defined.**
G.3.2 INSTALLING THE NDIS 2.01 DRIVER **Error! Bookmark not defined.**
G.3.3 INSTALLING THE PACKET DRIVER **Error! Bookmark not defined.**

APPENDIX H: FLASH*FUSION*™ BIOS LOAD Error! Bookmark not defined.

H.1 BIOS COMPONENTS Error! Bookmark not defined.
H.2 RUNNING LB Error! Bookmark not defined.
H.3 LB MENU Error! Bookmark not defined.
H.3.1 VGA BIOS, ADASTRA BIOS, SYSTEM BIOS **Error! Bookmark not defined.**
H.3.2 LOAD ALL BIOS COMPONENTS **Error! Bookmark not defined.**
H.3.3 CLEAR ALL BIOS COMPONENTS **Error! Bookmark not defined.**
H.3.4. SAVE OLD BIOS **ERROR! BOOKMARK NOT DEFINED.**

H.3.4. SAVE NEW BIOS _____ **ERROR! BOOKMARK NOT DEFINED.**
H.3.5 UPDATE BIOS NOW _____ **ERROR! BOOKMARK NOT DEFINED.**
H.3.6 EXIT _____ **ERROR! BOOKMARK NOT DEFINED.**
H.4 BIOS IMAGE FILE LIST_____ ERROR! BOOKMARK NOT DEFINED.

1. Introduction

The NPC-486E is a fully functional and complete PC/AT style computer contained on a single printed circuit board. All PC/AT subsystems are included and are 100% compatible with the standard PC/AT architecture. The NPC-486E is guaranteed to run all PC/AT compatible software.

The small form factor of the NPC-486E, 5.75" by 8", is achieved by using heavily integrated chip sets and state-of-the-art surface mount manufacturing. The form factor and mounting coincides with that of a standard 5.25" disk system.

The PC/AT subsystems normally found in a desktop unit are built in to the NPC-486E. These systems include the CPU, system RAM, system ROM (BIOS), DMA, counters, interrupt controllers, keyboard, and speaker of the motherboard; the floppy and IDE hard disk interfaces of the disk controller; the serial ports COM1 and COM2; a parallel port, LPT1; and a local-bus VGA display adapter capable of driving both flat-panels and CRTs.

Additional subsystems are integrated into the NPC-486E which further enhance its PC/AT functionality. These include a PS/2 style mouse and a 16-bit Ethernet interface.

Special features and functions are included on the NPC-486E to address the needs of embedded control. These functions include a watchdog timer, a solid state disk, and an ISA bus extension based on the PC/104 standard.

1.1 Feature List

- 486SX, 486DX, 486DX2, or 486DX4 CPU
- Multiple clock speeds: 25MHz, 33MHz, 66MHz, 75MHz, 100MHz
- Up to 32M bytes of RAM
- IDE hard disk controller
- Floppy disk controller
- 32-bit local-bus VGA display controller for CRT and flat-panel with optional Windows™ hardware accelerator
- Display power sequencing, LCD bias voltage on-board
- 16-bit Ethernet interface
- PC/AT keyboard port, PS/2 mouse interface
- Two deep-FIFO serial ports (one with RS-485 drive capability)
- One (bi-directional) parallel port
- Battery backed real-time clock
- Watchdog timer
- ISA bus expansion (PC/104)
- Up to 4.5 Mbytes Flash Solid State Disk (SSD)
- One 32 pin socket for additional SRAM, EPROM, EEPROM, or Flash SSD

1.2 Functional Specifications

CPU	486SX or 486DX at 25 or 33MHz; 486DX2 at 50 or 66MHz (internal) 486DX4 at 75 or 100MHz (internal)
RAM:	1M, 2M, 4M, 8M, 16M, or 32M
BIOS Memory:	One 128K byte 29F010 Flash - Field upgradeable
PC System Chip Set:	VLSI VL82C486, VL82C113A which contain the following: 82C37A DMA controller (2) 8254 Counter/Timer 82C59A Interrupt controller (2) 82284 Clock Controller 82288 Bus controller PC/AT Keyboard controller PS/2 Mouse Real-time Clock
Integrated I/O Chip:	A Super I/O chip which contains the following: PC/AT compatible floppy disk controller Western Digital compatible IDE controller Two 16550 serial UARTs, RS-232C One (bi-directional) (PC/AT printer) parallel port, TTL
Speaker Driver:	8 ohm, .5W speaker drive capability
Display:	VGA compatible adapter, 32-bit local-bus, 512K (1M optional) 16M colors; 640x480, 800x600, and 1024x768 resolution Simultaneous CRT with flat panels: LCD, EL, and Plasma Windows™ hardware accelerator (factory order option) On-board LCD bias (positive or negative) voltage On-board display power sequencing
Network:	16-bit Ethernet, Novell 2100 NIC compatible Drivers for NDIS, ODI, NetBIOS, TCP/IP, UNIX stream Network Boot support 10BASE-T on-board, 10BASE2 or 10BASE5 optional
Bus Expansion:	PC/104 ISA bus connection, up 6" cable extension 6 card drive capability
Solid State Disk:	Up to 4 Mbytes Flash Solid State Disk (SSD). One 32 pin socket for additional SRAM, EPROM, EEPROM, or Flash SSD

1.3 Physical Specifications

Mechanical:	5.75" x 8.00" x 1.00"
Mounting:	Eight mounting holes (compatible with 5.25" disk drive) Mounting for PC104 adapter cards
Temperature:	0 - 70 °C (with proper heat sinking)
Humidity:	5 - 95% RH (non-condensing)
Power:	1.5A at 5 volt (80486SX, 33 MHz, 4 Mbytes RAM)

1.4 Technical Support

Adastra Systems Corporation technicians and engineers are available for technical support should the need arise. We are committed to making our product easy to use and will help in any way we can when you apply our products in your systems.

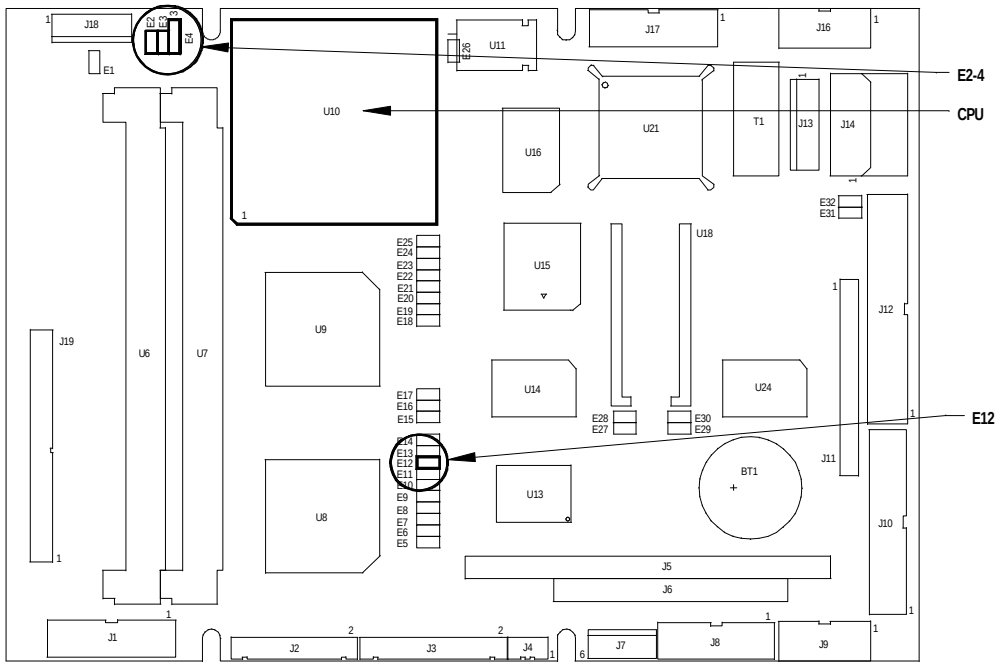
Technical support may be reached at (510) 732-6900, 8:00 am to 5:00 p.m. Pacific Time.

2. CPU

The NPC-486E supports four variations of the Intel 80x86 and 100% compatible type CPUs:

1. 486SX
2. 486DX
3. 486DX2
4. 486DX4

The 486SX CPU is identical to the 486DX except that it does not contain an internal math coprocessor. The 486DX2 and 486DX4 processors have internal clock multiplication. The DX2 doubles the system clock while the DX4 (not intuitively) triples the clock. Therefore, a system clock of 33MHz on a DX2 offers a bus speed of 33MHz and an internal processor bus speed of 66MHz. While all the processors will perform well, different processors are better suited to different applications. The 486SX is cost effective, but will not handle calculation intensive applications as well as the others. The DX4 is the highest performance processor, but this performance does not extend to memory or display intensive applications that are dependent on the external 33MHz bus.



2.1 Processor Upgrade

The CPU is a factory installed option and must be specified at the time of ordering. However, the processor type may be changed in the field if desired. Although the

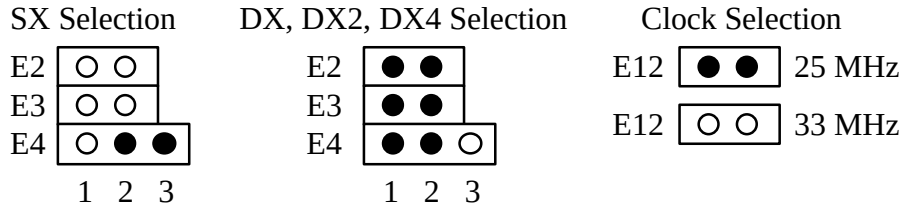
486DX4 is a 3.3V processor, the NPC-486E has a built-in regulator that provides the proper voltage when the DX4 is installed. Upgrading is simply a matter of replacing the processor and moving jumpers. Boards are always guaranteed to work at the higher speeds.

The procedure to change the processor is as follows:

1. Work at a suitable static-free work area.
2. Ground yourself, the new processor, and the NPC-486E to the work area.
3. Lay the NPC-486E on the work surface with the processor socket facing up. There should be support directly below the socket.
4. Remove the old processor. Use an extractor tool if one is available, following the tool's directions for use. A flat-head screw driver may be used to extract the chip as well. Use the screw driver as a pry, being careful to place protection under the point of leverage if it is on the printed circuit board; pry the processor up gently, working the pry tool around the chip and lifting it incrementally until it is free.
5. Place the new processor in the socket, taking care to line up the pin 1 indicators of the chip and socket.
6. Apply even pressure to opposite edges of the chip, starting with a low force.
7. Increase the pressure, evenly, on the chip edges until it is fully seated within the socket. The pressure required is significant, it is important that there be support under the PC board, directly below the CPU socket.
8. Change the jumpers to conform to the new processor type (see next section).

2.1.2 CPU Type Jumper Settings

Jumpers E2, E3, E4, and E12 are associated with the selection of the CPU type (SX, DX, or DX2) and clock speed. The settings for these jumpers are:



2.2 CPU Clock Speed and Power

The NPC-486E has the ability to reduce clock speed to conserve power. there are two mechanisms to change the system clock speed on the board. One method is to use the VLSI 82C486 chip set clock speed control features. This method involves processor resets, thus requiring the state of the processor to be saved and restored when the clock speed is changed. This method will work with the DX2 and DX4 processors.

An easier method is to use the clock control bits in Data Register 1 on the NPC-486E I/O subsystem. These bits allow the system clock speed to be changed without having to save and restore the processor state. However, processors with internal phase locked loops such as the DX2 and DX4 do not allow this method to be used. The bits obey the following table:

REG1_1	REG1_0	E12	System Speed	ISA Bus Speed
0	0	In	8 MHz	2.667 MHz
0	0	Out	8 MHz	2 MHz
0	1	In	16 MHz	5.333 MHz
0	1	Out	16 MHz	8 MHz
1	X	In	Full speed - 25 MHz	8.333 MHz
1	X	Out	Full speed - 33 MHz	8.25 MHz

X = Don't Care

The ISA bus speed can be changed by manipulating the VLSI VL82C486 CLKCTL register (index 06h). If E12 is out, the "fast clock divider" in the CLKCTL register is used; if E12 is in, the "slow clock divider" is used. See the VLSI Technology VL82C486 Data Manual for details or contact Adastra technical support.

See Chapter 16 for a table of the power savings from slowing down the clock and turning off peripherals.

2.2 Temperature Rating

The maximum ambient air temperature (Ta) rating for the 80486 CPU in a 168-pin PGA depends on heat sinking and airflow. The following tables illustrates this:

	486SX	Airflow- ft/min. (m/sec)					
	Clock Frequency	0 (0)	200 (1.01)	400 (2.03)	600 (3.04)	800 (4.06)	1000 (5.07)
Ta with	25.0 MHz	43	59	66	69	73	75
Heat Sink	33.3 MHz	31	51	60	65	69	72
Ta without	25.0 MHz	31	40	47	52	55	57
Heat Sink	33.3 MHz	15	27	36	42	47	49

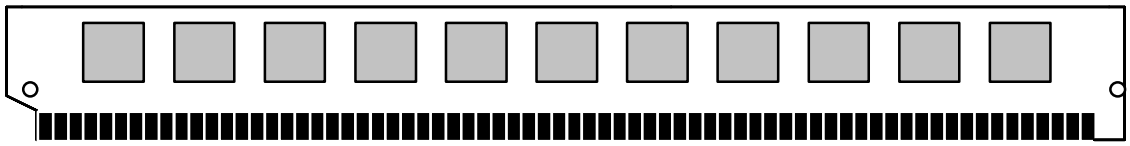
	486DX,DX2	Airflow- ft/min. (m/sec)					
	Clock Frequency	0 (0)	200 (1.01)	400 (2.03)	600 (3.04)	800 (4.06)	1000 (5.07)
Ta with Heat Sink	33 MHz	49	65	71	74	76	76
	50 MHz	30	54	64	68	71	72
	66 MHz	16	46	58	64	67	69
Ta without Heat Sink	33 MHz	36	44	50	55	58	60
	50 MHz	11	23	33	40	45	47
	66 MHz	-8	7	19	28	34	37

Notes:

1. Temperature given in °C
2. Source: Intel Microprocessor Handbook

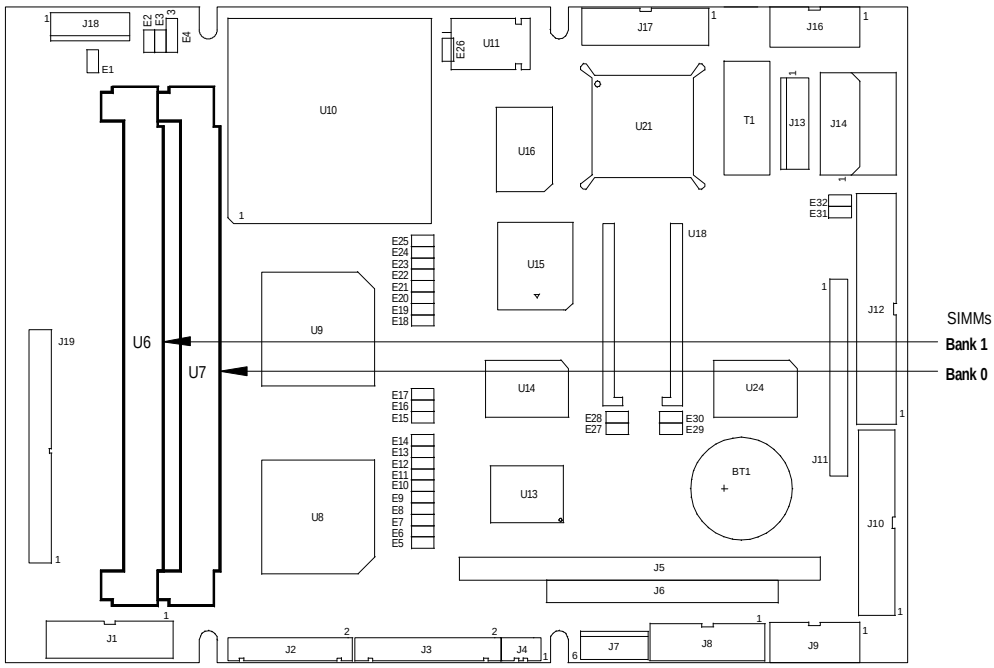
3. System Memory

The system memory of the NPC-486E consists of two 72-pin SIMM style DRAM modules. A SIMM module is standard sized printed circuit board containing memory chips.



3.1 Physical Configurations

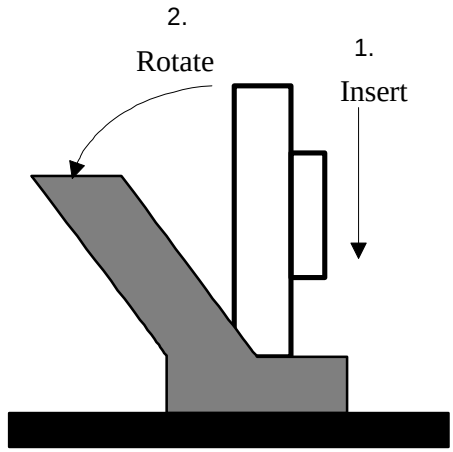
There are two SIMM memory sockets on the NPC-486E.



SIMM specifications are 72 pin, 36 bits wide, single-sided, 70 Ns. Single sided is important since the SIMMs are inserted at an angle to maintain a low profile. This prevents double sided (chips on both sides) from working well. Adastra also recommends that memory with gold leads be used. The SIMM sockets have gold contacts and using gold leaded SIMMs will improve long term reliability. These may be obtained from Adastra or at local computer stores and are often referred to as PS/2 style memory modules. Compatible modules come in 256Kx36 (1M), 512Kx36 (2M), 1Mx36 (4M), 2Mx36 (8M), and 4Mx36 (16M) capacity. The resulting memory configurations are 1M, 2M, 4M, 8M, 16M, or 32M bytes. One or two SIMMs may be loaded. If only one is loaded, either socket may be used.

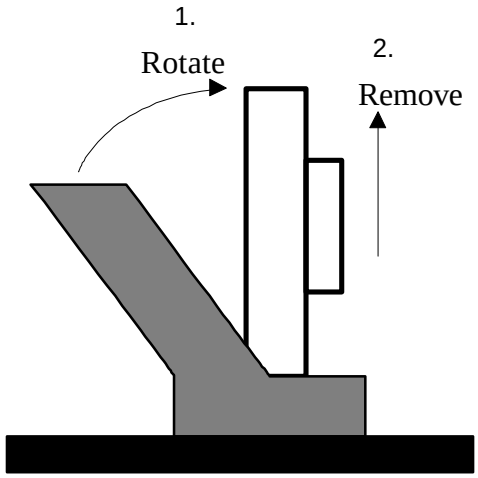
3.1.1 Installing SIMM Modules

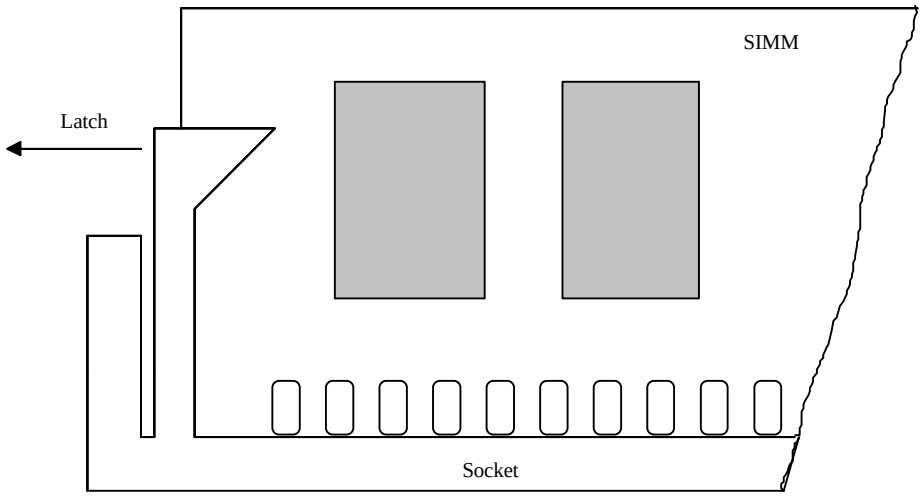
1. Insure that power to the system is off.
2. Carefully insert the SIMM module into the socket at a 90_ angle.
3. Slowly rotate the module to lie in the angled socket. Apply pressure evenly, along the entire length of the module.
4. The edges of the SIMM module should "click" as the latches lock into place.



3.1.2 Removing SIMM Modules

1. Insure that power to the system is off.
2. Pull the latch tabs on both ends of the socket back, away from the module. The module will rotate slightly, to a position free of the latches.
3. Rotate the module to 90.
4. Carefully pull the module out.





3.2 Changing Memory Configuration

If physical memory is removed or added to the system, BIOS will detect the changes during the power-on self-test period (POST) after reset. It will report the change and request that Set-up be run.

Run the BIOS Set-up to configure the memory so that BIOS will correctly account for the memory change. Running Set-up will eliminate the power-up warning.

3.3 Logical Configurations

Portions of the system memory may be allocated as conventional memory, extended memory, expanded memory, or shadow memory. Conventional, extended, and expanded memory are all accessible to programs for their own use. Shadow memory is used exclusively by BIOS. The mix of conventional, extended, expanded, and shadow memory is dictated primarily by the operating system and programs which will run on the NPC-486E.

3.2.1 Conventional Memory

Conventional memory is the first 640K bytes of RAM. This memory block is used extensively by various operating systems and programs common on the PC/AT.

3.2.2 Expanded Memory

Expanded memory refers to a design which allows access to a large address space (e.g. 32M bytes) on a processor such as the 8088, that has address lines to directly address only 1M byte of memory. 16K or 64K sections of memory, called pages, can be "switched" into addressable blocks (holes) in the expanded memory range. Programs must use the BIOS extension known as LIM (Lotus/Intel/Microsoft) Expanded Memory Services to control the switching of pages.

3.2.3 Extended Memory

This is memory beyond the first 1 MB. This memory is directly addressable by programs in the NPC-486E. However, it is usually controlled by an installed memory manager, such as HIMEM.SYS, to prevent programs from using the same area of extended memory.

3.2.4 Shadow Memory

BIOS may be copied from its ROM memory to a bank of RAM. Execution of BIOS can then take place from the faster RAM memory, enhancing performance. The RAM used is called shadow RAM.

