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EXM-10

WD8003EB Compatible Ethernet Controller EXM

Reference

RadiSys® Corporation

15025 S.W. Koll Parkway
Beaverton OR 97006

Phone: 800-950-0044
In Oregon: (503) 646-1800
Fax: (503) 646-1850

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1. Getting Started

This manual contains the information you will need to install and use the EXM-10 WD8003EB Compatible Ethernet Controller and accompanying software.

The EXM-10 is a high-speed controller for thick or thin Ethernet, compatible with the Western Digital WD8003EB Ethernet card. It provides two interfaces: a DB-15 DIX/MAU connector for attaching a transceiver cable to an Ethernet transceiver, and a BNC connector for attaching an RG58 (thin Ethernet) cable. All configuration parameters are set in software.

The software provided with the EXM-10 includes drivers for TCP/IP, Novell NetWare, DECnet, LanManager, 3Com+, and NDIS.

Note: See the file readme.txt on the distribution diskette for an explanation of the diskette's contents and use. Appendix A contains the contents of this file. Your actual file may be somewhat different if the version has been updated since this manual was released.

Compatibility

The EXM-10 can be used with any RadiSys EPC that supports an EXM slot. Examples are the EPC-2e, EPC-3, EPC-4, EPC-5, EPC-6 and EPC-7. When using the EXM-10, it is important that the EXM-10 setup information does not conflict with other devices in the system. The EXM-10 uses certain I/O registers, an 8KB or 32KB memory region and an interrupt signal that must not be used by other devices. These I/O registers, memory regions and interrupts are software configurable. Use the EZSetup program provided on the distribution diskette to establish the EXM-10 parameters. This procedure is described in a later section of the manual.

Specifications

The following table defines the power and environmental specifications of the EXM-10.

Characteristic		Value
Temperature	operating	0 to 60°C ambient
	storage	-40 to 125°C
Humidity	operating	0 - 90% noncondensing
	storage	0 - 95% noncondensing
Altitude	operating	10,000 ft (3000 m)
	storage	50,000 ft (15,000 m)
Vibration	operating	0.015 inch (0.38 mm) P-P displacement with 2.5 g peak (max) acceleration over 5-2000 Hz
	storage	0.030 inch (0.76 mm) P-P displacement with 5.0 g peak (max) acceleration over 5-2000 Hz
Shock	operating	30 g, 11 ms duration, half-sine shock pulse
	storage	50 g, 11 ms duration, half-sine shock pulse
Power	maximum	7.5 W
	typical	5.0 W
Current	maximum	+5V @ 1.5A
	typical	+5V @ 1.0A
Weight		4.3 oz

2. Installation

Before installing your EXM-10, you should unpack and inspect it for shipping damage.

- **DO NOT REMOVE THE MODULE FROM ITS ANTI-STATIC BAG UNLESS YOU ARE IN A STATIC-FREE ENVIRONMENT. THE EXM-10, LIKE MOST OTHER ELECTRONIC DEVICES, IS SUSCEPTIBLE TO ESD DAMAGE. ESD DAMAGE IS NOT ALWAYS IMMEDIATELY OBVIOUS, IN THAT IT CAN CAUSE A PARTIAL BREAKDOWN IN SEMICONDUCTOR DEVICES THAT MIGHT NOT IMMEDIATELY RESULT IN A FAILURE.**

- **ENSURE THAT THE INSTALLATION PROCESS AS DESCRIBED HEREIN IS ALSO PERFORMED IN A STATIC-FREE ENVIRONMENT.**

Insertion in an EXM Carrier

Insertion of the EXM-10 into an EXM carrier, such as the EXP-MC or the integrated EXM carriers in the EPC is straightforward. If you are using the EXM-10 with a VMEbus EPC, first ensure that the subplane has been inserted into the backplane. If an EXP-MC is being used, insert it in the desired VMEbus slot and attach it to the chassis. Then remove any blank EXM panel from the carrier (by unscrewing the thumbscrews) and insert the EXM-10 into the card guides. Firmly press the EXM-10 front panel to ensure that it has mated with the rear connector, and secure it with the thumbscrews.

- **MAKE SURE THAT POWER TO YOUR SYSTEM IS OFF. THE EXM IS NOT DESIGNED TO BE INSERTED OR REMOVED FROM A LIVE SYSTEM.**

- **WHEN INSERTING THE EXM, AVOID TOUCHING THE CIRCUIT BOARD, AND MAKE SURE THE ENVIRONMENT IS STATIC-FREE.**

Connectors

A 15-pin connector is provided on the front panel for connection to an external MAU for THICK ethernet. The connector is an AMP 745782-4 or equivalent socket and is defined as

Pin	Signal	Pin	Signal
1	GND	9	CD-
2	CD+	10	TX-
3	TX+	11	GND
4	GND	12	RX-
5	RX+	13	+12V Fused
6	GND	14	GND
7	No connect	15	No connect
8	GND		

Notes:
1. The minus sign next to a signal indicates active low
2. The plus sign next to a signal indicates active high
3. +12V is only supplied to pin 13 if the THICK parameter is selected in the option byte register, otherwise, this pin is open.

