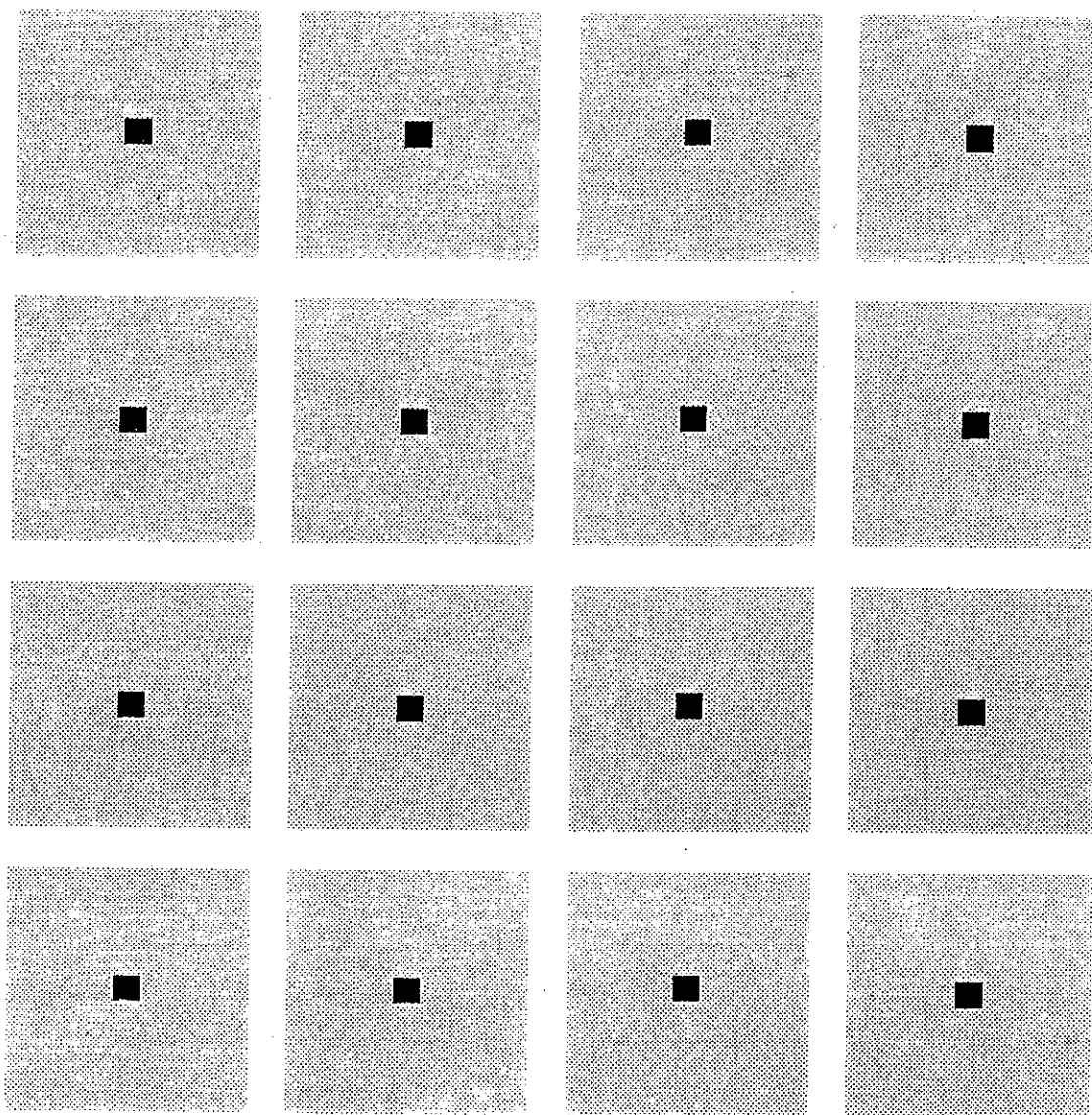

GRiDCASE 1500 Series Ethernet Cartridge Owner's Guide



**GRiDCase 1500 Series
Ethernet Cartridge
Owner's Guide**

March 1989

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WARNING: This expansion cartridge generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference with radio and television reception. This cartridge has been tested and complies with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case you, at your own expense, are required to take whatever measures are necessary to correct the interference (FCC, Part 15.818a).

The section DEALING WITH RADIO FREQUENCY INTERFERENCE, in Chapter 7, of the GRIDCASE 1500 Series Owner's Guide (Order Number 1500-40) describes some procedures that may correct the interference.

If necessary, consult the GRiD Resource Center or an experienced radio/television technician for additional suggestions. You may find helpful the FCC booklet *How to Identify and Resolve Radio-TV Interference Problems*. This booklet (Stock No. 004-000-00345-4) is available from the United States Government Printing Office, Washington, DC 20402.

Canadian Department of Communications (CDC) Statement

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

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ABOUT THIS BOOK

This manual introduces you to the GRiDCASE 1500 Series Ethernet Network Expansion Cartridge. The Ethernet cartridge supports GRiDCASE 1500 Series computer system operation with a data-link-level interface to a standard Ethernet network. The interface is used with network communications programs to communicate with other computers and devices that use the same communications protocol. This manual provides the cartridge description and operating characteristics, operation guidelines, and procedures for installing and testing.

A postage paid Customer Response Card is provided at the end of this manual. Owners and users are encouraged to use the card to comment on the usefulness and readability of the manual.

Books You May Need

You may want to refer to the following books for further information while using the GRiDCASE 1500 Series Ethernet cartridge.

GRiDCASE 1500 Series Owner's Guide (Order Number: 001500-40). Provides reference information on setting up and operating your GRiDCASE 1500 Series computer system.

MS-DOS Reference for GRiDCASE Users, Version 3.21, Release D (Order Number: 029515-40). Provides reference information on using MS-DOS on GRiDCASE 1500 Series computer systems.

CHAPTER 1: INTRODUCTION

The GRiDCASE 1500 Series Ethernet Network Expansion Cartridge provides your GRiDCASE 1500 Series computer system with a data-link-level interface (layer 2 of the OSI/ISO model) to a standard Ethernet network. The Ethernet cartridge is used with network communications programs to communicate with other computers and devices that use a standard communications protocol.

The Ethernet cartridge is designed to comply with the IEEE 802.3 10BASE5 (Ethernet) standard, and is mechanically, electrically, and architecturally compatible with other devices that comply with the same standard.

CHECKING THE CONTENTS OF THE BOX

Figure 1-1 shows the assemblies that are included in the shipping carton for the Ethernet cartridge.

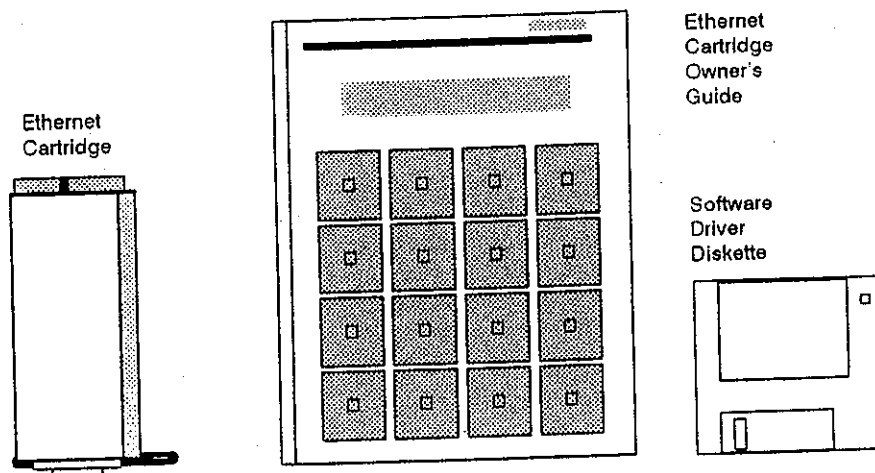


Figure 1-1. Contents of the Box.

Initial Inspection

Check the shipping carton for damage and for any missing components. If any equipment is missing or damaged, immediately contact the GRiD Resource Center at (415) 656 2100. The GRiD Resource Center (GRC) is open Monday through Friday from 6:00 AM to 5:00 PM Pacific Time. The address for the GRC is the same as the address given on the inside cover of this manual.

Keep the shipping carton and original packing materials in case you should ever need to return your cartridge to GRiD Systems for service. Do not return your cartridge to GRiD Systems unless you have received prior authorization from the GRC or your GRiD Systems representative.

Other Equipment You May Need

The Ethernet cartridge is shipped ready to install in a GRIDCASE 1500 Series computer. However, to connect the cartridge to an Ethernet network, you will require the following additional equipment:

1. An External ac-coupled Ethernet Network Transceiver.
2. An Ethernet Transceiver Cable.
3. A software driver to interface the cartridge to your network.

NOTE: A transceiver (Model 34150) with a BNC connector for thin Ethernet networks and a 3-meter transceiver cable (Model 6430) are available through GRiD Systems.

When your transceiver is connected in a Thin (RG-58 coaxial cable) Ethernet network, you may also require the following components:

1. A BNC T-connector to attach the transceiver to the network.
2. A 50-ohm BNC terminator to attach to the T-connector when your transceiver is the first or last transceiver on the network.

DESCRIPTION

The GRiDCASE 1500 Series Ethernet Network Expansion cartridge consists of two circuit boards contained in a metal enclosure (extrusion). The extrusion has the same form factor as the GRiDCASE battery pack, and is designed to be installed in the battery pack slot on the back of the computer. One end of the cartridge has two connectors that mate with the expansion bus connectors inside the battery pack slot. The other end of the cartridge has a single 15-pin, D-type connector that mates with the transceiver cable.

The following components are contained on the two Ethernet circuit boards:

- LAN Coprocessor
- 16k RAM Memory
- Command and Status registers
- Ethernet Address PROM
- Configuration jumpers

The following paragraphs briefly describe each component.