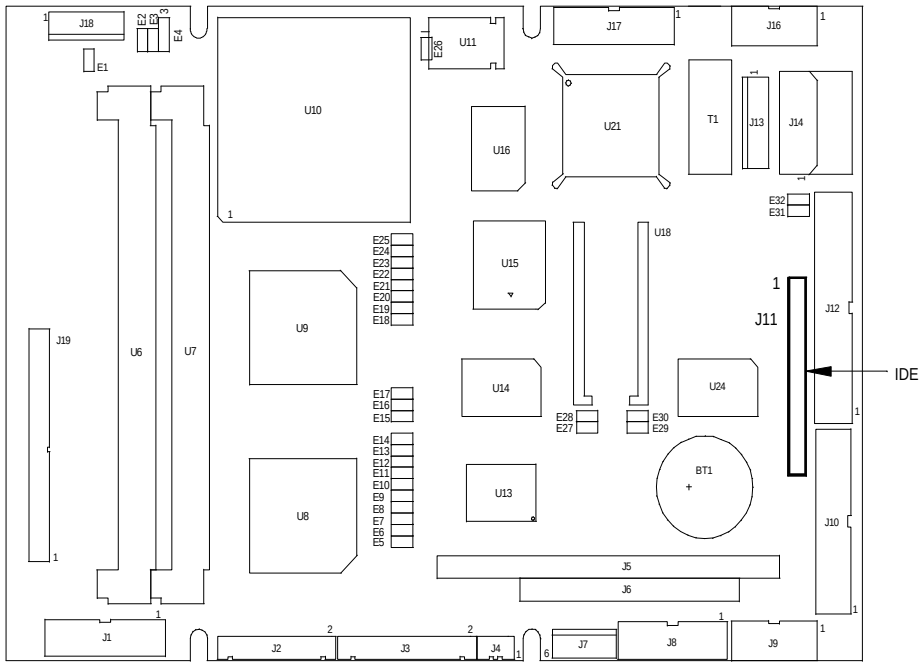
A special BIOS utility will copy ROM BIOS to shadow RAM if some of the system memory is allocated for the shadow RAM (using Set-up).

4. IDE Host Adapter

The NPC-486E contains a built-in IDE Host Adapter capable of driving two embedded hard disks. The embedded drives are connected, in a daisy chain fashion, to the NPC-486E through a 44 conductor cable.

4.1 Connector

The IDE connector, J11, is a 44-pin, dual-in-line, 2mm, male header.



One or two IDE drives may be connected to the header via a single cable. The first drive must be configured as the master; the second drive (at the end of the cable) must be configured as the slave. Consult the disk drive manual for instructions in this task.

The 44-pin, 2mm connector is pin compatible with 2.5" and 1.8" form factor drives. Power is provided on the cable. An adapter board or cable to convert from the 44-pin, 2mm connector to a 40-pin, 0.1" connector is required to connect to 3.5" hard disk drives.

IDE Connector, J11, pin out:

Pin	Signal	Pin	Signal
1	IDE Reset	2	GND
3	Data 7	4	Data 8
5	Data 6	6	Data 9
7	Data 5	8	Data 10
9	Data 4	10	Data 11
11	Data 3	12	Data 12
13	Data 2	14	Data 13
15	Data 1	16	Data 14
17	Data 0	18	Data 15
19	Signal GND	20	no connect
21	no connect	22	GND
23	IO Write	24	GND
25	IO Read	26	GND
27	IO Channel Ready	28	ALE
29	no connect	30	GND
31	IRQ 14	32	IOCS16
33	Addr 1	34	no connect
35	Addr 0	36	Addr 2
37	Hard Disk Select 0	38	Hard Disk Select 1
39	IDE Active	40	MGND
41	VCC	42	MVCC
43	GND	44	no connect

4.2 Port Address and IRQ

The port addresses and interrupt line used by the IDE Host Adapter are:

Port Addresses	Interrupt Line
1F0 - 1F7 & 3F6 - 3F7	IRQ 14

4.3 Drive Type Specification

The type of hard disk(s) connected to the IDE Host Adapter must be specified using the BIOS Setup utility. The drive specification includes cylinder, sector, and head information which translates into formatted capacity. BIOS offers an easy to install method that works for most hard drives. By executing the auto detect command found in BIOS, the system will usually set the correct parameters. In few cases the BIOS cannot detect the proper hard disk parameters; in these cases enter the parameters provided by the hard disk manufacturer.

The following table describes disk specification parameters for several small form factor (2.5") drives with capacities greater than 40 MB:

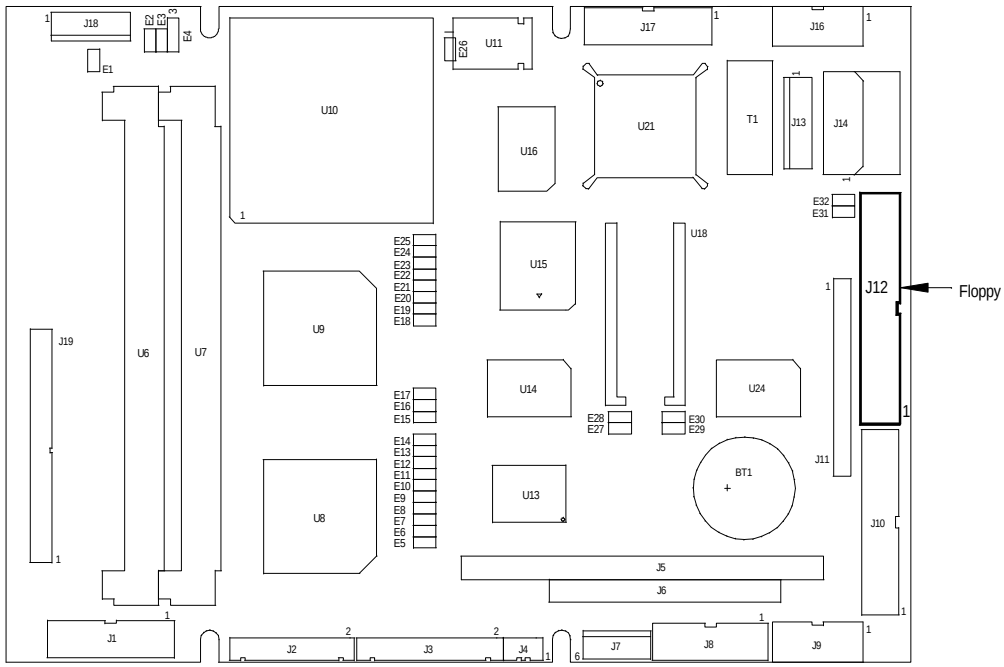
Maker	Form	Model	Cylinders	Heads	Sectors	Landing	Capacity
Maxtor	2.5"	2585	981	10	17	NA	85 M
Maxtor	2.5"	25128	1024	14	17	NA	128 M
Conner	2.5"	CP2064	823	4	38	823	64 M
Conner	2.5"	CP2124	762	8	39	762	120 M

5. Floppy Disk Interface

The floppy disk interface can support two drives. The drives may be 3.5" (720K or 1.44M), 5.25" (360K or 1.2M), or a mix of the two.

5.1 Connector

The floppy disk connector is a 34-pin, dual-in-line, male header designated J12.



The required cable connects to 5.25" floppy drives via a 34-pin female edge connector and to 3.5" drives via a 34-pin socket connector. In a two drive system, the drives are connected in a daisy chain fashion, one at the end of the cable and one in the middle. The first drive, drive A, is always connected to the end connector. The middle connector is used for the second drive, drive B. The daisy chain cable twists seven lines, 10 through 16, to correctly address the two floppies during operation (the twist is a "mirror" around line 13, which remains stable). See Appendix A for ordering information.

Pin-out for the floppy disk connector, J12:

Pin	Signal	Pin	Signal
1	GND	2	Density Select
3	GND	4	no connect
5	GND	6	Drive Type
7	GND	8	Index
9	GND	10	Motor 0
11	GND	12	Drive Select 1
13	GND	14	Drive Select 0
15	GND	16	Motor 1
17	GND	18	Direction
19	GND	20	Step
21	GND	22	Write Data
23	GND	24	Write Gate
25	GND	26	Track 0
27	GND	28	Write Protect
29	no connect	30	Read Data
31	GND	32	Head Select
33	no connect	34	Disk Change

5.2 Drive Type Specification

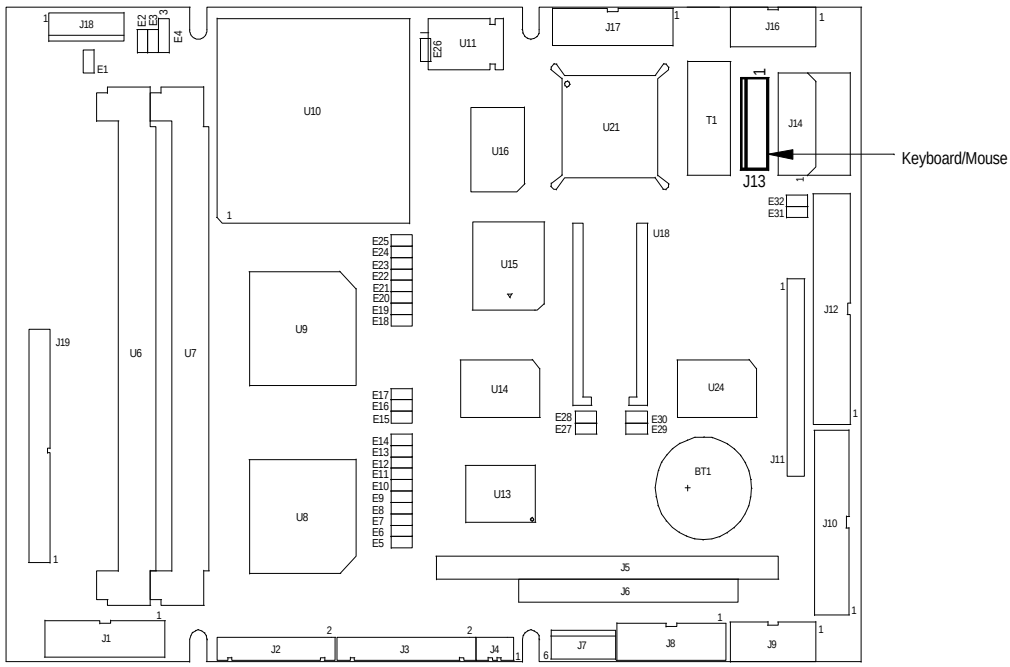
The drive type must be specified using the BIOS Setup utility. The drive type can be 5.25", either 360KB or 1.2MB, or 3.5", either 720KB or 1.44MB.

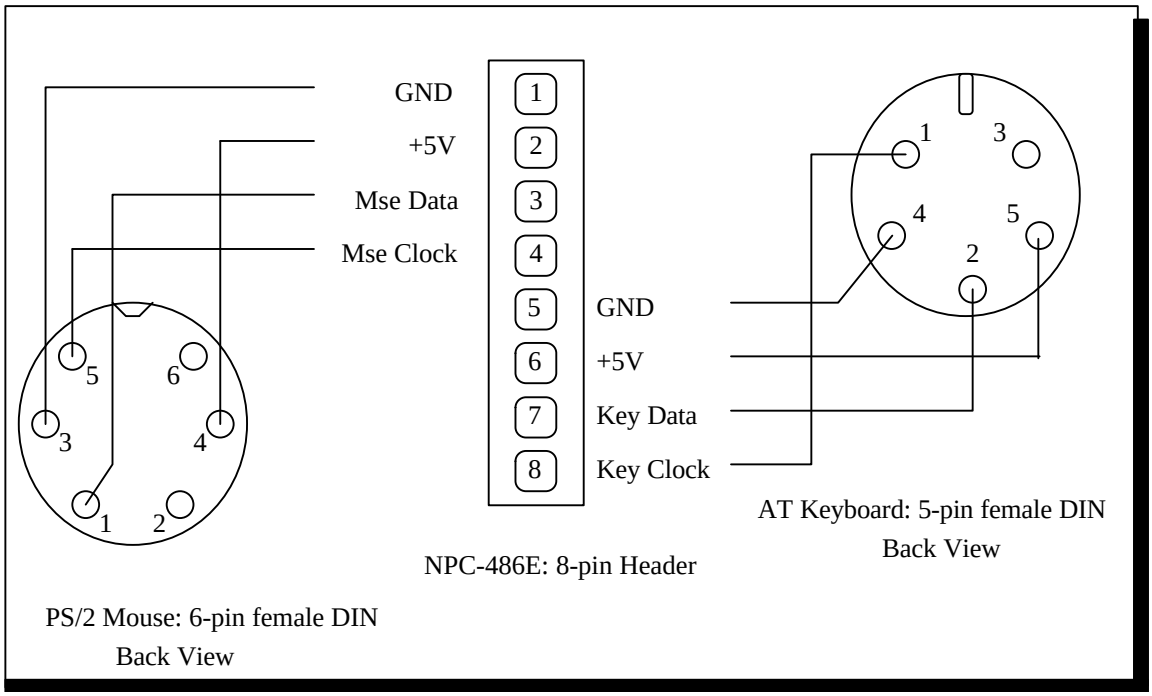
6. Keyboard and PS/2 Mouse Interface

The NPC-486E supports the PS/2 style mouse and keyboard through one port. Both PC/AT and PC/XT style keyboards are supported on this port. The NPC-486E includes BIOS support for the PS/2 style mouse.

6.1 Connector

The keyboard/mouse connector, J13, is a 8-pin, friction-lock, single-line header connector.





6.2 No-Keyboard Operation

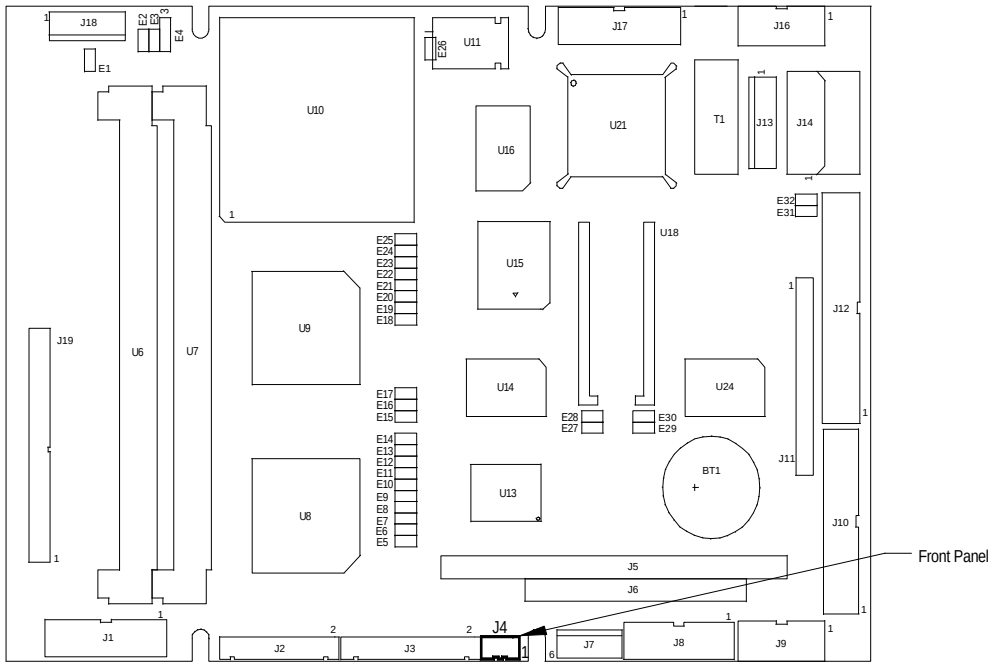
Often in embedded systems a keyboard is not used. Standard PC/AT BIOS will report an error and fail during power-on self-test (POST) after a reset, if a keyboard is not present. The NPC-486E BIOS is configured not to fail in the absence of a keyboard. It reports nothing or a simple warning instead of the standard error message and continues with POST.

7. Front Panel Interface

The front panel refers to the standard output annunciators of the PC. It consists of the speaker, hard disk access indicator, and the input switch for reset. On the NPC-486E, the signals to and from these devices are available on a single connector.

7.1 Connector

The font panel connector is 6-pin male, dual in line, Hirose DF11 designated J4.



The pin-out for the front-panel connector, J4, is:

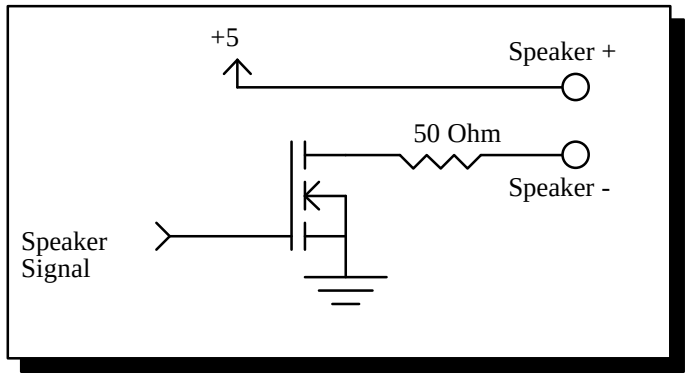
Pin #	Signal	Pin #	Signal
1	IDE LED resistor and anode (+5V)	2	IDE LED cathode
3	+Speaker (+5V)	4	-Speaker
5	-Push Button Reset Switch (GND)	6	Reset Switch +

7.2 Speaker

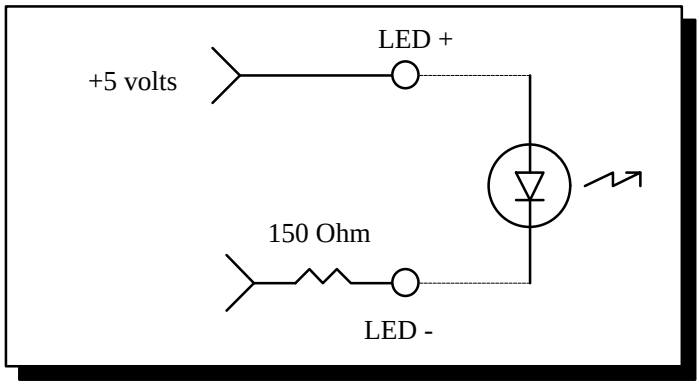
The NPC-486E can drive a standard PC/AT speaker or other audio annunciator. The PC/AT speaker is an 8 ohm, typically 2" speaker. Alternatives to speakers, such as piezo-electric devices, must have drive characteristics similar to that of a speaker.

The drive circuit for speakers and annunciators consists of a supply voltage and a transistor controlled drain.

The NPC-486E can drive an 8 ohm speaker at 0.5 watts. Alternatives to such a speaker must be compatible.



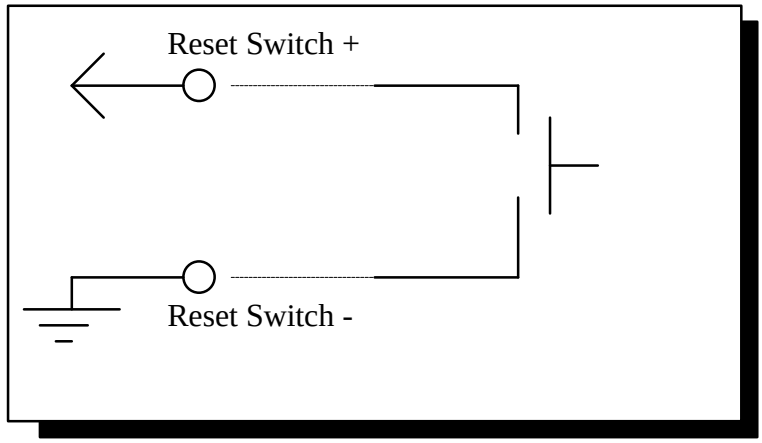
7.3 LED Interface



The front panel LED indicator, Hard Disk Access, is an active low signal capable of sinking 24 ma.

7.4 Reset Switch

The reset switch should be a momentary, normally open single pole switch. The switch should be rated for 10 ma, 5V.



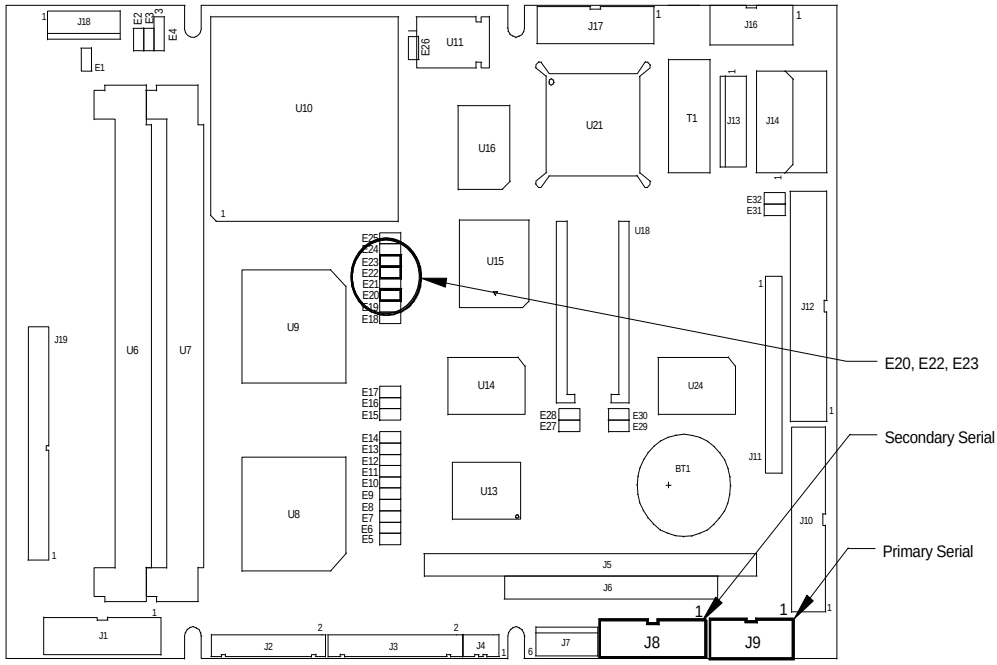
.