A BNC connector is provided for thin ethernet connection.

The EXM Configuration Program

The exmcfg.exe configuration program eliminates the need for the jumpers and DIP switches typically found on Ethernet cards. With the configuration program you select among a set of options. This information is recorded in the EPC's nonvolatile memory and is used by the EPC's BIOS at initialization to configure the EXM-10. You may specify the following options:

- Whether thick, thin, or extended thin Ethernet is to be used
- Whether the EXM-10 should be enabled or disabled at EPC initialization.

Thick Ethernet is typically yellow coaxial cable, with transceivers (MAUs) and transceiver drop (AUI) cables. Thin Ethernet uses a single RG58A/U-type coaxial cable with greater limitations on size and capacity than thick Ethernet (1000-meter total span including repeaters, 100 nodes per cable segment, 185-meter segment length without repeaters). The thin Ethernet transceiver is built into the EXM-10.

Execute exmcfg.exe from the diskette supplied with the EXM-10 or copy it from the diskette and execute it from the hard disk. This program must be run in a DOS environment. To execute it from the diskette, put the diskette in your EPC and type the following command:

```
a:exmcfg
```

The configuration program must be executed on the EPC in which you have installed the EXM-10. If you cannot execute the program (if, for example, your EPC has no hard disk or diskette drive), you may enter the configuration information at a lower level by using the EPC's BIOS setup screen. (See the section "Configuration Using BIOS Setup Screen.")

Exmcfg first displays a screen showing what devices *appear* to be installed in each EXMbus slot, and what devices are *described* as being installed in each slot. Follow the instructions and select the slot in which your EXM-10 is installed. (If you are installing multiple EXM-10s in your system, repeat these steps for each.)

The next screen, specific to the EXM-10, shows two categories of choices. You must make one selection from each of the categories. Your choices are shown in the following table:

Ethernet type	*EXM-10 status*
Thin	Disabled
Thick	Enabled
Extended thin	

Follow the instructions on the exmcfg screen to save the specified configuration in the EPC's nonvolatile RAM. After this, every time you boot or reset your EPC, the BIOS will initialize the EXM-10 in the specified slot to the specified configuration.

Network Interface Configuration

The second step in configuring the EXM-10 is to configure the network interface. The configuration you choose using the EZSetup program must not cause a conflict with other boards installed in the EPC.

The EZSetup program allows you to choose configuration options for the EXM-10. After specifying the appropriate options, you must save the configuration in the EXM-10's nonvolatile memory. The EXM-10 will remain configured even when the computer is powered off.

The ethernet node address information is required by some operating systems. Either look at the sticker on the EXM-10 or run the EZSetup program to determine the node address. The node address is a 12-digit hexadecimal number.

I/O Base Address

The EZSetup program can only reach the EXM-10 when the I/O space occupied by the EXM-10 does not conflict with I/O space assigned to another option board. In addition, the software drivers used with the EXM-10 must use the same I/O base address parameter as the EXM-10. Refer to the section "Modifying Software Drivers" to determine whether the I/O base address used by the EXM-10 requires a driver parameter change. The EXM-10 is programmed at the factory with I/O base address 240h. Choose the factory-programmed I/O base address or an optional address according to the guidelines set out in the following sections. A valid I/O base address is any address between 200h and 3C0h that is aligned on a 32-byte boundary. Examples are 200h, 220h, 240h, ... 3C0h.

Warning: If you mistakenly program the EXM-10 to use a base address that conflicts with another I/O device, then the EZsetup program will not be able to find the EXM-10 anymore. In this case, you will need to disable the other controller before attempting to reestablish a valid I/O base address for the EXM-10. Some common cases where this can occur are the SCSI controller on the EPC-7 which is at I/O address 340h and the EXM-16 which is also a SCSI controller at I/O address 340h. In the case of the EPC-7, place the SCSI controller at its alternate I/O address before trying to run the EZsetup program. See the EPC-7 Hardware reference manual for instructions on how to do this. For the EXM-16, turn the CDEN bit (bit 0 in the OB1 register) off for

the EXM-16 before trying to run the EZsetup program. This second example can be applied to other EXM's that conflict with the EXM-10, including other EXM-10's. All EXM's have a CDEN bit located in bit position zero of the OB1 register.