LAN Coprocessor

The Intel 82586 LAN Coprocessor supports the GRiDCASE computer interface to the external network. The LAN coprocessor is a Local Area Network communication controller that provides the following operations:

- Implements all of the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) operations required for transmitting and receiving data over the network.
- Processes the data-link-level data packets (prepares data for transmission) and transmits the data onto the network.

- Receives data from the network, checks the data for transmission errors, places the received data into the Ethernet cartridge memory, and notifies your GRIDCASE computer that the data has arrived.

RAM Memory

The Ethernet cartridge contains 16k bytes of dual-ported RAM memory. One port is used by the LAN Coprocessor and the other port is used by your GRIDCASE computer. Accessing the memory through separate ports allows the computer and LAN coprocessor to operate independently, which accelerates the movement of data to and from the network.

Command and Status Registers

The Ethernet cartridge has eight command and status registers. These registers are used by the computer to send instructions to the Ethernet cartridge and to receive status information from the cartridge.

Ethernet Address PROM

The Ethernet cartridge provides a PROM device that contains a unique Ethernet address assigned to your cartridge. Since no two devices connected to a network can have the same Ethernet address, this 48-bit address uniquely identifies the Ethernet cartridge on the network. Network application programs running on other computers need to know this address in order to communicate with your GRIDCASE computer through the Ethernet cartridge.

Configuration Jumpers

The Ethernet cartridge contains reconfigurable jumpers that are used to set the operating parameters of the cartridge. These jumpers have been set at the factory to provide default values for most configurations. The parameters that can be changed via the jumpers and their default values (in hexadecimal) are given in the following list:

Parameter	Default Value	Other Selectable Values
Interrupt Request Level	IRQ2	IRQ3, IRQ4, IRQ5, IRQ7
I/O Base Address	360	200 thru 3F8
Memory Base Address	C0000	C4000, C8000, CC000, D0000, D4000, D8000, DC000
Memory Capacity	16k Bytes	8k Bytes

It is seldom necessary to change the default values. The only circumstances where you may need to change the default values are as follows:

1. Your GRiDCASE computer system is a Model 1535 EXP. This computer model has an expansion chassis that accepts plug-in boards, and the plug-in board values may conflict with the default values listed for the Ethernet cartridge.
2. The software you are planning to use requires specific values that are different than the default values listed for the Ethernet cartridge.

If either of the previous circumstances should occur, and the best course of action is to change the Ethernet cartridge jumpers, refer to Appendix A for the proper procedure.

NOTE: Generally, the GRiDCASE 1500 Series computers allow installation of only one Ethernet interface via the expansion cartridge. Any reference to more than one Ethernet interface applies to the Model 1535 EXP computer only.

SPECIFICATIONS

The Ethernet cartridge operates within the guidelines of the Standard Ethernet/IEEE 802.3 10BASE5 Specification as listed in Table 1-1.

Table 1-1. Ethernet Cartridge Specifications

Characteristic	Description
Standard Ethernet Specifications	
Compatibility:	Ethernet Specification V2.0 and IEEE 802.3
Data Transmission Rate:	10M bps
Coaxial Cable Segment Length Standard (Thick):	500 meters (1640 feet) maximum
Thin:	185 meters (610 feet) maximum
Cable Segments per Network:	5
Coaxial Cable Length Between Two Stations Thick:	1500 meters (4920 feet) max
Thin	925 meters (3052 feet)
Maximum:	0.5 meters (1.5 feet)
Minimum:	0.5 meters (1.5 feet)
Distance between an Ethernet cartridge and its Transceiver Maximum:	50 meters (165 feet)
Number of Transceivers Thick Cable Segment:	100 maximum
Thin Cable Segment:	30 maximum
Repeaters Between Two Stations Ethernet:	2 maximum
IEEE 802.3:	4 maximum
Stations on a Network: Thick:	1024 maximum
Thin:	150 maximum

Table 1-1. Ethernet Cartridge Specifications (Continued)

Characteristic	Description
Transceiver Interface Specifications	
Compatibility:	Ethernet specification V2.0 and IEEE 802.3
Common Mode	
Minimum Output Voltage:	1.0
Maximum Output Voltage:	4.5
Differential Load:	78 ohms
Pulldown:	120 ohms
Receive and Collision	
Input Voltage:	2.5 to 4.0
Collision Input:	10 MHz +/-15%
Differential Output Swing	
Minimum Voltage:	0.55
Maximum Voltage:	1.20
Differential Load:	78 ohms
Pulldown:	120 ohms
Input Withstand Voltage:	15V
Transceiver Power Requirements	
Output Voltage:	13.3 to 14.5 Vdc
Output Current:	.5A maximum
Environmental Specifications	
Operating Temperature:	5-35 degrees Celsius (41-95 degrees Fahrenheit)
Relative Humidity:	20 to 80%, non-condensing

CHAPTER 2: INSTALLATION

The Ethernet cartridge is designed for installation in the power pack slot on the back of the GRiDCASE 1500 Series computer. The power pack slot contains two connectors; one is a 40-pin connector and other is a 60-pin connector. The two connectors provide the interface to the internal bus of the computer. Once it is properly connected, the Ethernet cartridge interfaces to the computer like any other peripheral device. The Ethernet cartridge connects to an Ethernet network through an external network transceiver.

PREPARING YOUR COMPUTER FOR CARTRIDGE INSTALLATION

A rear view of a GRiDCASE 1500 Series computer is provided in Figure 2-1.

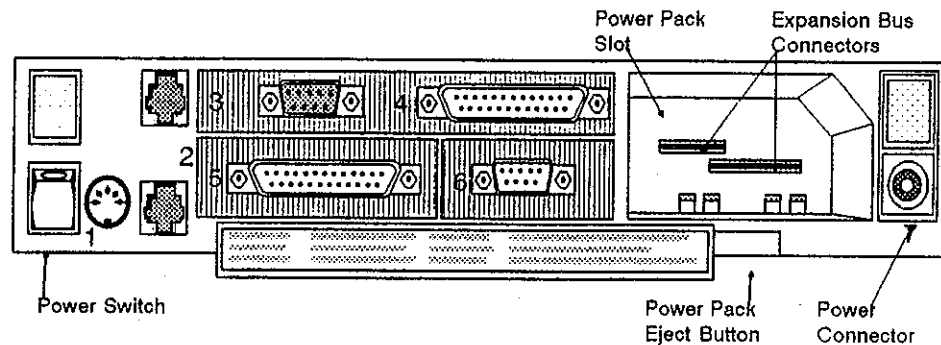


Figure 2-1. GRiDCASE 1500 Series Computer, Rear View

The Power Pack slot on the back panel of the computer is designed to accommodate one of following three devices:

1. GRiDCASE Battery Pack
2. GRiDCASE Internal/External Power Pack
3. GRiDCASE 1500 Series Expansion Cartridge

To prepare the computer for installation of the Ethernet cartridge, proceed as follows:

1. Set the computer power switch to OFF.

CAUTION

The GRiDCASE 1500 Series computer power switch must be turned OFF before removing a cartridge. Failure to do so may result in damage to the computer and the cartridge. The cartridge is designed to disconnect the power cable as the cartridge is being removed, but do not rely on this feature alone to protect your equipment.

2. Disconnect any power source connected to the computer. It is not necessary to disconnect cables from connectors 1 through 6. However, any cable connected to an expansion cartridge should be removed.

NOTE: Perform step 3 or 4 as required.

3. Remove any internal battery pack or power pack by pushing in on the power pack eject button until the pack pops loose. See Figure 2-1 for the location of the power pack eject button. When the pack is loose, it can be easily taken out of the slot and set to one side.
4. Remove any expansion cartridge by pulling straight out on its ejector knob until the cartridge is released from the connectors. See Figure 2-2 for the location of the ejector knob. **Do not twist or bend the ejector knob shaft. The power pack eject button is not used.** When the cartridge is loose, it can be easily taken out of the slot and set to one side.

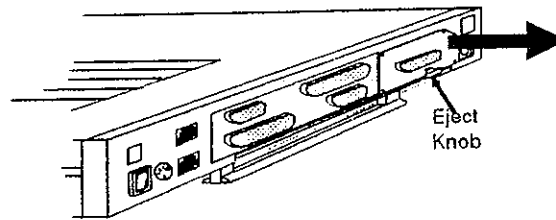


Figure 2-2. Ethernet Cartridge Eject Knob Location

INSTALLING THE ETHERNET CARTRIDGE

To install the Ethernet cartridge in a GRIDCASE 1500 Series computer, proceed as follows:

1. Verify that the computer power switch is OFF (Figure 2-1).
2. Ensure that the computer power pack slot is empty. If the slot is not empty, perform the previous procedure to prepare the computer for cartridge installation.
3. Compare the ends of the Ethernet cartridge to Figure 2-3. The inside end goes inside the computer and has two bus connectors. There is one 40-pin and one 60-pin bus connector that mate with connectors inside the power pack slot. The outside end of the cartridge has one 15-pin D-type connector. The 15-pin connector mates with a cable that is connected to an external Ethernet transceiver.
4. Insert the inside end of the Ethernet cartridge into the computer power pack slot until you feel its connectors resting next to the bus connectors in the slot.
5. Press firmly on the cartridge until it snaps into place and the bus connectors are connected.
6. Connect the Ethernet cartridge to an external transceiver as described in the following procedure.

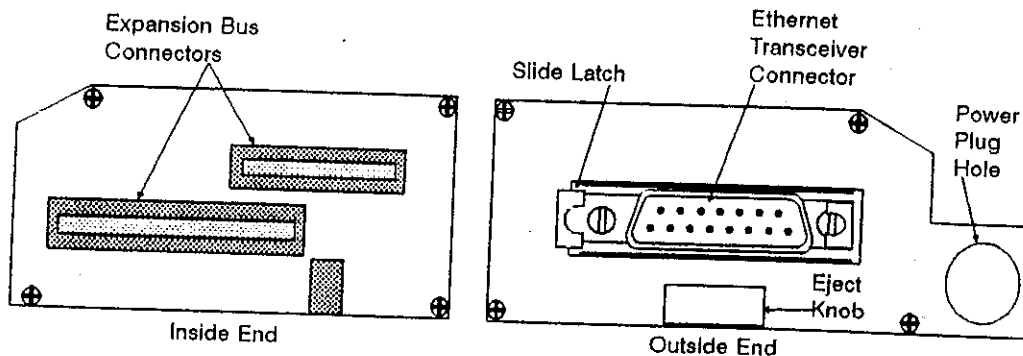


Figure 2-3. Inside and Outside Ends of the Ethernet Cartridge

CONNECTING THE ETHERNET CARTRIDGE TO AN EXTERNAL TRANSCEIVER

The Ethernet cartridge connects through an external Ethernet network transceiver to a standard (thick) or Thin (coaxial cable) network. In either case, the cartridge connects directly to a transceiver and the transceiver is then connected to the appropriate network cable. The Ethernet cartridge does not provide a BNC connector for direct connection to a Thin Ethernet network.

After the cartridge is connected, its diagnostic program can be used to verify that it is correctly configured and installed, and that the network connection is working. The procedure for verifying Ethernet cartridge operation is provided in Chapter 4.

NOTE: This cartridge has been FCC-certified under test conditions which include the use of SHIELDED cables between system components. GRiD-supplied cables are shielded. To reduce the possibility of causing interference to radio, television, and other electronic devices, it is important that you use shielded cables to connect your cartridge to any external device. Telephone cords do not require shielding.

Before Connecting the Ethernet Cartridge to Your Network

You must have the following cables and other components to connect the cartridge to your network:

1. An ac-coupled transceiver, which is installed on the Ethernet network.

The Ethernet cartridge operates correctly only with ac-coupled transceivers that are compatible with the Ethernet V2.0 or IEEE 802.3 specifications. The Ethernet cartridge is not designed for use with dc-coupled transceivers; when the Ethernet cartridge is connected to one it operates erratically, or simply may not operate. If you are uncertain about how the transceiver is coupled, refer to its installation manual or ask your system administrator.

2. A standard Ethernet transceiver cable with a male and female connector. One end of this cable connects to the transceiver and the other end connects to the Ethernet cartridge.

Make sure that the Ethernet transceivers are at least 2.5 meters (8 ft. 3 in.) apart. This minimizes the chance of the transceivers interfering with each other during operation. Approved Ethernet coaxial cable is marked with rings at 2.5-meter intervals.

Both the Ethernet Specification V2.0 and the IEEE 802.3 Specification recommend using a transceiver cable that is not longer than 50 meters (165 ft.).

3. For Thin Ethernet networks, the cables that interconnect the transceivers must be terminated at the first and last transceivers on the network. The termination requires a 50-ohm BNC termination.

Connecting the Ethernet Cartridge to the Transceiver

When the Ethernet transceiver is connected to a network, the cartridge is connected to the transceiver as follows:

1. Connect the female connector end of the transceiver cable to the Ethernet transceiver. Secure the connection to the transceiver with the slide latch on the connector bracket.

2. Attach the transceiver cable male connector to the D-connector of the Ethernet cartridge. Secure the connection with the slide latch.
3. Connect external power to the computer as described in the following procedure.

CONNECTING EXTERNAL POWER

To connect an external power source to the computer, proceed as follows:

1. Verify that the computer power switch is set to OFF.
2. Connect the GRiDCASE Internal/External Power Pack to the computer via its external dc-to-dc cable. The dc-to-dc cable connects to the computer through the power plug hole on the cartridge (Figure 2-3).
3. Connect the power pack power cable to an appropriate ac power source.
4. Proceed to the cartridge operations in Chapter 3.

ETHERNET CARTRIDGE REMOVAL

The following procedure is used to remove the Ethernet cartridge from the GRiDCASE 1500 Series computer and return the computer to its standard configuration.

1. Set the computer power switch to OFF.

CAUTION

The GRiDCASE 1500 Series computer power switch must be turned OFF before removing a cartridge. Failure to do so may result in damage to the computer and the cartridge. The cartridge is designed to disconnect the power cable as the cartridge is being removed, but do not rely on this feature alone to protect your equipment.

2. Disconnect the dc-to-dc cable from the computer power connector (Figure 2-1).
3. Disconnect the transceiver cable from the Ethernet cartridge. Release the slide latch in order to disconnect the cable.
4. Pull straight out on the cartridge ejector knob until the cartridge is released from its inside end connectors. See Figure 2-2 for the location of the ejector knob. **Do not twist or bend the ejector knob shaft. The power pack eject button is not used.** When the cartridge is loose, it can be easily taken out of the slot and set to one side.

CHAPTER 3: OPERATION

This chapter briefly describes how the Ethernet cartridge operates and then provides a procedure to verify proper operation. The installation procedures given in Chapter 2 must be complete before continuing with this chapter.

ETHERNET CARTRIDGE OPERATION

When the Ethernet cartridge is installed in your GRiDCASE 1500 Series computer, the cartridge operates like any other I/O device. To operate, the cartridge requires two types of software as follows:

1. A device driver is required to allow network communications programs to communicate with the cartridge. The software driver diskette supplied with your computer contains drivers for the following Network operating systems:

3COM 3Plus

Novel Netware 2.0/2.1

Sun PC-NFS

Check your disk directory for other drivers that may have been added. If the driver you require is not listed, contact your GRiD Systems representative for additional drivers that are available.

2. A network communications program. When the network communications program is correctly installed and running (refer to the manufacturer's instructions), your computer can transmit and receive data through the Ethernet cartridge.

Transmitting Data

The network communications program running in your computer prepares data for transmission by reconstructing it into Ethernet data packets. Each packet contains a quantity of data, which is transferred to the shared memory in the Ethernet cartridge. Then, the program uses the command and status registers in the cartridge to tell the LAN coprocessor where the data packets are located and how much data is available to transmit. Finally, the coprocessor performs the data-link-level processing for each packet and transfers the packet to the network.

Receiving Data

All of the data packets passing through the network also pass through the transceiver connected to your Ethernet cartridge. To receive data, the LAN coprocessor continually monitors the flow of data packets until it detects your unique Ethernet address. Only the data packets with your unique Ethernet address can be received by your Ethernet cartridge.

When the LAN coprocessor detects a data packet intended for an application program running in your computer, it initiates the following operations:

1. Checks the packet for corrupted data.
2. Stores the packet in shared memory in the cartridge.
3. Uses the command and status registers on the cartridge to determine the location and size of the received data packet.
4. Issues an interrupt to the microprocessor in your computer.
5. Transfers the location and size information to your computer.

The network communications program running in your computer strips away all of the control components of the data packet, leaving only the data. The program then performs one of the two following operations:

1. Reads the data located in the shared memory.
2. Transfers the data from shared memory to a new memory location in the computer main memory.

NETWORK OPERATING SYSTEM CONFIGURATION

Your Ethernet cartridge must be configured via the appropriate device driver to operate with your Network operating system. This software configuration can be accomplished either before or after verifying Ethernet cartridge operation as described in the subsequent paragraphs. However, before you can transmit and receive data over a network, you must configure the Ethernet cartridge for your Network Operating System (NOS) as follows:

1. Use the appropriate GRiD-supplied device driver for your NOS. If GRiD does not supply a device driver for your NOS, use the device driver supplied by your NOS for the Interlan NI5210 Ethernet board. Information on GRiD-supplied device drivers is given on page 3-1.

NOTE: The Ethernet cartridge is electrically similar to the Interlan NI5210 Ethernet board. With most Network Operation Systems, the device driver supplied for the NI5210 Ethernet board is compatible with the Ethernet cartridge. However, the GRiD-supplied device drivers are preferred for some applications since they have been tested with the cartridge.

2. Perform the setup procedures given in your NOS operating manual for configuring an Ethernet interface board.

VERIFYING ETHERNET CARTRIDGE OPERATION

The Ethernet cartridge diagnostic program verifies the correct configuration and installation of an Ethernet cartridge in your computer. You should run this program after you install an Ethernet cartridge, and subsequently if you suspect that there is a problem with the cartridge or the network.

The remainder of this chapter takes you through the basic steps recommended for testing a cartridge. The information that you enter is displayed in **bold** characters. If you need more information, or if you want to run individual tests, refer to Chapter 4.

Setting Up Your Computer

Before you can run the diagnostic program, you must do the following:

1. Determine that the MS-DOS Operating System is running on your computer. MS-DOS must be running before you can run the diagnostic program.
2. Insert the floppy disk containing the diagnostics into a floppy disk drive on your computer.
3. Use the MS-DOS COPY command to copy the following files from the diagnostic diskette to your working directory or a directory that is in the MS-DOS path:

NI5210DG.EXE (the executable diagnostic file)

NI5210DG.HLP (the diagnostic help file)

NI5210DG.FMT (the format file with diagnostic and cartridge parameters)

Starting the Diagnostics

To start the diagnostics, type the following command at the MS-DOS prompt:

```
NI5210DG
```

NOTE: Each command typed in the diagnostic procedures must be followed by depressing the Return key.

If you receive an MS-DOS message telling you that the file cannot be found, you must also specify the drive and/or the directory containing the diagnostic distribution kit files.

Once the file has been found, the Diagnostic Main menu shown in Figure 3-1 appears on your screen.