8. Serial Communication Interface

The NPC-486E supports two serial ports, a primary and a secondary. These ports may be configured as COM1 and COM2 of a standard PC/AT. The line drivers used conform to the IEEE RS-232C standard. The secondary port also supports RS-485 signal levels. Either port may be disabled if desired to accommodate an alternate serial device such as a modem or fax.

8.1 Connectors

The connector for the primary port, J9, is a 10-pin, dual-in-line, male header. The secondary port, J8, is a 14-pin, dual-in-line, male header.



The pin-out for the primary connector, J9, is:

Pin #	Signal	Pin #	Signal
1	DCD	**2**	DSR
3	RXD	**4**	RTS
5	TXD	**6**	CTS
7	DTR	**8**	RI
9	GND	**10**	NC

The pin-out for the secondary connector, J8, for RS-232 operation is:

Pin #	Signal	Pin #	Signal
1	DCD	**2**	DSR
3	RXD	**4**	RTS
5	TXD	**6**	CTS
7	DTR	**8**	RI
9	GND	**10**	NC
11	NC	**12**	NC
13	NC	**14**	NC

RS-485 operation on the secondary port is established by writing to Data Register 0 bits 4 and 5. The pin-out for the secondary connector, J8, for RS-485 operation is:

Pin #	Signal	Pin #	Signal
1	NA	**2**	NA
3	NA	**4**	NA
5	NA	**6**	NA
7	NA	**8**	NA
9	GND	**10**	NA
11	RS485 TXD +	**12**	RS485 TXD -
13	RS485 RXD +	**14**	RS485 RXD -

The port supports two channel and single channel RS-485 operation. In two channel operation, the transmit and receive channels are separate: transmit using pins 11 & 12, receive using pins 13 & 14. In single channel mode, the transmit and receive operations are multiplexed using the single channel of pins 13 & 14.

Multi-drop operation requires supplemental software to control the active transmitter in both one and two channel implementations. Application notes and technical support are available from Adastra Systems for RS-485 multi-drop. Inquiries should be directed to customer service.

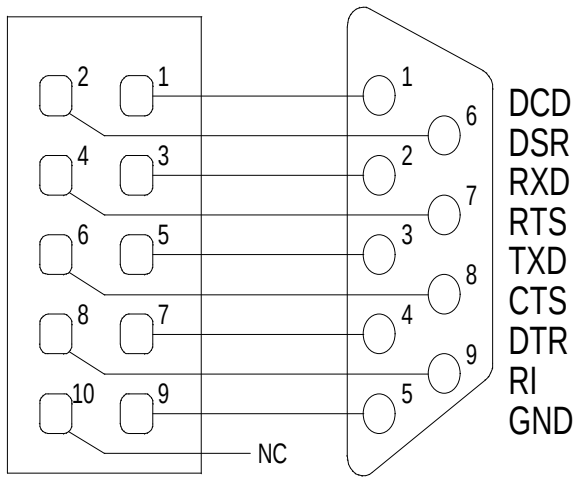
Data	**Signal level**	
Register 0	**High**	**Low**
Bit 4	Enables RS-232	Enables RS-485
Bit 5	Single channel operation	Two channel operation

8.1.1 DTE Signals

The COM ports are configured as DTE (Data Terminal Equipment) type serial devices. The signal definitions for a DTE are:

Mnemonic	Signal	Input/Output
CTS	Clear To Send	Input
DCD	Data Carrier Detect	Input
DSR	Data Set Ready	Input
DTR	Data Terminal Ready	Output
GND	Signal Ground	NA
NC	No Connect	NA (Open)
RI	Ring Indicator	Input
RTS	Request To Send	Output
RXD	Receive Data	Input
TXD	Transmit Data	Output

Adapter cables are used to transform the 10-pin header to 9-pin or 25-pin D-sub connector common to PC/AT serial ports. A similar conversion is used for the 14-pin header.



10-pin Header to 9-pin D-Sub Conversion

When using the RS-485 capability of the second serial port, an adapter to convert the 14-pin header to a 15-pin D-Sub is typically used. The RS-232 signals are not used for RS-485 operation, however, they are connected to components on the board. No signals should be connected to these pins.

8.2 Port Addresses and Enables

In the NPC-486E, the primary serial port is designated as COM1 and the secondary serial port is designated as COM2. The interrupts used by these ports are fixed: IRQ4 for the primary port and IRQ3 for the secondary port.

Port	Address Range	Interrupt
COM1	3F8 - 3FF	IRQ4
COM2	2F8 - 2FF	IRQ3

The serial ports may be disabled or re-configured as ports COM3 and COM4 by re-programming the I/O controller chip, the 82C733 from Chips and Technology or the FDC37C651 from Standard Microsystems Corp. Information on how to do this is available from Adastra Systems. Inquiries should be directed to customer service.

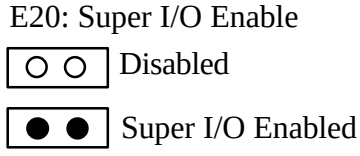
Port	Address Range	Interrupt
COM3	3E8 - 3EF	IRQ4
COM4	2E8 - 2EF	IRQ3

Jumpers E22 and E23 are used to physically couple the IRQ lines to the serial port hardware. These jumpers may be removed if another device requires the use of these interrupts.



The Super I/O chip that controls the serial ports, the parallel port, the floppy controller, and the IDE controller may be disabled to reduce power consumption. This is achieved in software by programming Data Register 0. See the explanation on the use of data registers in I/O Subsystems.

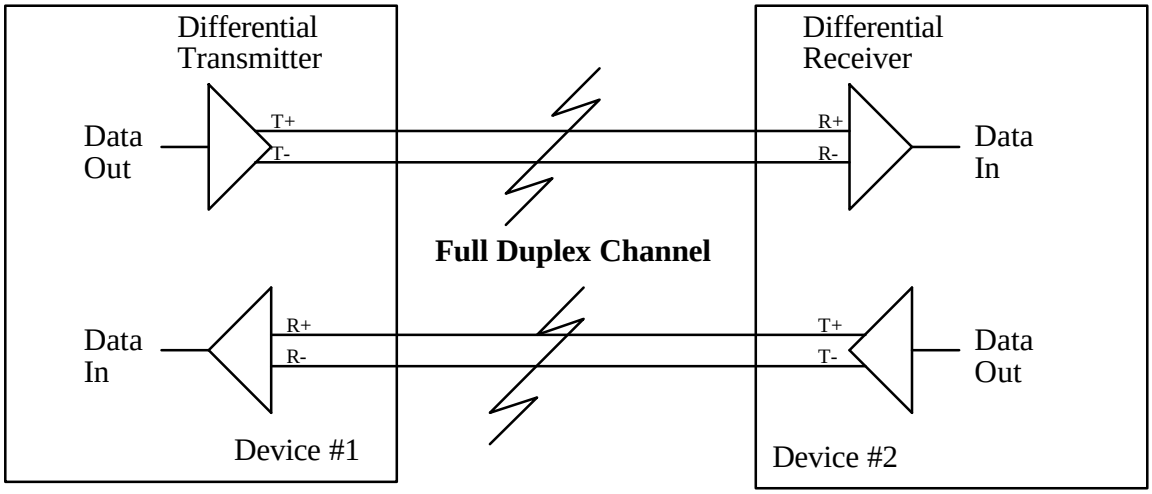
The Super I/O may also be disabled with hardware jumpers.

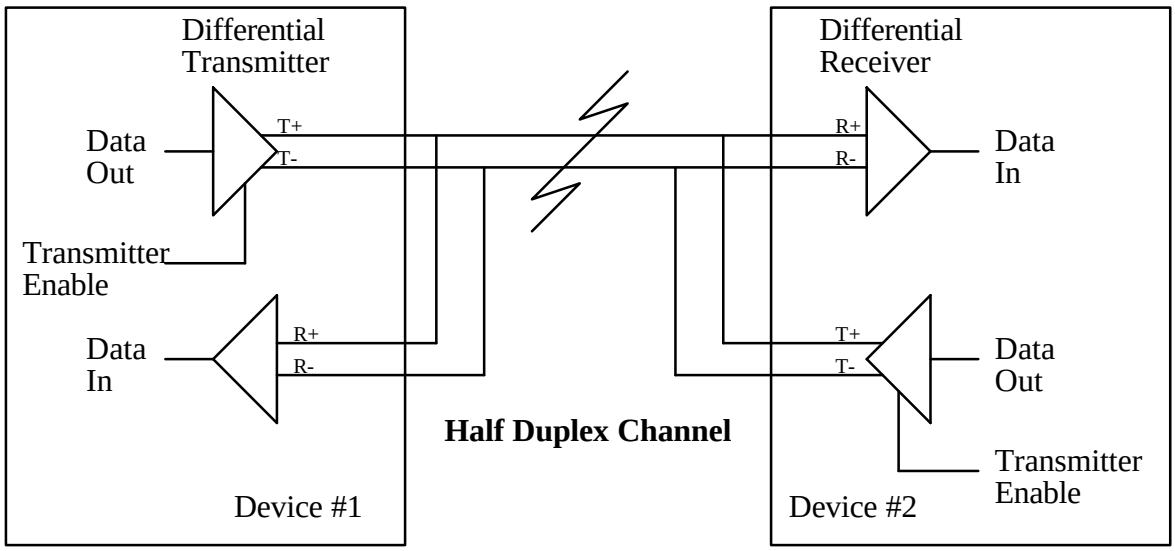


8.3 RS-485 Operation

The COM2 port of the NPC-486E supports RS-485 drive capability as an alternative to the standard RS-232 on the COM2 serial port. RS-485 uses a differential drive technique resulting in more robust, noise-immune transmission. Multi-drop support is included in the NPC-486E implementation.

RS-485 uses two physical lines per data channel. For a full-duplex port that means four physical lines. There are half-duplex (one channel) RS-485 implementations which require only two physical wires. The software protocol to control this topology is more rigorous than that of a two channel system.

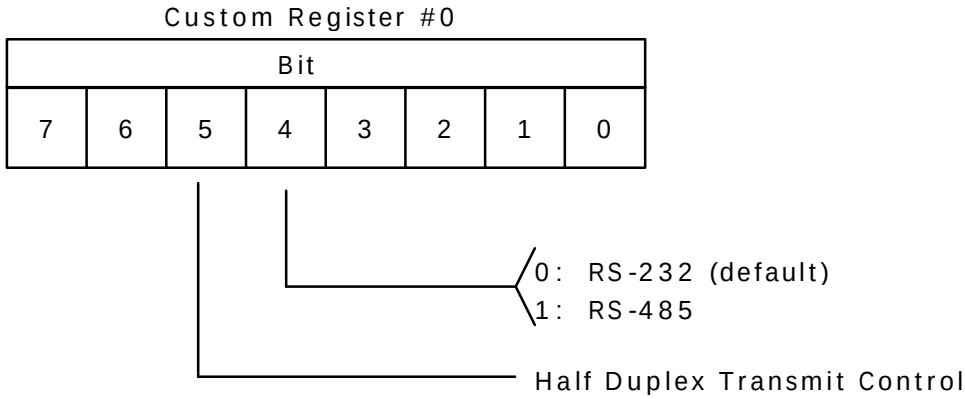




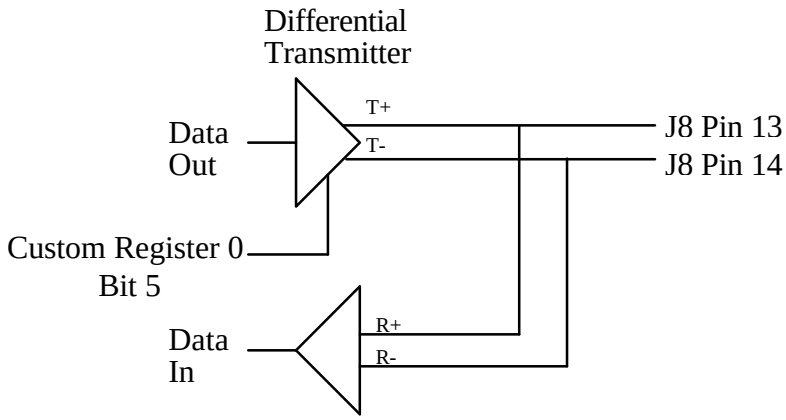
The NPC-486E supports two RS-485 channels: an input and an output. These channels correspond to the Transmit and Receive Data of the COM2 serial port. The on-board connector, J8, for COM2 is a 14-pin, dual-in-line, male header. The RS-485 transmit and receive channel pin-out for J8 is:

Pin #	Signal	Pin #	Signal
1	NC	**2**	NC
3	NC	**4**	NC
5	NC	**6**	NC
7	NC	**8**	NC
9	GND	**10**	NC
11	RS485 TXD +	**12**	RS485 TXD -
13	RS485 RXD +	**14**	RS485 RXD -

The selection of RS-485 versus RS-232 drive types is controlled by bit 4 in the NPC-486E Custom I/O Register 0. A “1” on this bit disables RS-485 and selects RS-232; a “0” on this bit selects RS-485.

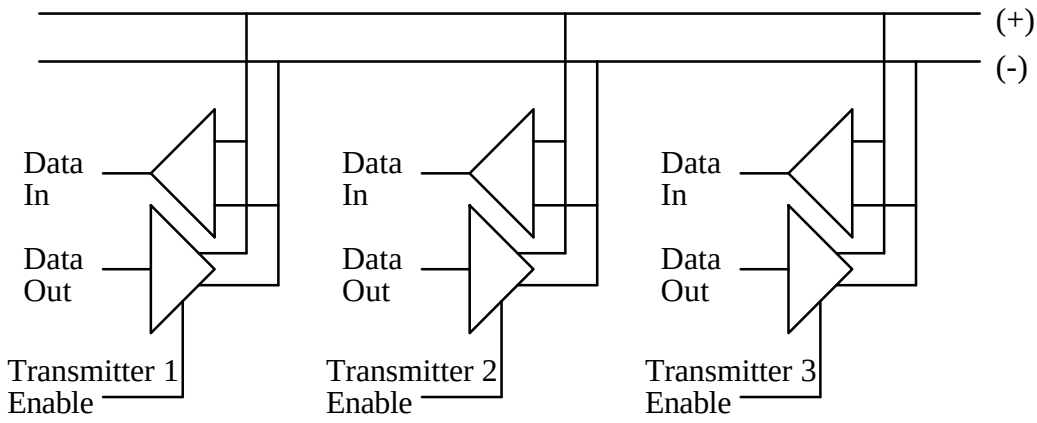


In a half duplex system the transmit and receive functions share pins 13 and 14 of J8. Bit 4 of Custom I/O register 0 is used to control the transmit enable in half duplex systems.



8.3.1 RS-485 Multi-drop

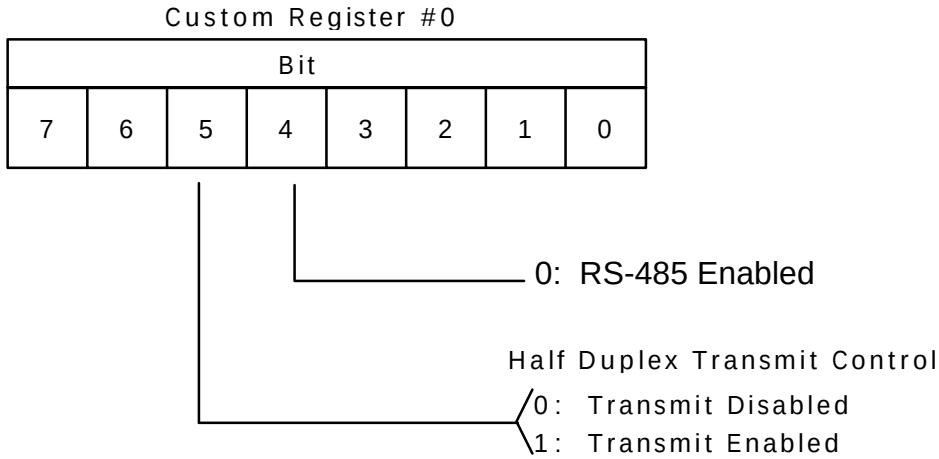
Multi-drop support allows several RS-485 transmitters to share a single (half duplex) channel. Software protocol insures that only one transmitter is active at any one time.



RS-485 Multi-Drop

In a multi-drop environment the transmitter is enabled only when necessary. A software protocol typically controls which RS-485 node has permission to transmit. The authorized transmitter asserts it's transmit enable and transmits all necessary data. When finished, the transmitter should be disabled.

In the RS-485 implementation of multi-drop of the NPC-486E, the transmitter enable line is controlled by bit 5 of Custom I/O register 0. The transmitter is enabled by writing a "1" to the bit and is disabled by writing a "0".

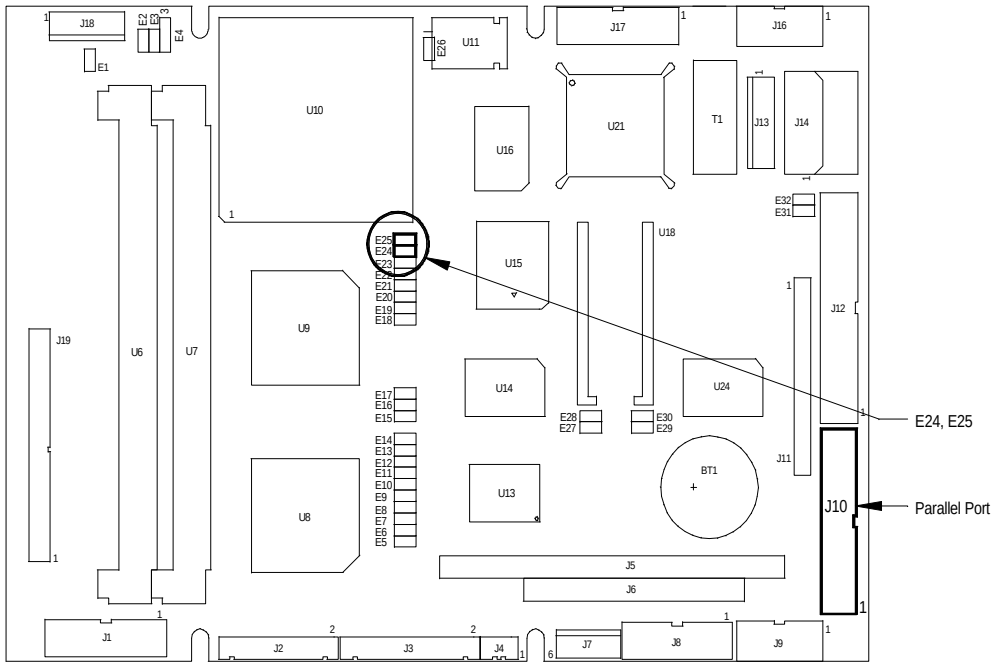


9. Parallel Communication Interface

The NPC-486E supports one parallel port. This port maintains full compatibility with the PC/AT printer port and adds PS/2 bi-directional capability. It is configured as PC/AT printer port LPT1.

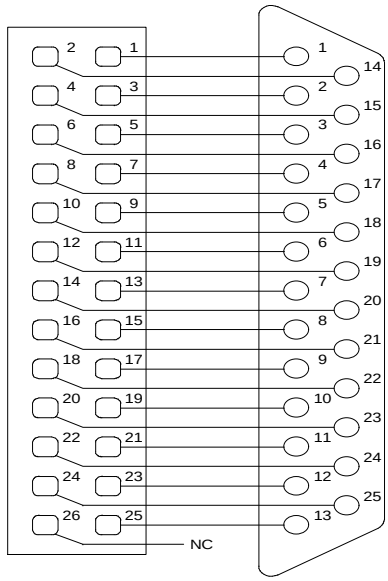
9.1 Connector

The connector is a 26-pin, dual in line, male header, reference J10.



Pin	Signal	Pin	Signal
1	\STROBE	2	\AUTOFD
3	D0	4	ERR
5	D1	6	\INIT
7	D2	8	\SLCTIN
9	D3	10	GND
11	D4	12	GND
13	D5	14	GND
15	D6	16	GND
17	D7	18	GND
19	\ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC

An adapter cable may be used to change the connect from the 26 pin header style of the NPC-486E to the more common 25-pin female D-sub. See Appendix A for adapter part numbers and ordering.



26-pin Header to 25-pin D-Sub conversion

9.2 Port Address

The parallel port of the NPC-486E is factory set to I/O addresses 278-27A. The parallel port may be disabled or re-configured to a different I/O address by re-programming the I/O controller chip. Information on how to do this is available from Adastra Systems. Inquiries should be directed to customer service.

With no other parallel port in the system, the BIOS will designate the on-board port as LPT1. The I/O addresses and interrupt assignment common to PC/AT printer ports are as follows.

Address Range	**Interrupt**
278 - 27A	IRQ7
378 - 37A	IRQ5
3BC - 3BE	IRQ7

9.3 Interrupt Selection

The interrupt used by the port is controlled by jumpers E24 and E25. Either E24 or E25 should be selected. There should never be a jumper in both E24 and E25 at the same time.

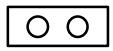
E24: IRQ5


IRQ5 disconnected


IRQ5 connected

E25: IRQ7


IRQ7 connected


IRQ7 disconnected

9.4 Bi-directional Operation

The standard PC/AT parallel port is an output only device. The NPC-486E parallel port is fully bi-directional. The bi-directional functions are compatible with those of a PS/2 style parallel port. This functionality is always available and does not conflict with normal printer use.