Interrupt

The EZSetup program also requires that you specify the interrupt to be used. You can specify IRQ2, IRQ3, IRQ4, or IRQ7. Some limitaions need to be observed when assigning interrupts. These are:

- If you use an EPC-2e you should not change the interrupt assignment. This was setup correctly at the factory.

- IRQ4, IRQ3 and IRQ7 are also used for COM1, COM2 and LPT1 respectively. If you are running software that uses one of these ports then do not assign that interrupt to the EXM-10.

Base Memory

The base memory can be set to a size of 8KB or 32KB. Use 8KB if you want to minimize the amount of high RAM that is used by the EXM-10. If you select 8KB, it can be located anywhere in the C or D-page of DOS memory on an 8-KB boundary. For example, C0000h, C2000h, C4000h, ... DE000h. If you select 32KB, it can be located on any 32KB boundary, e.g., C0000h, C8000h, D0000h, D8000h. Avoid using addresses from C0000h to C7FFFh if you are using a VGA controller. Also avoid using the C page for certain EPCs that do not have access to the EXMbus in the C page such as the EPC-2, EPC-3, EPC-4, and the EPC-7.

If you are using the DOS expanded memory manager or Microsoft Windows, you will need to be sure to exclude the area of memory reserved for the EXM-10 base memory. For instance, if the EXM-10 base memory size is 8K and is located at DE000h, include the following statement in the config.sys file:

```
device=c:\dos\emm386.exe x=de00-dfff ... other parameters ...
```

For Microsoft Windows, include the following statement in the [386Enh] section of the system.ini file:

```
EMMExclude=de00-dfff
```

Other parameters

The remaining setup parameters should be set as follows:

Add Wait States	yes
ROM Size	disabled
ROM Base Address	disabled

Single EXM-10

If no existing boards are installed in the range 240h to 25Fh, the EZSetup program will configure the EXM-10 to use the preprogrammed I/O base address of 240h.

You may need to configure a software driver if any other I/O base address, including the 240h factory default, is chosen. See the installation guide for your software driver.

Multiple EXM-10s

You must set each EXM-10 to use a unique I/O base address other than 240h. That way, as you install each succeeding EXM-10 with its factory default of 240h, no conflict will occur with preceding EXM-10s. Note that the software driver for each EXM-10 must be configured to match that EXM-10's actual I/O base address.

Other Functions

Verify that the I/O space assigned to the EXM-10 does not conflict with an existing option board. No other function can be assigned within that address range or a conflict will arise. If a conflict does occur between the EXM-10 and another option board, you must change either the address of the EXM-10 or the address of the other option board.

EZSetup Program

The EZSetup program is used to configure the EXM-10. The program allows you to do the following:

- Select one adapter to be configured from up to four adapters that may be installed.
- Automatically select a set of "generic" settings. These settings are suitable for most EPCs, but, if necessary, can be modified.
- Manually select configuration options (such as I/O base address and IRQ channel) for your specific installation.

Using the EZSetup Program

Make sure that network software is not running on the EPC. If network software is running on the EPC, you must reboot the EPC or unload the network software to ensure correct functioning of the EZSetup program.

To start the program, insert the diskette containing the EZSetup program, type a: and press Enter. Then, type ezsetup and press Enter. Note that the EZsetup program must be run in a DOS environment.

You must identify the EXM-10 in order to select it for configuration. If you installed a new EXM-10, it is listed on the menu as "WD8003EB" with the default I/O base address of 240h.

Check the parameters you choose against the configurations of other option boards. In some cases, the EZSetup program will display a message indicating an option that conflicts with another board. Make sure that the parameters displayed do not conflict with another LAN adapter or option board.

Note: If more than one EXM-10 requires configuration for the first time, see the section called "Configuring Additional EXM-10s."

Configuring a Single EXM-10

For a single EXM-10 installation, follow these steps:

1. Select the EXM-10 you just installed.
2. Change the EXM-10's I/O base address to any available location. **Note:** 280h is recommended because it allows you to use most software drivers without modification.
3. Select the other configuration options for this EXM-10, according to the screen instructions.
4. Save the configuration to the on-board memory.

If only one EXM-10 is to be installed, the configuration procedure is complete. Exit the EZSetup program and turn to the section called "Completing the Installation."

Configuring Additional EXM-10s

If you need to configure multiple EXM-10s for use in a single EPC, each EXM-10 must be inserted in your computer and configured, one at a time, *before* you insert the next EXM-10. EXM-10s are shipped with the default I/O base address of 240h. A conflict will occur if more than one unmodified EXM-10 is installed at a time. If I/O base address 240h is not available in your computer, disable the conflicting EXM and configure the EXM-10. To install more than one EXM-10, follow these steps:

1. Turn the EPC off, install one EXM-10, and turn the EPC on.
2. Invoke the EZSetup program and select the EXM-10 you just installed.
3. Specify for this EXM-10 any available I/O base address *other than* 240h.
4. Specify the other configuration options for this EXM-10.
5. Save the configuration to the on-board memory, then exit the EZSetup program.

