



ARNET®

PortsPLUS™

EXPANSION BOARD USER'S MANUAL

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June **1993**

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Nashville, TN 37211

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Radio Frequency Interference (RFI)

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

This equipment has been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when operated in a residential environment. However, there is no guarantee that interference will not occur in a particular installation,

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient or relocate the receiving antenna;
- increase the separation between the equipment and the receiver;
- connect the equipment to an outlet on a different circuit from that to which the receiver is connected; or
- consult the dealer or an experienced radio/TV technician for help.

FCC ID **FJS46W31534**

Modifications

Changes or modifications to this equipment not expressly approved by Arnet Corporation may void the user's authority to operate this equipment.

Cables

Shielded cables must be used to remain in compliance with FCC Class B.

Canadian DOC Notice

This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

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SECTION ONE

Introduction

The PortsPLUS serial expansion board is a two-port intelligent I/O communications board designed to relieve your host CPU of processing overhead and alleviate the I/O bottlenecks caused by the limited performance of standard COM1 and COM2 serial ports. PortsPLUS installs in any ISA computer. With support for data rates up to 115.2 Kb/second, PortsPLUS allows you to take full advantage of high-speed modem communications; creates efficient RS-232 Local Area Networks; and easily supports data-intensive PC-to-peripheral connections.

PortsPLUS provides certified driver support for most popular operating systems. This includes MS-DOS 5.0, Microsoft® Windows™ 3.1, Windows for Workgroups, Windows NT, and OS/2, as well as Novell® Netware™.

An onboard Intel 80186 processor and 64KB of dual-ported RAM allow the PortsPLUS board to handle serial communications efficiently and without errors, leaving more time for the system processor to run applications.

The PortsPLUS boards dual-ported RAM is mapped into an unused area of system memory. If the system has limited free memory space, PortsPLUS can be configured so that the 64KB block of dual-ported RAM may be accessed through an 8KB window.

PortsPLUS includes SurgeBlock™, which is designed to protect both the board and the host computer against damage from transient voltage surges entering through the data lines.

Appendix D contains a list of the major features and specifications of the PortsPLUS board.

Protecting Your Equipment and Data

Electrical Surge and Power Protection

Lightning, electrical surges, and power fluctuations can damage your equipment and/or data through the power lines and/or the serial data lines. When electrical storms occur, the most effective method of protecting your computer system is to unplug your computer and peripherals, and disconnect all data and telephone lines.

To protect against lightning, electrical surges, and power fluctuations, Arnet recommends uninterruptible power supplies (UPS), power line filters, and surge protectors for every installation.

A UPS can provide protection from electrical surges and fluctuations in the power supplied to the computer. However, it does little good to protect the main console if you have no protection on the other devices attached to the system. Power Line filters protect against electrical surges and transient spikes. Some filters even have a shutdown feature that drops power to the device if voltage drops below a preset level. This prevents the spikes and surges caused by the typical “off and on” electrical problems that occur during a thunderstorm. AC line filters should be used with all electrical devices connected to a computer system, no matter how small or simple.

The serial cables themselves present another potential danger. Nearby lightning strikes can induce high-voltage surges into RS-232 cables. Machinery, especially commercial machines with electric motors, often generates electrical noise that can be picked up by serial cables and cause data errors or equipment damage. Arnet includes SurgeBlock™ on every PortsPLUS. SurgeBlock clips fast-rising peak voltages to help protect against spikes over twenty-five volts caused by lightning, static, or induced voltage. For maximum protection we recommend surge suppressors on the peripheral end of all serial cables.

Cables running long distances and/or through electrically noisy areas are subject to noise pickup that can cause data errors or equipment damage. To minimize this danger, we recommend low capacitance shielded cable for all RS-232 connections.

Destructive power surges can also enter through modems via telephone connections. Filters made specifically for this purpose should be included on all telephone line connections.

Grounding Techniques

Many terminals and computers are dependent on earth ground to set a reference for signal ground. Improper grounding or differences in ground potential between your computer and terminals can damage your equipment or even create a safety hazard. Consequently, you should make sure that every component in your system is properly grounded.