The following piece of code may be used to put the on-board I/O device into bi-directional mode:

```
MOV     DX,3F0H ;ENTER SUPER I/O CONFIG
MOV     AX,55H
CLI
OUT     DX,AL
OUT     DX,AL

MOV     DX,3F0H ;CONFIG: BI-DI PARALLEL PORT
MOV     AL,1
OUT     DX,AL
MOV     DX,3F1H
IN      AL,DX
AND     AL,0F7H
OUT     DX,AL

MOV     DX,3F0H ;EXIT SUPER I/O CONFIG
MOV     AX,0AAH
OUT     DX,AL
STI
```

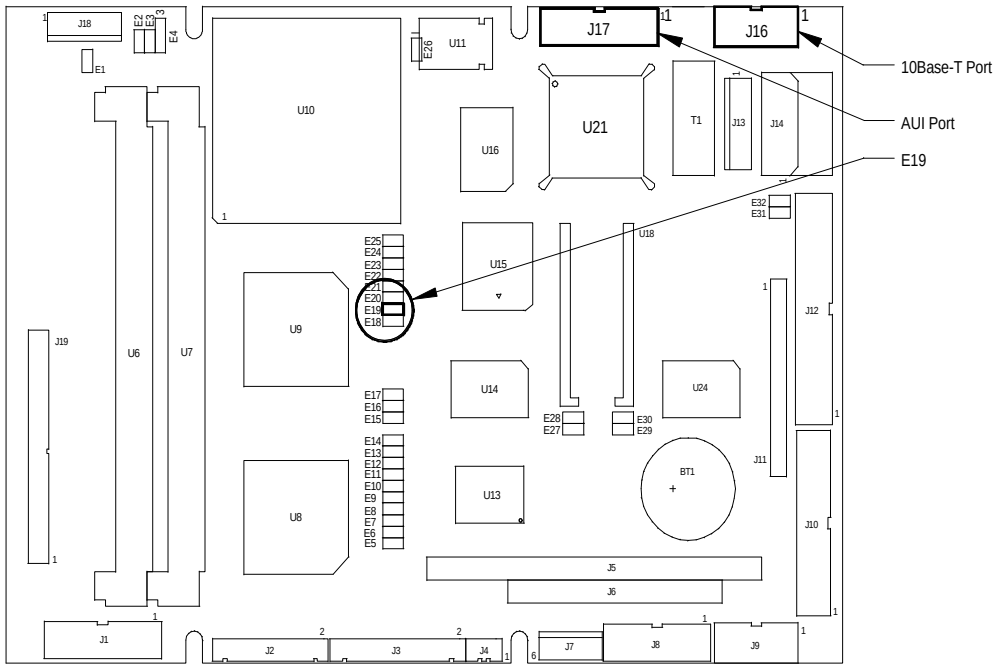
10. Ethernet Interface

The NPC-486 on-board Ethernet interface is based on the Advanced Micro Devices AM79C961 Ethernet Controller. The AM79C961 emulates a Novell NE2100 network interface card. The NE2100 uses a 16-bit, bus master type architecture.

The interface is supported by all major network operating systems, and several real-time and embedded operating systems. It is Plug-n-Play compatible for ease of use.

10.1 Connectors

The Ethernet interface supports 10Base-T (twisted pair), 10Base2 (thin-wire), and 10Base5 (thick-wire) media. Selection of 10Base-T, 10Base2, or 10Base5 can be achieved by connecting the network to one of two ports. 10Base-T connects through a simple adapter cable to a 10 pin polarized header, J16. 10Base2 and 10Base5 connect through their respective Attachment Unit Interfaces (AUI) and a straight-through ribbon cable to a 16 pin polarized header, J17. See appendix A for part numbers and ordering information.



Only one interface, 10Base-T or AUI, should be active. The AM79C961 dynamically selects the active interface. If both are active, it will select the 10Base-T interface over the AUI.

10.2 10Base-T Operation

The 10Base-T, J16, is a 10-pin, dual-in-line, male header.

Pin #	Signal	Pin #	Signal
1	VCC	2	Link Status LED
3	RCV+	4	RCV-
5	Reverse Polarity LED	6	GND
7	Disable Transceiver	8	GND
9	XMT+	10	XMT-

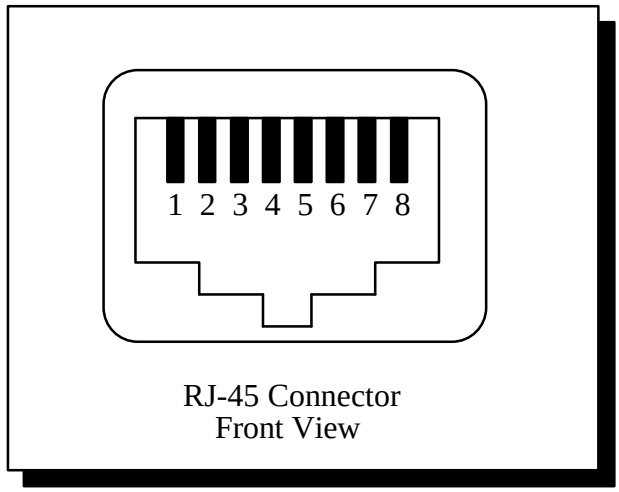
There are two status LEDs associated with the 10Base-T connection. One indicates the link status of the hub connection and the other indicates reverse line polarity. Signals capable of driving remotely located LEDs are available on the 10Base-T connector (J16) pins 2 and 5. External, current limiting resistors in series with the LEDs are needed.

10.2.1 RJ45 Pin-Out

An adapter cable converting the J16 10-pin header to a standard 10Base-T RJ45 jack is available, see Appendix A for adapter part numbers and ordering information.

RJ-45 Pin-out:

Pin	Signal
1	Transmit Data +
2	Transmit Data -
3	Receive Data +
4	No Connect
5	No Connect
6	Receive Data -
7	No Connect
8	No Connect



RJ-45 Connector
Front View

10.3 10Base2 and 10Base5 Operation

10Base2 (thin) and 10Base5 (thick) coax connections are made through an attachment unit interface (AUI) connector, J17 on-board.

The AUI connector, J17, is a 16-pin, dual-in-line male header.

Pin #	Signal	Pin #	Signal
1	GND	2	CL-, collision input
3	CL+, collision input	4	DO-, AUI transmit
5	DO+, AUI transmit	6	GND
7	GND	8	DI-, AUI receive
9	DI+, AUI receive	10	+12V
11	GND	12	GND
13	NC	14	NC
15	NC	16	+5V

See Appendix A for adapter part numbers and ordering information.

10.4 I/O Address, Interrupt, and DMA Configuration

The on-board Ethernet interface may be configured by a software utility program. This program will allow the selection of the I/O address, DMA channel, and Interrupt Request line used by the interface. It also can disable the dynamic selection of the AUI interface.

I/O Address Selections
300H - 31FH
320H - 33FH
340H - 35FH
360H - 37FH
380H - 39FH
3A0H - 3BFH

IRQ Channel Selections
5
9
10
11
12
15

DMA Channel Selections
3
5
6
7

The factory defaults for these values are:

I/O Address	IRQ	DMA
300H - 31FH	5	5

Please see Appendix G for information on running the configuration utility software.

10.5 Interface Enable Jumper

The network interface can be enabled or disabled by jumper E19:

E19

 IN: Network interface enabled

 OUT: Network interface disabled

10.6 Network Software Drivers

Drivers for the popular PC/AT network operating systems are available and may be ordered directly from Adastra (see Appendix A for ordering information). The following drivers are available:

- Novell Netware 3.1x, 4.x Server ODI, DOS ODI, OS/2 ODI
- Novell UnixWare 1.1
- Microsoft LAN Manager 2.x
- Microsoft Windows for Workgroups 3.1 (NDIS 2.01)
- Microsoft Windows for Workgroups 3.11 (NDIS 2.01/NDIS 3.0)
- Microsoft NDIS 2.01 compatible networks
    - DEC PATHWORKS
    - Banyan VINES
    - IBM LAN Server 2.0/3.x,
    - Sun PC-NFS 5.x
    - Artisoft LANtastic 6.0
- Microsoft Windows NT 3.1, 3.5 (NDIS 3.0)
- SCO UNIX 3.2.4 (ODT 3.0)
- Sun Solaris 2.1
- Packet Driver (DOS)
- Universal Boot ROM
    - Novell NetWare
    - Microsoft LAN Manager (Server)
    - IBM LAN Server

Many of the AMD PCnet Family software driver diskettes are structured for automatic OEM installation. The directory structures on these diskettes are setup to correspond with Network Operating Systems search path during the installation process.

Note:
Please refer to the appropriate OEM's User Manuals for specific instructions on loading additional drivers from an external floppy diskette.

The following environments are supported for automatic OEM installation:

NDIS 2.01

- IBM LAN Server 2.0, 3.x
- Microsoft LAN Manager 2.x
- Sun PC-NFS 5.x
- Microsoft Windows for Workgroups 3.1
- Microsoft Windows for Workgroups 3.11
- Artisoft LANtastic 6.0

NDIS 3.0

- Microsoft Windows NT 3.1, 3.5
- Microsoft Windows for Workgroups 3.11

ODI

- Novell NetWare 4.x (DOS and Server)
- Sun PC-NFS 5.x
- Microsoft Windows NT 3.1
- Microsoft Windows for Workgroups 3.11

STREAMS

- SCO UNIX 3.2.4 (ODT 1.0, ODT 2.0, ODT 3.0)
- Novell UnixWare 1.1
- Sun Solaris 2.1

The software configuration utility AMINSTAL can be used to install the following drivers:

- Novell NetWare DOS ODI Client driver
- NDIS 2.01 driver
- Packet driver

See Appendix G for instructions on the utility.

10.7 Net Boot ROM

Network boot functionality is accomplished by incorporating the boot ROM image for the appropriate network operating system in the BIOS memory of the NPC-486. The following boot ROM images are available:

- General purpose Boot ROM (based on IBM Remote Program Load protocol) for Novell, Microsoft, or IBM operating systems.
- BOOTP Boot ROM for TCP/IP networks

The general purpose Boot ROM supports any combination of I/O address, IRQ, and DMA selections. The BOOTP Boot ROM supports only certain combinations:

Config Option	I/O Addr	IRQ	DMA
1	300h	3	5
2	320h	4	6
3	340h	5	7
4	360h	9	3

BOOTP Allowed Configurations

Most net boot ROM images are 16K bytes in size. In the NPC-486E, the image is typically located within the BIOS memory device and at address CC000h. The Boot ROM images are distributed with the network drivers and can be obtained from the factory. They can be loaded into the NPC-486E's flash based BIOS in circuit using the Flash*Fusion* BIOS update utility.

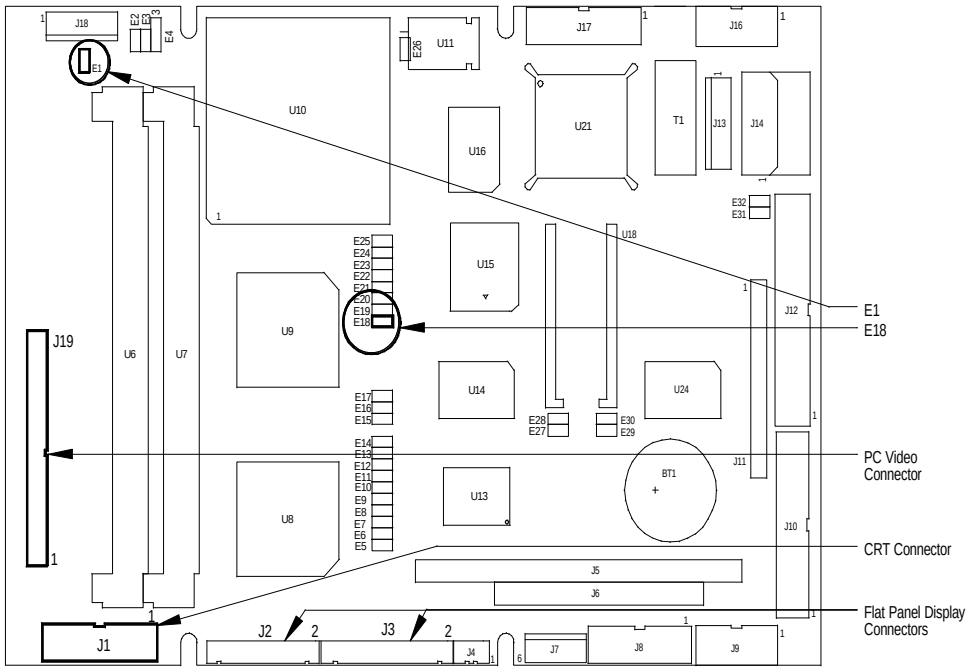
The Boot ROM image may be located within a memory device loaded in the Socket Solid State Disk if desired. The image can be programmed into a compatible part, at offset 0000H, and the part can be loaded into the SSD socket.

11. VGA Interface

The NPC-486E includes a local bus VGA interface with up to 1 Mbyte of memory. The interface can drive conventional CRT displays with resolution up to 1024x768. Resolutions of 640x480 and 800x600 support 256 colors while 1024x768 supported 16 colors. It is capable of driving a variety of flat-panel displays including electro-luminescent (EL), gas plasma, passive LCD, and active LCD.

11.1 Connectors

There are two VGA display connectors on the NPC-486E, one for standard CRT VGA monitors and one for flat-panel displays.



Connector J1, a 16-pin, dual-in-line header is used for CRT monitors which are compatible with the IBM 8014 VGA display. A simple cable adapter can be used to map this connector to the standard 15-pin D-SUB connector commonly used for VGA. See Appendix A for ordering information.

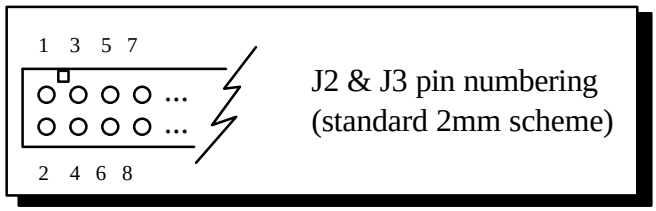
The pin-out for connector J1 is:

J1			
Pin #	**Signal**	**Pin #**	**Signal**
1	RED	2	NC
3	GREEN	4	Signal GND
5	BLUE	6	NC
7	NC	8	NC
9	Signal GND	10	HSYNC
11	Chassis GND	12	VSYNC
13	Chassis GND	14	NC
15	Chassis GND	16	NC

Connector J2 and J3 are used for flat-panel displays. The pin-out for these connectors is:

J2					
Pin #	**Signal**	**Description**	**Pin #**	**Signal**	**Description**
1	P8	Panel Data 8	2	Signal GND	
3	P9	Panel Data 9	4	P20	Panel Data 20
5	P10	Panel Data 10	6	Signal GND	
7	P11	Panel Data 11	8	P21	Panel Data 21
9	P12	Panel Data 12	10	Signal GND	
11	P13	Panel Data 13	12	P22	Panel Data 22
13	P14	Panel Data 14	14	Signal GND	
15	P15	Panel Data 15	16	P23	Panel Data 23
17	P16	Panel Data 16	18	Signal GND	
19	ENAVEE	Enable VEE LCD Bias	20	-SHFCLK	Inverted clock
21	LCD_POS	LCD Positive Bias Voltage	22	Signal GND	
23	+12V_SW	Switched +12V	24	Signal GND	
25	+12V_SW	Switched +12V	26	Signal GND	

J3					
Pin #	**Signal**	**Description**	**Pin #**	**Signal**	**Description**
1	FLM	First Line Marker	2	Signal GND	
3	LP	Line Load Pulse	4	Signal GND	
5	M/DE	LCD M or Display Enable	6	Signal GND	
7	SHFCLK	Data shift clock	8	Signal GND	
9	P0	Panel Data 0	10	Signal GND	
11	P1	Panel Data 1	12	P17	Panel Data 17
13	P2	Panel Data 2	14	Signal GND	
15	P3	Panel Data 3	16	Signal GND	
17	P4	Panel Data 4	18	P18	Panel Data 18
19	P5	Panel Data 5	20	Signal GND	
21	P6	Panel Data 6	22	P19	Panel Data 19
23	P7	Panel Data 7	24	Signal GND	
25	LCD_NEG	LCD Negative Bias Voltage	26	Signal GND	
27	+5V_SW	Switched +5V	28	Signal GND	
29	+5V_SW	Switched +5V	30	+5V_SW	Switched +5V



J2 & J3 pin numbering
(standard 2mm scheme)

11.2 Flat-Panel Display Selection

Unlike the original NPC-486, the NPC-486E supports only one display setting for a given BIOS. However, the NPC-486E can now support simultaneous CRT and flat panel for all displays including dual scan LCD. It also has Flash BIOS that enables the user to easily re-program the VGA BIOS for a different display. See the chapter on Flash BIOS for instructions on changing the VGA BIOS.

The standard BIOS shipped with the NPC-486E is P/N 750-041. This part is initially programmed for simultaneous CRT and 512 color TFT LCD. When first prototyping with the NPC-486E, it is best to use a CRT so that you confirm that everything is properly connected. After testing the set-up with a CRT, re-program the BIOS (if necessary) with Flash*Fusion*™. This software utility is discussed in Appendix H.

11.3 Panel Power Sequencing

LCD display manufacturers recommend that the LCD bias voltage not be applied to the panel until the logic supply voltage (+5V) and panel video signals are stable. The NPC-486E supports full display power sequencing.

The +5V, +12V, and the positive or negative LCD bias voltages provided on J2 and J3 are properly sequenced to guarantee that the flat panel display power sequences properly. On-board transistors are controlled by the C&T 6554X to insure that valid video signals are available before providing the higher voltages to the display drivers.

11.4 LCD Bias Voltage and Contrast Control

The NPC-486E provides on-board LCD bias voltages for both monochrome and color passive liquid crystal displays. Typical monochrome LCDs require approximately -24V. Color passive displays operate at +28V. The bias voltage supply generates both positive and negative voltages at the same time. Both are available on different pins on the connectors. Care should be taken to connect the proper voltage polarity.

To reduce the potential for providing to high a voltage, there is a jumper, E1, that limits the positive or negative voltage to ±24V. Consult the display specification to determine which setting is correct for your display. If there is any doubt, call Adastra customer service.

E1: Bias Voltage Setting

 ±30V LCD Bias Voltage

 ±24V LCD Bias Voltage

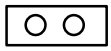
The LCD bias voltage is used to affect the contrast on an LC display. Connector J18 provides three pins to connect a 1 Meg ohm potentiometer. To increase the range of LCD Bias voltage, connect the counter clockwise pin of the potentiometer to +12V instead of +5V. This connector may also be used to provide power to a heat sink fan.

J18		
Pin #	**Signal**	**Description**
1	+5V	Counter Clockwise (CCW) pin of contrast control pot
2	Set	Wiper pin of pot
3	GND	Clockwise pin of pot
4	GND	+5V return
5	+5V	+5V fan power
6	GND	+12V return
7	+12V	Power for fan or CCW pin of contrast control pot

11.5 VGA Enable

The VGA subsystem may be disabled in hardware or software. Jumper E18 provides a hardware disable of the VGA. If an external VGA card is to be used with the system, you must disable the on-board VGA and re-program the System BIOS to remove the VGA component.

E18: VGA Enable


VGA disabled


VGA enabled

The software enable is controlled with Data Register 0 and is explained in I/O Subsystems.

11.6 VGA Video Modes

Standard VGA								
Mode # (Hex)	**Display Mode**	**Colors**	**Text Display**	**Font Size**	**Pixel Resolution**	**Vertical Freq.**	**Video Memory**	**CRT Codes**
0+, 1+	Text	16	40x25 40x25 40x25	9x16 8x14 8x8	360x400 320x350 320x200	70 Hz	256 KB	A,B,C
2+, 3+	Text	16	80x25 80x25 80x25	9x16 8x14 8x8	720x400 640x350 640x200	70 Hz	256 KB	A,B,C
4	Graphic	4	40x25	8x8	320x200	70 Hz	256 KB	A,B,C
5	Graphic	4	40x25	8x8	320x200	70 Hz	256 KB	A,B,C
6	Graphic	2	80x25	8x8	640x200	70 Hz	256 KB	A,B,C
7+	Text	Mono	80x25 80x25 80x25	9x16 9x14 9x8	720x400 720x350 720x350	70 Hz	256 KB	A,B,C
D	Planar	16	40x25	8x8	320x200	70 Hz	256 KB	A,B,C
E	Planar	16	80x25	8x8	640x200	70 Hz	256 KB	A,B,C
F	Planar	Mono	80x25	8x14	640x350	70 Hz	256 KB	A,B,C
10	Planar	16	80x25	8x14	640x350	70 Hz	256 KB	A,B,C
11	Planar	2	80x30	8x16	640x480	60 Hz	256 KB	A,B,C
12	Planar	16	80x30	8x16	640x480	60 Hz	256 KB	A,B,C
13	Packed Pixel	256	40x25	8x8	320x200	70 Hz	256 KB	A,B,C

CRT Codes:

A PS/2 fixed frequency analog CRT monitor or equivalent (31.5 / 35.5 KHz Horizontal Frequency Specification)

B Multi-Frequency CRT monitor (37.5 KHz Minimum Horizontal Frequency Specification) (NEC MultiSync 3D or equivalent)

C Multi-Frequency High-Performance CRT Monitor (48.5 KHz Minimum Horizontal Frequency Specification) (MultiSync 5D or equivalent)

Extended Resolutions								
Mode # (Hex)	**Display Mode**	**Colors**	**Text Display**	**Font Size**	**Pixel Resolution**	**Vertical Freq.**	**Video Memory**	**CRT Codes**
20	4 bit Linear	16	80x30	8x16	640x480	60 Hz	512 KB	A,B,C
22	4 bit Linear	16	100x37	8x16	800x600	60 Hz	512 KB	B,C
24	4 bit Linear	16	128x48	8x16	1024x768	60 Hz	512 KB	C
24I						43 Hz	512 KB	B,C
30	8 bit Linear	256	80x30	8x16	640x480	60 Hz	512 KB	A,B,C
32	8 bit Linear	256	100x37	8x16	800x600	60 Hz	512 KB	B,C
34	8 bit Linear	256	128x48	8x16	1024x768	60 Hz	1 MB	C
34I						43 Hz	512 KB	B,C
40	15 bit Linear	32K	80x30	8x16	640x480	60 Hz	1 MB	A,B,C
41	16 bit Linear	64K	80x30	8x16	640x480	60 Hz	1 MB	A,B,C
50	24 bit Linear	16	80x30	8x16	640x480	51.6 Hz	1 MB	B,C
60	Text	16	132x25	8x16	1056x400	68 Hz	256 KB	A,B,C
61	Text	16	132x50	8x16	1056x400	68 Hz	256 KB	A,B,C
6A, 70	Planar	16	100x37	8x16	800x600	60 Hz	256 KB	B,C
72, 75	Planar	16	128x48	8x16	1024x768	60 Hz	512 KB	C
72, 75 I						43 Hz	512 KB	B,C
78	Packed Pixel	16	80x25	8x16	640x400	70 Hz	256 KB	A,B,C
79	Packed Pixel	256	80x30	8x16	640x480	60 Hz	512 KB	A,B,C
7C	Packed Pixel	256	100x37	8x16	800x600	60 Hz	512 KB	B,C
7E	Packed Pixel	256	128x48	8x16	1024x768	60 Hz	1 MB	C
7E I						43 Hz	1 MB	B,C

CRT Codes:

A PS/2 fixed frequency analog CRT monitor or equivalent (31.5 / 35.5 KHz Horizontal Frequency Specification)

B Multi-Frequency CRT monitor (37.5 KHz Minimum Horizontal Frequency Specification) (NEC MultiSync 3D or equivalent)

C Multi-Frequency High-Performance CRT Monitor (48.5 KHz Minimum Horizontal Frequency Specification) (MultiSync 5D or equivalent)

The “I” designation next to the mode number indicates “Interlaced.”