Repeat this procedure until all EXM-10s are installed and configured. Make sure that no parameter conflicts occur among the EXM-10s.

Completing the Installation

With the adapter installed and fully configured, you are ready to check the installation and cable, install the software driver, and load the network software. Follow the instructions below.

This distribution diskette contains a collection of licensed software that Western Digital makes available for its WD8003 "Plus" family of Ethernet adapters. This software includes the setup program (EZSetup), a diagnostic program, and a collection of drivers for various network protocols and operating systems.

Each software package is a self extracting executable file that contains user documentation on how to use it, and release information about what has changed with this release. To extract the files, create a separate directory, copy the file to that directory and then execute the file. For instance to extract the EZSetup files, do the following in a DOS environment:

```
c:
mkdir setup
cd setup
copy a:\setp101.exe
setp101.exe
```

These files were all obtained from the Western Digital BBS (714-753-1234) under a license agreement between Western Digital and RadiSys Corp.

The readme.doc file on the distribution diskette will point you to the appropriate driver for the network software that you are using. Some additional installation notes follow. See Appendix A for a description of these files and their application.

Configuring the Software Drivers

The software driver for each installed adapter must use the actual parameters you saved with the EZSetup program for that adapter. The I/O base address, RAM base address, and IRQ channel used by each LAN adapter must agree with the values for those parameters that are used by the adapter's software driver. The method used to change the software driver parameters depends on the network operating system software you are using. The distribution diskette contains archive files for each software driver. When an archive file is expanded into a directory, the file install.doc in that directory provides specific instructions on modifying the software driver.

Loading the Network Software

When the EXM-10 and cable are installed and verified, load the network operating system software on the EPC. Use the instructions provided with the network software package.

Novell NetWare Installation

You may skip this section if you do not plan to use the EXM-10 on a Novell NetWare LAN using the Western Digital Ethernet protocol packet driver.

The diskette distributed with EXM-10 contains files that you need to copy to the disk(s) from which you generate NetWare shells. If you generate NetWare shells from the NetWare diskettes, follow these steps:

Copy files *.lan and *.obj to the NetWare diskette WSGEN. The files you need can be extracted from the file n21-308.exe on the distribution diskette. Once extracted, copy the following files to the WSGEN diskette:

wdplus.lan
wdplussh.lan
wdplusad.obj
wdplusbd.obj
wdpluscd.obj
wdplusdd.obj
wdplussh.obj

You may now run the NetWare Wsgen program. When you are directed to select the LAN driver, look for "WD Ethercard Plus V3.1EC" in the list. Select this menu item. In the next screen, select the item called "First SW configured Adapter".

Wsgen constructs a NetWare Ethernet driver specific to the EXM-10, called ipx.com. At this point you may need to run ECONFIG. You must run ECONFIG if

- Your NetWare configuration shares the same Ethernet cabling with other systems (such as a VAX);

- You use an Ethernet II topology (or what Novell calls Ethernet type 8137)

To do this type the following command:

```
econfig ipx.com shell:e 8137
```

You or your network administrator will typically copy this file and NetWare file netx.com (the file system redirecter for DOS) onto your EPC and insert these names (as programs to be executed) and a NetWare login command in your autoexec.bat file.

When IPX executes on your EPC (invoked from the autoexec.bat file, for example, when you boot), it should display a message indicating that it is the NetWare packet driver. If it indicates something else, you are using a version of ipx.com for some other network controller. The NETX program should display a message saying that you are attached to a particular file server (if you have connected your EPC to the network) or a message saying that no file server could be found (indicating you are not properly connected to a NetWare network).

IPX and NETX are also terminate-and-stay-resident programs (TSRs). The software structure is that IPX sits on the bottom and controls the EXM-10 hardware, NETX sits atop IPX and makes calls to it. Because of this, the two TSRs need to be invoked in this order —that is, your autoexec.bat file should contain the following lines in the order shown:

```
...
ipx.com
netx.com
f:login ...
```

TCP/IP Driver Installation

The packet driver (8003pkdr.exe) adheres to the PC/TCP Packet Driver Specification from FTP Software, Inc. A variety of software companies produce user-interface and LAN software based on this interface. A popular one is PC/TCP, a TCP/IP driver from FTP Software. PC/TCP, like the software distributed with the EXM-10, is a TSR. It can be invoked at the DOS prompt or from the autoexec.bat file (by placing its name after the invocation of 8003pkdr). For other drivers, consult the installation instructions shipped with them.

SCO Unix Installation

This section describes instructions for properly installing the TCP/IP and Lan Manager drivers of SCO Open Desktop version 1.1 or SCO Unix/386 version 2.0.

First, configure the EXM-10 using the methods described in the previous sections. Do this under DOS. The EZSetup and Diagnose programs are DOS programs.

After installation of the SCO Unix/386 or SCO Open Desktop environment, proceed with the installation of the WD8003E and TCP/IP drivers as detailed in SCO's documentation. Use the values that you defined in the EZSetup program for I/O base address, IRQ number, memory address and size.

All other aspects of installing the TCP/IP and LAN Manager packages and communicating with remote workstations is identical to that outlined in the SCO documentation.

Configuring an EXM-10

To configure an EXM-10, execute either of the programs EZSETUP. These programs allow you to configure the EXM-10's interrupt vector, I/O base address, and RAM buffer addresses. Executing these programs requires that the EPC be booted to DOS (not SCO UNIX), either from a DOS floppy or a DOS partition on the hard disk.

When installed in an EPC-2E, an EXM-10 must use IRQ3 as its interrupt vector. It may use 0x240, 0x280, or 0x320 as its I/O base address. It may use 8K bytes or 32K bytes of memory for its RAM buffers (initially, 8K bytes is recommended).

Note: Since IRQ3 is used by the COM2 serial port driver, the COM2 serial port driver must be disabled (see "Disabling the COM2 Serial Port Driver", below).

When installed in an EPC other than the EPC-2e, an EXM-10 may use IRQ2, IRQ3, or IRQ7 as its interrupt vector (IRQ2 is recommended). It may use 0x240, 0x280, or 0x320 as its I/O base address. It may use 8K bytes or 32K bytes of memory for its RAM buffers (initially, 8K bytes is recommended).

Notes: If IRQ3 is chosen as the EXM-10 interrupt vector, the COM2 serial port driver must be disabled (see "Disabling the COM2 Serial Port Driver", below). If IRQ7 is chosen as the EXM-10 interrupt vector, the parallel port driver must be disabled (see "Disabling the Parallel Port Driver", below).

Disabling the COM2 Serial Port Driver.

The SCO UNIX COM2 serial port driver can be disabled manually by carefully editing two kernel configuration files and rebuilding the kernel:

1. Edit the file /etc/conf/sdevice.d/sio. The file contains two lines:

   ```
   sio   Y   1   7   1   4   3F8   3FF   0   0
   sio   Y   1   7   1   3   2F8   2FF   0   0
   ```

   The line with a "3" in the sixth column specifies a serial I/O device driver on IRQ3. Change the "Y" in the second column of the line to "N" to remove the device driver from future kernel builds:

   ```
   sio   Y   1   7   1   4   3F8   3FF   0   0
   sio   N   1   7   1   3   2F8   2FF   0   0
   ```

2. Edit the file /etc/conf/pack.d/sio/space.c. In the section of this file defining non-microchannel devices is the line:

   ```
   {1,IBM_BOARD,1,3,1,sd(0x2f8),0,0,MCRBIT3}, /* ibm COM2 */
   ```

   This line defines the COM2 port in the serial I/O driver device table. Using "C" comment symbols, remove the line from the file:

   ```
   /*{1,IBM_BOARD,1,3,1,sd(0x2f8),0,0,MCRBIT3},*//* ibm COM2 */
   ```

3. The final step in disabling the COM2 serial port driver is to rebuild the kernel:

   a. Log in as root and execute **sysadmsh**, or simply log in as **sysadmsh**.

   b. Select the "System" option.

   c. Select the "Configure" option.

   d. Select the "Kernel" option.

   e. Select the "Rebuild" option to build a kernel. When prompted, specify that the new kernel should boot by default, and that a new kernel environment should be built.

   f. Exit **sysadmsh**.

g. Reboot your system ("**shutdown -g0**" or "**init 6**").

Disabling the Parallel Port Driver

The SCO UNIX parallel port driver can be disabled manually by carefully editing two kernel configuration files and rebuilding the kernel:

1. Edit the file /etc/conf/sdevice.d/pa. The file contains a single line:

   pa Y 1 3 1 7 378 37F 0 0

   The "7" in the sixth column specifies that the device driver will use IRQ7. Change the "Y" in the second column of the line to "N" to denote that the device driver should not be built into the kernel:

   pa N 1 3 1 7 378 37F 0 0

2. Edit the file /etc/conf/cf.d/mdevice. Included in the file is the line:

   pa ocIiw ictoHr pa 0 6 1 3 -1

   The "r" in the string in the third column specifies that the device driver is required in all kernel builds. Delete the "r" from the string in the third column:

   pa ocIiw ictoH pa 0 6 1 3 -1

3. The final step in disabling the parallel port driver is to rebuild the kernel:

   a. Log in as root and execute **sysadmsh**, or simply log in as **sysadmsh**.

   b. Select the "System" option.

   c. Select the "Configure" option.

   d. Select the "Kernel" option.

   e. Select the "Rebuild" option to build a kernel. When prompted, specify that the new kernel should boot by default, and that a new kernel environment should be built.

   f. Exit **sysadmsh**.

   g. Reboot your system ("**shutdown -g0**" or "**init 6**").

Venturecom VENIX Installation

Installing an EXM-10 ethernet controller requires that the EXM-10 be configured to execute effectively with the other devices in the system. VenturCom VENIX may also require configuration, depending on the EXM-10's configuration parameters.

Configuring an EXM-10

To configure an EXM-10, execute either of the programs EZSETUP or DIAGNOSE. These programs allow you to configure the EXM-10's interrupt vector, I/O base address, and RAM buffer addresses. Executing these programs requires that the EPC be booted to DOS (not SCO UNIX), either from a DOS floppy or a DOS partition on the hard disk.

When installed in an EPC-2E, an EXM-10 must use IRQ3 as its interrupt vector. It may use 0x240, 0x280, or 0x320 as its I/O base address. It may use 8K bytes or 32K bytes of memory for its RAM buffers (initially, 8K bytes is recommended).

Note: Since IRQ3 is used by the COM2 serial port driver, the COM2 serial port driver must be disabled (see "Disabling the COM2 Serial Port Driver", below).

When installed in an EPC other than the EPC-2e, an EXM-10 may use IRQ2, IRQ3, or IRQ7 as its interrupt vector (IRQ2 is recommended). It may use 0x240, 0x280, or 0x320 as its I/O base address. It may use 8K bytes or 32K bytes of memory for its RAM buffers (initially, 8K bytes is recommended).

Notes: If IRQ3 is chosen as the EXM-10 interrupt vector, the COM2 serial port driver must be disabled (see "Disabling the COM2 Serial Port Driver", below). If IRQ7 is chosen as the EXM-10 interrupt vector, the line printer driver must be disabled (see "Disabling the Line Printer Driver", below).

Disabling the COM2 Serial Port Driver.

The VenturCom VENIX COM2 serial port driver can be disabled manually by carefully editing a kernel configuration file and rebuilding the kernel:

1. Edit the file /etc/conf/sdevice.d/asy. The file contains two lines:

```
asy    Y    1    7    1    4    3F8    3FF    0    0
asy    Y    1    7    1    3    2F8    2FF    0    0
```

   The line with a "3" in the sixth column specifies a serial I/O device driver on IRQ3. Change the "Y" in the second column of the line to "N" to remove the device driver from future kernel builds:

```
asy    Y    1    7    1    4    3F8    3FF    0    0
asy    N    1    7    1    3    2F8    2FF    0    0
```

2. To remove the COM2 serial port driver from the kernel, a new kernel must be built and rebooted:

   a. Log in as root and execute **kconfig**.

   b. Select the "BUILD A KERNEL" option.

   c. When prompted, specify that the new kernel should be installed, specify the shutdown warning time, and confirm that a shutdown should occur.

Disabling the Line Printer Driver

The VenturCom VENIX line printer driver can be disabled using **kconfig**:

1. Log in as root and execute **kconfig**.
2. Select the "CONFIGURE KERNEL" option.
3. Select the "REMOVE DRIVER" option.
4. Select the "Line Printer Driver" option, if it is present, and confirm that the line printer driver should be removed. Otherwise, skip to the next step.
5. Return to the **kconfig** top-level menu (by specifying "m" as the selection to both the driver removal and configuration menus).
6. If earlier selections removed the line printer driver, a prompt will occur. Confirm that the modified system files should be saved.
7. Select the "BUILD A KERNEL" option.
8. When prompted, specify that the new kernel should be installed, specify the shutdown warning time, and confirm that a shutdown should occur.

Connecting to the Network

If you are using thick Ethernet, the final step is connecting the transceiver cable to the DB-15 connector on the EXM-10 front panel.

If you are using thin Ethernet, the final step is connecting the cable to the BNC connector on the front panel. Usually this is done with a "T" connector. If this EXM-10 is not the last station on the cable, the T connector should connect to two coaxial cables. If this EXM-10 is the last station, a terminator should be connected to one side of the "T" connector.

Diagnostics

When the LAN adapter is installed, use the Diagnostic program on the distribution diskette to check the adapter installation. The file `\diagnose\user.doc` (extracted from diag201.exe) provides instructions for using the program. Note that none of the Diagnostic program tests operate properly unless the adapter is attached to a properly-terminated network or to a BNC "T" connector that has two terminators connected. When the cables to each network computer are installed, use the Diagnostic program to check the network interconnection.

3. Operation

This chapter contains some notes on the operation of the EXM-10.

Front Panel LEDs

One LED on the EXM-10 front panel is labeled CA or cable active. It is lit whenever any station is transmitting on the network. The other is labelled TR or transmit. It is lit whenever the EXM-10 is transmitting a packet to the network.

Configuration Using BIOS Setup Screen

There are some rare situations in which you will be unable to run the EXM configuration program —if, for example, you have a diskless EPC-3 and the last thing you do before rebooting is to run the configuration program from the file server and disable the EXM-10. In such a situation, you must use the ROM-based BIOS Setup screen to configure the EXM-10. To do so, reboot your EPC, wait for the self-tests to complete, press Ctrl-Alt-Esc to invoke the Setup program, and press the designated function key to invoke the EXM menu. The screen should resemble the following example:

```
EXM Setup Screen

          ID OB1 OB2
Slot 0    F5  01  00
     1    FF  00  00
     2    FF  00  00
     3    FF  00  00
     4    FF  00  00
     5    FF  00  00
```

This screen displays the data (in hexadecimal) stored in nonvolatile memory describing the EXM configuration. ID is the device's ID (the ID for EXM-10 is F5, the ID for "no device expected" is FF). OB1 and OB2 are two bytes of option information. EXM-10 uses OB1 but not OB2.

To add or change an EXM-10 configuration, the ID byte should be set to F5 for the slot in which the EXM-10 resides, and OB1 should be set according to the following bit definitions:

Bits 2-1: *Ethernet type*		*Bit 0:* *EXM-10 status*	
`00`	Thin	`0`	Disabled
`01`	Thick	`1`	Enabled
`10`	Extended thin		

For instance, a typical OB1 value is 01h (00000001) representing normal length segments, thin cable, and EXM-10 enabled.

4. Programming Interface

The EXM-10 consists of a National Semiconductor DP8390 Ethernet controller, a Western Digital WD83C583 ATbus interface, an EXMbus interface, transceiver and cable interfaces, and an 8-bit-wide 16 kilobyte buffer RAM. Most of the programming interface is defined by the DP8390 and WD83C583 chips. The Western Digital and National Semiconductor manuals for these chips are useful references that you may want to keep at hand.

EXMbus Configuration Registers

The EXM-10 contains two additional ports in the I/O space for configuration. It responds to accesses at these ports only if EXMbus line -EXMID is asserted.

An 8-bit read from I/O address 100h returns the value `F5`. This is the device ID of an EXM-10.

A read/write configuration register appears at I/O address 102h. Its format is

Bits 7-3	Bit 2	Bit 1	Bit 0
Reserved	Extend	Type	CDEN

where

Extend — Specifies whether extended (500 meter) or normal (300 meter) thin Ethernet is used. `0` signifies normal segment length, `1` signifies extended segment length. This bit has no effect when Type is 1 (thick Ethernet). When using the extend mode, the following restrictions apply:

1. All other cards on the same segment must be set the same.
2. The interface is not fully compliant with IEEE802.3
3. Repeaters are not allowed.

Type	Specifies whether thick or thin Ethernet is used. `0` signifies thin Ethernet, `1` signifies thick Ethernet.
CDEN	Specifies whether the EXM-10 is enabled or disabled. If disabled (`0`), the EXM-10 will not respond to any I/O or memory address accesses and will not assert an interrupt output; it will only respond to reads from I/O port 100h and reads and writes from I/O port 102h, and then only if EXMbus line -EXMID is asserted.

5. Support and Service

If you have questions or problems, call 800-950-0044 or 503-646-1800 between the hours of 8 AM and 5 PM Pacific time. Technical support is provided for users who purchased their system from RadiSys or a RadiSys sales representative; if you purchased your system elsewhere, you should contact that party for support.

Repair

Repair service under the standard warranty is provided to the original purchaser. Products returned for warranty repair that are found to be fully functional will be subject to a recertification fee. Typical turnaround time for repair and recertification is five working days (exclusive of shipping time).

Out-of-warranty service is subject to a service charge. After the damaged product is analyzed, the customer will be given a cost estimate and asked for authorization to proceed. All repairs are warranted for 90 days or the balance of the warranty period, whichever is greater.

Shipping

Products requiring service may be returned to RadiSys, shipping prepaid, after issuance of a return materials authorization (RMA). Return authorization may be obtained by calling customer service (800-950-0044) with the product model, serial number, and problem description. Proper packaging, preferably the original shipping containers, should be used. Be sure to use anti-static and padded packaging, and to include a written description of the problem. The customer assumes all liability for loss or damage in transit in both directions. Unless otherwise agreed in advance, products will be returned to the customer with shipping and any repair charges due on delivery. Ship the product needing service, freight prepaid, to:

Product Service Center
RadiSys Corporation
15025 S.W. Koll Parkway
Beaverton, OR 97006 USA

Replacement Parts

The following replacement parts can be ordered from the address above. When ordering parts, please include the serial number of your EXM-10.

Part Number	Description
07-0065	EXM-10 Manual
40-0090	BNC 'T' Connector

Appendix A

This README.DOC file is supplied by RadiSys Corp.
Last Updated: June, 1991.

This directory contains a collection of software that Western Digital makes available for its WD8003 "Plus" family of Ethernet adapters. This software includes the setup program, a diagnostic program, and a collection of drivers for various network protocols and operating systems.

Each software package contains user documentation on how to use it, and release information about what has changed with this release.

These files were all obtained from the Western Digital BBS (714-753-1234).

Information from the Western Digital BBS

The BBS had the following information on these files:

Some of the following files have been compressed for downloading convenience (specifically when there is a family of files required). The compressed files are self-extracting and have a file extension of .EXE. To restore the file after you download, place it into an empty sub-directory and type the FILENAME without the .EXE extension.

THE DRIVERS LISTED BELOW HAVE BEEN CLASSIFIED AS FOLLOWS:

C = CURRENT RELEASE: Current release drivers are drivers that have been fully tested and released by Western Digital. Current release drivers are production level drivers.

B = BETA DRIVERS: Beta drivers are drivers that have completed most of Western Digital's test process. Western Digital makes these drivers available to the field to verify that these drivers operate as we expect.

A = ALPHA DRIVERS: Alpha drivers are drivers that have been installed and appear to function however Western Digital has not started formal testing. An Alpha driver is often a revised driver that has been changed to fix a specific problem.

P = PRE-ENGINEERING RELEASE: Pre-engineering release drivers are drivers that have been modified and, because of equipment/test-bed limitations, have not been tested by Western Digital.

O = OTHER UTILITIES

ANET3COM.EXE	O	ANET3.COM FOR ELS 1 VER 3.05	05-24-90
ADF.EXE	O	ADF INSTALL FILES FOR MICROCHANNEL	05-24-90
NADDUTIL.EXE	O	ETHERNET NETWORK ADDRESS UTILITY	05-24-90
NWPATCH.EXE	O	NETWARE PATCH UTILITY VER 1.06	05-24-90
NB30112.EXE	C	NETBIOS PROGRAM - VER 3.01.12	11-16-90
SETP101.EXE	C	EZSETUP PROGRAM - VER 1.01	11-16-90
DIAG201.EXE	C	ETHERNET DIAGNOSTIC PROG - VER 2.01	11-16-90
DEC301.EXE	C	DECNET/PCSA DRIVER - VER 3.01	11-16-90
PKDR201.EXE	C	NETWARE/TCP\IP PACKET DRVR -VER 2.01	11-16-90
N20-308.EXE	C	NETWARE 2.0A DRIVER - VER 3.08	11-16-90
N21-308.EXE	C	NETWARE 2.1X DRIVER - VER 3.08	11-16-90
N31-203.EXE	C	NETWARE 386 3.1 - VER 2.03	11-16-90
NFS203.EXE	C	SUN PC/NFS DRIVER - VER 2.03	11-16-90
NDIS.EXE	A	NDIS (LAN MANAGER) DRIVER - VER 1.06	11-16-90
3PSHAR.EXE	A	3+ SHARE DRIVER - VER 2.10	11-16-90
OS2R.EXE	A	NOVELL OS2 REQUESTOR DRIVER -VER 1.2	11-16-90

Notes on DIAG201.EXE

The version of the Diagnose program found on the distribution diskette is slightly different than the version found in the DIAG201.EXE archive. The difference is that the version in the root directory on the distribution diskette was patched to reflect the RadiSys's IEEE assigned Ethernet group address instead of the Western Digital's IEEE assigned Ethernet group address.

Here's how that patch was done (using DEBUG):

```
C> copy diagnose.exe diagnose.tmp
C> debug
-n diagnose.tmp
-l 7000:0
-s 8000:0 l ffff "OEM Node Address:"
8000:B424
-d 8000:b424 l 14
8000:B420       4F 45 4D 20-4E 6F 64 65 20 41 64 64   OEM Node Add
8000:B430       72 65 73 73 3A 00 00 C0               ress:...
-e 8000:b437 50
-w 7000:0
Writing 0BF7 bytes
-q
C> comp diagnose.exe diagnose.tmp

C:DIAGNOSE.EXE and C:DIAGNOSE.TMP

Compare error at OFFSET 1B437
File 1 = C0
File 2 = 50
EOF mark not found

C> del diagnose.exe
C> rename diagnose.tmp diagnose.exe
```

And that's the only difference. Once this patch is made, the Western Digital diagnostic program will function correctly with the EXM-10.

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