Connect your computer and all terminals and other peripherals to three-pronged grounded receptacles, making sure that the receptacles are wired properly. If you must use three-prong to two-prong adapters, make sure that the adapter ground tabs are properly grounded.

The shell (chassis ground) of the RS-232 data connector of your peripheral is connected to the device frame or to earth ground. When you connect the data cable, make sure that the cable shield is tied to the connector shell on the peripheral side.

A proper chassis ground guarantees that no dangerous voltages exist on terminal frames. Proper grounding also helps cancel noise that can otherwise be induced on the frame or equipment.

Local electrical codes may also dictate special grounding arrangements. Your electrician can make sure that your installation complies with all applicable codes. If you have any doubt about the integrity of the grounding system in your location, have the system checked by a licensed electrician.

Static Protection

Your computer's case not only houses its family of computer components, but it also protects these sensitive electronic components from stray magnetic (EMI) and electrical (RFI, static) fields.



WARNING

Using proper static control methods is essential whenever you use, move, or open your computer for modifications.

Make sure that you are working in a static-controlled area which includes at least a conductive **benchtop** mat or chair mat that is electrically connected to earth ground. Conductive wrist straps in conjunction with ground cords provide extra protection when handling electronic components. Always store and/or move individual printed circuit boards in a conductive bag. Consult your local electronics or office supply distributor for static control products.

If you would like an overview of grounding and static protection theories and techniques, you can obtain a copy of Federal Information Processing Standards Publication 94: Guideline on *Electrical Power of ADP Installations*. This booklet is available from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161 703/487-4650.

Checking Your Package Contents

After opening the shipping box, check the contents.



WARNING

Leave the board in its protective anti-static bag until installation. When installing or removing boards, always use adequate precautions (such as a grounding strap) to prevent electrostatic damage.

PortsPLUS Contents:

- PortsPLUS board
- Information packet, including
 - User's Manual
 - Driver diskette and manual (when required)
 - Warranty card

Quick Installation Guide

Read this section. If you are an experienced user, this section provides the information necessary to configure and install your PortsPLUS. If you need additional information, read the detailed sections referenced.

**WARNING**

Leave the PortsPLUS in its protective anti-static bag until installation. When installing the board, use adequate precautions (such as a grounding wrist strap that is connected to earth ground) to prevent electrostatic damage.

1. Set the switch on the PortsPLUS board (Section 5).
2. Disconnect the computer's power cord from the power source and remove the computer cover.

**NOTE**

*Before installing the PortsPLUS, locate the assembly number on the board. Record the number in the **space** provided below. You may need this number to perform diagnostics.*

PortsPLUS board assembly number _____

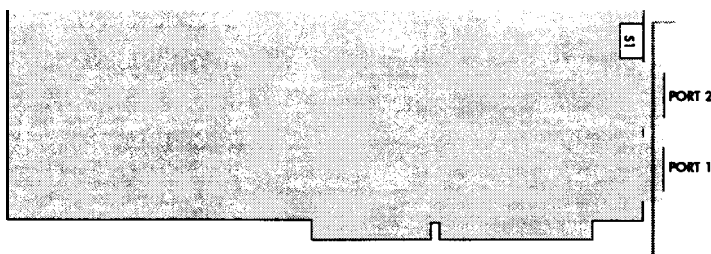
3. Install the PortsPLUS board in your computer (Section 6).
4. Replace the computer cover and reconnect the power cord.
5. Connect the peripherals to the PortsPLUS board (Section 7).

Setting the **PortsPLUS** Switch

Before installing the PortsPLUS board in your system, set the multi-segment switch. (**S1**). The location of the switch is shown in Figure 1.

S1 selects the starting address of the block of 16 I/O locations used by PortsPLUS.

Figure 1, PortsPLUS switch and port connector locations



Proper Switch Settings

Set S1 to select the starting I/O address which PortsPLUS will use. Appendix A shows all possible settings for this switch. If you don't know which I/O locations are available in your system, set the switch to select 320H. This is a good starting point if the PortsPLUS is the only Arnet board installed. (If there are two or more Arnet boards in your system, each must have its own unique I/O address.)