Source: Chips and Technologies, “65540/45 Technical Reference Manual” Revision 1.0

The NPC-486E comes standard with 512 Kbytes of memory. This is sufficient for the most common modes of operation: 16 and 256 color. If higher resolutions or more colors is desired, a 1 Mbyte option is available at order time.

11.7 PC Video Overlay

The PC video overlay feature is compatible with the Chips and Technologies PC Video™ standard. It enables the user to supply digital full motion video data to the NPC-486E and

overlay it on the VGA screen. The board provides synchronization signals and pixel clock to the video source and the source provides RGB digital data and a keying signal. The KEY signal multiplexes the video output to the screen between the on-board VGA controller and the input video source. This is an advanced feature of the NPC-486E and its use may require assistance from Adastra technical support.

A convenient method of taking advantage of the PC video overlay is to use the Digital Video Audio Board (DVAB-104X) available from Adastra. Designed for use with the NPC-486E, it can display live video with VGA text and graphics on a CRT monitor or flat panel display. The scaleable video window may be positioned anywhere using X-Y coordinates or color keying. An on-board 1M frame buffer may be used for still-frame capture. The DVAB-104X includes Sound Blaster™ compatible audio features.

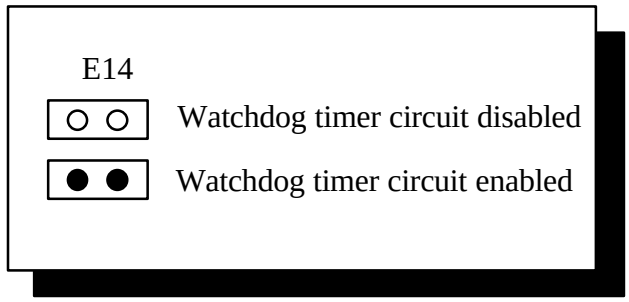
J19					
Pin #	**Signal**	**Comments**	**Pin #**	**Signal**	**Comments**
1	GND		2	NC	No connect
3	GND		4	NC	
5	GND		6	RED7	MSB input to NPC-486E
7	GND		8	RED6	
9	GND		10	RED5	
11	RED1		12	RED4	
13	RED0	LSB input to NPC-486E	14	RED3	
15	GND		16	RED2	
17	GND		18	GRN7	MSB input to NPC-486E
19	GND		20	GRN6	
21	GND		22	GRN5	
23	GRN1		24	GRN4	
25	GRN0	LSB input to NPC-486E	26	GRN3	
27	GND		28	GRN2	
29	GND		30	BLU7	MSB input to NPC-486E
31	GND		32	BLU6	
33	GND		34	BLU5	
35	BLU1		36	BLU4	
37	BLU0	LSB input to NPC-486E	38	BLU3	
39	GND		40	BLU2	
41	GND		42	HSYNC	Horizonal sync output from NPC-486E
43	GND		44	VSYNC	Vertical sync output from NPC-486E
45	GND		46	KEY	Overlay key in to NPC-486E
47	GND		48	PCLK	Pixel Clock output from NPC-486E
49	GND		50	NC	

12. Watchdog Timer

The watchdog timer feature of the NPC-486E provides a means to insure the integrity of system operation. When enabled, the timer must be refreshed by the system software every 250 milliseconds or it will assert a hardware signal which will reset the system.

12.1 Enable

The timer circuit function is enabled by a jumper strap, E14, and by a control bit in a software accessible register.



Software control of the watchdog circuit is accomplished by manipulating the contents of the NPC-486E's Custom I/O register 1. This register controls many special features of the NPC-486E, the watchdog timer among them. See Appendix C for a description of this register. Bit 2 of register 1 is the software timer enable. A "1" in this location enables the timer for operation (if E14 is IN as well). A "0" at this location disables the timer circuit. The default value for this bit is "0".

12.2 Operation

When enabled, the timer circuit must be continually strobed to prevent it from entering the alarm condition. Strobing is done by reading the NPC-486E's Custom I/O Index register. Should a time-out occur, the circuit will trigger a reset.

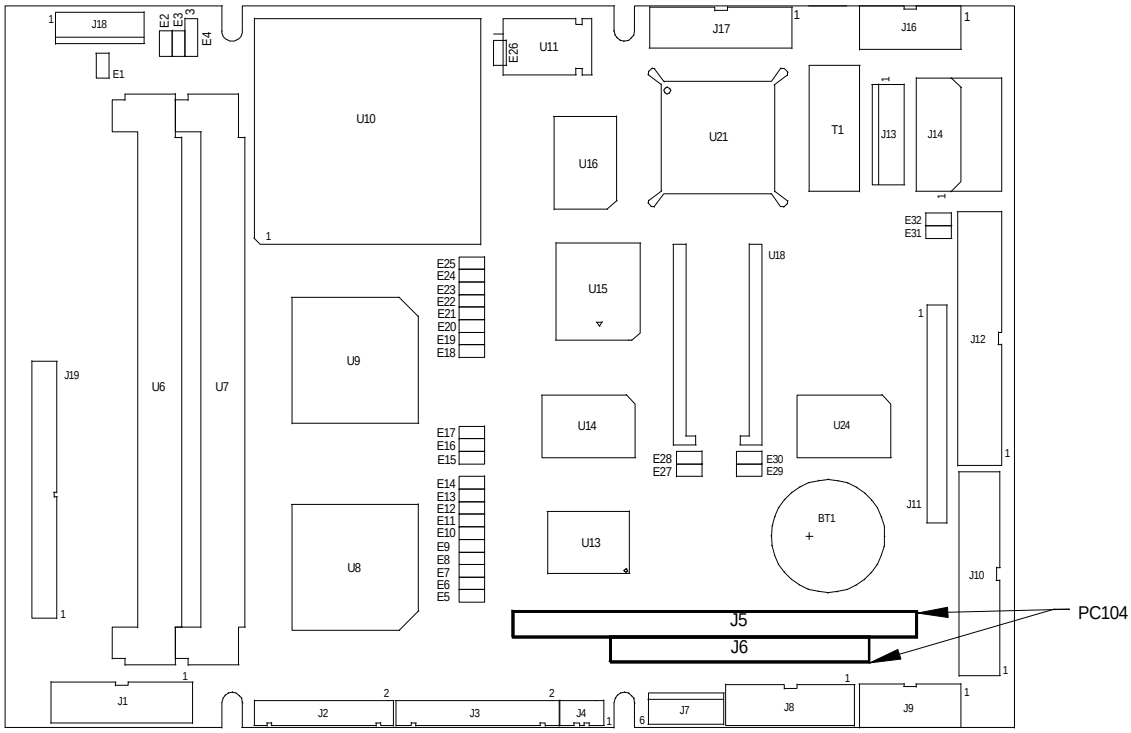
The timer circuit is based on the Maxim MAX1232 (also available from Dallas as part DS1232). The circuit has been designed for 600ms as the time-out period. The specification for the 1232 defines this as a typical value. The actual time-out can range from 250ms to 1000ms. Strobe software must assume the minimum time-out of 250ms, and shut-down circuitry should assume the maximum, 1000ms.

13. PC/104 ISA Bus Expansion

The PC/104 specifies an ISA bus with certain mechanical and electrical features that make it well suited to embedded applications. It eliminates the need for a backplane, it provides for compact adapters, and allows for reduced bus signal drive requirements.

13.1 Connector

There are two physical connectors associated with the 16-bit PC/104 expansion supported by the NPC-486E, J5 and J6.



J5 is a 64-pin, dual row socket connector, with 0.1" x 0.1" pitch, which implements the standard 8-bit ISA bus signals. J6 is a 40-pin connector of the same style and implements the ISA bus 16-bit expansion signals. All ISA bus signals are supported.

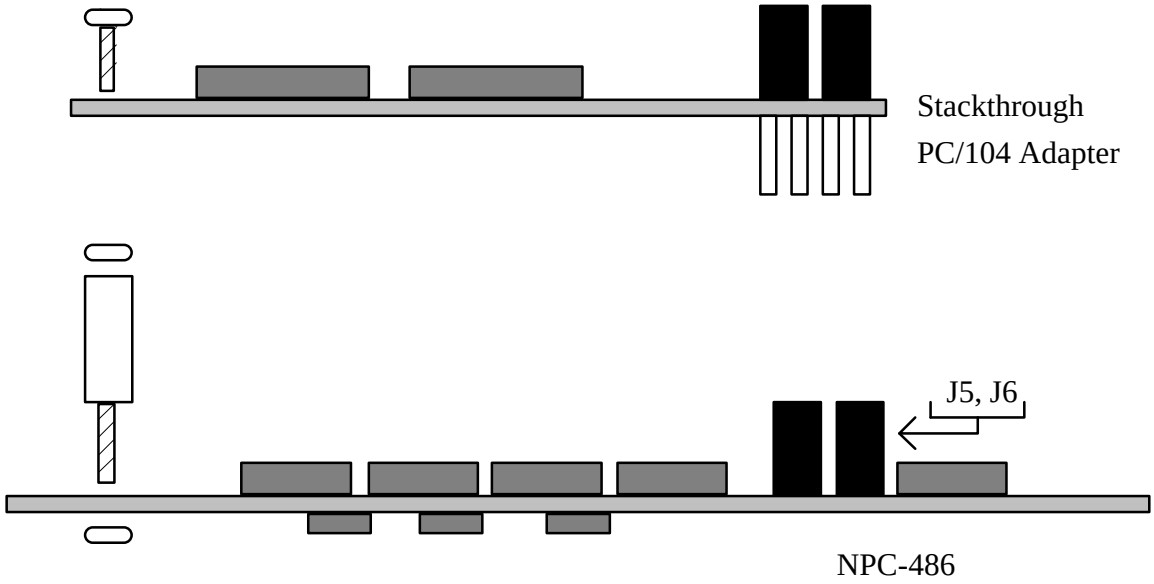
J5			
Pin #	**Signal**	**Pin #**	**Signal**
A1	\IOCHK	B1	GND
A2	SD7	B2	RESDRV
A3	SD6	B3	VCC
A4	SD5	B4	IRQ9
A5	SD4	B5	-5V
A6	SD3	B6	DREQ2
A7	SD2	B7	-12V
A8	SD1	B8	\WS0
A9	SD0	B9	+12V
A10	IOCHRDY	B10	GND
A11	AEN	B11	\SMEMW
A12	SA19	B12	\SMEMR
A13	SA18	B13	\IOW
A14	SA17	B14	\IOR
A15	SA16	B15	\DACK3
A16	SA15	B16	DREQ3
A17	SA14	B17	\DACK1
A18	SA13	B18	DREQ1
A19	SA12	B19	\REFSH
A20	SA11	B20	SYSCLK
A21	SA10	B21	IRQ7
A22	SA9	B22	IRQ6
A23	SA8	B23	IRQ5
A24	SA7	B24	IRQ4
A25	SA6	B25	IRQ3
A26	SA5	B26	\DACK2
A27	SA4	B27	TC
A28	SA3	B28	ALE
A29	SA2	B29	VCC
A30	SA1	B30	OSC
A31	SA0	B31	GND
A32	GND	B32	GND

J6			
Pin #	**Signal**	**Pin #**	**Signal**
C0	GND	D0	GND
C1	\BHE	D1	\MEMCS16
C2	LA23	D2	\IOCS16
C3	LA22	D3	IRQ10
C4	LA21	D4	IRQ11
C5	LA20	D5	IRQ12
C6	LA19	D6	IRQ15
C7	LA18	D7	IRQ14
C8	LA17	D8	\DACK0
C9	\MEMR	D9	DREQ0
C10	\MEMW	D10	\DACK5
C11	SD8	D11	DREQ5
C12	SD9	D12	\DACK6
C13	SD10	D13	DREQ6
C14	SD11	D14	\DACK7
C15	SD12	D15	DREQ7
C16	SD13	D16	VCC
C17	SD14	D17	\MASTER
C18	SD15	D18	GND
C19	KEY	D19	GND

PC/104 connector pin-out

13.2 Adapter Card Mounting

PC/104 adapter cards are mounted in a "stackthrough" manner. Adapter cards are designed with plugs on their undersides which mate with the PC/104 socket connectors of the NPC-486E. PC/104 adapters can support the socket connector version on their top side and allow further "stacking" of adapters.



14. Solid State Disks

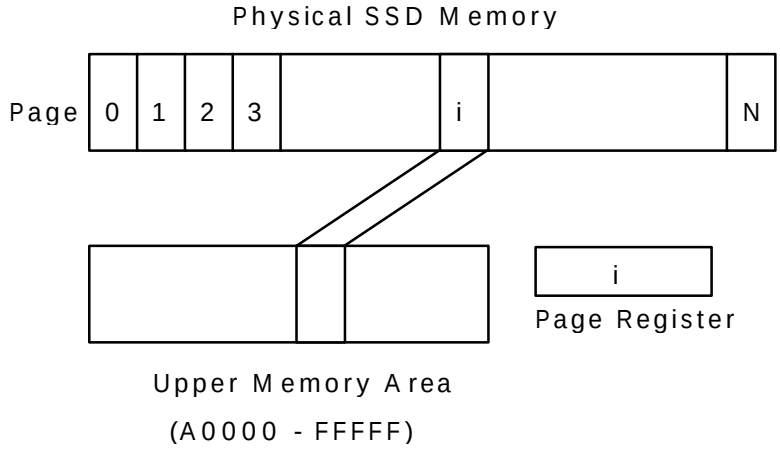
There are two Solid State Disks (SSDs) available on the NPC-486E. They are each composed of one or two memory devices. Driver software allows the memory devices to emulate a floppy disk drive.

The first Solid State Disk of the NPC-486E consists of one or two Flash memory devices soldered on the NPC-486E. This SSD is referred to as the "Factory" SSD since it is factory installed and must be specified at ordering time. It has a maximum capacity of 4M bytes (realized by two 2M devices). 1M or 2M configurations are also possible.

The second NPC-486E SSD is field installable. A 32-pin socket (U18) on the NPC-486E can accept memory devices of 32K, 128K, 256K, or 512K bytes. The memory type can be EPROM, EEPROM, Static RAM (SRAM), or Flash. An external battery can be connected to Static RAM devices if desired, for non-volatility. This SSD is referred to as the "Socket" SSD.

14.1 Memory Configuration

The architecture of the PC/AT and the limitations imposed by DOS force the memory spanned by the SSD to be "paged". That is, it is accessible in discrete blocks or "Pages". A "window" in the Upper Memory Area of the PC/AT (A0000 - FFFFF) is reserved to "view" the SSD memory. The size of this window is the Page size of the SSD, and is a multiple of 16K (the minimum Page size). The physical memory viewed in the window is specified by selecting a Page using a Page Selection Register in the I/O space of the PC/AT.



The memory space 00000 through FFFFF is addressed by 20 address lines, A0 through A19. The SSD Window is restricted to a select range within this space, from D0000 to EFFFF. The Page Selection Register bits supply the some of these address lines and the rest come from the system bus.

The Page Selection Registers for the Factory and Socket SSDs are accessed through the NPC-486E Custom Features I/O. See Chapter __ for a complete explanation of the Custom Feature I/O registers.

14. 2 Socket SSD Configuration

The Socket SSD has a maximum capacity of 0.5M. It supports EPROM, EEPROM, SRAM, and Flash memory types, in sizes of 32K, 128K, 256K, or 512K bytes. The SSD window size, window location, memory type, and memory size are configured using jumpers.

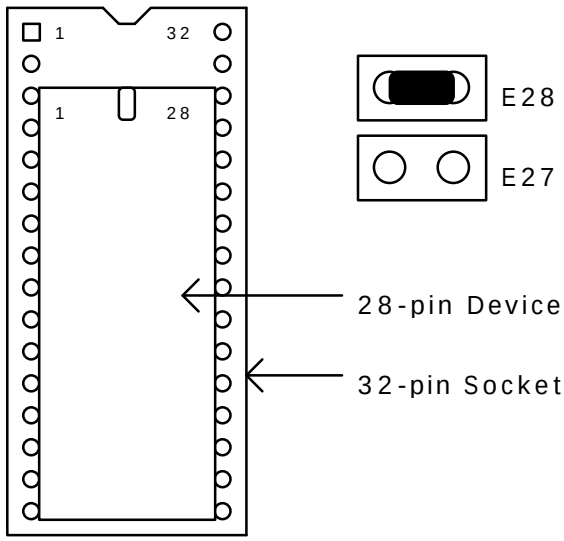
The Socket SSD memory type is specified by jumpers E9 and E10.

E10	E9	Memory Type	Supported Sizes
Out	Out	Reserved	NA
Out	In	5V Flash	128K, 512K
In	Out	EPROM	128K. 256K, 512K
In	In	SRAM/EEPROM	32K, 128K, 512K

The JEDEC style socket of the Socket SSD accepts 32-pin devices. It can also accept 28-pin (32K byte) SRAM and EEPROM devices. The selection of 28 vs. 32 pins is controlled by jumpers E27 and E28.

Part Pin Count	E27	E28
28	Out	In
32	In	Out

28-pin devices must be offset in the socket for the SSD, which is designed for 32-pin devices.



The memory of the Socket SSD devices is made available to the system using a variable sized window in the Upper Memory Area (A0000 - FFFFF). Jumpers E7 and E8 are used to select the base address and size of this window, or disable it completely. E5 and E6, which control the size and location of the Factory SSD window, affect the Socket SSD window under certain conditions (see table).

E8	E7	Window Size	Window Base Address
OUT	OUT	NA	Disable Socket SSD
OUT	IN	16K	E8000
IN	OUT	64K	D000 (if E5 and/or E6 IN)
IN	OUT	128K	D000 (if E5 and E6 OUT)
IN	IN	16K	D4000

14.2.1 Socket SSD Battery Connection

The NPC-486E includes circuitry which allows reliable battery backed SRAM operation. The on-board battery used by the Real-Time Clock (RTC) of the NPC-486E can be used by Socket SSD SRAM as well. It is also possible to use an external battery. Using the RTC battery will diminish it lifetime, and **an external battery is recommended**.

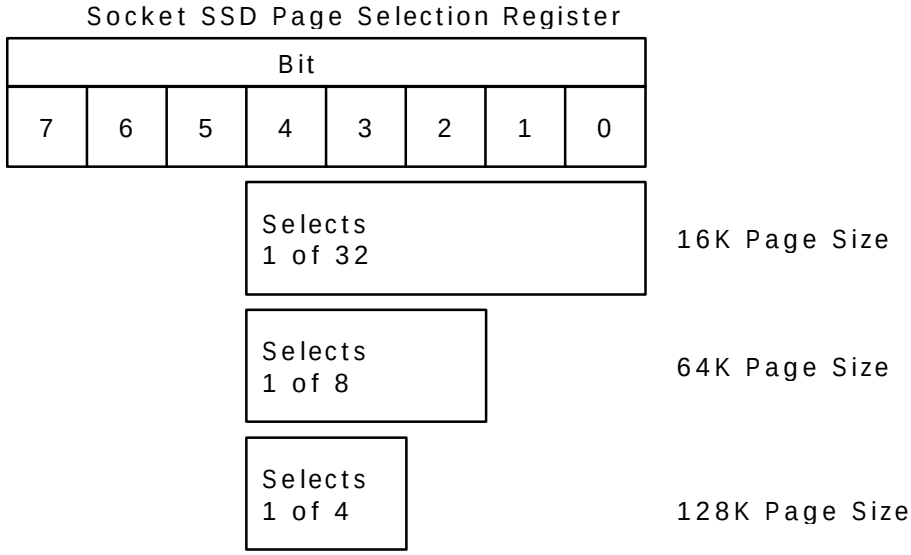
Connector J7 is used to connect an external battery to the SSD SRAM device.

J7 Pin Number	Function
6	SRAM battery positive (+3 to +5 volts)
5	SRAM battery return

Jumper E29 is used to route the RTC battery to the SSD SRAM device. E29 should be installed if the RTC batter is used.

14.2.2 Socket SSD Page Selection

The Socket SSD memory is divided into 32 16K Page Units. Page selection is accomplished using Custom Register 2 of the Custom Feature I/O. Bits 0 through 4 of Register 2 select one of the 16K pages for access in the Socket SSD Window. For larger page sizes (64K or 128K), low order bits are ignored.



The Page Selection Register is selected by writing an index value of 2 to the Custom Feature Index Register.

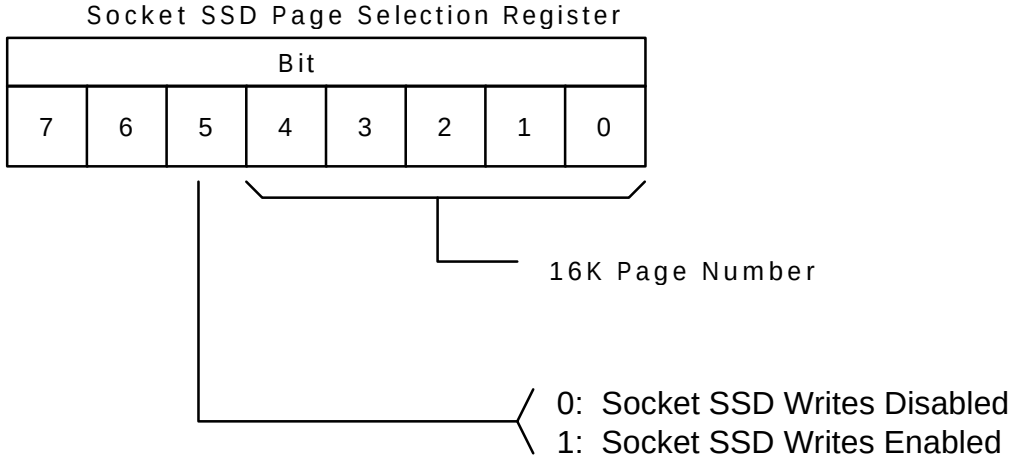
```
MOV     DX,CF_INDXREG
IN      AL,DX                   ;READ INDEX REGISTER
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;
AND     AL,0FCH         ;MASK INDEX BITS
OR      AL,2                    ;INDEX = SSD PAGE REGISTER
OUT     DX,AL
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;

MOV     DX,CF_DATAREG   ;SELECT DESIRED SSD PAGE
IN      AL,DX                   ;READ INDEX REGISTER
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;
AND     AL,0E0H         ;MASK PAGE BITS
OR      AL, <desired page>
OUT     DX,AL
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;
```

14.2.3 Socket SSD Write Enable

The Socket SSD memory can be read anytime. It can be written as well, but a Write Enable line, controlled by software, must be asserted first. Writes are ignored when the Write Enable Line is de-asserted. This is useful to protect the contents of the SSD from being compromised by errant programs.