MICOM-Interlan NI5210 Ethernet Controller Diagnostic		
Main Menu		
A. Run All Tests B. Internal Test C. Network Tests D. Change Parameters E. Read Error Log F. Help ? X. Exit Diagnostic		
Select Function _		
STATUS		
PARAMETERS		
Test Repetition = 10	Boards Installed = 1	I/O Addr. = 360
Max Error Count = 99	Board Under Test = 1	Mem. Ad. = C0000
Logging Device = NUL		Mem. Size = 16K
Network Ad. = 000000	Diagnostic V 1.XX	Interrupt = IRQ2

Figure 3-1. The Diagnostic Main Menu

Checking the Parameters

The bottom area of the Main menu lists the default cartridge and diagnostic parameters; these are loaded from the NI5210DG.FMT file. Check that the following parameters listed in the PARAMETERS area match the parameters required by your Ethernet cartridge:

- I/O address (I/O base address)
- Memory base address
- Memory size
- Interrupt request (IRQ) level

NOTE: The default memory size is 16k bytes. If your diagnostic main menu indicates 8k bytes, you must change this value to 16K. See "Specifying Correct Parameters" in the following paragraphs.

If the NI5210DG.FMT file cannot be found in your current directory or in a directory that is in the MS-DOS path, no values appear in the PARAMETERS area of your screen. In addition, you receive the following message in the space located under the word STATUS:

No Parameter File on Disk.

If you press any key after receiving this message, the diagnostic loads its default values. The only two values that are not loaded are the network address and the interrupt request level, which is OFF. You must specify the interrupt request level before running any tests. If any of the other parameters do not match the jumper positions on the cartridge, specify the correct positions before running any tests. Change any incorrect or missing parameters after you set up an error logging device, as described in the following paragraph.

Note: As shown in Figure 3-1, the PARAMETERS area displays a network address of all zeros. You can specify the network address of your cartridge before you run a test. Otherwise, when you run a test the diagnostics retrieve the address from the ROM in the Ethernet cartridge and subsequently add the address to the PARAMETERS area of your screen.

The menus shown throughout this manual are supplied by the diagnostic program. The menus use the term "boards" to indicate any Ethernet interface including a cartridge or a plug-in module. Most GRIDCASE 1500 Series computer systems can accommodate only one Ethernet interface, which is the Ethernet cartridge. Therefore, in the PARAMETERS area of the menus, the "Boards Installed" and the "Board Under Test" values are normally set to "1." These values will not change unless a second Ethernet interface is installed in a Model 1535 EXP computer with expansion slots.

Setting up an Error Logging Device

In order to receive certain error messages that may occur when you run the diagnostic tests, you need to specify either: (1) a device, such as a printer, or (2) an MS-DOS file, to which the errors are written. If you specify an MS-DOS file name, you can later display the file (10 lines at a time) by choosing option E from the Main menu.

Begin by entering a D on the Main menu, in the space marked by the cursor, as follows:

Select Function D

The menu in Figure 3-2 then appears on your screen.

MICOM-Interlan NI5210 Ethernet Controller Diagnostic		
Change Parameters		
A. Change Test Repetition Count	G. Change Number of Board	
B. Change Max Error Count	H. Change Board Under Test	
C. Change Error Logging Device	I. Change I/O Address	
D. Change Network Address	J. Change Interrupt Channel	
E. Change All Parameters	K. Change Memory Configuration	
F. Help ?	L. Save/Recall Parameters	
	X. Exit to Main Menu	
Select Function _		
STATUS		
PARAMETERS		
Test Repetition = 10	Boards Installed = 1	I/O Addr. = 360
Max Error Count = 99	Board Under Test = 1	Mem. Ad. = C0000
Logging Device = NUL		Mem. Size = 16K
Network Ad. = 000000	Diagnostic V 1.XX	Interrupt = IRQ2

Figure 3-2. The Change Parameters Menu.

Enter C in the space marked by the cursor. Another menu then appears and you are asked to specify a "new device". In the space marked by the cursor, enter an MS-DOS device name, such as PRN (for printer), or an MS-DOS file name, such as ERR.LOG. When specifying your logging device, observe the following precautions:

- Do not specify the device CON, which causes the error messages to be displayed on your screen. The messages are displayed over the top of the menu on your screen and are difficult to read.
- If you give a file name, do not specify the drive that contains the original diagnostic diskette. The diskette is write-protected and you will receive an error message if you try to create a file on it.

Once you have entered a device or file name, press the Return key. This brings you back to the Change Parameters menu.

At this point, you should change any other parameters that are different from the jumper positions on your cartridge. If all of the parameters are correct, proceed to "Running All Tests".

SPECIFYING CORRECT PARAMETERS

When any of the default parameters are not suitable, you must change parameters before running any tests. A single parameter can be selected and changed via the menu, or all parameters can be selected sequentially. To change parameters, perform step 1 or 2 as required.

1. Change or enter a new value for only one of the parameters listed in the PARAMETERS area of the screen, as follows:
 - a. Enter the associated letter at the cursor in the Change Parameters menu. A new menu is then displayed.
 - b. Enter the correct value and depress the Return key. The program then returns to the Change Parameters menu.
2. Change or enter a new value for more than one parameter listed in the PARAMETERS area of the screen, as follows:

- a. Select E from the Change Parameters menu. The program then steps through each parameter as the Return key is depressed.
- b. Enter a new value or just press the Return key as each parameter is displayed. If the Return key is pressed before entering a new value, the current value is retained.

When you finish changing parameters, select L from the menu to save the new values. If you need help changing and saving parameters, choose option F from the Change Parameters menu and refer to Chapter 4 for more detailed diagnostic information.

RUNNING ALL TESTS

You are now ready to test the cartridge. To do so, select X to return to the Main menu and then select A (Run All Tests) from the Main menu. The new screen that appears keeps the STATUS and PARAMETERS area information, but adds the pertinent test information.

The Run All Tests option runs a series of internal tests, immediately followed by one network test (a transmit test). The internal tests check that the major areas of the cartridge (the command and status registers, the shared memory RAM, the LAN coprocessor, and the transmit and receive circuits) are functioning properly. The transmit test checks the network interface and sends a 256-byte packet onto the network. The diagnostic program formats the packet with the address of the cartridge as the destination address.

Each test runs ten times, as specified by the Test Repetition parameter. To change this parameter, select D to go to the Change Parameters menu and then select A.

If the internal tests and the transmit test pass, you will receive the following message in the STATUS area of the Main menu:

Board 1 Passed

Since two cartridges cannot be installed in your GRiDCASE 1500 Series computer, a "Board 2 Passed" message will not appear unless a second Ethernet interface is installed in a Model 1535 EXP computer expansion slot.

If you have a second Ethernet interface installed, the diagnostic program tests each interface in turn. (The interface being tested is identified in the STATUS area and its parameters appear in the PARAMETERS area.) The Change Parameters menu allows you to change the number of boards (Ethernet interfaces) that are installed and being tested. The default value is 1 for both parameters (G and H, respectively).

After the appropriate "Passed" message, press any key to return to the Main menu. If you have changed any parameters, save the parameters by going to the Change Parameters menu and choosing L. If you have not made any changes, select X from the Main menu to exit from the diagnostic program.

Diagnostic Errors

If a test cannot be run, or if a test fails, you will receive an error message. In either case, you must first make a note of the test that did not run or that failed while running. You can then return to the Main menu by pressing any key.

If a Test Cannot Be Run

If a particular test cannot be run because of improper parameter values, you will receive an error message. The message appears in or immediately above the STATUS area on the diagnostic screen.

The most common of these messages are listed in the following paragraphs. If one of the error messages occurs, check your records for the correct parameter values. If the value in the cartridge is wrong, you must remove the cartridge and change the appropriate jumpers. It is more likely that the jumper positions are correct and that they were specified incorrectly in the diagnostic program. If this is the case, simply go to the Change Parameters menu (D from the Main menu) and specify the correct parameter value. When you are finished, return to the Main menu and enter A to Run All Tests again.

The common messages are as follows:

No Interrupt Line Selected

Make sure that the IRQ jumper position on the cartridge matches the interrupt value shown in the PARAMETERS area of the menu (see Figure 3-2). You must enable an interrupt channel.

No NI5210 Controller at this I/O address

This means the diagnostic program could not be run because it could not find your Ethernet cartridge at the address listed in the PARAMETERS area of the diagnostic menu. Check the cable connections to Ethernet cartridge. Then, verify that your cartridge address matches the address specified in the diagnostic menu.

If a Test Fails

If one or more of the diagnostic tests fail, the diagnostic program stops at that point and the following message is displayed in the STATUS area:

Board *n* Failed

If you receive this message, check the output from your logging device, or display the contents of your log file by pressing E from the Main menu. The log file should contain one or more of the messages listed below. If you check your values as suggested in the explanations and you still receive the message, or if the message indicates that it is a hardware failure, contact the GRiD Resource Center at (415) 656 2100. The GRiD Resource Center (GRC) is open Monday through Friday from 6:00 AM to 5:00 PM Pacific Time.

The messages that can be logged are:

Cannot write to extended memory

The diagnostics were configured for 16k bytes of RAM, but the second 8k byte bank of RAM could not be found. Check that your memory configuration jumpers are positioned correctly for 16k. Otherwise, this indicates a possible hardware failure.

Data compare error *nnnn*

After the loopback test, the receive buffer did not match the transmit buffer. This indicates a possible hardware failure.

Invalid network address

The Ethernet address does not begin with the assigned number. Check the value of your I/O base address.

Invalid ROM test pattern

The test pattern for the read-only memory is incorrect. Check the value of your I/O base address.

82586 command complete interrupt failure

The 82586 LAN coprocessor failed to interrupt the computer upon completion of a command. Check your interrupt value.

**82586 failed to accept *cmd* command,
cmd command failed to complete, or
cmd command failed**

The 82586 LAN coprocessor failed to execute the specified command correctly. This is generally caused by a hardware failure. An exception is the transmit command, which requires a network connection.

82586 failed to initialize

The diagnostic could not communicate with the 82586 LAN coprocessor, or there was a general failure of the 82586. Check your memory configuration jumpers.

82586 receiver start failure

The diagnostics could not start 82586 packet reception. This is a hardware failure.

CHAPTER 4: DIAGNOSTIC TESTS

As described in Chapter 3, the Ethernet cartridge diagnostic program verifies the correct installation and configuration of the Ethernet cartridge. Chapter 3 also describes how to start up the diagnostic program and run the "Run All Tests" option. This chapter describes the rest of the diagnostic program.

THE DIAGNOSTIC TESTS AND PARAMETERS

The diagnostic program performs two sets of tests:

Internal Tests

Network Tests

Internal Tests

The Internal Tests check that the cartridge is configured, installed, and functioning properly. These tests can be performed when the cartridge is not connected to the network (off-line). There are four Internal Tests:

Network Address ROM Test

Buffer RAM Test

82586 Internal Test

Internal Loopback Test

The "Run All Tests" option runs all of these tests, but you can also run them individually. This is helpful if the cartridge has failed a particular test under "Run All Tests" and you want to rerun only the test that failed. Refer to "Choosing B-The Internal Tests" in this chapter for more information.

Network Tests

The Network Tests check the connection of the cartridge to the network as well as the overall integrity of the network. They should be run only after the Internal Tests have passed.

There are four Network Tests:

- Transmit Test
- Receive Test
- Echo Test
- Echo Server Test

The "Run All Tests" option runs the Transmit test, but you can run the other tests as well. Refer to "Choosing C-The Network Tests" in this chapter for more information.

Parameters

The diagnostics also let you change one or all of the configuration parameters for the Ethernet cartridge. The Ethernet cartridge has the following parameters:

- Test repetition count
- Maximum error count
- Current error logging device
- Network address
- Number of cartridges installed
- Cartridge under test
- I/O base address
- Interrupt channel
- Memory configuration

Refer to "Choosing D-Change Parameters" for more information.

CHOOSING A TO RUN ALL TESTS

When you select A from the diagnostics Main menu, the diagnostics perform all of the Internal Tests and one Network Test (the Transmit Test). The "Run All Tests" option is recommended for a quick and easy verification of the cartridge. If you want to run the other Network Tests, choose C from the Main Menu; if you want to rerun a particular Internal Test, choose B from the Main menu.

The following sections describe the other options you can choose from the Main menu of the diagnostic program, which is shown in Figure 4-1.

MICOM-Interlan NI5210 Ethernet Controller Diagnostic		
Main Menu		
A. Run All Tests B. Internal Test C. Network Tests D. Change Parameters E. Read Error Log F. Help ? X. Exit Diagnostic		
Select Function _		
STATUS		
PARAMETERS		
Test Repetition = 10	Boards Installed = 1	I/O Addr. = 360
Max Error Count = 99	Board Under Test = 1	Mem. Ad. = C0000
Logging Device = NUL		Mem. Size = 16K
Network Ad. = 000000	Diagnostic V 1.XX	Interrupt = IRQ2

Figure 4-1. The Diagnostic Main Menu

CHOOSING B TO RUN INTERNAL TESTS

When you select B from the main menu, a new menu appears, as shown in Figure 4-2.

Select one of the four Internal Tests, run the Help menu, or return to the Main menu. Each time a test completes, you return to the Internal Tests menu.

Network Address ROM Test

This test reads the network address from the ROM on the Ethernet cartridge. If the test passes, the address shows up in the PARAMETERS area of your screen. By reading the address, this test verifies proper reading of the Ethernet cartridge command and status registers.

MICOM-Interlan NI5210 Ethernet Controller Diagnostic		
NI5210 Internal Tests		
A. Network Address ROM Test B. Buffer RAM Test C. 82586 Internal Test D. Internal Loopback Test E. Help ? X. Exit Diagnostic		
Select Function _		
STATUS		
PARAMETERS		
Test Repetition = 10	Boards Installed = 1	I/O Addr. = 360
Max Error Count = 99	Board Under Test = 1	Mem. Ad. = C0000
Logging Device = NUL		Mem. Size = 16K
Network Ad. = 000000	Diagnostic V 1.XX	Interrupt = IRQ2

Figure 4-2. The Internal Tests Menu

If the test fails, the I/O Base Address parameter is probably incorrect or the ROM is not functioning. Check the I/O Base Address jumper positions on your Ethernet cartridge. Make sure that the selected address matches the one shown in the PARAMETERS area of your screen. (For information on how to configure the Ethernet cartridge, refer to Appendix A.)

Buffer RAM Test

This memory address test checks that the memory segment exists and that the 16k bytes of memory are readable/writable.

If this test fails, make sure that you have enabled the correct Memory Base Address and memory size on the cartridge, and that the enabled values match the values listed in the PARAMETERS area of your screen.

82586 Internal Test

The 82586 LAN Controller has a built-in self-test capability. This internal test causes the controller to verify its ability to execute commands and confirm proper operation of its internal functions.

If this test fails, the IRQ value or the memory size may be incorrect. Make sure that you have enabled an IRQ level on the cartridge, and that the IRQ and memory size parameters enabled match the values specified in the PARAMETERS area of your screen. Check your error log file.

Internal Loopback Test

This test configures the LAN Controller for internal loopback and causes a short frame to be transmitted and received.

If this test fails, make sure that the IRQ level enabled on the cartridge matches the interrupt parameter listed in the PARAMETERS area. If so, there is probably something wrong with the cartridge. In this case, contact the GRiD Resource Center at (415) 656 2100. The GRiD Resource Center (GRC) is open Monday through Friday from 6:00 AM to 5:00 PM Pacific time.

CHOOSING C TO RUN NETWORK TESTS

If you choose C on the Main menu, the Network Tests menu appears, as shown in Figure 4-3.

You can select one of the four Network Tests, run the Help menu, or return to the Main menu. Each time a test completes, you are automatically returned to the Network Tests menu. Each of the four Network Tests is described in the following paragraphs.

Transmit Test

This test checks the network interface by transmitting a packet onto the network. If the test passes, the packet was transmitted successfully and carrier sense was detected on the network. If the test fails, the network might be jammed (with excessive collisions) or open (that is, no carrier sense is detected).

When you run the test from this menu, the program prompts you for the following information: a destination address in hexadecimal (any physical or multicast address) and a packet size (1 to 1500 bytes). The default values appear in brackets. After you specify this information, the test begins. A new screen then displays the following information:

- Number of loops (the number of times the transmission of a packet is attempted)
- Number of errors (the number of transmission attempts that failed)
- Percentage of packets transmitted successfully but with collisions
- Percentage of packets transmitted successfully after first being deferred
- Current transmit status (two hexadecimal digits that indicate the status of the 82586 transmits)

MICOM-Interlan NI5210 Ethernet Controller Diagnostic		
NI5210 Network Tests		
A. Transmit Test B. Receive Test C. Echo Test D. Echo Server E. Help ? X. Exit to Main Menu		
Select Function _		
----- STATUS -----		
----- PARAMETERS -----		
Test Repetition = 10	Boards Installed = 1	I/O Addr. = 360
Max Error Count = 99	Board Under Test = 1	Mem. Ad. = C0000
Logging Device = NUL	Diagnostic V 1.XX	Mem. Size = 16K
Network Ad. = 000000		Interrupt = IRQ2

Figure 4-3. The Network Tests Menu

Receive Test

This test checks the receive process and can be used to monitor the traffic on the network. When you choose this test, you are asked to specify the addressing mode (that is, promiscuous, multicast, or broadcast) and whether you want the program to display the actual packets that are received.

After you give this information, the test runs. The screen then changes to show you the number of packets received and the number of packets received with errors. If you chose the packet display, the program also gives you the receive status and a 10-line window that shows the first 25 bytes of the packet received.

Echo Test

This test is a combination of the Transmit and Receive tests. It begins by transmitting a broadcast packet onto the network, searching for an echo server. The test tries 10 times to find the server; after that, it reports that no server could be found and quits.

If a server exists, it should respond by returning a response packet. (The test gets the address of the server from the source address field of the response packet.) During this time, the test displays a "Waiting for Packet" message. If the server doesn't send a response packet in 5 seconds, the test logs an error and tries again.

As the test runs, you see status messages and statistics similar to those displayed during the Transmit and Receive tests. These include the number of packets transmitted, the number received, the number of transmit errors, and the percentage of collisions and deferrals.

Echo Server Test

This test works in conjunction with the Echo Test. It listens on the network for request packets and responds when it receives one. When a packet addressed specifically to the server arrives, the sender of that packet becomes the client of the server. The server can support only one client.

As the test runs, the server displays a list of clients, the number of packets received, the number of packets sent, and the percentage of failures of transmitted packets with collisions and deferrals. If there is a problem with the network during the test, you get error messages similar to those displayed during the Transmit and Receive tests.

CHOOSING D TO CHANGE PARAMETERS

To change any of the Ethernet cartridge configuration and diagnostic parameters, choose D from the Main menu. The menu shown in Figure 4-4 then appears.

At the cursor, enter the appropriate letter, and a new screen appears with information about the parameter you want to change. To change several parameters, pick E from the menu. Using option E, you can change a series of parameters without returning to the Change Parameters menu after each change.

Follow the instructions given for each parameter, entering all choices at the cursor or pressing the Return key to keep the current value. Where applicable, defaults are shown in brackets.

When you make a change, the PARAMETERS area displays the new value (for the cartridge specified in the Cartridge Under Test parameter). You can then select another option from the menu, or return to the Main menu by pressing X.

Note: Any parameter changes you make remain in effect until you exit the diagnostic program. To save the values in the NI5210DG.FMT file, choose L (the Save/Recall All Parameters option) from the menu and follow the instructions for saving the values.

The following paragraphs describe the options on the Change Parameters menu and tell you how to change each parameter.