NOTE

If several boards are already installed in your system, you can avoid time-consuming trial and error by determining which addresses are free before attempting to install the PortsPLUS board.

NOTE

Jumper J1 is factory set to connect the top and middle pins together. Do not change the position of this jumper.

Installing the **PortsPLUS** Board

When you have set the switch, install the PortsPLUS board in one of the 16-bit expansion slots of your computer.



*Turn off power to your computer and disconnect the power cord. Inserting a board into the system **with** power applied could damage the system, the board, or both. Such abuse will void your warranty.*

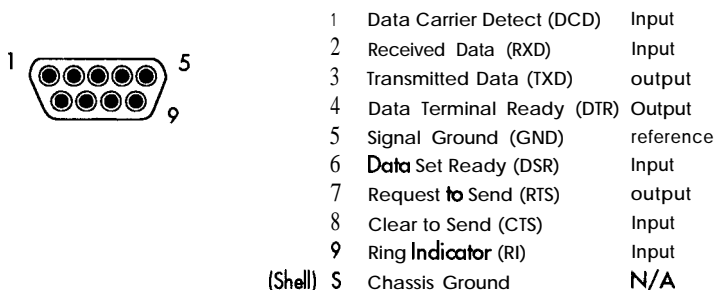
1. Remove the cover of the computer (see computer manufacturer's instructions).
2. Determine which 16-bit slot your PortsPLUS board will occupy. Remove the hold-down screw at the top of the blank card bracket of the slot and remove the blank card bracket. The blank card bracket will not be reused.
3. Insert the PortsPLUS board into the mating motherboard socket. Push the board firmly into place.
4. Secure the board by replacing the board hold-down screw that was removed in Step 2 and replace the computer cover.
5. Connect peripherals as described in Section 7.

Connecting Peripherals

PortsPLUS Interface

PortsPLUS provides an EIA RS-232C interface. Each port has one DB-9 male connector for attaching a peripheral device; the ports are configured as DTE (Data Terminal Equipment). Data transmission and reception is in serial form. Figure 2 shows the PortsPLUS port assignments and the pin assignments for the board mounted connectors.

Figure 2, PortsPLUS DB-9 male connector and connector pin assignments



We recommend shielded cables (30 pF or less capacitance per foot) for all installations. The FCC requires the use of shielded cable for control of emissions with PortsPLUS. In addition, cables that run long distances or through electrically noisy areas are subject to voltage surges that can cause data errors or equipment damage.

**NOTE**

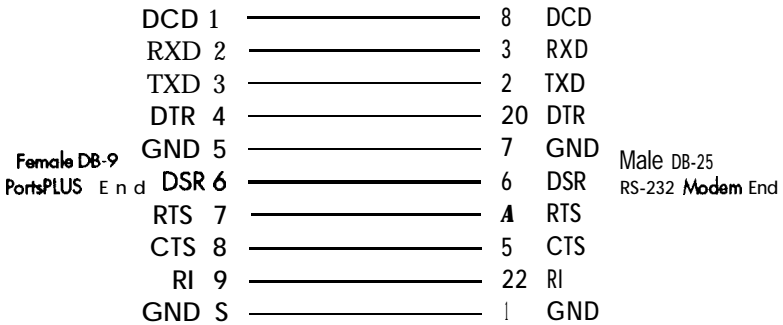
*When routing your cables, do not run them **parallel** to AC wiring or on top of fluorescent light ballasts. Bundling several RS-232 cables together is acceptable.*

RS-232 specifies a maximum cable length of 50 feet. If you run cables farther than 50 feet, you increase the risk of surge damage. This type of damage is NOT covered by warranty.

Cabling for Modems

You can connect the PortsPLUS port connectors to RS-232 asynchronous modems with standard PC modem cables, available at most computer dealers. The wiring of these cables is shown below.

Figure 3, Modem cable wiring: DB-9 female to DB-25 male



Cabling for Other DTE Devices

To connect the PortsPLUS port connectors to other DTE devices (terminals, serial printers, or other computers' serial ports, for example) you will need a null-modem cable. These cables are available from most computer dealers. The wiring of two common types of null-modem cables is shown on the following page.



NOTE

The diagrams shown include all of the signals which PortsPLUS supports. Cables for your application may require some or all of these signals. Refer to your peripheral device user's manual for details.

Figure 4, Null-modem cable wiring: DB-9 female to DB-9 male

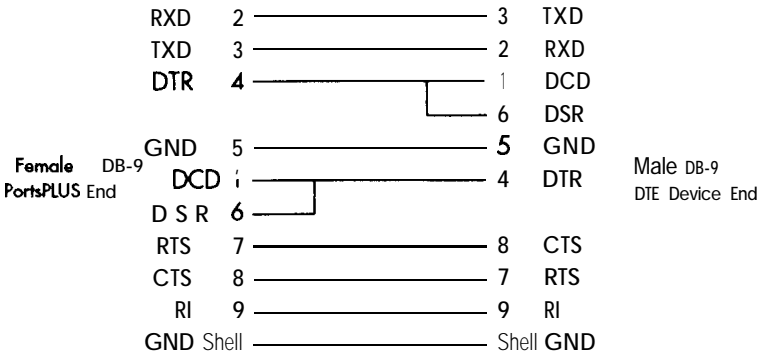
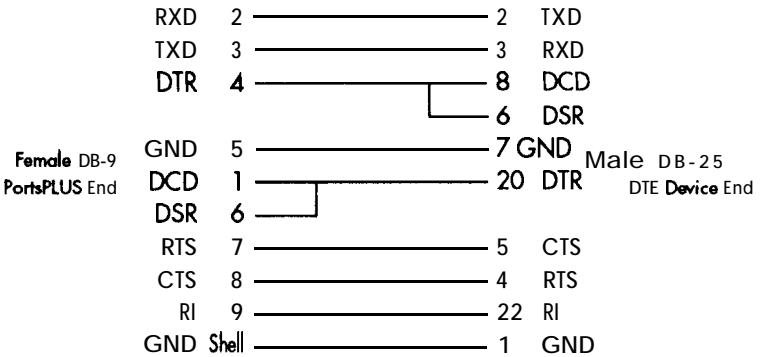


Figure 5, Null-modem cable wiring: DB-9 female to DB-25 male



In Case of Trouble



WARNING

*Make sure your computer is turned off before installing or removing board&. Your computer must **also** be off to change switch settings on the boards. When installing or removing **boards**, always use adequate precautions (*such as a grounding strap*) to prevent electrostatic damage.*

The symptoms of particular problems may vary between operating systems. Several common problems are listed below.

Address/Interrupt Conflicts

All devices in your system must have unique addresses that do not overlap. The memory location you select during the driver configuration must be outside the caching memory range. If you think you have a conflict problem, try the alternate settings listed for your operating system. See Appendix B, *Selecting Memory Addresses and Interrupts*, for further information.

Inconsistent Baud Rate

The baud rate and other RS-232 parameters chosen via the operating system and/or driver setup must be the same for the PortsPLUS and the peripherals connected to it.

No Handshaking Signals

Some peripheral devices may need some or all of the handshaking (control) signals that PortsPLUS supports.

Improper Grounding

Make sure that every component in your system is properly grounded. Differences in ground potential between your computer and terminals can damage equipment.

If your board fails the diagnostics or you are unable to isolate the problem, call Arnet Technical Support (800-366-8844) between 8 a.m. and 7 p.m. Central Time (Monday through Friday). We can give you suggestions for things to try. Please have the following information ready when you call:

Fill in information here

- Computer make _____
- Computer model number _____
- Operating system _____
- Which Arnet board you are using _____
 Serial number _____
 Revision number _____
- Type of hard drive in your system _____
- Type of video card in your system _____
- Type of tape backup in your system _____
- Failure symptoms _____
- Results of diagnostics _____
- Whether the board has worked before
 (was it installed successfully?) _____
- Dealer/store where you purchased
 your Arnet board _____

If You Have to Return a Board

Sometimes our boards do have problems and have to be returned for service. In this case, you'll need to call us for an RMA number. You must have an RMA number to return a board to Arnet. The RMA number must appear on the outside of the package. Before calling for the number, make sure you can answer the following questions:

1. Where did you buy your board? If you bought from a dealer, you should go through the dealer to return the board. If you bought it from **Arnet**, you can deal directly with us for repair.
2. What is your boards serial number and revision level number?
3. Have you followed the checklist at the beginning of this section and tried all of the steps? We've found that these procedures eliminate most problems encountered during installation.
4. Have you contacted the dealer from whom you originally purchased the board for his advice and assistance?

Your **Arnet** board is one of the most reliable parts of your multiuser system. We back this product with the **Arnet Full Lifetime Warranty**. (Refer to Appendix C.) As a matter of fact, if you purchase a board from us and it doesn't work in your application, or if you decide not to keep it for any reason during the first 30 days, we will refund your money. But remember, we're here to help in any case-because our ultimate goal is to keep your system up and running, and to keep you a satisfied customer.

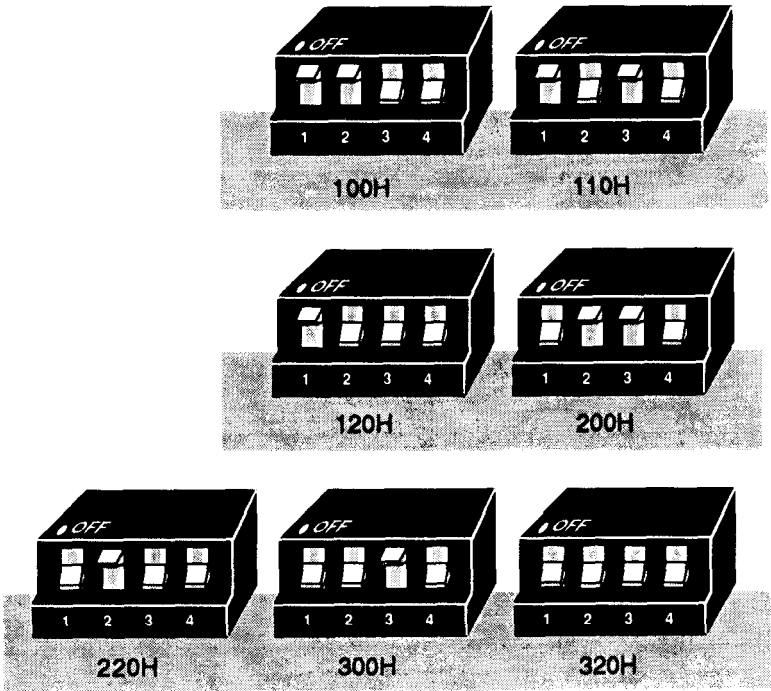
Switch Settings for **S1** , I/O Address



All the I/O addresses mentioned in this manual are in hexadecimal format. Hex numbers are noted by the letter "H" following the number, e.g., 20H.

S1 selects the I/O address.

I/O Address Switch Settings



Selecting Memory Addresses and Interrupts

The Arnet PortsPLUS board requires at least 8K bytes of unused memory address space in your system. If the system has 16 MB or more of RAM, the address you select must be under 1 MB (except with certain EISA computers; see the next page). However, some operating systems and/or drivers allow placing the board anywhere within the address range of the computer.

When you install the device driver for PortsPLUS, you will be asked to specify both the memory window location and its size (8KB or 64KB). There is no difference in performance between using an 8KB and a 64KB window. On DOS-based systems, in which the board must be mapped into the first megabyte, it can be much easier to place the board if you choose the 8KB option.

All addresses mentioned in this appendix are in hexadecimal notation.

Memory Addresses Under 1 MB

The most commonly available memory address below 1 MB is D0000. Before choosing this address, though, check for **conflicts** with other adapter cards such as SCSI or ESDI controllers or Ethernet cards.

If your system uses a monochrome graphics (MGA) display, addresses A0000 and C0000 should be available. MGA adapter cards (but not monochrome VGA) reserve only the space between B0000 and BFFFF.

Monochrome VGA adapters use the memory space between A0000 and C7FFF. If the VGA controller is built into the motherboard, C0000 through C7FFF may be available.



NOTE

Some 8-bit boards, such as VGA or EGA controllers, may occupy the same 128KB memory region as PortsPLUS. To avoid memory contention in this case, you must choose to disable the PortsPLUS memory except when it is in use. See the PortsPLUS driver manual for more information.

SCSI, ESDI, and some caching IDE controllers use a 16KB segment somewhere in the C0000 through DFFFF range. The most commonly used location is C8000, but they may also appear at other locations such as D8000 or DC000. Non-caching IDE controllers typically reserve no address space. Ethernet cards require 16KB, most commonly at D0000.

Some systems may have yet other options for placing the PortsPLUS board. Certain models of Dell computers, for example, have space available at E0000. Or, if your computer has only 512KB of base memory instead of the usual 640KB, you may be able to use addresses between 80000 and 9FFFF.

Your computer may have other restrictions on placement of expansion boards. For instance, some Hewlett-Packard Vectra models cache all memory below 1MB; to install a PortsPLUS board below 1 MB in these systems, you must disable caching. Refer to your computer user's manual if you have any questions about unusual memory restrictions.

Other Available Memory Addresses

Your system may provide tools that will help you locate unused segments of memory. Look for address options in the system setup screen (CMOS settings) for ISA systems, the EISA configuration utility for EISA systems, or the reference disk utility for Micro Channel systems.

Some systems allow disabling sections of physical RAM, such as a portion of upper memory (e.g., F00000) or the upper 128KB of base memory (from 512K to 640K).

Identifying Memory Conflicts

If the memory address you choose for the PortsPLUS board conflicts with another system component, the system will likely not recognize the board. In this case choose a different memory address through the driver configuration program. If you have tried several memory options which you know are valid and none will work, you may have a problem with the PortsPLUS board.

Interrupt Selection

Depending on which operating system you use, you may need to assign an interrupt line (IRQ) to the PortsPLUS board. You can choose to use any of seven interrupts (see Appendix D, *Features and Specifications*) or to disable interrupts.

Drivers for PortsPLUS which require interrupts will include a selection screen for choosing the interrupt. The driver programs the board for the appropriate interrupt line; there are no switches on the board for interrupt selection.

If you choose an IRQ for the PortsPLUS board, it must be unique; no other system device may use that same interrupt. Certain commonly-used system devices have an IRQ assigned to them, including the following:

- IRQ3 - standard serial ports COM2 and COM4;
- IRQ5 - secondary parallel printer port;
- IRQ7 - primary parallel printer port.

If your system includes any of these devices, the PortsPLUS board can not use the corresponding IRQ. Many other types of expansion boards also use interrupts. Check the documentation for any boards installed in your system to determine which, if any, interrupts they may be using.

Arnet Full lifetime Warranty

I. **Length of Warranty:**

The Arnet Full Lifetime Warranty extends to the original purchaser of the product as well as all subsequent owners. The warranty is a full lifetime warranty that is in existence for the life of the computer equipment in which the Arnet product is originally installed, except for the external power supply, which receives the manufacturer's warranty.

II. **What The Warranty Will Cover:**

Any and all defects, malfunctions, or failures of the Arnet product, including electrical and mechanical components that fail, defects in software supplied with the boards, and any and all defects in material or workmanship.

III. **What The Warranty Will Not Cover:**

Defects, malfunctions or failure of any warranted product if caused by damage (not resulting from a defect or malfunction of product) while in the consumer's possession or caused by an unreasonable use of the product. Such causes may include:

- (A) Damage by acts of God (such as flood, fire, etc.); damage caused by other external forces such as power line disturbances, host computer malfunction, plugging the board in under power, or incorrect cabling, and damage caused by misuse, abuse, or otherwise failing to follow instructions"
- (B) Modification of any type without authorization from the Arnet Customer Support Department.
- (C) Use with unapproved operating system software or computers. A list of approved operating systems and hardware can be obtained from the Arnet Customer Support Department.
- (D) Use in research and development of new software products.
- (E) Installation in a computer different from the unit in which it was originally installed.

IV. What Arnet Will Do Under Warranty Claims:

In the event of a defect, malfunction, or failure to perform to written specifications, **Arnet** at its option will repair, replace, or refund the original purchase price of the item. If a product still fails after a reasonable number of attempts to remedy the defect or malfunction, you may elect for a full refund of your purchase price. Generally, boards are repaired or replaced within two working days of receipt by the factory. For customers in the U.S., **Arnet** will pay shipping charges to return repaired or replacement boards via UPS ground. For customers in other countries, **Arnet** will pay for return shipping by standard air carrier. If you want repaired or replacement boards shipped by some other method, you must pay the shipping charges. A service fee will be charged for testing any board found by **Arnet** not to be defective, malfunctioning, or failed, or if the board has been damaged under the terms of Paragraph III.

V. What To Do In The Event Of A Claim:

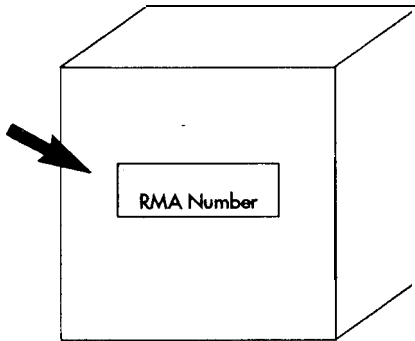
First, contact the dealer from whom you originally purchased the board for his advice and assistance. **Arnet** dealers are authorized to perform warranty obligations. If you bought the product directly from **Arnet**, call **Arnet** Customer Support for an RMA number. Then send the unit postage paid to the following address:

Attention: Customer Support Department
Arnet Corporation
618 Grassmere Park Drive
Nashville, TN 37211
Telephone: (800) 366-8844; (615) 834-8000.

Include the following information with the return:

- Your name and address
- Daytime telephone number
- A written explanation of the defect(s) and the circumstances under which it arose.

**THE RMA NUMBER MUST
APPEAR ON THE OUTSIDE
OF THE PACKAGE.**



VI. Disclaimer:

Arnet's remedies and obligations are only to repair, replace, or refund the purchase price of the Arnet product. Arnet disclaims and shall not be liable for any incidental or consequential damages in connection with any Warranty claim and/or product defect or malfunction. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations for exclusion may not apply to you. This Warranty gives you specific legal rights and you may also have rights that vary from state to state.

Features and Specifications

Features

- Onboard Intel 80186 8MHz processor
- Two RS-232 serial ports (DB-9 connectors)
- Line speeds to 115.2Kb/second
- Supports RS-232 synchronous modems
- 64KB onboard shared memory
- Software configurable with switch selectable I/O address
- Tri-state memory and IRQ logic (multiple boards share same memory address and IRQ line)
- 16 bit ISA bus
- SurgeBlock onboard surge protection on all signal lines
- Full Lifetime Warranty

Specifications

Processor:	Intel 80186 8MHz
Memory:	64KB Dual-Ported RAM (&i-stated)
Shared Memory Window:	8-64KB (size selectable at driver installation)
Serial Ports:	2
Port Type:	RS-232 Serial
Port Signals Supported:	TXD, RXD, RTS, CTS, DSR, DCD, RI, DTR, Signal ground
Connectors:	DB-9 Male (PC Standard)
USART:	Zilog 8530 SCC or equivalent
Baud Rate:	Up to 115.2 KB/second on both ports
Bus Interface:	16-bit ISA
I/O Address:	Switch selectable
PC Interrupts:	IRQ 3, 5, 7, 10, 11, 12, 15 (selectable at driver installation)
Dimensions:	9.8"l x 4.2"w
Power Requirements:	1A @ 5 VDC 0.8A @ +12 VDC 0.5A @ -12 VDC
Operating Temperature:	10-55" c
Relative Humidity:	5-90%, noncondensing
Certifications:	FCC Class B, VDE Class B, CSA, UL
SurgeBlock:	Yes
Warranty:	Full Lifetime