The Write Enable line for the Socket SSD is bit 5 of it's Page Selection Register. A value of "1" enables writes, a value "0" disables writes.



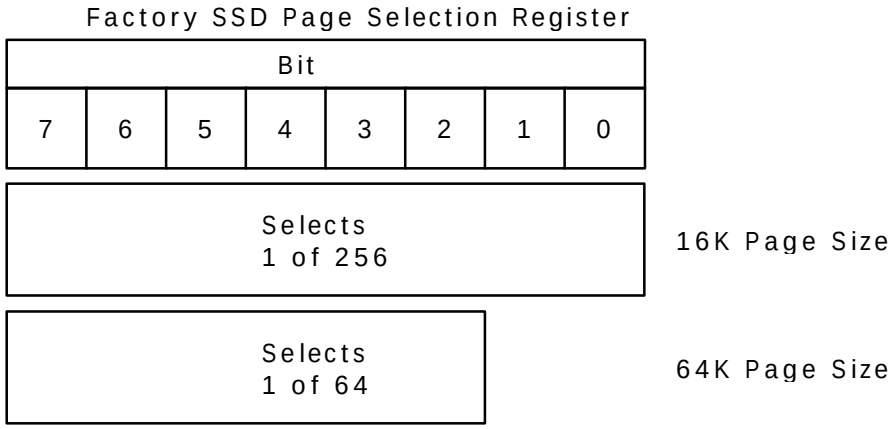
14. 3 Factory SSD Configuration

The Factory SSD consists of one or two Flash memory devices soldered on the board. The devices can be 1M or 2M individually, resulting in SSD capacities of 1M, 2M, or 4M. Like the Socket SSD, the memory of the Factory SSD is accessible in a window in the Upper Memory Area. Jumpers E5 and E6 control the size and base address of the window.

E5	E6	Window Size	Window Address Range
In	In	16K	D8000 - DBFFF
In	Out	16K	EC000 - EFFFF
Out	In	64K	E0000 - EFFFF
Out	Out	NA	Disable Factory SSD

14.3.1 Factory SSD Page Selection

The Factory SSD memory is divided into 256 16K Page Units. Page selection is accomplished using Custom Register 3 of the Custom Feature I/O. Bits 0 through 7 of Register 3 select one of the 16K pages for access in the Factory SSD Window. For a Window size of 64K, the two low order bits are ignored.



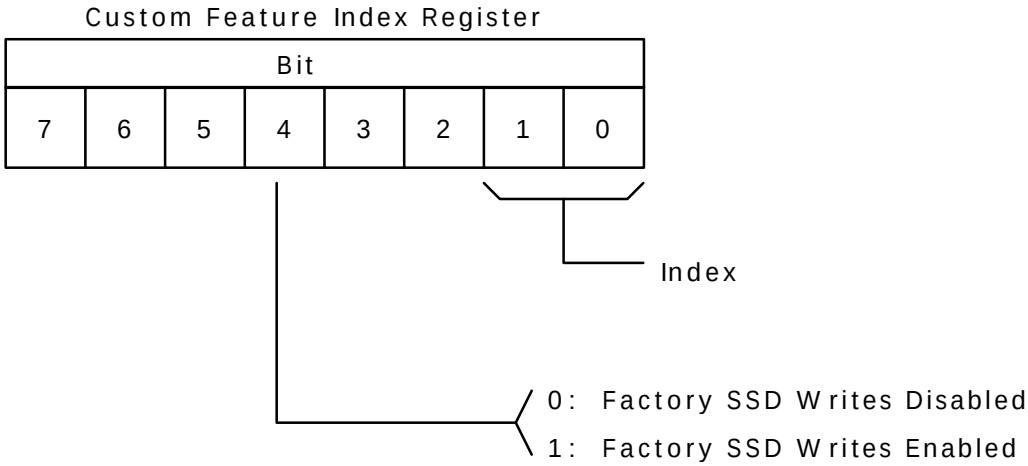
The Page Selection Register is selected by writing an index value of 3 to the Custom Feature Index Register.

```
MOV     DX,CF_INDXREG
IN      AL,DX                   ;READ INDEX REGISTER
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;
AND     AL,3                    ;MASK INDEX BITS
OR      AL,3                    ;INDEX = SSD PAGE REGISTER
OUT     DX,AL
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;

MOV     DX,CF_DATAREG   ;SELECT DESIRED SSD PAGE
IN      AL,DX                   ;READ INDEX REGISTER
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;
MOV     AL, <desired page>
OUT     DX,AL
JMP     $+2                     ;DELAY FOR ISA BUS I/O
JMP     $+2                     ;
```

14.3.2 Factory SSD Write Enable

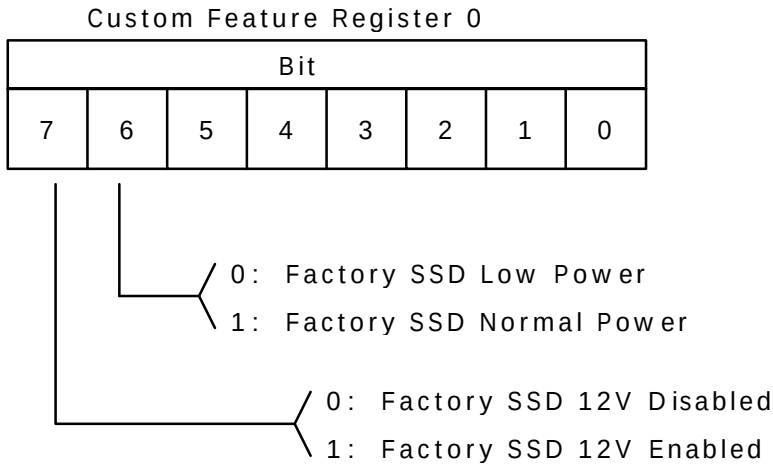
The Write Enable line for the Factory SSD is bit 4 of the Custom Feature Index Register. A value of "1" enables writes, a value "0" disables writes.



14.3.3 Factory SSD Power Control

There are two issues concerning the power required by the Factory SSD. First, 12V Flash devices require a 12V supply during erase and write operations. Second, some Flash devices supported by the Factory SSD are capable of a "low power" mode. Control lines are provided to enable and disable the 12V supply and to assert the "low power" mode.

Both control lines are on Custom Feature Register 0. Bit 7 controls the 12V supply and bit 6 controls the low power mode. A value of "1" enables power for the respective lines.



14.4 SSD Page Address Calculations

The physical memory spanned by an SSD must be addressed via a Page and an Offset within the SSD Window. Given a logical address within the linear space of the memory, the Page

and Offset values may be derived and are dependent on the Window Size and the Page Unit size of 16K. The location of the SSD window provides the segment address to complete the physical address specification to allow a program access to the memory.

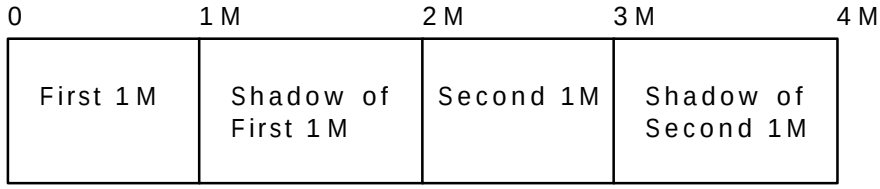
Page	= Linear Address / Page Unit
Offset	= Linear Address MOD Window Size
Segment	= Window Location

The memory is addressed by calculating the Page and writing the value to the Page Selection Register, then combining the Segment and Offset to form a physical address.

Note that for Window sizes larger than 64K, the Offset may be larger than a 64K segment. This requires that the Segment and Offset change.

Segment	= Segment + (Offset /64K) * 4096
Offset	= Offset MOD 64K

Special consideration must be given to the case of a 2M Factory SSD comprised of (2) 1M devices. In this configuration, the total 2M of the SSD is not contiguous and each device starts on a 2M boundary.

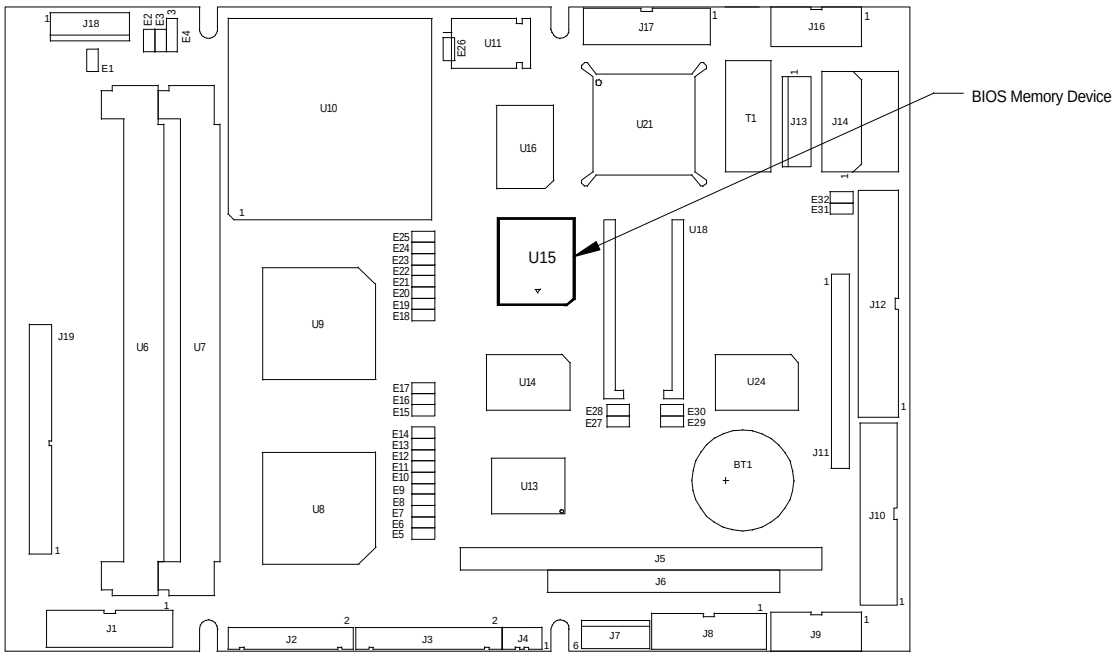


Memory map of Factory SSD comprised of two 1M devices.

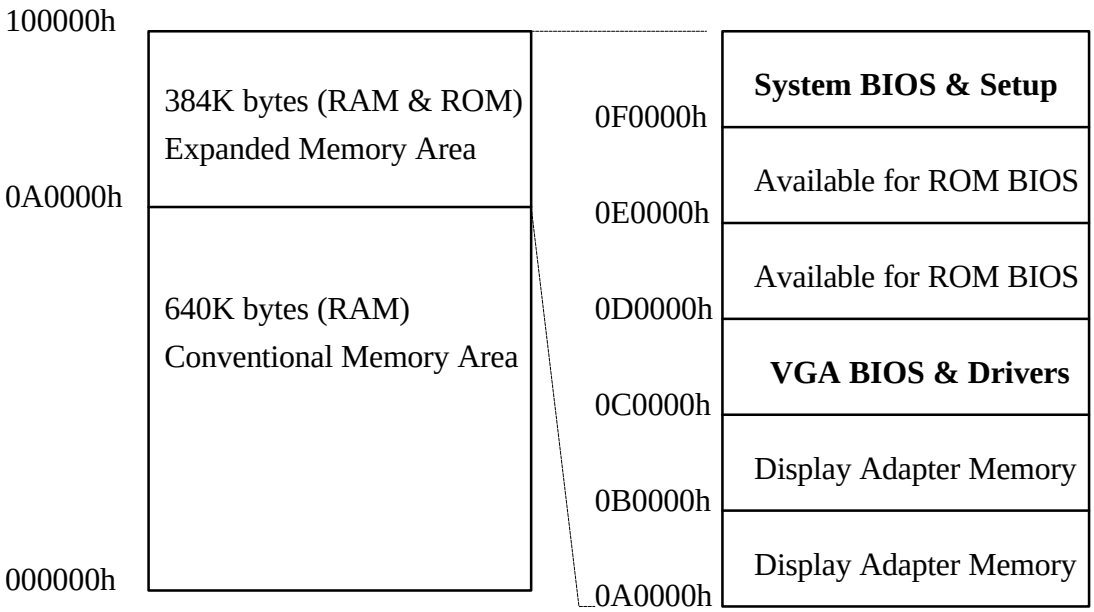
To correctly address this memory, a value of 40h must be added to the Page value to access the second 1M block.

15. BIOS

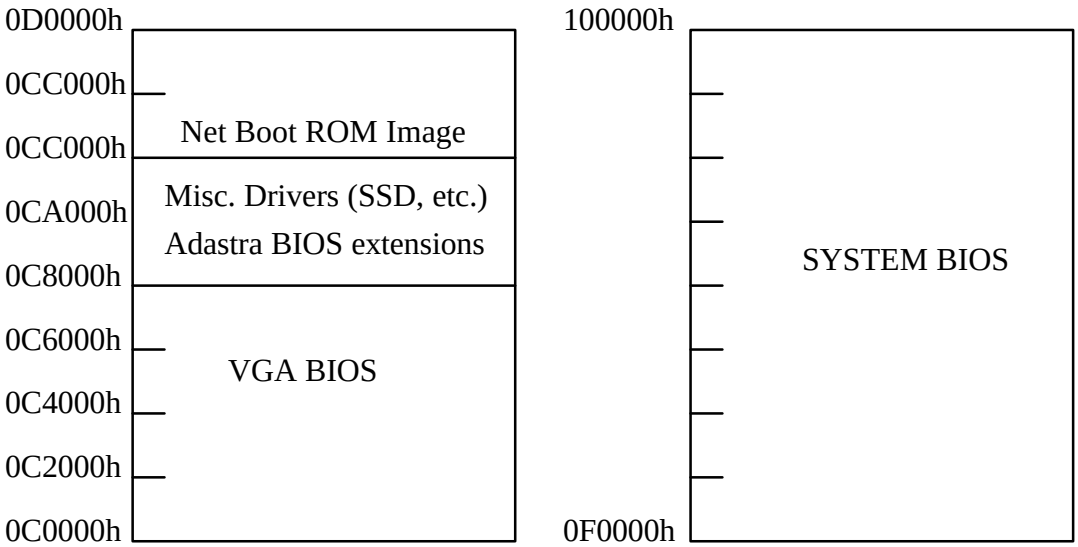
Physical BIOS memory is located in a 128K byte, 32-pin, PLCC device designated U15.



The device spans 128K of memory in the Upper Memory Area, addresses C0000h to CFFFFh and F0000h to FFFFFh. System BIOS occupies the upper 64K bytes and the VGA BIOS and various drivers occupy the lower 64K



The lower 64K bytes of the BIOS memory is located in the NPC-486E memory map at 0C0000h. Half of this memory (32K) is used for VGA BIOS. The remaining 32K can be used for network Boot ROM images, the Solid State Disk driver, and other custom drivers. The suggested layout and use of this segment is shown at left.



15.1 Flash*Fusion*™ Flash BIOS Update Utility

The NPC-486E BIOS device is typically Flash memory. This type of memory is re-programmable in-circuit. Adastra System's Flash*Fusion* Utility can be used to reprogram all or part of the BIOS image in the device.

15.2 Solid State Disk Driver

The Solid State Disk (SSD) driver can be included within the BIOS ROM or contained within the SSD memory itself. An alternate method is to incorporate the driver within the SSD. Incorporating the driver in ROM BIOS frees SSD memory for disk image data. Maintaining the driver within the SSD frees space within the BIOS ROM for other drivers and utilities.

15.3 Network Boot Driver

Network Boot ROM images are available for many network operating systems. A net boot image may be incorporated into the ROM BIOS by special order or by FlashFusion.

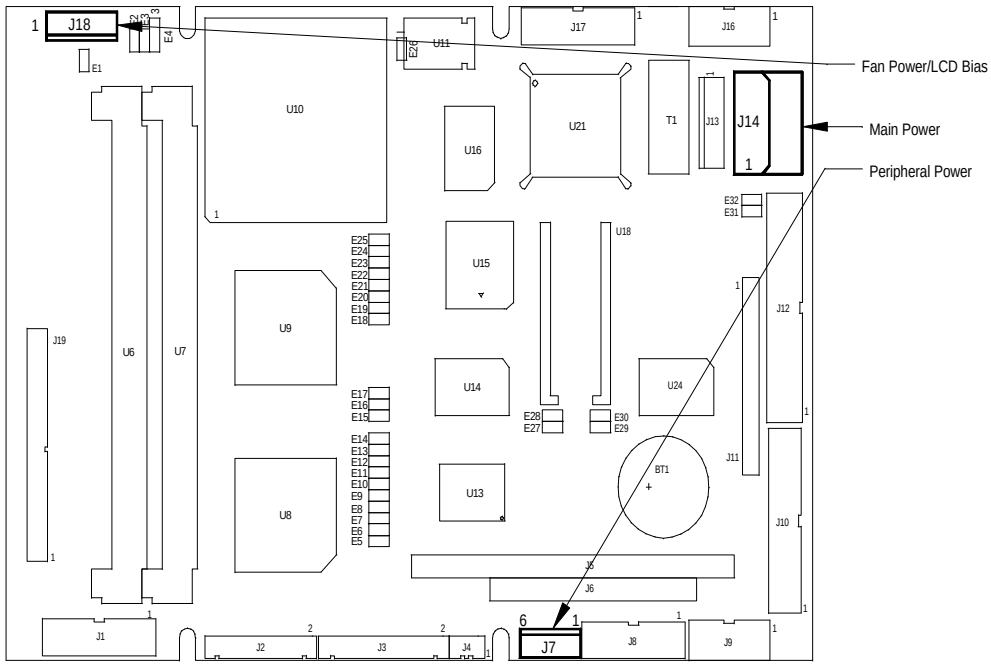
16. Power

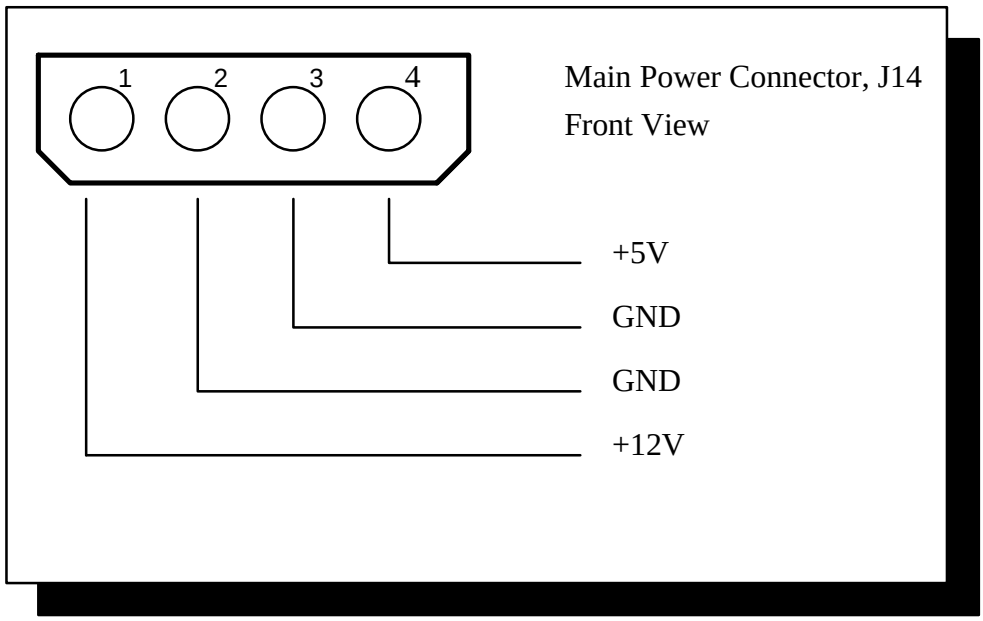
The NPC-486E uses a main power connector which mates with connectors commonly found on commercial PC power supplies. A second power input, the peripheral power connector, is used to supply voltages required by some peripherals.

The NPC-486E can operate using +5V only supplied on the main power input. The +12V supplied on the main power connector is used for CPU fans and in conjunction with input voltages of -5V and -12V on the peripheral power connector to operate peripherals and PC/104 adapters.