Change Test Repetition Count

Choose A to change the test repetition count shown in the PARAMETERS area of your screen. The diagnostics define this parameter as the number of times a selected test is to be executed. If you enter 0, the test runs until you stop it. The range is 0 to 99. The default value is 10.

Change Maximum Error Count

Choose B to change the maximum error count value shown in the PARAMETERS area. The diagnostics define this count as the maximum number of errors logged to the logging device during a test. Enter a new value, using a range of 0 to 99, or press the return key to keep the current value. The default value is 99.

MICOM-Interlan NI5210 Ethernet Controller Diagnostic		
Change Parameters		
A. Change Test Repetition Count B. Change Max Error Count C. Change Error Logging Device D. Change Network Address E. Change All Parameters F. Help ?	G. Change Number of Board H. Change Board Under Test I. Change I/O Address J. Change Interrupt Channel K. Change Memory Configuration L. Save/Recall Parameters X. Exit to Main Menu	
Select Function _		
STATUS		
PARAMETERS		
Test Repetition = 10 Max Error Count = 99 Logging Device = NUL Network Ad. = 000000	Boards Installed = 1 Board Under Test = 1 Diagnostic V 1.XX	I/O Addr. = 360 Mem. Ad. = C0000 Mem. Size = 16K Interrupt = IRQ2

Figure 4-4. The Change Parameters Menu

Change Error Logging Device

To write errors detected by the diagnostics to a specific device, choose C and enter any valid DOS device or filename at the space marked by the cursor. For example, NUL (the default) specifies No Device, PRN specifies a Line Printer, and A:LOG.ERR specifies a DOS file name. Enter your chosen logging device, or keep the default (NUL) by pressing the return key. If you specify a DOS file name, you can later display the error log file (10 lines at a time) by choosing option E from the Main menu. When specifying your logging device, observe the following precautions:

- Do not specify the device CON, which causes the error messages to be displayed on your screen. The messages are displayed over the top of the menu on your screen and are difficult to read.
- If you give a file name, do not specify the drive that contains the original diagnostic diskette. The diskette is write-protected and you will receive an error message if you try to create a file on it.

Change Network Address

To specify the network address of the Ethernet cartridge installed on your system, choose D. The diagnostic displays the current address and asks if you want to change this address. Type Y or N at the cursor. If you enter Y, the diagnostics ask if you want to: 1) retrieve the address from the ROM, or 2) enter the address as 12 hexadecimal digits. The default value is 1.

Change All Parameters

This option prompts you in turn for changes to all of the Ethernet cartridge parameters. If you choose E, the diagnostics go through the change procedures for each parameter.

Help ?

To get general information about how to change the parameters, select F and read the Change Parameters Help menu.

Change Number of Boards

Since more than one cartridge cannot be installed in your GRiDCASE 1500 Series computer, the default value for this parameter is 1. The value is not changed unless your computer is a Model 1535 EXP with expansion slots. This parameter can be set to 2 only if a second Ethernet interface is installed.

Then, select G to change the parameter indicating the number of Ethernet interfaces installed on your system. Valid entries are 1 (the default) or 2. If you specify 2, the diagnostic program should have two separate sets of parameter values and should test each interface separately under "Run All Tests". When the diagnostic program is testing the second interface, its parameters will appear in the PARAMETERS area of the screen.

Change Board Under Test

To run the Internal Tests or the Network Tests individually, you can specify which Ethernet interface you want to test by choosing H. The default value is "1" to test the Ethernet cartridge. Specify 2 only if a second Ethernet interface is installed in a Model 1535 EXP computer expansion slot.

Under the "Run All Tests" option, the Board Under Test parameter is ignored. The value entered under the Boards Installed parameter determines how many Ethernet interfaces are tested under "Run All Tests".

Change I/O Address

To change the default Ethernet cartridge I/O address (shown in the PARAMETERS area of your screen), choose I. The diagnostics ask if you to want to change the current value. Type Y or N. If you type Y, you are prompted to enter the I/O address of the Ethernet cartridge, using a range of 200 to 3FC (hex). Enter the value at the space marked by the cursor. Pressing the return key without entering a value keeps the current parameter. The default I/O address for the Ethernet cartridge is 360. If a second Ethernet interface is installed, its default address is 368. If you change either parameter, the new value appears in the PARAMETERS area.

Change Interrupt Channel

Choose J to specify an IRQ level. The selection must correspond to the IRQ jumper on the Ethernet cartridge. The diagnostics ask if you want to change the current value. Type Y or N. If you type Y, you are prompted to enter an interrupt channel parameter by using a range of 2 through 6 (representing IRQ2, IRQ3, IRQ4, IRQ5, or IRQ7). The default value for the Ethernet cartridge is 2.

Change Memory Configuration

Choose K to change the memory base address and memory size parameters shown in the PARAMETERS area. The diagnostics ask if you want to change the current value for the memory base address. Enter Y or N. If you enter Y, you are prompted for a new memory address, using a range of C0000 to DC0000 (hex). The default for the Ethernet cartridge is C0000. If a second Ethernet interface is installed, its default is D0000. When you are done with the memory base address, the diagnostics ask if you want to change the current memory size. Enter Y or N. If you enter Y, you are prompted to specify either 8K or 16K for the memory size. The default size is 16k.

Save/Recall Parameters

Choose L to save the parameters you specified, recall the parameters listed in the NI5210DG.FMT file, or exit. The diagnostics ask you enter your choice using the letters S (save), R (recall), or X (exit).

CHOOSING E TO READ THE ERROR LOG

When you choose this option from the Main menu, the program opens and displays the first 10 lines of the error log file, if one is specified by the Error Logging Device parameter. Initially, the program disables error logging, but you can specify an error log file using the Change Parameters menu.

You can use any valid DOS filename. The name appears as a parameter in the PARAMETERS area of your screen. The next time you start up the diagnostic program, the file is opened automatically. Since the diagnostic program displays the error log file 10 lines at a time, you must press the space bar each time you want to see more of the file. Typing any other character returns you to the main menu.

CHOOSING F TO READ THE HELP FILE

If you need information about how to run the diagnostic program, choose F from the Main menu. The diagnostic program then runs the help file (NI5210DG.HLP) and displays the help screen for the Main menu. If the help file cannot be found, you get a message that says there is no help file.

The diagnostic program is designed to offer you different help menus for each major diagnostic function. The help screen from the Main menu, for example, gives you the most general diagnostic information. The help screens offered by the Internal Tests, Network Tests, and Change Parameters menus give detailed descriptions of their corresponding menus.

To see the entire help file, return to DOS and enter the following at the prompt:

TYPE NI5210DG.HLP

APPENDIX A: CONFIGURATION

The Ethernet cartridge contains reconfigurable jumpers that are used to set the operating parameters of the cartridge. These jumpers have been set at the factory to provide default values for most system configurations. The parameters that can be changed via the jumpers and their preset default values are as follows:

- The I/O Base Address is 360 (hex).
- The Memory Base Address is C0000 (hex).
- The Interrupt Request Level is 2 (IRQ2).
- The memory capacity is 16k bytes.

It is seldom necessary to change the default values. The only circumstances where you may need to change the default values are as follows:

1. Your GRiDCASE computer system is a Model 1535 EXP. This computer model has an expansion chassis that accepts plug-in boards, and the plug-in board values may conflict with the default values listed for the Ethernet cartridge.
2. The software you are planning to use requires specific values that are different than the default values listed for the Ethernet Cartridge.

If either of these circumstances should occur, and you need to change the Ethernet cartridge jumper configuration, perform the procedures given in this appendix.

CHANGING THE CARTRIDGE CONFIGURATION

The following paragraphs provide an overview of how the ethernet cartridge configuration is changed and lists the tools required to perform the procedures. Read these paragraphs to help you determine what needs to be done before you perform the procedures.

How the Configuration is Changed

In order to change the Ethernet cartridge configuration, it is necessary to change positions of the reconfigurable jumpers. The reconfigurable jumpers are located on a printed circuit board, and the board is located inside the cartridge. Therefore, the cartridge must be disassembled to gain access to the jumpers (see Figure 4-1).

After the circuit boards are removed from the extrusion, the two boards are separated to gain access to the jumpers. The jumper positions can then be changed as required and the disassembly procedures reversed to reassemble the cartridge. Step-by-step procedures for cartridge disassembly are provided in the following paragraphs.

CAUTION

Handle the circuit boards carefully by their edges and do not touch the components or traces. Careless handling of the circuit boards can cause damage to components or the circuit boards.

How Jumpers Are Reconfigured

The Ethernet cartridge jumpers are small plastic parts with an internal wire connecting two female pins. The jumper is designed so that its pins fit over two male pins of a three-pin jumper block. The three pins in the jumper block are arranged in a straight line so that the jumper fits over the middle pin and one pin on either side of the middle pin. When the jumper is installed at one side of

the middle pin, the output for that jumper block is a logic "0." If the jumper is installed on the opposite side of the same middle pin, the jumper block output is changed to a logic "1." The reconfigurable jumpers are located in 17 jumper blocks that are designated W2 thru W6 and W9 thru W20.

In some cases, such as the I/O Base Address, several jumper blocks are associated with the same parameter and are located very close together (see Figure A-2). In the figures that show jumper block locations, the shaded areas indicate the default jumper positions.

Tools You Will Need

To disassemble the Ethernet cartridge and change the jumper positions, you will need the following hand tools:

1. A No. 1 Phillips (small cross-point) screwdriver.
2. A small pair of needle-nose pliers.

ETHERNET CARTRIDGE DISASSEMBLY

The Ethernet Cartridge disassembly is performed in two stages. First, the circuit boards are removed from the extrusion. Then, the two circuit boards are separated to gain access to the jumpers. To disassemble the Ethernet cartridge, perform the two procedures in sequence.

Removing the Circuit Boards

To remove the circuit boards from the extrusion, perform the following steps:

1. Remove the Ethernet cartridge from the computer (refer to Chapter 2), if required, and then place the cartridge on a clean and stable work area.
2. Disconnect the spring carefully from the ejector knob shaft on the bottom of the cartridge (see Figure A-1).

3. Remove four flat-head screws from the outside end of the cartridge. Place the screws in a safe place.
4. Pull straight out on the outside end plate and gently slide both circuit boards out of the extrusion. The connectors on the inside end are not connected to the end plate or extrusion.

Four internal slots in the extrusion hold the edges of the boards in place when the cartridge is assembled. Once the boards are removed from the extrusion they are not supported at the edges and must be handled more carefully to prevent stress on the boards.

5. Set the extrusion to one side temporarily while you perform the procedure for separating the two circuit boards.

Separating the Circuit Boards

Once the circuit boards have been removed from the extrusion, you must separate them from each other in order to gain access to the jumpers. The boards are connected together physically as well as electrically by one connector near the outside end.

To separate the two boards, proceed as follows:

1. Grasp the boards along the edges and approximately in the middle with one board in each hand.
2. Pull the boards apart gently and firmly while working to separate the two halves of the connector.

CAUTION

Be very careful not to bend the pins on the connector that holds the boards together. Excessive force and torque can damage the connector and circuit board.

3. Set the separated boards on a clean and stable work area. Be careful not to damage the ejector knob shaft.

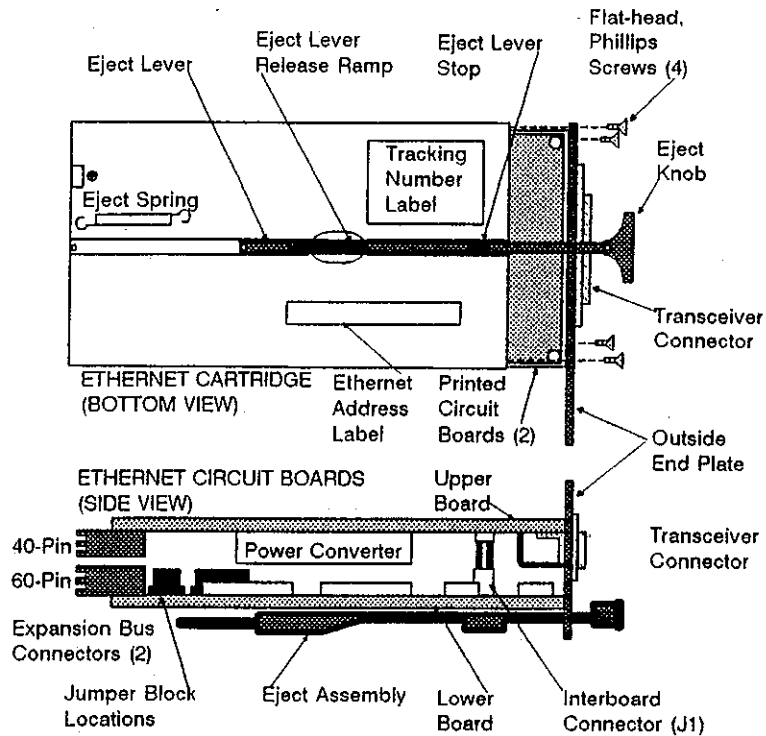


Figure A-1. Disassembly of the Ethernet Cartridge

4. Observe which of the two boards contains the jumper blocks (see Figure A-2).
5. Perform the following procedure for changing the jumper positions.

CHANGING THE JUMPER POSITIONS

The following paragraphs describe how to change the positions of the reconfigurable jumpers. Each parameter that can be changed is described in a separate procedure. The procedures for changing the parameters are given in the following order:

1. I/O Base Address
2. Memory Base Address
3. Interrupt Request Level
4. Memory Capacity

Changing the I/O Base Address

The I/O Base Address is an address in the computer I/O address space. The address is used by your computer to identify the Ethernet cartridge. During operation, your computer uses the I/O Base Address as a reference point to access the Ethernet cartridge command and status registers.

If you have other I/O devices installed in the GRIDCASE Model 1535 computer expansion slots, the Ethernet cartridge must have a different I/O Base Address than any other I/O device. Also, the Ethernet cartridge I/O address space must not overlap the I/O address space of any other I/O device. Therefore, the Ethernet cartridge I/O Base Address must be at least 8(hex) greater or less than any other I/O Base Address used in your computer system.

The location and preset address (360 hex) of the I/O Base Address Jumpers is shown in Figure A-2. Changing the Ethernet cartridge I/O Base Address involves repositioning the six I/O Base Address jumpers in blocks W9 thru W14.

To change the I/O Base Address jumper positions, perform the following procedure:

1. Arrange the board as shown in Figure A-2 in a clean and stable work area. Also, refer to the figure for the location of jumper blocks W9 thru W14.
2. Select the desired address between 200(hex) and 3F8(hex) from Table A-1.
3. Observe the logic level listed in Table A-1 for each jumper block (W9 thru W14). Logic "0" is located on one side of the jumper block center pin and logic "1" is located on the opposite side of the same center pin.

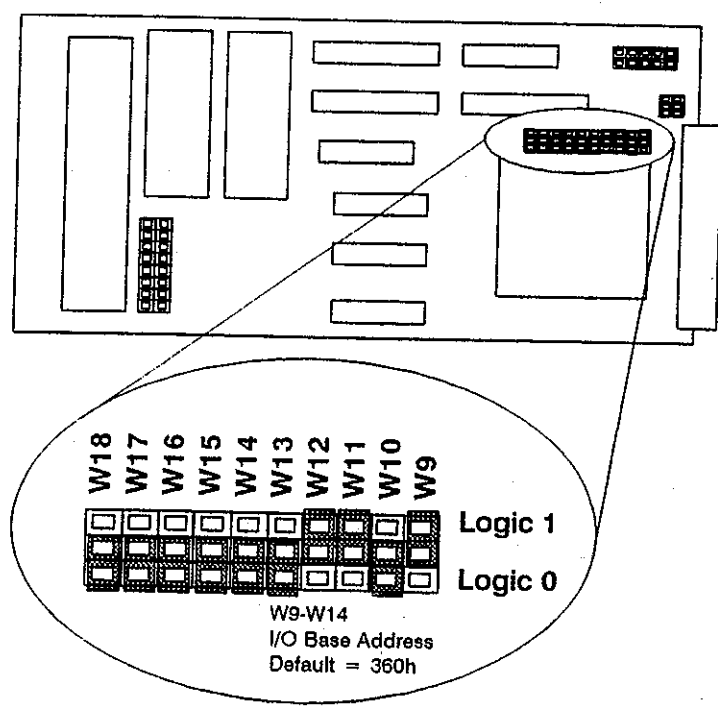


Figure A-2. Location and Default Address of the I/O Base Address Jumpers

4. Reposition the jumpers one at a time using the needle nose pliers. To reposition a jumper, pull it straight up, position it carefully over the pins in its new location, and then push it straight down on the pins.
5. Recheck each of the six jumper block positions (W9-W14) to ensure that it represents the required logic level for the selected address.
6. Perform the next procedure required to change jumper positions or proceed to the cartridge reassembly procedure.

Table A-1. Valid I/O Base Addresses

Address (hex)	Jumper Positions					
	W14	W13	W12	W11	W10	W9
200	0	0	0	0	0	0
208	1	0	0	0	0	0
210	0	1	0	0	0	0
218	1	1	0	0	0	0
220	0	0	1	0	0	0
228	1	0	1	0	0	0
230	0	1	1	0	0	0
238	1	1	1	0	0	0
240	0	0	0	1	0	0
248	1	0	0	1	0	0
250	0	1	0	1	0	0
258	1	1	0	1	0	0
260	0	0	1	1	0	0
268	1	0	1	1	0	0
270	0	1	1	1	0	0
278	1	1	1	1	0	0
280	0	0	0	0	1	0
288	1	0	0	0	1	0
290	0	1	0	0	1	0
298	1	1	0	0	1	0
2A0	0	0	1	0	1	0
2A8	1	0	1	0	1	0
2B0	0	1	1	0	1	0
2B8	1	1	1	0	1	0
2C0	0	0	0	1	1	0
2C8	1	0	0	1	1	0
2D0	0	1	0	1	1	0
2D8	1	1	0	1	1	0
2E0	0	0	1	1	1	0
2E8	1	0	1	1	1	0
2F0	0	1	1	1	1	0
2F8	1	1	1	1	1	0

Address (hex)	Jumper Positions					
	W14	W13	W12	W11	W10	W9
300	0	0	0	0	0	1
308	1	0	0	0	0	1
310	0	1	0	0	0	1
318	1	1	0	0	0	1
320	0	0	1	0	0	1
328	1	0	1	0	0	1
330	0	1	1	0	0	1
338	1	1	1	0	0	1
340	0	0	0	1	0	1
348	1	0	0	1	0	1
350	0	1	0	1	0	1
358	1	1	0	1	0	1
360	0	0	1	1	0	1
368	1	0	1	1	0	1
370	0	1	1	1	0	1
378	1	1	1	1	0	1
380	0	0	0	0	1	1
388	1	0	0	0	1	1
390	0	1	0	0	1	1
398	1	1	0	0	1	1
3A0	0	0	1	0	1	1
3A8	1	0	1	0	1	1
3B0	0	1	1	0	1	1
3B8	1	1	1	0	1	1
3C0	0	0	0	1	1	1
3C8	1	0	0	1	1	1
3D0	0	1	0	1	1	1
3D8	1	1	0	1	1	1
3E0	0	0	1	1	1	1
3E8	1	0	1	1	1	1
3F0	0	1	1	1	1	1
3F8	1	1	1	1	1	1

Changing the Memory Base Address

The Memory Base Address is used by the computer to identify the starting address of the Ethernet cartridge built-in memory. If you have other devices installed in a GRiDCASE 1535 EXP computer expansion slot that uses built-in memory, the Ethernet cartridge must have a different Memory Base Address than any other device.

The location and preset address (C0000 hex) of the Memory Base Address Jumpers is shown in Figure A-3. Changing the Ethernet cartridge Memory Base Address involves repositioning the four Memory Base Address jumpers in blocks W15 thru W18.

To change the Memory Base Address jumper positions, proceed as follows:

1. Arrange the board as shown in Figure A-3 in a clean and stable work area. Also, refer to this figure for the location of jumper blocks W15 thru W18.
2. Select the desired address between C0000 (hex) and DC000 (hex) from Table A-2.
3. Observe the logic level listed in Table A-2 for each jumper block (W15 thru W18). Logic "0" is located on one side of the jumper block center pin and logic "1" is located on the opposite side of the same center pin.
4. Reposition the jumpers one at a time using the needle nose pliers. To reposition a jumper, pull it straight up, position it carefully over the pins in its new location, and then push it straight down on the pins.
5. Recheck each of the four jumper block positions (W15-W18) to ensure that it represents the required logic level for the selected address.
6. Perform the next procedure required to change jumper positions or proceed to the cartridge reassembly procedure.

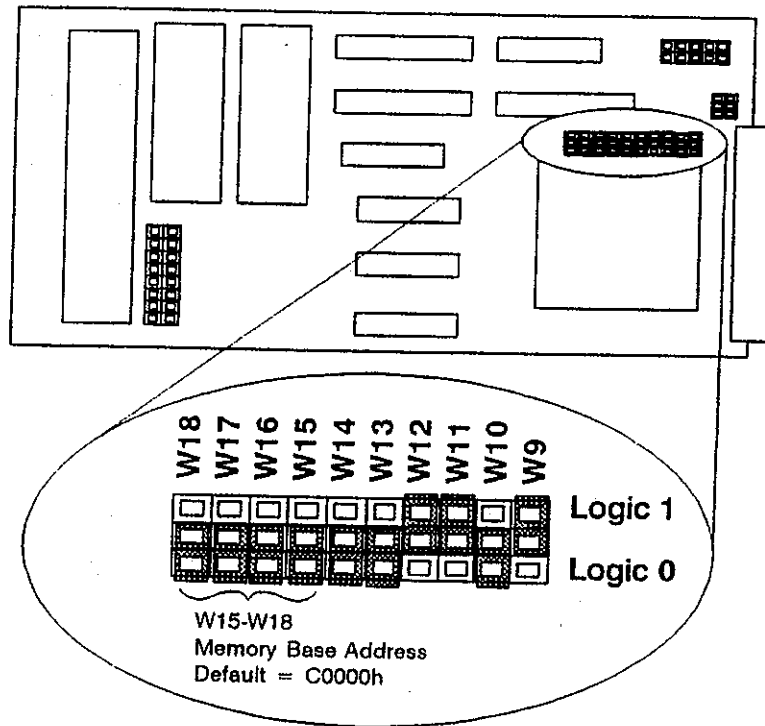


Figure A-3. Location and Default Address of the Memory Base Address Jumpers.

Table A-2. Valid Memory Base Addresses

Address (hex)	Jumper Positions			
	W18	W17	W16	W15
C0000	0	0	0	0
C4000	1	0	0	0
C8000	0	1	0	0
CC000	1	1	0	0
D0000	0	0	1	0
D4000	1	0	1	0
D8000	0	1	1	0
DC000	1	1	1	0

Changing the Interrupt Request Level

The Ethernet cartridge uses an Interrupt Request to let your computer know that it requires service. Other devices installed in your computer such as the display and keyboard also use Interrupt Requests. The Ethernet cartridge must use a different Interrupt Request than any other device in your computer or in a GRiDCASE Model 1535 EXP computer with expansion slots connected to your system.

To change the Interrupt Request Level jumper positions, perform the following procedure:

1. Arrange the board as shown in Figure A-4 in on a clean and stable work area. Also, refer to the figure for the location of jumper blocks W2 thru W6.
2. Select the desired Interrupt Request Level from Table A-3. The available choices are IRQ2 thru IRQ5 or IRQ7. Only one Interrupt Request Level can be selected.
3. Reposition the Interrupt Request Level jumper using the needle nose pliers. Only one jumper is used because only one Interrupt Request Level can be selected. To reposition a jumper, pull it straight up, position it carefully over the pins in its new location, and then push it straight down on the pins.
4. Recheck the jumper position to ensure that it represents the required Interrupt Request level.
5. Perform the next procedure required to change jumper positions or proceed to the cartridge reassembly procedure.

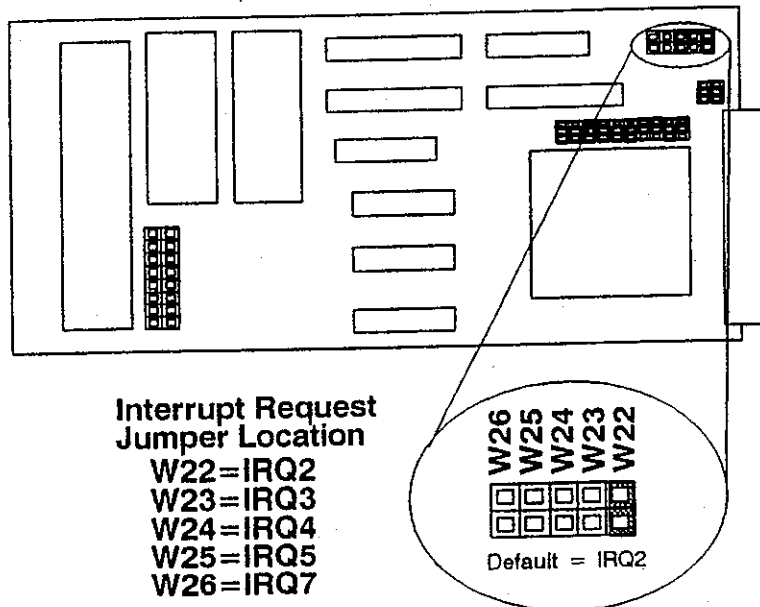


Figure A-4. Location and Default Jumper Position for the Interrupt Request Level

Table A-3. IRQ Jumpers

IRQ Level	Jumper Block
IRQ2	W2
IRQ3	W3
IRQ4	W4
IRQ5	W5
IRQ7	W6

Changing Memory Capacity

The memory capacity jumpers, labeled W19 and W20, are shown in Figure A-5. The memory capacity jumpers are installed at the factory to indicate the size of the installed memory. The jumpers seldom require repositioning. Therefore, the following information is supplied for reference only.

The memory capacity is selected via two jumper blocks labeled W19 (XME) and W20 (XRE). Figure A-5 shows the memory capacity jumper locations and Table A-4 list the jumper location information.

After examining and, if necessary, repositioning the memory capacity jumpers, perform another procedure, if required, to change jumper positions or proceed to the cartridge reassembly procedure.

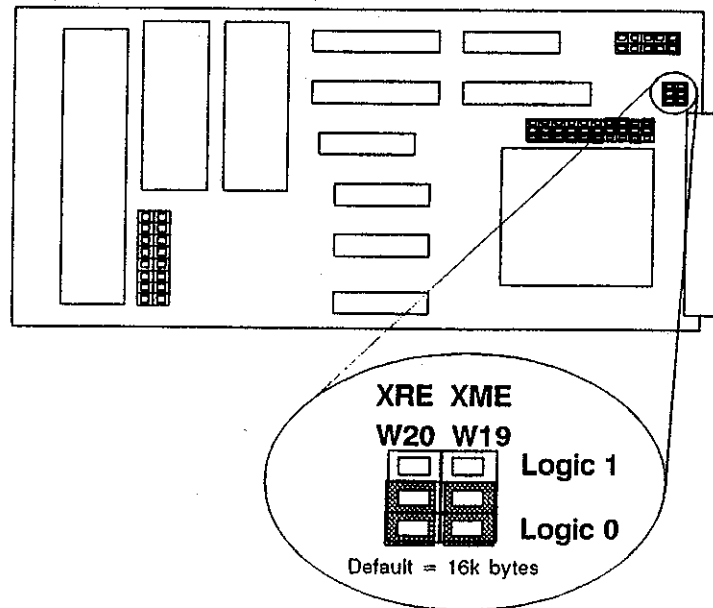


Figure A-5. Memory Capacity Jumper Location

Table A-4. Memory Capacity Jumper Positions

Ethernet Cartridge Memory Size	Jumper Positions	
	XME	XRE
8k byte RAM	1	1
16k byte RAM	0	0
Boot PROM Device	0	1
Not used for the Ethernet cartridge.		

REASSEMBLING THE ETHERNET CARTRIDGE

After the jumpers have been repositioned to establish the desired values, the Ethernet cartridge is reassembled using the following procedure.

1. Grasp the boards along the edges and approximately in the middle with one board in each hand.
2. Align the connector pins with the mating connector socket holes. Make sure each pin lines up with its respective hole.
3. Press the boards gently together. As you press the two boards together, observe the pins and make sure that they do not bend.
4. Observe that the inside end of the boards will be inserted into the extrusion first with the smaller of the two connectors at the top. The boards will not fit any other way.
5. Align the edges of the two boards with the slots on the inside of the extrusion.
6. Slide the circuit boards into the extrusion while being careful not to damage the ejector knob shaft that fits on the outside bottom of the extrusion.

7. Install the four flat-head screws in the outside end plate to secure the end plate to the extrusion.
8. Reconnect the spring carefully to the ejector knob shaft. Overstretching the spring may cause erratic ejector operation.
9. Reinstall and test the Ethernet cartridge (refer the Chapter 2).