16.1 Main Power Connector

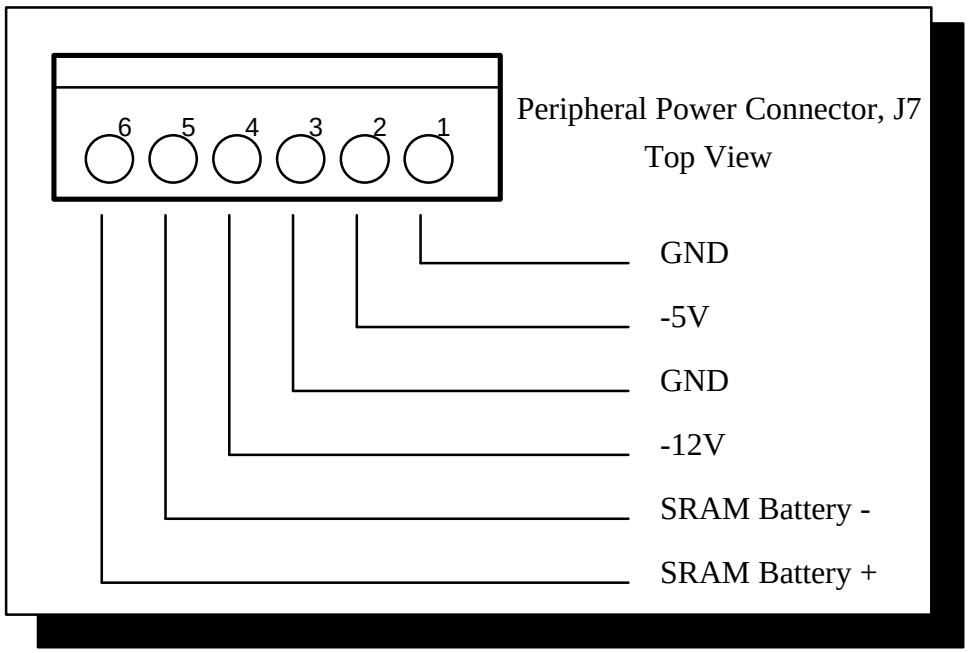
The main power connector, J14, mates with the hard disk power output connector of a typical PC power supply. While the main power input accepts +5V and +12V, only the +5V is required by the NPC-486 alone. The +12V is required to supply some flat panel displays, the PC/104-ISA bus, and 12V CPU-mounted fans.





16.2 Peripheral Power Connector

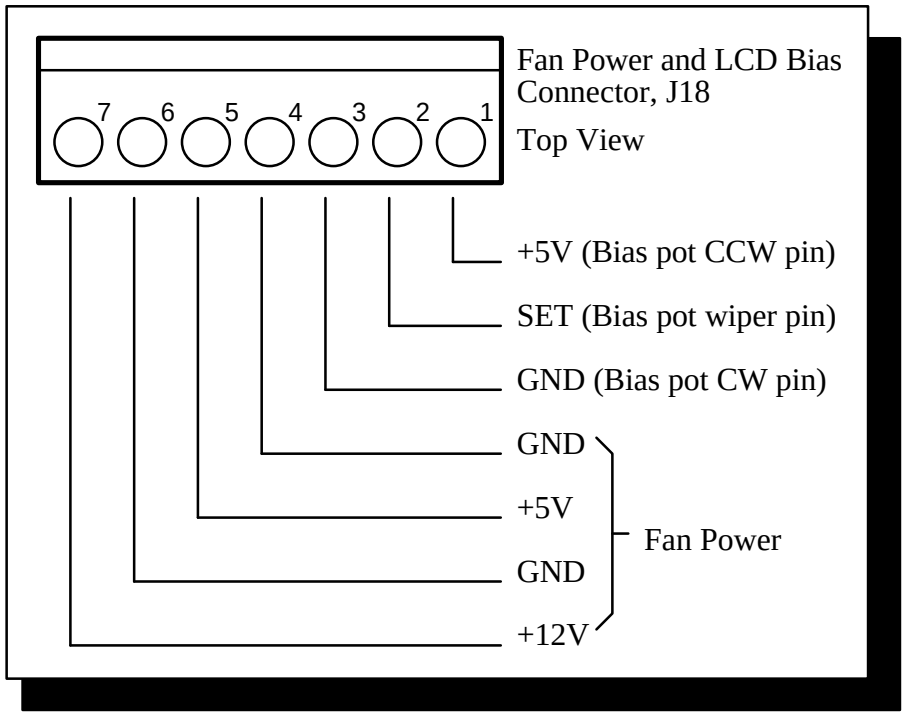
The peripheral power connector, J7, accepts -5V and -12V required for some PC/104-ISA bus expansion boards. It also will accept power from an external battery for use with SRAM devices in the Socket SSD. This is the recommended method for providing battery back-up to the SRAM SSD. It is a 0.1" pitch, single row, 6 pin, friction lock header.



16.3 LCD Bias Adjust and Fan Power Connector

A CPU-mounted fan for cooling can be powered using the voltages supplied on J18. Fans typically require either +5V or +12V. The fan power connector supplies both. It is a 0.1" pitch, single row, 7 pin, friction lock header.

In addition to providing a tap for fan power, pins on J18 can be used to connect to a potentiometer to control the bias voltage for LCD flat panel displays connected to the on-board VGA interface. See Chapter 11 for information on bias voltages.



16.4 Power Consumption

As discussed in Chapter 2 and Appendix C, the NPC-486E has the ability to slow down the CPU speed or shut down peripherals in order to conserve power. The following tables illustrates typical current requirements at 5V for the 80486SX, DX, DX2, and DX4 processors with 4 Mbytes of memory.

80486SX	**Current (Amps) at 5V**			
Peripherals	**33 MHz**	**25 MHz**	**16 MHz**	**8 MHz**
All peripherals enabled	1.54	1.36	1.13	.94
Network only disabled	1.50	1.29	1.08	.88
VGA only disabled	1.34	1.13	.92	.71
All peripherals disabled	1.31	1.10	.89	.68

80486DX	Current (Amps) at 5V			
Peripherals	**33 MHz**	**25 MHz**	**16 MHz**	**8 MHz**
All peripherals enabled	1.63	1.39	1.17	.94
Network only disabled	1.59	1.19	1.12	.90
VGA only disabled	1.42	1.19	.96	.73
All peripherals disabled	1.39	1.16	.93	.70

80486DX2	Current (Amps) at 5V			
Peripherals	**33 MHz (66)**	**25 MHz (50)**	**16 MHz**	**8 MHz**
All peripherals enabled	2.00	1.71	NA	NA
Network only disabled	1.97	1.68	NA	NA
VGA only disabled	1.81	1.51	NA	NA
All peripherals disabled	1.77	1.48	NA	NA

80486DX4	Current (Amps) at 5V			
Peripherals	**33 MHz (100)**	**25 MHz (75)**	**16 MHz**	**8 MHz**
All peripherals enabled	2.15	1.82	NA	NA
Network only disabled	2.11	1.78	NA	NA
VGA only disabled	1.95	1.62	NA	NA
All peripherals disabled	1.90	1.58	NA	NA

Appendix A: Options and Adapters

There are several options available for the NPC-486E. Use the specified part number referred to in the description of the following options and adapters when ordering.

A.1. Cables

The following table describes the cables available for the NPC-486E. These cables mate to the on-board connectors of the NPC-486E, and terminate in a connector style common to the peripheral they serve.

Part Number	Description	NPC-486E Connector	Terminating Connector (manufacturer/part)
620-008	2.5" and 1.8" IDE (3.5"drives with adapter 800-312)	J11	44-pin, 2mm, female IDC (Astron AT-IDCSK-44-1-GF)
800-312	3.5" IDE Adapter Board		Use with 620-008
620-009	Dual Floppy, 3.5" and 5.25"	J12	(2) 34-pin, .1", female IDC (2) 34-pin, .1" card edge
620-001	Primary serial (COM1)	J9	9-pin male DSUB (3M U 89809-8003)
620-002	Secondary serial (COM2) RS-232	J8	9-pin male DSUB (3M U 89809-8003)
620-010	Secondary serial (COM2) RS-485	J8	9-pin male DSUB (3M U 89815-8003)
620-007	Parallel Port	J10	25-pin female DSUB (3M U 89925-8003)
620-011	Network, 10BASE2, 10BASE5 AUI	J17	15-pin female DSUB (3M u89915-8003)
620-012	Network, 10BASE-T	J16	RJ45 8-pin modular jack, high density.
620-003	VGA CRT	J1	15-pin DSUB (Kycon K86-ED-155-K)
620-004	Keyboard and PS/2 mouse	J13	5-pin circular DIN (Switchcraft 57 GB5F) 6-pin circular DIN
620-005	Keyboard	J13	5-pin circular DIN (Switchcraft 57 GB5F)
620-018	Main power (4-conductor pigtail)	J14	
620-033	Front panel (6-conductor pigtail)	J4	
620-034	Peripheral Power (6-conductor pigtail)	J7	
620-035	Fan Power/LCD contrast control (7 conductor pigtail)	J18	

A cable set is available, part number 620-032, which includes all cables in the above table except part number 620-005 (keyboard only cable).

A.2 Memory

Part Number 100-049: 256Kx36 (1Mbyte), 70ns, 72-pin, single-sided SIMM
Part Number 100-043: 512Kx36 (2Mbyte), 70ns, 72-pin, single-sided SIMM
Part Number 100-031: 1Mx36 (4Mbyte), 70ns, 72-pin, single-sided SIMM
Part Number 100-077: 2Mx36 (8Mbyte), 70ns, 72-pin, single-sided SIMM
Part Number 100-039: 4Mx36 (16Mbyte), 70ns, 72-pin, single-sided SIMM

A.3 Network AUI

Part Number 940-001: AUI to 10Base2 transceiver

A.4 Disk Drives

Part Number 920-001: 3.5", 1.44M bytes floppy disk drive
Part Number 920-002: 5.25", 1.2M bytes floppy disk drive

A.5 Software, Operating Systems

Part Number 930-004: MS-DOS 6.22
Part Number 930-005: MS Windows for Workgroups 3.11
Part Number 930-006: MS-DOS 6.22 and MS Windows for Workgroups 3.11

A.6 Software, Utilities

Part Number 930-020: ROM*Fusion* Solid State Disk Utilities

A.7 Software, Network Drivers

Part Number 930-019: Network Starter w/AMINSTAL. NDIS, ODI drivers for OS/2, DOS, Windows, and NT. DOS Packet driver with source.
Part Number 930-022: Sunsoft Solaris driver
Part Number 930-023: SCO UNIX LLI3.2 driver (TAR format)
Part Number 930-024: UNIXware DLPI driver (PkdAdd format)

Appendix B: Hardware Interrupt Assignment

The following table describes the allocation of the 16 hardware interrupt lines for the NPC-486E. The allocations shown are typical. Many subsystems which use the hardware interrupt lines can use alternate lines if desired. These alternate choices are selectable via jumper or BIOS Configuration.

IRQ	Interrupt Number	Primary Use	Alternate Use
0	08H	18.2 ms Timer	NA
1	09H	Keyboard	NA
2	0AH	Slave 8259 interrupt controller	NA
3	0BH	COM2 (secondary serial)	
4	0CH	COM1 (primary serial)	
5	0DH	Not used (LPT2)	Ethernet controller
6	0EH	Floppy disk controller	NA
7	0FH	LPT1	
8	70H	Real time clock	NA
9	71H	LAN	
10	72H	Not used	Video
11	73H	Not used	
12	74H	PS/2 Mouse	
13	75H	Math coprocessor	NA
14	76H	Fixed disk controller	NA
15	77H	Not used	

NA: "Not Applicable", no alternate function allowed.

Appendix C: I/O Port Assignment

The following table shows the allocation of I/O port addresses in the NPC-486. The PC/AT only decodes the first 10 I/O address lines. The I/O map repeats on 1K boundaries. The NPC-486 decodes an additional line and the repeat boundary is 2K.

C.1 Standard PC/AT I/O Address Range 000 - 3FFH

Address range	Function
000 - 01F	DMA controller 1
020 - 03F	Interrupt controller 1
040 - 05F	Counter/Timer
060 - 06F	Keyboard controller
070 - 07F	RT Clock & NMI
080 - 09F	DMA Page register
0A0 - 0BF	Interrupt controller 2
0C0 - 0DF	DMA controller 2
0E0 - 0EF	Undocumented
0F0 - 0FF	Math coprocessor
100 - 1EF	Unused
1F0 - 1F7	Fixed disk controller
1F8 - 1FF	Unused
200 - 20F	Unused (game port)
210 -277	Unused
278 - 27F	Unused (LPT2)
280 - 2E7	Unused
2E8 - 2EF	Unused (COM4)
2F0 - 2F7	Unused
2F8 - 2FF	COM2
300 - 35F	Unused
360 - 36F	Network
370 - 377	Unused
378 - 37F	LPT1
380 - 3AF	Unused
3B0 - 3BB	VGA (monochrome)
3BC - 3BF	Unused
3C0 - 3CF	VGA (EGA)
3D0 - 3DF	VGA (CGA)
3E0 - 3E7	Unused
3E8 - 3EF	Unused (COM3)
3F0 - 3F7	Unused
3F8 - 3FF	COM1

C.2 NPC-486 Extended I/O

The I/O system is implemented in an Altera programmable logic device. The description below applies to Adastra part number 750-104 rev. A.

C.2.1 I/O Locations

The I/O system is an indexed system which occupies two I/O locations. The base location address depends on E13. If E13 is in, the I/O system occupies addresses 510 and 511 hex. If E13 is absent, I/O occupies 590 and 591 hex. Eleven bits of address (SA0 to SA10) are decoded.

Although E13 is not readable, the Adastra BIOS extension can determine which set of I/O locations is in use by checking for the power up default values, and/or by performing some write/read tests on the locations.

C.2.2 I/O Registers

The even I/O location (510 or 590, depending on E13) is referred to as the index register. The two least significant bits of this register form an index value. Accesses to the odd I/O location are routed to one of four registers, depending on the two index bits. These four registers accessed at the odd address are referred to as Data Registers.

The high bits of the index register are used for miscellaneous functions, described below.

Index Register	R/W (@ 510 if E13 in; 590 if E13 out) except as noted Power up default: (0000 xx11)
IDX7	SSD IRQ enable
IDX6	COM1 Ring Indicator IRQ enable
IDX5	LAN activity IRQ enable
IDX4	4 Meg SSD write enable
IDX3	_flat jumper input (read only; low => jumper is in)
IDX2	VGA jumper input (read only; low => jumper is out and VGA disabled)
IDX1	Index bit 1
IDX0	Index bit 0

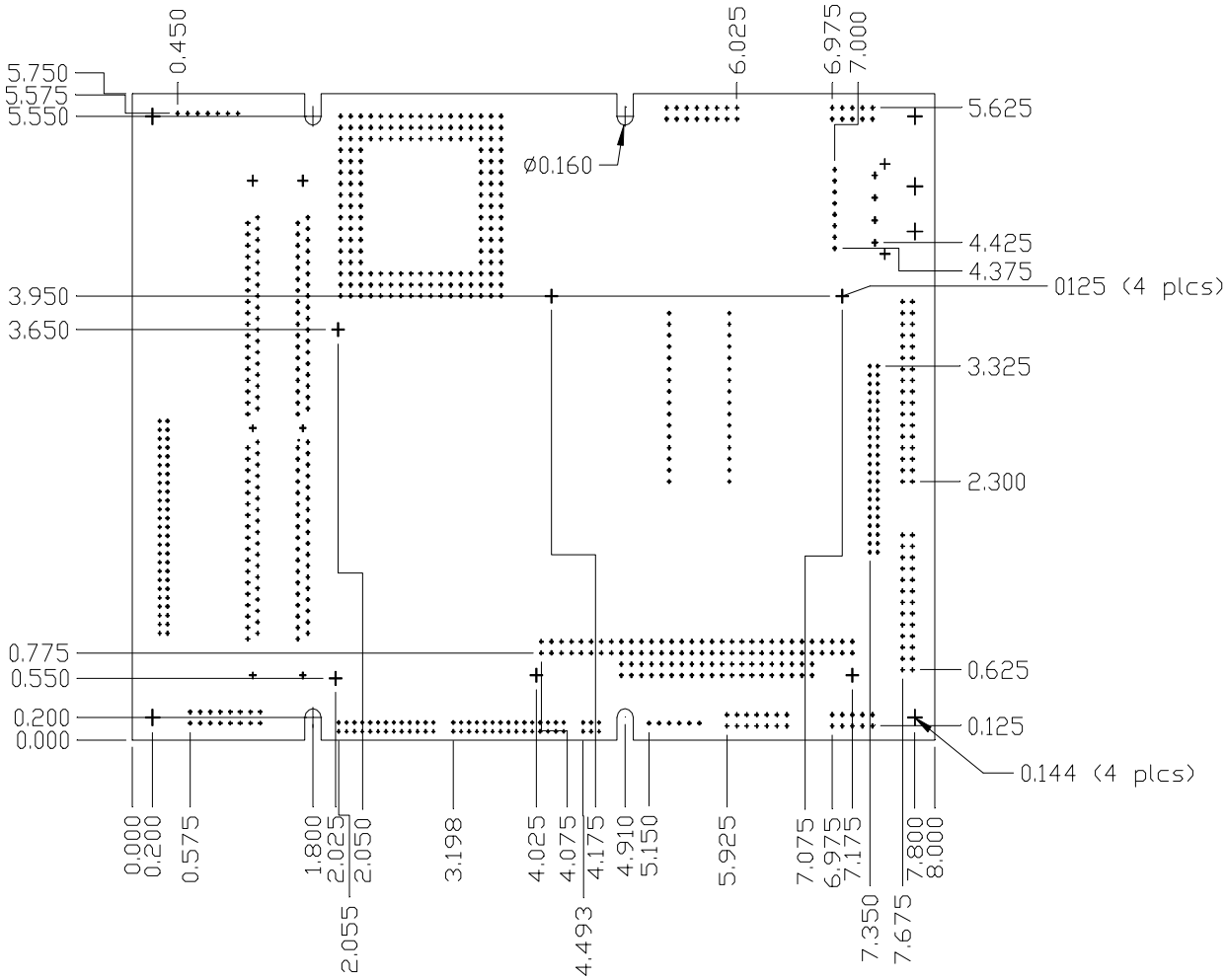
Data Register 0	R/W (@ 511 if E13 in; 591 if E13 out; IDX1, IDX0 == 0) This register shadows a latch external to the 486IO chip. Power up default (external latch): (0101 1111) Power up default (shadow latch): (0000 0000)
REG0_7	VPP enable (Flash +12V): high => on
REG0_6	ROM disk power down (for 4 Meg SSD): low => power down
REG0_5	COM2 RS485 2 wire TXEN: high => half duplex mode (2 wire comm.)
REG0_4	COM2 RS232 enable: high => RS232, low => RS485
REG0_3	COM1 enable: high => COM1 data transceiver on
REG0_2	VGA sleep: low => VGA sleeps
REG0_1	LAN enable: high => LAN enabled
REG0_0	Super I/O enable: high => Super I/O enabled

Data Register 1	R/W (@ 511 if E13 in; 591 if E13 out; IDX1, IDX0 == 1) except as noted Power up default: (xxxx x011)
REG1_7	4 Meg SSD select jumper 1 (read only): low => jumper in (E5)
REG1_6	4 Meg SSD select jumper 0 (read only): low => jumper in (E6)
REG1_5	512K SSD select jumper 1 (read only): low => jumper in (E7)
REG1_4	512K SSD select jumper 0 (read only): low => jumper in (E8)
REG1_3	ck_sel jumper (read only): low => 25 MHz system; high => 33 MHz (E11)
REG1_2	Watch dog enable: high => watchdog enabled
REG1_1	System clock speed: 'course' control: high => faster (see table Chap. 2)
REG1_0	System clock speed: 'fine' control: high => faster (see table Chap. 2)

Data Register 2	R/W (@ 511 if E13 in; 591 if E13 out; IDX1, IDX0 == 2) except as noted Power up default: (xx00 0000)
REG2_7	JEDEC type select jumper 1 (read only): low => jumper in (E9)
REG2_6	JEDEC type select jumper 0 (read only): low => jumper in (E10)
REG2_5	512K SSD write enable: high => writes to 512K SSD enabled
REG2_4	512K SSD address line 18
REG2_3	512K SSD address line 17
REG2_2	512K SSD address line 16
REG2_1	512K SSD address line 15
REG2_0	512K SSD address line 14

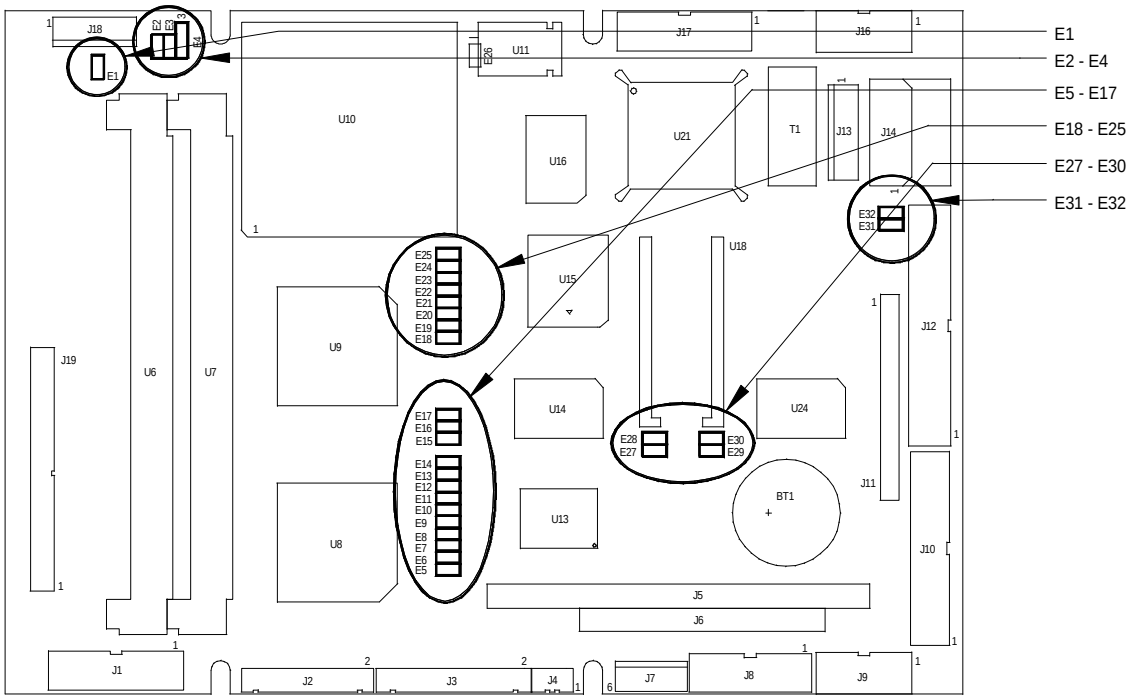
Data Register 3	R/W (@ 511 if E13 in; 591 if E13 out; IDX1, IDX0 == 3) Power up default: (0000 0000)
REG3_7	4 Meg SSD address line 21
REG3_6	4 Meg SSD address line 20
REG3_5	4 Meg SSD address line 19
REG3_4	4 Meg SSD address line 18
REG3_3	4 Meg SSD address line 17
REG3_2	4 Meg SSD address line 16
REG3_1	4 Meg SSD address line 15
REG3_0	4 Meg SSD address line 14

Appendix D: Mechanical Specification



Appendix E: Jumper Settings

E.1 Jumper Locations



E.2 Jumper Definitions (by numerical order)

In the following tables:

1) Single pole jumpers have only two pins (1 and 2), double pole jumpers have three pins (1, 2, and 3). A jumper setting "OUT" indicates the jumper is not present; the designations "IN" or "IN(1-2)" indicate a jumper which joins pin 1 to pin 2; "IN(2-3)" indicates a jumper which joins pin 3 to pin 2.

2) "NA" refers to "not applicable".

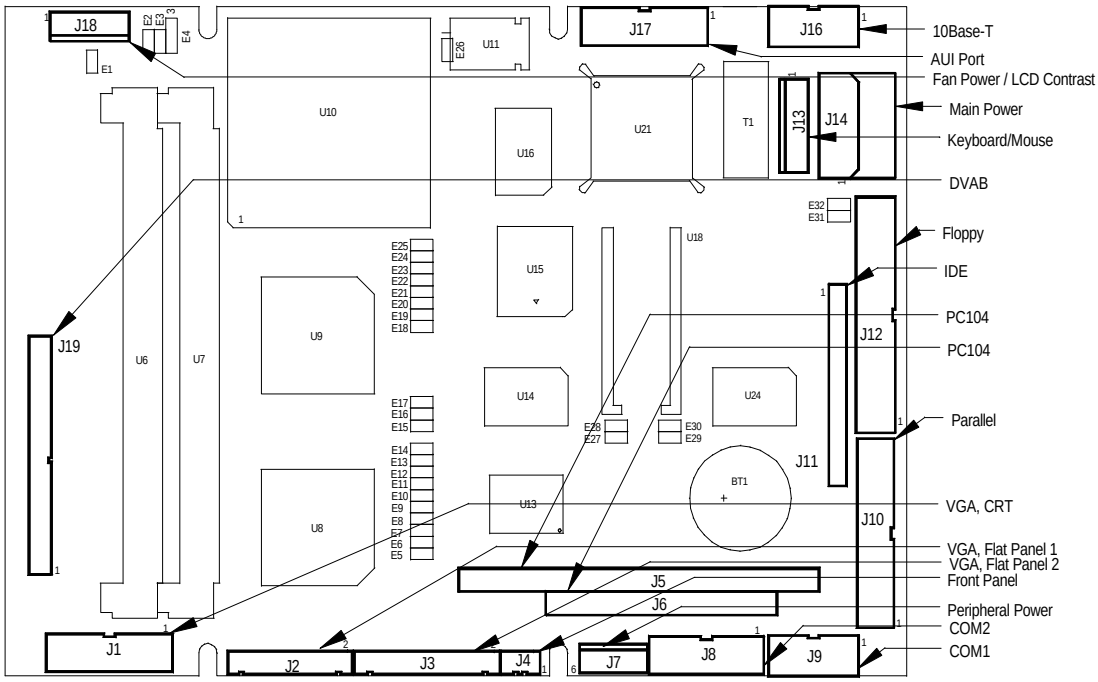
3) The factory default setting for a jumper, if any, is indicated by an asterisk (*).

Designation	Function	Setting	Selection
E1	LCD Bias Voltage	IN * OUT	24V max. (under load) 30V max. (under load)
E2	CPU Select, C14	IN * OUT	DX, DX2, DX4 SX
E3	CPU Select, NMI	IN * OUT	DX, DX2, DX4 SX
E4	CPU Select, A15	IN(1-2) * IN(2-3) OUT	DX, DX2, DX4 SX invalid
E6, E5	Factory SSD (4M) Window Select	OUT, OUT * OUT,IN IN,OUT IN,IN	SSD Disabled 16K byte @EC00 64K byte @E000 16K byte @D800
E8, E7	Socket SSD (.5M) Window Select	OUT, OUT * OUT,IN IN,OUT IN,IN	SSD Disabled 16K byte @E800 64K/128K byte @D000 16K byte @D400
E10, E9	Socket SSD (.5M) Memory Type	OUT, OUT * OUT,IN IN,OUT IN,IN	NA 5V Flash EPROM SRAM/EEPROM
E11	VGA BIOS Overlap	IN * OUT	No overlap C8000 overlap of C0000
E12	CPU Clock Speed	IN OUT *	25 MHz 33 MHz
E13	Custom Features I/O Address	IN * OUT	510h/511h 590h/591h

Designation	Function	Setting	Selection
E14	Watchdog Timer Enable	IN OUT *	Enabled Disabled
E17, E16, E15	Custom Features IRQ Selection (at most one IN)	E17 IN E16 IN E15 IN all OUT *	IRQ15 IRQ11 IRQ10 No IRQ Selected
E18	VGA Enable	IN * OUT	On-board VGA Enabled On-board VGA Disabled
E19	Network Enable	IN * OUT	On-board Net Enabled On-board Net Disabled
E20	Super I/O Enable (disk, COM, LPT)	IN * OUT	Super I/O Enabled Super I/O Disabled
E21	BIOS Write Enable	IN * OUT	BIOS Writes Enabled BIOS Writes Disabled
E22	COM2 IRQ connect	IN * OUT	COM2 uses IRQ3 No COM2 IRQ connected
E23	COM1 IRQ Connect	IN * OUT	COM1 uses IRQ4 No COM1 IRQ connected
E25, E24	LPT IRQ Connect (at most one IN)	OUT, OUT OUT,IN IN,OUT * IN,IN	No LPT IRQ connected LPT IRQ 5 LPT IRQ 7 Invalid
E26	3.3V Bypass **Factory Installed**	IN OUT *	No 3.3V Regulator 3.3V Regulator installed
E28, E27	Socket SSD (.5M) 28/32 Pin Device (only one IN)	OUT, OUT OUT,IN * IN,OUT IN,IN	Invalid 32-pin device selected 28-pin device selected Invalid
E29	Socket SSD SRAM Uses RTC Battery Socket SSD SRAM Use J7 for back-up	IN OUT *	SRAM uses RTC battery **Not recommended** no RTC battery connect. Use J7 for battery input
E30	RTC Battery RTC Circuit Connect	IN * OUT	RTC battery connected RTC battery disconnect
E31	Floppy DRV Enable (J12 pin 6)	IN OUT *	DRV connected DRV not connected
E32	IDE ALE Enable (J11 pin 28)	IN OUT *	ALE connected ALE not connected

Appendix F: Connectors

F.1 Connector Layout



F.2 Mating Connector Specifications

The following table describes the cables available for the NPC-486. These cables mate to the on-board connectors of the NPC-486, and terminate in a connector style common to the peripheral they serve.

Reference Designator	Function Description	NPC-486 Connector manufacturer: part	Mating Connector manufacturer: part
J1	VGA, CRT	3M: 2516-6002UG	3M: 3452-6616
J2	VGA, flat-panel 1	Hirose: DF11-26DP-2DSA	Hirose: DF11-26DS-2C
J3	VGA, flat panel 2	Hirose: DF11-30DP-2DSA	Hirose: DF11-30DS-2C
J4	Front panel	Hirose: DF11-6DP-2DSA	Hirose: DF11-6DS-2C
J5	PC/104, ISA16-bit	Samtec: ESW-132-14-G-D	Samtec: HCMD-32-02
J6	PC/104, ISA 8-bit	Samtec: ESW-120-14-G-D	Samtec: HCMD-20-02
J7	Alternate power	AMP: 640456-6	AMP: 640441-6
J8	Secondary serial	3M: 2514-6002UG	3M: 3385-6614
J9	Primary serial	3M: 2510-6002UG	3M: 3473-6610
J10	Parallel port	3M: 2526-6002UG	3M: 3399-6626
J11	IDE	Astron: AT-PH2-44-2-0-GF	Astron: AT-IDCSK2-44-1-GF
J12	Dual Floppy, 3.5" and 5.25"	3M: 2534-6002UG	3M: 3414-6634
J13	Keyboard and PS/2 mouse	AMP: 640456-8	AMP: 640441-8
J14	Main power	AMP: 641737-1	Molex: 15-24-4048
J16	Network, 10BASE-T	3M: 2510-6002UG	3M: 3473-6610
J17	Network, AUI	3M: 2516-6002UG	3M: 3452-6616
J18	Fan Power/Contrast Control	AMP: 640456-7	AMP: 640441-7
J19	DVAB video	Astron: AT-PH2-50-2-0-GF	Astron: AT-IDCSK2-50-1-GF

Appendix G: AMINSTAL Utility

The AMINSTAL Utility provides an easy-to-use user interface to automatically configure the on board Ethernet network interface and install one software driver. The network interface is based on Advanced Micro Devices PCnet family of network interfaces.

In addition to configuring the hardware, AMINSTAL can also install the following drivers:

- Novell NetWare DOS ODI Client driver
- NDIS 2.01 driver
- Packet driver

G.1 Running AMINSTAL

Follow the steps listed below:

1 Insert the “All Drivers” diskette into the floppy drive. Make sure “HIMEM.SYS” for DOS is loaded in the “CONFIG.SYS” file.

2 Type at the prompt:

aminstal.exe

Then press <Enter>.

3 Follow the screens to complete the Configuration (Section 1) and Installation (Section 2) for the interface. AMINSTAL supports a mouse, otherwise a Key Map (see below) is provided to navigate through the utility. You may press “F1” at any time for help.

Key	**Function**
ESC	Exit the configuration or help screen
F1	Help
Tab	Move the cursor to the next position
Left/Right arrows	Move the cursor
ENTER	Select (Highlight)
Space bar	Select (Highlight)
<Alt> C	Continue to configure PCnet card
<Alt> P	Go to previous screen
<Alt> E	Exit the configuration utility
<Alt> R	Reboot the system

Key Map For AMINSTAL Utility

G.2 Configuration

The first section of AMINSTAL is used to configure network interface hardware. The utility will allow the user to view and modify the I/O base address, IRQ channel, and DMA channel.

The network interface can operate in two different modes:

• Microsoft Plug and Play (PnP) ISA Enabled
• Microsoft PnP ISA Disabled

G.2.1 PnP ISA Mode Enabled

AMINSTAL will detect the PnP mode, the IEEE address for the interface, the I/O base address, IRQ channel, DMA channel, and media type. The only field that may be modified is the “Enable BNC” box which enables the 10Base2 media. Otherwise, the interface will perform an auto detect of the appropriate media type.

The user must select the “Continue” button in the “Configuration” dialog box to complete the configuration.

The configuration information is controlled by the PnP BIOS, Intel's Configuration Manager™, or any other PnP configuration software (e.g., Microsoft 'Chicago'). Load the PnP Configuration Manager in the “CONFIG.SYS” file and reboot the system.

G.2.2 PnP ISA Mode Disabled

AMINSTAL will detect the network interface with the Hardware ID in the base offset I/O address 09h of the IEEE address ROM, the IEEE address for the adapter card, the I/O base address, IRQ channel, DMA channel, and media type.

The user may change the settings for the I/O address, IRQ channel, DMA channel, and media type. If the configuration settings are modified, the new configuration will be written to the EEPROM on the interface after the “Continue” button in the “Configuration” dialog box is pressed.

The user may also enable the PnP mode. The user must reboot the system after exiting AMINSTAL. If the user wishes to continue with installation of a driver using AMINSTAL, select the “Continue” button in the “Configuration” dialog box. See Driver Installation section below.

G.3 Driver Installation

The second section of AMINSTAL can be used to install the following drivers:

- Novell NetWare DOS ODI Client driver
- NDIS 2.01 driver
- Packet driver

The AMINSTAL "Installation" dialog box is used for installing the drivers listed above. Some drivers must be installed using the Network Operating System's OEM installation guidelines. See the OEM Installation section of the documentation file PCNETMAN.DOC on the driver distribution disk #1 for more information.

Note: PCNETMAN.DOC is a Microsoft Word 2.0 document. It can be found in compressed form in DOCS.ZIP in the directory \DOCS of disk #1 of the driver distribution.

G.3.1 Novell NetWare DOS ODI Client

Follow the steps listed below:

1 Run the AMINSTAL Utility to configure your network interface's I/O base address, IRQ channel, and DMA channel.

   Once you have completed the configuration of your network interface using AMINSTAL, go to step 2 below to continue.

2 Select the "Continue" button in the "Configuration" dialog box. The "Installation" dialog box will appear.

3 Select the desired network interface by highlighting it in the top of the dialog box (the on-board interface should be already selected unless you have another PCnet family device installed).

4 Highlight the "Novell ODI DOS Client driver" for the NetWare environment. Change the default path if necessary.

5 Press the "Continue" button to install the driver. AMINSTAL will then copy the driver into the specified directory, create a "NET.CFG" file in the specified directory, and copy a sample "AUTOEXEC.NET" file into the specified directory.

"AUTOEXEC.NET" contains the following command lines:

```
LSL
PCNTNW
IPXODI
NETX
```

• LSL.COM	Link Support Layer
• PCNTNW.COM	AMD NetWare DOS ODI Client driver
• IPXODI.COM	An IPX protocol stack file (e.g., IPXODI.COM)
• NETX.EXE	NetWare Shell (used with conventional memory workstations)

The user must copy these files into the specified directory above. "LSL.COM", "IPXODI.COM", and "NETX.EXE" can be obtained from the Workstation Driver Diskette in the Novell Client Software Package or from CompuServe. The AMD-supplied client driver file "PCNTNW.COM" can be obtained from the DOS ODI directory (i.e., a:\novell\wkstn\dosodi) of the AMD NetWare driver diskette.

6 Exit from AMINSTAL when the installation has completed.

Note:
The user may need to make modifications to autoexec.bat, using the AMD-supplied sample autoexec.net file as reference.

The installation of the NetWare DOS ODI client driver is now complete.

G.3.2 Installing The NDIS 2.01 Driver

NDIS (Network Driver Interface Specification) 2.01 is a driver specification developed by Microsoft to offer a standard driver interface for adapter cards. AMD's NDIS 2.01 driver supports the following environments:

- Microsoft LAN Manager 2.x
- Microsoft Windows for Workgroups 3.1
- Microsoft Windows for Workgroups 3.11
- Banyan VINES
- IBM LAN Server 2.0, 3.x
- Sun PC-NFS 5.x
- Artisoft LANtastic 6.0

Follow the steps listed below:

1 Run the AMINSTAL Utility to configure your network interface's I/O base address, IRQ channel, and DMA channel.

Once you have completed the configuration of your network interface using AMINSTAL, go to step 2 below to continue.

2 Select the "Continue" button in the "Configuration" dialog box. The "Installation" dialog box will appear.

3 Select the desired network interface by highlighting it in the top of the dialog box (the on-board interface should be already selected unless you have another PCnet family device installed).

Note:
If IBM LAN Manager, Microsoft Windows for Workgroups, Sun PC-NFS, etc. OEM installation procedures are used to install the NDIS 2.01 driver, then do not use AMINSTAL to install the NDIS 2.01 driver.

4 Highlight the "NDIS 2.01 driver" to install the driver. Change the default path if necessary. The default directory is: `C:\NDIS`.

5 Press the "Continue" button to complete the installation. AMINSTAL will copy the selected driver file into the specified directory, create a "PROTOCOL.INI" file in the specified directory, and copy a sample "CONFIG.NET" file into the specified directory.
"CONFIG.NET" contains the following:

```
DEVICE=<install path> PROTMAN.DOS /I:<install path>
DEVICE=<install path> PCNTND.DOS
```

Note:
"PROTMAN.DOS" is distributed by Microsoft, IBM, and other OS companies.

6 Exit AMINSTAL when the installation has been completed. The user may need to make modifications to the system files, using the AMD sample files as reference.

The installation of the NDIS 2.01 driver is now complete.

G.3.3 Installing The Packet Driver

The AMD Packet Driver for the PCnet architecture (backwards compatible to the Am2100/Am1500T) is based on the packet driver from Clarkson University.

Follow the steps listed below:

1 Run the AMINSTAL Utility to configure your network interface's I/O base address, IRQ channel, and DMA channel.

Once you have completed the configuration of your network interface using AMINSTAL, go to step 2 below to continue.

2 Select the "Continue" button in the "Configuration" dialog box. The "Installation" dialog box will appear.

3 Select the desired network interface by highlighting it in the top of the dialog box (the on-board interface should be already selected unless you have another PCnet family device installed).

4 Highlight the "Packet driver" to install the driver. Change the default path if necessary. The default directory is: `C:\PKTDRV`.

5 Press the "Continue" button to complete the installation. AMINSTAL will copy the selected driver file into the specified directory and create a sample "AUTOEXEC.NET" file in the specified directory.

"AUTOEXEC.NET" contains the following:

```
PCNTPK INT=0x60 IOADDRESS=<ioaddress> IRQ=<irq> DMA=<dma>
```

Note:
The Packet driver uses a software interrupt to provide a handle for a TCP driver to automatically scan. The software interrupt range is 0x60-66. AMINSTAL uses a default value for INT of "0x60". If there is a conflict with other software settings, please change this setting by editing the "AUTOEXEC.NET" file.

6 Exit AMINSTAL when the installation has been completed. The user may need to make modifications to the system files, using the AMD sample files as reference.

The installation of the Packet driver is now complete.

Appendix H: Flash*Fusion*™ BIOS Load

FlashFusion is a utility which can update the on-board BIOS of the NPC-486E *in-circuit*. This allows changes to the BIOS without having to physically remove parts, or dismantle the system in any way.

BIOS is composed of three parts: 1) System BIOS, 2) VGA BIOS, and 3) Adastra BIOS Extensions. Adastra Systems distributes BIOS component images on diskette together with FlashFusion utilities. These utilities can reload any BIOS component.

H.1 BIOS Components

System BIOS provides the bulk of the services used by operating systems common to the PC. More important, it performs the initialization of the low level hardware of the PC/AT including interrupt controllers, DMA channels, timers, disk interface, and other subsystems that operating systems depend upon.

VGA BIOS provides display services. While many sophisticated graphics programs bypass the rather primitive character and graphic draw functions, they do rely on VGA BIOS to correctly program the display interface hardware. VGA BIOS is they key to flat panel display support. By reloading this component, the physical display can be changed from CRT to flat panel, or to a different flat panel.

Adastra BIOS Extensions initialize the unique features built into the NPC-486E. The extensions can also include network boot functions or special customer-requested features.

H.2 Running LB

LB.EXE is a DOS based program which is used to reprogram the BIOS memory device with new component images. LB must be run in real mode. This means it cannot be run from a DOS window under Microsoft Windows. Extended memory managers such as EMM386 and QEMM also place the processor in protected mode. It is recommended that the system be booted from a floppy diskette containing only DOS and FlashFusion. Such a disk can be created by installing DOS on the FlashFusion distribution diskette via the DOS "SYS" command.

To run LB.EXE, follow the steps below:

1. Insure that the processor is running in real mode, not protected mode.
2. If necessary, insert the FlashFusion diskette into the floppy drive and make it the default drive (by typing A:<ENTER> at the DOS prompt).
3. At the A:> prompt type: LB <ENTER>.

LB will issue a warning and abort if the processor is found to be in protected mode, otherwise it will read the first component image file listed in the list file BIOS.LST into a buffer in preparation to load it into the BIOS device.

LB defaults to loading only the VGA BIOS component and will not allow the System BIOS component to be updated at all. This is done for two reasons. First, if the System BIOS is unsuccessfully loaded, the NPC-486E cannot boot at all. The BIOS device must be removed from its socket and be replaced by a pre-programmed device. Second, if an incompatible VGA BIOS is loaded and the display is unreadable, the VGA component can be reloaded with a minimum of effort by inserting the FlashFusion disk, invoking LB, and typing <ENTER>.

Command line option switches are used to change the default settings and allow System BIOS to be reprogrammed. LB command line option switches are of the form "/O+" (or "/O") or "/O-"; where 'O' is the either 'V', 'E', or 'S'. These switches enable or disable the default loading of VGA, Extension, or System BIOS components. A command line of the form

```
> LB /S+ /V- /E+
```

Would select the only the System and Extension components to be loaded. The defaults can be can be changed by menu selection once LB is running.

H.3 LB Menu

LB is menu driven. The menu fields are navigated by using the arrow keys. The current selection is denoted by a highlight and can be changed or invoked by type <ENTER>



The descriptions of LB menu fields follow

H.3.1 VGA BIOS, Adastra BIOS, System BIOS

Allows a component to be specified for update. The selected component images are read into an Update Buffer, which contains the new BIOS image.

Invoking any one of these fields causes a second menu, a list of BIOS image files, to be activated. The fields of this menu are the file names and descriptions listed in the list file BIOS.LST. A file can be selected by highlighting it and typing <ENTER>. If the selected file contains the component of the required by the main menu selection (VGA, Adastra Extension, or System) the component is read into the Update Buffer.

H.3.2 Load All BIOS Components

A short cut which will cause all components to be updated from a single file. The file should contain all components. LB will issue error messages for missing components.

H.3.3 Clear All BIOS Components

Sets all components to “No update”.

H.3.4. Save Old BIOS

Copies the contents of the BIOS memory device into the file BIOS.OLD. This can be used to preserve a working BIOS prior to loading a new one.

H.3.4. Save New BIOS

Copies the contents of the BIOS Update Buffer into the file BIOS.NEW. This can be used to preserve a new BIOS prior to loading.

H.3.5 Update BIOS Now

Causes the Update Buffer to be transferred to the BIOS device. Only those components selected are updated.

H.3.6 Exit

Exit from LB without updating.

H.4 BIOS Image File List

BIOS.LST lists all component image files which LB can use. Files can be added to the list if done with care.

Each image file in is described in BIOS.LST by two lines of text. The first line is the actual file name (with path information) of the image file. The second line includes a description of the file. This description starts with three characters which denote what components are included in the file: 'V" signifies VGA BIOS component; 'E' signifies Adastra Extension BIOS; and 'S' signifies System BIOS. If a component is absent, a '*' is used. For example, "V**" describes a VGA only component, and "VES" describes an image which contains all components. The rest of the description is displayed by LB when component files are listed for selection.

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP