Software Manual

Digi Intelligent Asynchronous Serial Communications Solutions

Device Drivers for MS-DOS 2.0 - 6.x

Digi International Inc.	Phone	(800) 344-4273
11001 Bren Road		(612) 912-3444
Minnetonka, MN 55343	FAX	(612) 912-4952
	BBS	(612) 912-4800
Digi International GmbH	Phone	+49 221 920520
Domkloster 1	FAX	+49 221 9205210
50667 Köln	BBS	+49 221 9205211
Germany		
Digi International Asia Pte Ltd	Phone	+65 732 1318
13-06 Tower 'A'	FAX	+65 732 1312
391A Orchard Road	BBS	+65 292 7163
Ngee Ann City		
Singapore 0923		

Table of Contents

Digi C/X System

Introduction

This device driver supports Digi C/X systems for ISA, EISA and Micro Channel platforms under most versions of MS-DOS.

This device driver is software-compatible at the Interrupt 14h level with the universal DOS device drivers for Digi Xe, PC/Xi, PC/Xe, COM/Xi and MC/Xi intelligent asynchronous serial communication boards, and for Digi Xem systems.

This device driver may co-reside with the above-mentioned DOS device drivers, so that Digi C/X systems and Digi asynchronous serial boards can operate in the same computer system.

Features

- Full DOS command-line support (COPY to or from ports, redirect input or output with "<>", etc.)

- 28 Interrupt 14h BIOS calls

- 6 Interrupt 14h EBIOS calls

- Receive buffer status (empty or not empty) can be monitored by checking a flag in host memory

- Supports baud rates of up to 115,200

Hardware Installation

This section provides the information necessary to configure C/X host adapters for use with the DOS device driver, and has been divided into three sub-sections, one for each of the three host adapters supported by the device driver. If you are installing an ISA host adapter, the configuration information starts on the next page. The EISA configuration begins on page 7. If you are installing a Micro Channel host adapter, skip to page 8.

C/X - ISA Host Adapters

Install the C/X - ISA host adapter according to the instructions provided in the *Installation Guide* that came with the host adapter. The driver supports up to four C/X - ISA host adapters, and a maximum of 256 ports. C/X - ISA host adapters may also be installed in EISA machines, either alone, or in combination with EISA host adapters (up to a combined total of four).

Set each ISA host adapter's I/O port address to one of the following:

108, 118, 128, 208, 228, 308 or **328**

I/O port addresses must be unique, and may not be shared by any other device, including other Digi products.

The C/X DOS device driver configuration utility will configure the board for a memory start address and IRQ line.

C/X - EISA Host Adapters

Install the C/X - EISA host adapter according to the instructions provided in the *Installation Guide* that came with the host adapter.

Run the EISA configuration utility (`CF.EXE`) each time you either add or remove an C/X - EISA host adapter.

Make sure that "Dual-Ported Mem Address" is below 1 Meg and "Dual-Ported Mem Enbl/Dsbl" is set to "Disabled". Multiple C/X - EISA host adapters may share the same memory start address.

Select one of the IRQ numbers listed below, and set "Interrupt Configuration" accordingly:

3, 5, 7, 10, 11, 12, 15 or None

IRQ numbers must be unique, and may not be shared by any other device, including other Digi products.

NOTE—IRQs only need to be enabled if you are using the Character Ready feature of the driver (see Enabling/Disabling the Character Ready Flags, on page 20, for more information).

C/X - MC Host Adapters

Install the C/X - MC host adapter according to the instructions in the *Installation Guide* that came with the host adapter. The Automatic Configuration program will make address and IRQ selections that do not conflict with other devices.

NOTE—IRQs only need to be enabled if you are using the Character Ready feature of the driver (see Enabling/Disabling the Character Ready Flags, on page 20, for more information).

Device Driver Installation

This section describes the configuration and installation of the DOS device driver. The procedures described are used for the first-time configuration of the driver, as well as any future reconfiguration. With few exceptions, the procedures are identical regardless of which C/X host adapter you have installed. Differences will be noted as appropriate.

Power up your computer, boot DOS, and copy **cxdrv.exe**, a self-extracting file containing the device driver software and setup program, onto your hard disk. You may place the files in the root (\) directory, or a subdirectory of your choice. An example follows:

```
C:\> md digi
C:\> cd digi
C:\DIGI> copy a:\cxdrv.exe
C:\DIGI> cxdrv
```

The last command runs the self-extracting file **cxdrv**, causing the device driver and setup program to be uncompressed. Now run the device driver setup program:

```
C:\DIGI> cxdoscfg
```

The setup program will configure the DOS device driver so that it can communicate with the boards you have installed, and set the parameters the boards will use to communicate with remote serial devices.

After configuring the driver with the setup program for the first time, be sure to save the configuration. The setup program modifies **cxdos5.pgm** and writes it back to the hard disk as **cxdos5.sys**. The device driver configuration can be subsequently reviewed or changed at any future time by running **cxdoscfg.exe**.

The following pages describe the use of the setup program.

ISA Host Adapter Parameters

If you are installing the ISA version of the C/X system, your initial screen will look similar to this:

```
                    Digi CONFIGURATION PARAMETERS

   Board     Type    Memory     I/O     IRQ    # Brd    Start    Driver
     #                Window    Port      #     Chnls    Chnl#   Support

                     Driver configured for 0 boards.
```

```
Configuration Selections :

Q)uit    A)dd Board

Enter Selection :
```

The first time you run **CXDOSCFG**, the parameters will all be empty, because no boards have been configured.

Select "**A)dd Board**". You will be asked for the memory start address for the host adapter (NOTE—ISA host adapters may share the same memory start address):

```
Memory Window Starting Addresses :

8) 80000h  9) 90000h  A) A0000h  B) B0000h  C) C0000h  D) D0000h  E) E0000h
F) 88000h  G) 98000h  H) A8000h  I) B8000h  J) C8000h  K) D8000h  L) E8000h

Enter Selection :
```

Enter the letter that corresponds to the memory start address you have chosen for the host adapter. In most DOS systems, only addresses **C0000h**, **C8000h**, **D0000h** and **D8000h** are available for installable peripherals, and of these, **D0000h** and **D8000h** are the most likely to be available (EGA and VGA cards use memory in the C0000h-C7FFFh range, and many hard disk controllers use memory in the C8000h-CFFFFh range).

Next you will be asked to identify the I/O port address you have set on the host adapter's DIP switches (I/O port addresses must be unique for each board):

```
Board I/O Port Selections :

   A) 108h   B) 118h   C) 128h   D) 208h   E) 228h   F) 308h   G) 328h

Enter Selection :
```

Choose the address that corresponds to the host adapter you are configuring.

Now select an IRQ for the host adapter:

```
IRQ Selections :

    A) 3   B) 5   C) 7   D) 10   E) 11   F) 12   G) 15   H) Disabled

Select IRQ Number :
```

NOTE—IRQs only need to be enabled if you are using the Character Ready feature of the driver (see Enabling/Disabling the Character Ready Flags, on page 20, for more information).

Now you need to identify the concentrators connected to the host adapter. You will see:

```
The Concentrators on Board 1 are:

 Conc1    Conc2    Conc3    Conc4    Conc5    Conc6    Conc7    Conc8
-------  -------  -------  -------  -------  -------  -------  ------


Please enter the Concentrator number to be changed:
```

Enter the number (1-8) of the concentrator you wish to configure. You are now given the option to add, remove or change the selected concentrator. If this is a new installation, no concentrators will be currently configured, so type "**A**" to select Add Concentrator. You will asked to select the type of concentrator. Type "**A**" for a C/CON-8 concentrator, or "**B**" for a C/CON-16 concentrator.

If you selected a C/CON-16, your screen will now look something like this:

```
                    Digi CONFIGURATION PARAMETERS

   Board     Type    Memory    I/O    IRQ    # Brd    Start    Driver
     #                Window    Port    #     Chnls    Chnl#    Support
════════════════════════════════════════════════════════════════════

     1       C/X     D8000h    0208    10     16        4      DOS/EBIOS
   └────────────────────────────────────────────────────────────────

Configuration Selections :                       Use Arrow Keys  ▲ ▼ ◄ ►

Q)uit   S)ync Config   C)hnl Params   O)ptions   A)dd Board   R)emove Board

Enter Selection :
```

If you have more than one concentrator, use the arrow keys to highlight **# Brd Chnls**. When asked for the number of the concentrator to be changed, type "**2**", then select the concentrator. This time you will be shown the sync line characteristics for each concentrator. Type "**Q**" to leave the default values in place (you can change them later, if appropriate). Repeat this procedure for all concentrators (up to eight) connected to the host adapter.

If you have more than one host adapter, use the arrow keys to highlight **Board #**, then type "**A**" to add a board. Configure the second host adapter (and any

remaining boards) as you did the first. The memory window address can be the same for all boards, but the I/O Port address and IRQ (unless it is disabled) must be unique for each board installed.

Now proceed to page 15 to set up the EIA-422 synchronous line configuration, channel parameters, options, starting channel number and driver support.

EISA Host Adapter Parameters

The C/X configuration utility gets its I/O port, memory start address and IRQ setup information for EISA host adapters from the EISA system configuration. Your initial screen will look something like this:

```
                       Digi CONFIGURATION PARAMETERS

      Board      Type      Memory     I/O      IRQ     # Brd     Start     Driver
        #                  Window     Port      #      Chnls     Chnl#     Support
     ═══════════════════════════════════════════════════════════════════════════

         1       C/X       D8000h     2005     10       16         4       DOS/EBIOS
         2       C/X       D8000h     3005      5       16        20       DOS/EBIOS
         3       C/X       D8000h     4005     12       16        36       DOS/EBIOS
     └──────────────────────────────────────────────────────────────────────────

     Configuration Selections :                          Use Arrow Keys  ▲ ▼ ◄ ▶

     Q)uit    S)ync Config    C)hnl Params    O)ptions    A)dd Board    R)emove Board

     Enter Selection :
```

Now proceed to page 15 to set up the EIA-422 synchronous line configuration, channel parameters, options, starting channel number and driver support.

Installing ISA Host Adapters in EISA Machines

C/X - ISA host adapters may be installed in EISA machines, but since the EISA configuration utility doesn't recognize ISA boards, they must be configured manually.

To install an ISA host adapter, select the option "**A)dd Board**" from the menu, then follow the procedure for installing ISA host adapters, beginning on page 10. The ISA board will be identified in the configuration table as "C/X ISA" to differentiate it from any EISA host adapters (which will be identified simply as "C/X").

To remove an ISA host adapter from the configuration, use the arrow keys to highlight the number of the board you wish to remove, and select "**R)emove Board**" from the menu.

NOTE—The "A)dd Board" and "R)emove Board" options affect only ISA host adapters. EISA host adapters must be added or removed through the EISA configuration utility.

Micro Channel Host Adapter Parameters

If you are installing the Micro Channel (PS/2) version of the C/X system, the configuration program will automatically find the memory and I/O addresses and the IRQ for each host adapter from the computer's Programmable Option Select (POS). Your initial screen will look something like this:

```
                    Digi CONFIGURATION PARAMETERS

  Board      Type    Memory     I/O     IRQ    # Brd    Start     Driver
    #                Window     Port      #    Chnls    Chnl#     Support
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

    1        C/X     D8000h     0108     3      16        4       DOS/EBIOS
    2        C/X     D0000h     0118     5      16       20       DOS/EBIOS
    3        C/X     C8000h     0128     7      16       36       DOS/EBIOS
└───────────────────────────────────────────────────────────────────────┘

Configuration Selections :                        Use Arrow Keys ▲ ▼ ◀ ▶

Q)uit   S)ync Config   C)hnl Params   O)ptions

Enter Selection :
```

To change board parameters, you must boot your system with the Reference Diskette, and run the IBM configuration program.

Now proceed to page 15 to set up the EIA-422 synchronous line configuration, channel parameters, options, starting channel number and driver support.

Channel Parameters and Options (All Boards)

This section applies to the ISA, EISA and Micro Channel versions of the C/X system.

Once the host adapter's hardware parameters (I/O port, memory start address and IRQ) have been set up, you need to set up the EIA-422 synchronous serial channel transmission characteristics, EIA-232 asynchronous serial line parameters and device driver support parameters.

Host Adapter Synchronous Channel Transmit Configuration

To set the host adapter synchronous channel transmit configuration, use the arrow keys to highlight the number of the board you wish to configure, and select "**S)ync Config**", then select "**H)ost Adapter**". You will see the following:

```
        C/X Host Adapter #1 Transmit Configuration


                                     Use Arrow Keys ▲ ▼ ◀ ▶
        Line      Mode      Clock      Speed
         1        8-Wire    Internal   1.2M
         2        8-Wire    Internal   1.2M

        Q)uit
```

Use the arrow keys to select the wiring method, clock type and baud rate for each of the host adapter's synchronous lines. If the host adapter synchronous line is to be connected directly to a concentrator, the recommended setting is 8-wire, internal clocking and 1.2 megabaud. If the host adapter will be communicating with the concentrator via synchronous modem, select 8-wire, external clocking, and the fastest baud rate your modem can support without errors. Modems may only be placed between the host adapter and the first concentrator of a daisy chain.

Concentrator Synchronous Channel Transmit Configuration

This procedure is automatically invoked whenever the number of channels to be supported is changed (see the procedure on the following page). If your host adapter is already configured for the correct number of channels, you may invoke the procedure manually as follows:

Use the arrow keys to highlight the number of the host adapter you wish to configure, then select "**S)ync Config**" from the menu, then select "**C)oncentrators**". You will see the following:

```
       Conc #      Line      Mode      Clock     Speed

          1          1      8-Wire    Internal    1.2M
          2          1      8-Wire    Internal    1.2M
          3          1      8-Wire    Internal    1.2M
          4          1      8-Wire    Internal    1.2M
          5          2      8-Wire    Internal    1.2M
          6          2      8-Wire    Internal    1.2M
          7          2      8-Wire    Internal    1.2M
          8          2      8-Wire    Internal    1.2M

       Q)uit
```

Use the arrow keys to select each field you wish to change, and select "**Q)uit**" when all desired changes have been made.

The configuration utility will automatically set the transmission characteristics of the last concentrator on each host adapter line to match the characteristics set for that line. Toggling the wiring mode of any concentrator between 8-wire and 4-wire causes all concentrators on the same host adapter line to be similarly toggled, and the host adapter line itself is reconfigured to the new mode. All concentrators except the last one of a chain are automatically configured for internal clocking. The last one is configured to match the clocking method of the host adapter line to which it is connected.

If any concentrator is configured for Line 1, all concentrators above it in the list will also be configured for Line 1. If any concentrator is configured for Line 2, all concentrators below it in the list will also be configured for Line 2.

Setting the Number of Channels

EISA and Micro Channel Host Adapters

If you are installing EISA or Micro Channel host adapters, the driver is automatically configured for one C/CON-16 concentrator per host adapter. If you are connecting two or more concentrators to a single host adapter, or you are installing a C/CON-8 instead of a C/CON-16, you must adjust the number of channels supported for that board (default is 16). Use the arrow keys to move the cursor to the "**# Brd Chnls**" field for the host adapter you wish to modify. You will be shown a list of currently configured concentrators:

```
The Concentrators on Board 1 are:

 Conc1    Conc2    Conc3    Conc4    Conc5    Conc6    Conc7    Conc8
-------  -------  -------  -------  -------  -------  -------  ------
C/CON-16

Please enter the Concentrator number to be changed:
```

Enter the number (1-8) of the concentrator you wish to configure. You are now given the option to add, remove or change the selected concentrator. If you select Add or Change, you will be given the choice of Adding (or changing to) either a C/CON-16 or C/CON-8 concentrator.

Each time you change or add a concentrator, you will be given the option to change the synchronous line configuration for all concentrators currently installed on the currently selected host adapter. Type "Q" to leave the default values, or edit the configuration as described on page 16. If you are adding concentrators in a new installation, it is convenient to leave the default values until all concentrators have been added, then configure the all sync lines at once.

ISA Host Adapters

If you are installing an ISA host adapter, you already performed this step during the "**Add Board**" procedure. If you wish to change the configuration, follow the procedure above.

Setting the Starting Channel Number

The **Start Chnl #** (also referred to as DX-LOW) is defined as the channel number of the first port on board #1, and is the lowest channel number that will be supported by the C/X DOS device driver. All ports on all boards for which the device driver has been configured are numbered sequentially, beginning with the Start Chnl #. The configuration display shows the Start Chnl # for each host adapter, but it can only be changed for the first board.

To set the starting channel number, use the arrow keys to highlight the Start Chnl # for Board # 1. When prompted, enter the new number. The Start Chnl # for any remaining boards will automatically be updated.

Driver Support

The DOS device driver can support DOS calling conventions (using a COM name such as COM5), Interrupt 14h BIOS calls and EBIOS functions (refer to the file **INT14.TXT** in the directory where you extracted the device driver and configuration utility files). Interrupt 14h support is always included in the driver. DOS and EBIOS support can be removed from the driver, if desired, to make the driver more compact. This is useful for large application programs which use only the Interrupt 14h routines to communicate with the boards.

Use the arrow keys to highlight the Driver Support item for any board. You will be given the option of including DOS support, EBIOS support, both, or neither along with the standard Interrupt 14h support.

Setting the Asynchronous Channel Parameters

Asynchronous channel parameters are set on a board-by-board basis. To change the channel parameters for a board, use the arrow keys to highlight the number of the board for which you wish to change the parameters, then select **"C)hannel Parameters"**. You will be presented with a display similar to this:

```
Enter Concentrator # (1-8) :


            Conc #      Line      Mode       Clock      Speed

              1          1       8-Wire    Internal     1.2M
              2          1       8-Wire    Internal     1.2M
              3          1       8-Wire    Internal     1.2M
              4          1       8-Wire    Internal     1.2M
              5          2       8-Wire    Internal     1.2M
              6          2       8-Wire    Internal     1.2M
              7          2       8-Wire    Internal     1.2M
              8          2       8-Wire    Internal     1.2M
```

Select the concentrator for which you wish to change parameters. You will see the following screen:

```
                           BOARD 1 PARAMETERS
   CHANL      BAUD      MODE      RX FLOW        TX FLOW         NAME
   ═════════════════════════════════════════════════════════════════

     4        57600     8,N,1      XON            XON           COM5
     5        57600     8,N,1      XON            XON           COM6
     6        57600     8,N,1      XON            XON           COM7
     7        57600     8,N,1      XON            XON           COM8
     8        57600     8,N,1      XON            XON           COM9
     9        57600     8,N,1      XON            XON           COM10
    10        57600     8,N,1      XON            XON           COM11
    11        57600     8,N,1      XON            XON           COM12
    12        57600     8,N,1      XON            XON           COM13
    13        57600     8,N,1      XON            XON           COM14
    14        57600     8,N,1      XON            XON           COM15
    15        57600     8,N,1      XON            XON           COM16
    16        57600     8,N,1      XON            XON           COM17
    17        57600     8,N,1      XON            XON           COM18
    18        57600     8,N,1      XON            XON           COM19
    19        57600     8,N,1      XON            XON           COM20

Q)uit    S)et All                              Use Arrow Keys  ▲ ▼ ◀ ▶

Select Parameter :
```

Use the arrow keys to highlight the parameter you wish to change. In each case you will be presented with the available options for that parameter. If you wish to have the same parameters for all channels, set up one of the channels in the table as desired, then select "**S)et All**" (you need to have the channel number highlighted). "**S)et All**" sets all parameters of all channels to match the selected channel.

Enabling/Disabling the Character Ready Flags

The DOS device driver provides a method of quickly checking the status of the input buffers (received data) for an empty or not-empty condition, without having to set up and execute an BIOS Interrupt 14h function call each time. This is done through the Character Ready Flags, which are bytes in the host computer's RAM (they are located within the body of the device driver itself), which can be simply checked for a zero or non-zero condition to determine whether the associated input buffer is empty or not empty, respectively.

The FEPOS (Front-End Processor Operating System—the on-board software which controls the actual functions of the host adapter) constantly monitors the input buffers for which Character Ready Flags are enabled, and as soon as a buffer changes from empty to not empty, the board generates an interrupt request (IRQ). The interrupt handler in the DOS device driver sets the appropriate Character Ready Flag and returns control to the application program, which must periodically check the flags to see if there is data waiting in the input buffer. If a flag is set (non-zero; the byte will actually contain FFh), there is at least one character in the receiving buffer. When the last character has been read from the buffer, the DOS device driver will automatically reset the flag to 00h.

Since the location of the flags is dependent upon where the DOS device driver has been loaded in memory, Interrupt 14h, Function 0Dh - Get Pointer to Character Ready Flag, has been provided (see the text file **INT14.TXT**, in the directory where you extracted the device driver and configuration utility files, for a full explanation of the function). This function should be run as part of the initialization of any application program which will use the Character Ready Flags, and since each channel has its own flag, the function must be run for each channel that will be monitored via Character Ready Flags.

The board and driver must be configured for an IRQ line for this feature to work.

To configure the DOS device driver to use the Character Ready Flags, use the arrow keys to highlight the number of the board you wish to configure, and select "**O)ptions**" from the main menu, then select "**C)har Ready Flags**" and specify the concentrator number. You will be presented with a screen similar to this:

```
Board 1 Character Ready Flag Status

       Chnl  4 : Disabled        Chnl  5 : Disabled
       Chnl  6 : Disabled        Chnl  7 : Disabled
       Chnl  8 : Disabled        Chnl  9 : Disabled
       Chnl 10 : Disabled        Chnl 11 : Disabled
       Chnl 12 : Disabled        Chnl 13 : Disabled
       Chnl 14 : Disabled        Chnl 15 : Disabled
       Chnl 16 : Disabled        Chnl 17 : Disabled
       Chnl 18 : Disabled        Chnl 19 : Disabled

Change :

T)oggle One Channel  E)nable All Channels  D)isable All Channels
Q)uit
```

To enable or disable the Character Ready Flag for an individual channel, select "**T)oggle One Channel**", then enter the number of the channel to be modified. If previously disabled, that channel will now be enabled, and vice versa. There are also menu items to enable or disable Character Ready Flags for all channels with a single keystroke. When all channels have been set as desired, select "**Q)uit**" to return to the main menu.

Enabling/Disabling the ALT PIN Feature

This feature internally swaps the signals DCD (Data Carrier Detect) and DSR (Data Set Ready). This is useful for concentrator models that are equipped with RJ-45 modular jacks for the serial connections. The DCD signal is normally on pin 10 of the RJ-45 jack, which makes it inaccessible to 8-pin RJ-45 plugs.

When the ALT PIN feature is enabled, pin 2 of the 10-pin RJ-45 connector will be interpreted by the driver as the DCD signal. This corresponds to pin 1 of an 8-pin RJ-45 connector. Pin 10 then becomes DSR (and is inaccessible to 8-pin RJ-45 plugs).

To configure the DOS device driver to use the alternate pin assignments, use the arrow keys to highlight the number of the board you want to configure, and select "**O)ptions**" from the main menu, then select "**A)lt Pin**" and specify the concentrator number. You will be presented with a screen similar to this:

```
Board 1 Alt Pin Status

    Chnl  4 : Disabled        Chnl  5 : Disabled
    Chnl  6 : Disabled        Chnl  7 : Disabled
    Chnl  8 : Disabled        Chnl  9 : Disabled
    Chnl 10 : Disabled        Chnl 11 : Disabled
    Chnl 12 : Disabled        Chnl 13 : Disabled
    Chnl 14 : Disabled        Chnl 15 : Disabled
    Chnl 16 : Disabled        Chnl 17 : Disabled
    Chnl 18 : Disabled        Chnl 19 : Disabled

Change :

T)oggle One Channel  E)nable All Channels  D)isable All Channels
Q)uit
```

To enable or disable the ALT PIN feature for an individual channel, select "**T)oggle One Channel**", then enter the number of the channel to be modified. If previously disabled for that channel, Alt Pin processing will now be enabled, and vice versa. There are also menu items to enable or disable Alt Pin processing for all channels with a single keystroke. When all channels have been set as desired, select "**Q)uit**" to return to the main menu.

Memory Enable/Disable Option (ISA and EISA)

The dual-ported memory on the ISA and EISA versions of the C/X host adapter is "stackable"—that is, all host adapters in a system can share the same memory addresses, since only one board's memory is turned on at any given time.

The DOS device driver normally leaves a board's memory turned on after writing to that board, and only switches it off when it needs to talk to a different board with the same memory start address.

Sometimes, however, it is desirable to keep the host adapters' memory turned off when the driver is not actually performing a read or write operation. The most common situation where this is desirable is when an 8-bit board (such as a VGA or EGA card) resides in the same 128K region (e.g. C0000h—DFFFFh) as the host adapter. The C/X host adapter is a 16-bit board, and when a 16-bit device and an 8-bit device inhabit the same 128K block, the 8-bit device can only address even-numbered bytes. By keeping the host adapters' memory disabled when not in use, this can minimize potential 8-bit/16-bit memory conflicts.

To configure the DOS driver to leave the host adapter's memory disabled when not in use, highlight the board you wish to change (use the arrow keys), select "**O)ptions**", then select "**L)eave Memory Enabled**". You will see the following choices:

```
Current Status : Leave Memory Enabled.

 Leave Memory    D)isabled     E)nabled

Enter Selection
```

After making your selection, you will be returned to the main menu.

Exiting the Setup Program

Once all of the parameters have been set as desired for each board, exit the setup program by selecting "**Q)uit**" from the main menu. If the driver is already loaded and the host adapter(s) installed, you will be asked:

```
Re-configure the Board? (y/*) :
```

If you answer "yes", the changes will be made to the board and driver, and will take effect immediately. Next, you will be asked:

```
Save Changes to Disk for Re-Boot? (y/*) :
```

Answer "yes" if you wish the changes to become permanent (you must answer "yes" if this is the first time you have configured the driver). Now you will be asked:

```
Quit? (Q/*) :
```

Select "Q" to return to the DOS prompt. Any other key will return you to the main menu of the setup program.

NOTE—If you reconfigure the host adapter without saving the changes to disk, the changes will be effective only until DOS is rebooted. The driver will then revert to whatever parameters have been previously set.

Receive and Transmit Buffer Size

The size of the receive and transmit buffers for each asynchronous port is determined by two factors: the amount of memory on the host adapter (either 128K or 512K) and the number of concentrators connected to it. The following table shows the respective buffer sizes for the possible combinations of these factors:

Host Adapter Memory Size:	128k		512k	
Number of Concentrators	Rx	Tx	Rx	Tx
1	2k	2k	16k	8k
2	1k	1k	8k	4k
3	512	512	4k	2k
4	512	512	4k	2k
5	512	512	4k	2k
6	256	256	256	256
7	256	256	256	256
8	256	256	256	256

Installing the Device Driver

Once the driver has been configured and the file **CXDOS5.SYS** has been created, the driver needs to be added to the system configuration. This is done by adding the line:

```
DEVICE=C:\DIGI\CXDOS5.SYS
```

to **CONFIG.SYS** in the root directory (assuming that you have located the driver file in **C:\DIGI**). Use your favorite text editor to do this.

Now reboot your computer.

When the driver is loaded, the following information should be displayed (depending upon your system configuration and **AUTOEXEC.BAT** file, it may scroll by too quickly to read):

```
Digi C/X DOS Driver
Version 4.0.7
Copyright (C) Digi International Inc. 1992-1996

Board 00 - Initializes Successfully.
Board 01 - Initializes Successfully.
```

(The above is what you would see if you had installed two host adapters.)

The DOS device driver is now loaded and ready for use.

Error Messages

During the initialization of the DOS device driver and the host adapters (at boot-up time), the following messages might appear on your console. In general, unless precisely the same configuration has been known to work previously, these messages indicate that the board(s) and driver were not configured with matching parameters, or that the configuration is in conflict with some other device in the system. If the system has been working as configured, and no other software or hardware changes have been made in the mean time, these error messages may indicate a board failure.

Board 00 - Port 320h not found.

The driver was configured for a board with an I/O port at 320h, but could not find a port at that address.

Verify that the board's DIP switches are set for the correct I/O Port address, as defined with the setup program. (If the host adapter is a Micro Channel or EISA board, check the POS or EISA configuration, respectively)

Board 00 - Port at 320 fails hardware reset.

The driver could not reset the board. This usually indicates a hardware malfunction, but could also result from an I/O Port address conflict with some other device in your system.

Reconfigure the host adapter for a different I/O Port address. Make sure to run the setup program to reconfigure the driver accordingly.

Board 00 - Memory Not Found

No memory was found at the address specified during driver configuration.

Possible hardware problem.

Board 00 - Fails BIOS Initialization.
Board 00 - Fails FEPOS Initialization.
Board 00 - Fails Command Buffer Initialization.

These messages indicate that the initialization process failed while the driver was attempting to load or use on-board code. Failures of this kind may be caused by a board hardware malfunction or by memory address conflicts with another device in your system.

Try rebooting your system. If the message still persists, check your system for possible address conflicts.

Board 00 - Fails IRQ Test - Check IRQ Setting.

This message indicates the board was initialized properly but interrupts could not be generated by the board. This usually means that the board's IRQ setting does not match the IRQ you indicated with the setup program or that there is a conflict with another device in your system. Check and rectify any differences or conflicts. If the error persists, it is probably related to faulty hardware.

Programming Information

The MS-DOS device driver is accessed via an extended set of BIOS and EBIOS Interrupt 14h function calls. These functions provide character and string read/write capability, channel parameter control, I/O buffer management and status information. For details on specific functions, refer to the file **INT14.TXT** in the directory where you extracted the device driver and configuration utility files (see page 9).

Digi Xem System

Introduction

The **XEMDOS5.SYS** DOS device driver supports up to four Xem host adapters on ISA, EISA and Micro Channel bus computers. Each host adapter can support up to four EBI modules, providing up to 64 asynchronous ports per host adapter. The driver supports eight, nine (8 serial + 1 parallel), and sixteen port Xem PORTS modules.

This device driver is software-compatible at the Interrupt 14h level with the universal DOS device driver for Digi PC/Xi, PC/Xe, COM/Xi and MC/Xi intelligent asynchronous serial communication boards, and with the DOS device driver for Digi C/X systems.

This device driver may co-reside with the above-mentioned DOS device drivers, so that any Digi intelligent asynchronous products can operate in the same computer system.

Features

- Full DOS command-line support (COPY to or from ports, redirect input or output with "<>", etc.)

- 28 Interrupt 14h BIOS calls

- 6 Interrupt 14h EBIOS calls

- Receive buffer status (empty or not empty) can be monitored by checking a flag in host memory

- Supports baud rates of up to 115,200

Hardware Installation

This section provides the information necessary to configure the Xem host adapters for use with the DOS device driver, and has been divided into three sub-sections, one for each of the three host adapters supported by the device driver.

Xem - ISA

Install the Xem - ISA host adapter according to the instructions provided in the *Installation Guide* that came with the Xem system. The driver supports up to four Xem host adapters, and a maximum of 249 ports. Xem - ISA host adapters may also be installed in EISA machines, either alone, or in combination with Xem - EISA host adapters (up to a combined total of four).

Set each Xem - ISA host adapter's I/O port address to one of the following:

104, **114**, **124**, **204**, **224**, **304** or **324**

I/O port addresses must be unique, and may not be shared by any other device, *including* **other Digi products.**

The Xem system DOS device driver configuration utility will configure the board for a memory start address and IRQ line.

Xem - EISA

Install the Xem -EISA host adapter according to the instructions provided in the *Installation Guide* that came with the Xem system.

Run the EISA configuration utility (`CF.EXE`) each time you either add or remove an Xem - EISA host adapter.

Make sure that "**Dual-Ported Mem Address**" is below 1 Meg and "**Dual-Ported Mem Enbl/Dsbl**" is set to "**Disabled**". Multiple Xem - EISA host adapters may share the same memory start address.

Select one of the IRQ numbers listed below, and set "Interrupt Configuration" accordingly:

> **3**, **5**, **7**, **10**, **11**, **12**, **15** or **None**

IRQ numbers must be unique, and may not be shared by any other device, *including* other Digi products.

NOTE—IRQs only need to be enabled if you are using the Character Ready feature of the driver (see Enabling/Disabling the Character Ready Flags, on page 45 for more information).

Important! Be sure to write down the slot number, IRQ and memory address selections for Xem - EISA host adapters. You will need this information during the software configuration.

Xem - MC

Install the Xem - MC host adapter according to the instructions in the *Installation Guide* that came with the Xem system. The Automatic Configuration program will make address and IRQ selections that do not conflict with other devices.

NOTE—IRQs only need to be enabled if you are using the Character Ready feature of the driver (see Enabling/Disabling the Character Ready Flags, on page 45 for more information).

Device Driver Installation

This section describes the configuration and installation of the DOS device driver. The procedures described are used for the first-time configuration of the driver, as well as any future reconfiguration. With few exceptions, the procedures are identical regardless of which Digi Xem host adapter you have installed. Differences will be noted as appropriate.

Power up your computer, boot DOS, and load the device driver software and configuration utility onto your hard disk. You may place the files in the root (\) directory, or a subdirectory of your choice. An example follows:

```
C:\> md digi
C:\> cd digi
C:\DIGI> copy a:\xemdrv.exe
C:\DIGI> xemdrv
```

The last command runs the self-extracting file **xemdrv**, causing the device driver and setup program to be uncompressed. Now run the device driver setup program:

```
C:\DIGI> xemcfg
```

The set-up program will configure the DOS device driver so that it can communicate with the boards you have installed, and set the parameters the boards will use to communicate with remote serial devices.

After configuring the driver with the set-up program for the first time, *be sure to save the configuration*. The set-up program modifies **xemdos5.pgm** and writes it back to the hard disk as **xemdos5.sys**. The device driver configuration can be subsequently reviewed or changed at any future time by running **xemcfg.exe**.

The following pages describe the use of the set-up program.

Xem Host Adapter Parameters

PC/Xem and EISA/Xem Host Adapters

If you are installing an Xem - ISA or Xem - EISA host adapter, your initial screen will look similar to this:

```
                    Digi CONFIGURATION PARAMETERS

  Board  Type  Window  Memory     I/O     IRQ    # Brd   Start   Driver
    #          Size    Window     Port      #    Chnls   Chnl#   Support
  ═════════════════════════════════════════════════════════════════════
                     Driver configured for 0 boards.
  └                                                                    ┘
```

```
Configuration Selections :

Q)uit   A)dd Board

Enter Selection :
```

The first time you run **XEMCFG**, the parameters will all be empty, because no boards have been configured.

Select "**A)dd Board**". You will be asked for the memory start address for the host adapter (*NOTE—Multiple Xem host adapters may share the same memory start address*):

```
Memory Window Starting Addresses :

8) 80000h  9) 90000h  A) A0000h  B) B0000h  C) C0000h  D) D0000h  E) E0000h
F) 88000h  G) 98000h  H) A8000h  I) B8000h  J) C8000h  K) D8000h  L) E8000h

Enter Selection :
```

Enter the letter that corresponds to the memory start address you have chosen for the host adapter. In most DOS systems, only addresses **C0000h**, **C8000h**, **D0000h** and **D8000h** are available for installable peripherals, and of these, **D0000h** and **D8000h** are the most likely to be available (EGA and VGA cards use memory in the C0000h-C7FFFh range, and many hard disk controllers use memory in the C8000h-CFFFFh range).

Next, you will be asked for the board's I/O port address (for PC/Xem host adapters) or its slot number (for EISA/Xem host adapters):

Xem - ISA:

```
Board I/O Port Selections :

   A) 104h   B) 114h   C) 124h   D) 204h   E) 224h   F) 304h   G) 324h

Enter Selection :
```

Xem - EISA:

```
Enter the Board's Slot# (1-8):
```

Choose the address or enter the slot number that corresponds to the Xem host adapter you are configuring. If you are installing a Xem - ISA host adapter in an EISA machine, you will need to specify both the slot number and the I/O address.

Now select an IRQ for the host adapter:

```
IRQ Selections :

   A) 3   B) 5   C) 7   D) 10   E) 11   F) 12   G) 15   H) Disabled

Select IRQ Number :
```

NOTE—IRQs only need to be enabled if you are using the Character Ready feature of the driver (see Enabling/Disabling the Character Ready Flags, on page 45, for more information).

You will now be asked for the number of EBI modules connected to the host adapter (this refers to PORTS/16em, PORTS/8em and PORTS/8emp modules):

```
 EBI Module Configuration

             EBI 1 : 16 Ports

          Enter # of EBI Modules (1-4) :
```

Enter the number of PORTS modules connected to your host adapter. Your screen will now look something like this:

```
                    Digi CONFIGURATION PARAMETERS

   Board   Type  Window  Memory     I/O    IRQ    # Brd    Start    Driver
     #            Size    Window     Port    #    Chnls    Chnl#    Support

     1     XEM    32k    D0000h     0204    10     ----     ----    -------
```

```
EBI Module Configuration

                         EBI 1 : 16 Ports
                         EBI 2 : 16 Ports
                         EBI 3 : 16 Ports
                         EBI 4 : 16 Ports

    N)umber of EBI Modules    P)orts on EBI Modules    C)ontinue  :
```

Note that the default number of ports is 16. If your EBI module is a PORTS/8em or a PORTS/8emp, you need to change the number of ports. To change the number of ports on one or more EBI modules, press "p". You will see the following:

```
            EBI Module Configuration          Use Arrow Keys ▲▼

                         EBI 1 : 16 Ports
                         EBI 2 : 16 Ports
                         EBI 3 : 16 Ports
                         EBI 4 : 16 Ports

   Number of Ports  A) 8      B) 9     C) 16     Q)uit
```

The number of ports for the first EBI module will be highlighted. Use the up and down arrow keys to highlight the EBI module you wish to change, then press "a" for 8 ports (PORTS/8em modules), "b" for 9 ports (PORTS/8emp modules) or "c" for 16 ports (PORTS/16em modules). When you have finished, press "q".

Your screen will now look something like this:

```
                    Digi CONFIGURATION PARAMETERS

   Board  Type  Window  Memory    I/O   IRQ  # Brd   Start   Driver
    #           Size    Window    Port   #   Chnls   Chnl#   Support
════════════════════════════════════════════════════════════════════
     1    XEM    32k    D0000h    0204   10    64       4    DOS/EBIOS
     2    XEM    32k    D0000h    0224   11    49      68    DOS/EBIOS
     3    XEM    32k    D0000h    0304   12    32     117    DOS/EBIOS
     4    XEM    32k    D0000h    0324   15    16     149    DOS/EBIOS


Configuration Selections :                    Use Arrow Keys ▲ ▼ ◀ ▶

  Q)uit   C)hannel Parameters   O)ptions   A)dd Board   R)emove Board

Enter Selection :
```

Now proceed to page 41 to set up the channel parameters, options, starting channel number and driver support.

Xem - MC Host Adapters

If you are installing the Micro Channel (PS/2) version of the Digi Xem system, the configuration program will automatically find the memory and I/O addresses and the IRQ for each host adapter from the computer's Programmable Option Select (POS). Your initial screen will look something like this:

```
                     Digi CONFIGURATION PARAMETERS


  Board   Type   Window   Memory     I/O      IRQ     # Brd    Start    Driver
    #             Size    Window     Port       #     Chnls    Chnl#    Support
 ═══════════════════════════════════════════════════════════════════════════════
    1      XEM     32k    D0000h     0204      10       64        4     DOS/EBIOS
    2      XEM     32k    D8000h     0224      11       49       68     DOS/EBIOS
 └                                                                              ┘

Configuration Selections :                          Use Arrow Keys ▲ ▼ ◄ ►

  Q)uit    C)hannel Parameters    O)ptions

Enter Selection :
```

The number of board channels can be changed from this menu. To change other board parameters, you must boot your system with the Reference Diskette, and run the IBM configuration program.

Now proceed to page 41 to set up the channel parameters, options, starting channel number and driver support.

Channel Parameters and Options (All Boards)

This section applies to ISA, EISA and Micro Channel Xem systems.

Once the host adapter's hardware parameters (I/O port, memory start address, IRQ, number of EBI modules and number of channels) have been set up, you need to set up the EIA-232 asynchronous serial line parameters and device driver support parameters.

Setting the Number of Channels

Micro Channel Host Adapters

When installing Xem - MC host adapters, the number of board channels is set to 16 (one PORTS/16em module) by default. To change this, use the arrow keys to highlight the **# Brd Chnls** field for the desired board. You will be see the following:

```
                    EBI Module Configuration

                        EBI 1 : 16 Ports

                 Enter # of EBI Modules (1-4) :
```

Enter the number of PORTS modules connected to your host adapter. Your screen will now look something like this:

```
                      Digi CONFIGURATION PARAMETERS
```

Board #	Type	Window Size	Memory Window	I/O Port	IRQ #	# Brd Chnls	Start Chnl#	Driver Support
1	XEM	32k	D0000h	0204	10	16	4	DOS/EBIOS

```
                      EBI Module Configuration

                        EBI 1 : 16 Ports
                        EBI 2 : 16 Ports
                        EBI 3 : 16 Ports
                        EBI 4 : 16 Ports

    N)umber of EBI Modules    P)orts on EBI Modules    C)ontinue :
```

Note that the default number of ports is 16. If your EBI module is a PORTS/8em or a PORTS/8emp, you need to change the number of ports. To change the number of ports on one or more EBI modules, press "**p**". You will see the following:

```
              EBI Module Configuration          Use Arrow Keys ▲ ▼

                    EBI 1 : 16 Ports
                    EBI 2 : 16 Ports
                    EBI 3 : 16 Ports
                    EBI 4 : 16 Ports

    Number of Ports   A) 8      B) 9     C) 16      Q)uit
```

The number of ports for the first EBI module will be highlighted. Use the up and down arrow keys to highlight the EBI module you wish to change, then press "**a**" for 8 ports (PORTS/8em modules), "**b**" for 9 ports (PORTS/8emp modules) or "**c**" for 16 ports (PORTS/16em modules). When you have finished, press "**q**".

Your screen will now look something like this:

```
                     Digi CONFIGURATION PARAMETERS

    Board   Type   Window   Memory     I/O     IRQ    # Brd    Start   Driver
      #             Size     Window     Port     #     Chnls    Chnl#   Support
  ════════════════════════════════════════════════════════════════════════════
      1     XEM     32k     D0000h     0204     10      49        4     DOS/EBIOS
```

Board #	Type	Window Size	Memory Window	I/O Port	IRQ #	# Brd Chnls	Start Chnl#	Driver Support
1	XEM	32k	D0000h	0204	10	49	4	DOS/EBIOS

```
Configuration Selections :                       Use Arrow Keys ◄ ►

  Q)uit   C)hannel Parameters   O)ptions   A)dd Board   R)emove Board

Enter Selection :
```

Xem - ISA and Xem - EISA Host Adapters

If you are installing a ISA or EISA Xem host adapter, you already performed this step during the "Add Board" procedure. If you wish to change the number, follow the procedure above.

Setting the Starting Channel Number

The **Start Chnl #** (also referred to as DX-LOW) is defined as the channel number of the first port on board #1, and is the lowest channel number that will be supported by the C/X DOS device driver. All ports on all boards for which the device driver has been configured are numbered sequentially, beginning with the Start Chnl #. The configuration display shows the Start Chnl # for each host adapter, but it can only be changed for the *first* board.

To set the starting channel number, use the arrow keys to highlight the **Start Chnl #** for Board # 1. When prompted, enter the new number. The Start Chnl # for any remaining boards will automatically be updated.

Driver Support

The DOS device driver can support DOS calling conventions (using a COM name such as COM5), Interrupt 14h BIOS calls and EBIOS functions (these functions are described in **INT14.TXT**, on the distribution diskette). Interrupt 14h support is always included in the driver. DOS and EBIOS support can be removed from the driver, if desired, to make it more compact. This is useful for large application programs which use only the Interrupt 14h routines to communicate with the boards.

Use the arrow keys to highlight the Driver Support item for any board. You will be given the option of including DOS support, EBIOS support, both, or neither along with the standard Interrupt 14h support.

Setting the Asynchronous Channel Parameters

Asynchronous channel parameters are set on a board-by-board basis. To change the channel parameters for a board, use the arrow keys to highlight the number of the board for which you wish to change the parameters, then select "**C)hannel Parameters**". You will be presented with a display similar to this:

```
            EBI Module Configuration

             EBI 1 : 16 Ports
             EBI 2 : 16 Ports
             EBI 3 :  8 Ports
             EBI 4 :  9 Ports

          Select EBI # to Configure (1-4) :
```

Select the EBI module for which you wish to change parameters. You will see the following screen:

```
BOARD 1 PARAMETERS
  CHANL    BAUD     MODE     RX FLOW      TX FLOW        NAME
  -------------------------------------------------------------

     4     57600    8,N,1     XON          XON          COM5
     5     57600    8,N,1     XON          XON          COM6
     6     57600    8,N,1     XON          XON          COM7
     7     57600    8,N,1     XON          XON          COM8
     8     57600    8,N,1     XON          XON          COM9
     9     57600    8,N,1     XON          XON          COM10
    10     57600    8,N,1     XON          XON          COM11
    11     57600    8,N,1     XON          XON          COM12
    12     57600    8,N,1     XON          XON          COM13
    13     57600    8,N,1     XON          XON          COM14
    14     57600    8,N,1     XON          XON          COM15
    15     57600    8,N,1     XON          XON          COM16
    16     57600    8,N,1     XON          XON          COM17
    17     57600    8,N,1     XON          XON          COM18
    18     57600    8,N,1     XON          XON          COM19
    19     57600    8,N,1     XON          XON          COM20

Q)uit    S)et All                        Use Arrow Keys   ▲ ▼ ◄ ►
```

Use the arrow keys to highlight the parameter you wish to change. In each case you will be presented with the available options for that parameter. If you wish to have the same parameters for all channels, set up one of the channels in the table as desired, then select "**S)et All**" (you need to have the channel number highlighted).   "**S)et All**" sets all parameters of all channels to match the highlighted channel.

Enabling/Disabling the Character Ready Flags

The DOS device driver provides a method of quickly checking the status of the input buffers (received data) for an empty or not-empty condition, without having to set up and execute an BIOS Interrupt 14h function call each time. This is done through the Character Ready Flags, which are bytes in the host computer's RAM (they are located within the body of the device driver itself), which can be simply checked for a zero or non-zero condition to determine whether the associated input buffer is empty or not empty, respectively.

The FEPOS (Front-End Processor Operating System—the on-board software which controls the actual functions of the host adapter) constantly monitors the input buffers for which Character Ready Flags are enabled, and as soon as a buffer changes from empty to not empty, the board generates an interrupt request (IRQ). The interrupt handler in the DOS device driver sets the appropriate Character Ready Flag and returns control to the application program, which must periodically check the flags to see if there is data waiting in the input buffer. If a flag is set (non-zero; the byte will actually contain FFh), there is at least one character in the receiving buffer. When the last character has been read from the buffer, the DOS device driver will automatically reset the flag to 00h.

Since the location of the flags is dependent upon where the DOS device driver has been loaded in memory, Interrupt 14h, Function 0Dh - Get Pointer to Character Ready Flag, has been provided (BIOS Interrupt 14h functions are described in **INT14.TXT**, on the distribution diskette). This function should be run as part of the initialization of any application program which will use the Character Ready Flags, and since each channel has its own flag, the function must be run for each channel that will be monitored via Character Ready Flags.

The board and driver must be configured for an IRQ for this feature to work.

To configure the DOS device driver to use the Character Ready Flags, use the arrow keys to highlight the number of the board you wish to configure, and select "**O)ptions**" from the main menu, then select "**C)har Ready Flags**". You will be presented with a screen similar to this:

```
Board 1 Character Ready Flag Status

     Chnl  4 : Disabled        Chnl  5 : Disabled
     Chnl  6 : Disabled        Chnl  7 : Disabled
     Chnl  8 : Disabled        Chnl  9 : Disabled
     Chnl 10 : Disabled        Chnl 11 : Disabled
     Chnl 12 : Disabled        Chnl 13 : Disabled
     Chnl 14 : Disabled        Chnl 15 : Disabled
     Chnl 16 : Disabled        Chnl 17 : Disabled
     Chnl 18 : Disabled        Chnl 19 : Disabled

Change :

T)oggle One Channel  E)nable All Channels  D)isable All Channels Q)uit
```

To enable or disable the Character Ready Flag for an individual channel, select "**T)oggle One Channel**", then enter the number of the channel to be modified. If previously disabled, that channel will now be enabled, and vice versa. There are also menu items to enable or disable Character Ready Flags for all channels with a single keystroke. When all channels have been set as desired, select "**Q)uit**" to return to the main menu.

Enabling/Disabling the Alt Pin Feature

This feature internally swaps the signals DCD (Data Carrier Detect) and DSR (Data Set Ready). This is useful for PORTS EBI modules that are equipped with RJ-45 modular jacks for the serial connections. The DCD signal is normally on pin 10 of the RJ-45 jack, which makes it inaccessible to 8-pin RJ-45 plugs.

When the Alt Pin feature is enabled, pin 2 of the 10-pin RJ-45 connector will be interpreted by the driver as the DCD signal. This corresponds to pin 1 of an 8-pin RJ-45 connector. Pin 10 then becomes DSR (and is inaccessible to 8-pin RJ-45 plugs). Note: See *ALTPIN Modem Wiring*, in the Xem System *Installation Guide*.

To configure the DOS device driver to use the alternate pin assignments, use the arrow keys to highlight the number of the board you want to configure, and select "**O)ptions**" from the main menu, then select "**A)lt Pin**". You will be presented with a screen similar to this:

```
Board 1 Alt Pin Status

    Chnl  4 : Disabled       Chnl  5 : Disabled
    Chnl  6 : Disabled       Chnl  7 : Disabled
    Chnl  8 : Disabled       Chnl  9 : Disabled
    Chnl 10 : Disabled       Chnl 11 : Disabled
    Chnl 12 : Disabled       Chnl 13 : Disabled
    Chnl 14 : Disabled       Chnl 15 : Disabled
    Chnl 16 : Disabled       Chnl 17 : Disabled
    Chnl 18 : Disabled       Chnl 19 : Disabled

Change :

T)oggle One Channel  E)nable All Channels  D)isable All Channels Q)uit
```

To enable or disable the Alt Pin feature for an individual channel, select "**T)oggle One Channel**", then enter the number of the channel to be modified. If previously disabled for that channel, Alt Pin processing will now be enabled, and vice versa. There are also menu items to enable or disable Alt Pin processing for all channels with a single keystroke. When all channels have been set as desired, select "**Q)uit**" to return to the main menu.

Memory Enable/Disable Option (ISA and EISA Only)

The dual-ported memory on ISA and EISA Xem host adapters is "stackable"—that is, all host adapters in a system can share the same memory addresses, since only one board's memory is turned on at any given time.

The DOS device driver normally leaves a board's memory turned on after writing to that board, and only switches it off when it needs to talk to a different board with the same memory start address.

Sometimes, however, it is desirable to keep the host adapters' memory turned off when the driver is not actually performing a read or write operation. The most common situation where this is desirable is when an 8-bit board (such as a VGA or EGA card) resides in the same 128K region (e.g. C0000h—DFFFFh) as the host adapter. The Xem host adapter is a 16-bit board, and when a 16-bit device and an 8-bit device inhabit the same 128K block, the 8-bit device can only address even-numbered bytes. By keeping the host adapters' memory disabled when not in use, this can minimize potential 8-bit/16-bit memory conflicts.

To configure the DOS driver to leave the host adapter's memory disabled when not in use, highlight the board you wish to change (use the arrow keys), select "**O)ptions**", then select "**L)eave Memory Enabled**". You will see the following choices:

```
Current Status : Leave Memory Enabled.

Leave Memory    D)isabled    E)nabled

Enter Selection
```

After making your selection, you will be returned to the main menu.

Exiting the Set-Up Program

Once all of the parameters have been set as desired for each board, exit the set-up program by selecting "**Q)uit**" from the main menu. If the driver is already loaded and the host adapter(s) installed, you will be asked:

```
Re-configure the Digi? (y/*) :
```

If you answer "yes", the changes will be made to the board and driver, and will take effect immediately. Next, you will be asked:

```
Save Changes to Disk for Re-Boot? (y/*) :
```

Answer "yes" if you wish the changes to become permanent (you *must* answer "yes" if this is the first time you have configured the driver). Now you will be asked:

```
Quit? (Q/*) :
```

Press "**Q**" to return to the DOS prompt. Any other key will return you to the main menu of the set-up program.

NOTE—If you reconfigure the host adapter without saving the changes to disk, the changes will be effective only until DOS is rebooted. The driver will then revert to whatever parameters have been previously set.

Installing the Device Driver

Once the driver has been configured and the file **XEMDOS5.SYS** has been created, the driver needs to be added to the system configuration. This is done by adding the lines

```
DEVICE=C:\DIGI\XEMDOS5.SYS
DEVICE=C:\DIGI\XEM5INIT.SYS
```

to **CONFIG.SYS** in the root directory (assuming that you have located the driver file in **C:\DIGI**). Use your favorite text editor to do this.

Now reboot your computer.

When the driver is loaded, the following information should be displayed (depending upon your system configuration and **AUTOEXEC.BAT** file, it may scroll by too quickly to read):

```
Digi Xem DOS Driver
Version 4.0.0
Copyright (C) Digi International Inc. 1993

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the Government
is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the
Rights in Technical Data and Computer Software clause at DFARS 252.227-7013.
Digi International Inc. 11001 Bren Rd, Minnetonka, MN 55343.


Board 0: Mem D0000h  Port 204h  Support Successfully Loaded.
Board 1: Mem D0000h  Port 224h  Support Successfully Loaded.


Digi Xem DOS Driver Initializer
Version 1.0.0
Copyright (C) Digi International Inc. 1993

Board 0: Mem D0000h  Port 204h  64 of 64 Ports Successfully Initialized.
Board 1: Mem D0000h  Port 224h  49 of 49 Ports Successfully Initialized.
```

(The above is what you will see if you have installed two host adapters.)

The DOS device driver is now loaded and ready for use.

Error Messages

During the initialization of the DOS device driver and the host adapters (at boot-up time), the following messages might appear on your console. In general, unless precisely the same configuration has been known to work previously, these messages indicate that the board(s) and driver were not configured with matching parameters, or that the configuration is in conflict with some other device in the system. If the system has been working as configured, and no other software or hardware changes have been made in the mean time, these error messages may indicate a board failure.

XEMDOS5.SYS Messages

The following messages are produced by the DOS device driver, **XEMDOS5.SYS**:

- **Port not found.**

    This message indicates that the board's I/O port was not found. Check to ensure that the board's port dip switch setting matches the driver's configuration.

- **fails hardware reset.**

    This message indicates that the board could not be placed into a reset condition. This could result from a conflict with another devices I/O port, or a faulty board.

- **Memory Not Found.**

    This message indicates that the driver could not find the board's memory. This usually indicates a memory conflict with another device or a faulty board.

- **Support Successfully Loaded.**

    The driver is loaded and awaiting initialization by **XEM5INIT.SYS**

- **Driver Configured for 0 Boards.**

    This message indicates that the driver was loaded before it was configured. Run **XEMCFG.EXE** to configure the driver.

- **Shared IRQ line - Driver Load Aborted.**
  Run POS configuration utility to select unique IRQ lines.

    Shared IRQs are not supported and the user must run the POS utility to change the shared interrupts.

`XEM5INIT.SYS` Messages

The following messages are produced by the DOS device driver initialization program, `XEM5INIT.SYS`:

`* Error - XEMDOS5.SYS Not Loaded`

This means that the `XEMDOS5` driver is not loaded and thus the initialization can not proceed. If the `XEMDOS5` driver attempted to load but could not, see the error messages for that driver.

`Port Not Found`

This message indicates that the board's I/O port was not found. Check to ensure that the board's port dip switch setting matches the driver's configuration.

`Memory Not Found`

This message indicates that the driver could not find the board's memory. This usually indicates a memory conflict with another device or a faulty board.

`Waiting for BIOS Initialization`

This message indicates that the BIOS initialization process is under way.

`BIOS fails to Initialize`

This message indicates that the BIOS failed to initialize properly. This usually results from a memory conflict with another device in your system or a faulty card.

`BIOS Initializes Successfully`

This message indicates that the BIOS initialized properly.

`Waiting for FEPOS Initialization`

This message indicates that the FEPOS initialization process is under way.

`FEPOS finds 0 Channels`

This message indicates that the FEPOS initialized successfully but that it could find no ports. Check to see that the EBI modules are connected properly to the host adapter card.

`FEPOS fails to Initialize`

This message indicates that the FEPOS failed to initialize. This could result from a memory conflict with another device in your system or a faulty card.

`FEPOS Initializes Successfully`

This message indicates that the FEPOS initialized properly.

Fails IRQ 5 Test, Check IRQ Configuration.
This means that the board was configured for IRQ 5 but no interrupt could be generated from the board. This may mean that another device is configured for the same IRQ.

- chnl 1 IFLAG failed
- chnl 1 IDATA failed
- chnl 1 getparm failed
- chnl 1 setparm failed
- chnl 1 setflow failed
- chnl 1 getbufsize failed
- chnl 1 setlow water failed
- chnl 1 sethi water failed
- chnl 1 SetDtrRts failed
These messages indicate an initialization failure on the specified channel. This could result from a memory conflict with another device or a faulty board. The specific failure is useful to the Digi Technical Support team for troubleshooting.

16 of 16 Ports Successfully Initialized.
This message indicates a successful initialization

PC/Xe, PC/Xi, MC/Xe, MC/Xi and COM/Xi Boards

Introduction

The MS-DOS device driver supports the PC/Xe, PC/Xi, MC/Xe, MC/Xi and COM/Xi boards under most versions of MS-DOS.

The device driver provides the following features:

- Full DOS command-line support (COPY to or from ports, redirect input or output with "< >", etc.)

- 28 Interrupt 14h BIOS calls

- 6 Interrupt 14h EBIOS calls

- Receive buffer status (empty or not empty) can be monitored by checking a flag in host memory

- Supports baud rates of up to 115,200

Important! *Application programs not specifically written to support Digi intelligent serial boards may not work with these boards.*

This MS-DOS device driver supports only application programs that use BIOS Interrupt 14h functions to communicate with the board.

Programs that specifically support the basic Interrupt 14h functions 0-3, or Digi's extended Interrupt 14h functions, should also work with the boards.

Most DOS application programs communicate with serial ports by directly controlling the interface hardware, and make no attempt to access a device driver. Because Digi intelligent serial boards do not support virtualization of UARTs, communication with and through the board must be performed via the Digi device driver.

Installation

Hardware Installation

Before proceeding with the software installation for the MS-DOS device driver, you must first install the board(s) according to the instructions in the board's *Installation Guide*.

Important! *Before attempting to install the MS-DOS Device driver, be sure to run the Memory Map utility to find the required amount of available address space, and the User Diagnostics to verify that the board is working correctly. See the Installation Tips section of the Installation Guide for your board for details.*

Device Driver Configuration

This section describes the installation and configuration of the DOS device driver. The procedures described are used for the first-time configuration of the driver, as well as any future reconfiguration. With few exceptions, the procedures are identical regardless of which intelligent board you have installed. Differences will be noted as appropriate.

Power up your computer, boot DOS, and copy the device driver software and configuration utility onto your hard disk. You may place the files in the root (\) directory, or a subdirectory of your choice. An example follows:

```
C:\> md digi
C:\> cd digi
C:\DIGI> copy a:xall.exe
```

Now run **xall.exe** to expand the compressed driver files:

```
C:\DIGI> xall
```

Finally, run the device driver set-up program:

```
C:\DIGI> xidoscfg
```

The set-up program will configure the DOS device driver so that it can communicate with the boards you have installed, and set the parameters the boards will use to communicate with remote serial devices.

After configuring the driver with the set-up program for the first time, *be sure to save the configuration*. The set-up program modifies **xidos5.pgm** and writes it back to the disk as **xidos5.sys**.

The following pages describe the use of the set-up program, **xidoscfg.exe**.

Micro Channel Board Parameters

If you are installing a Micro Channel board (MC/Xe, MC/Xi), the configuration program will automatically find the memory and I/O port addresses, the IRQ and number of channels for each board from the PS/2's Programmable Option Select (POS). Your initial screen will look something like the example shown below.

```
                 Digi CONFIGURATION PARAMETERS
   Board   Type Window  Memory  I/O   IRQ # Brd   Start   Driver
     #          Size    Window  Port   #  Chnls   Chnl#   Support

     1     MC/Xi  32K   C8000   118    4    8        4    DOS/EBIOS
     2     MC/Xe  8K    D0000   128   11    2       12    DOS/EBIOS

 Configuration Selections :              Use Arrow Keys   ▲ ▼ ◄ ►

 Q)uit    C)hannel Parameters      O)ptions

 Enter Selection :
```

To change board parameters, you must boot your system with the IBM Reference Diskette, and run the configuration program.

To change channel parameters, options, starting channel number and driver support, skip to page 58. The following pages deal with ISA (PC/Xe, PC/Xi and COM/Xi) board parameters.

ISA Board Parameters

If you are installing an ISA (PC/Xe, PC/Xi or COM/Xi) board, you will see a screen similar to the example below.

```
                   Digi CONFIGURATION PARAMETERS
  Board   Type Window Memory  I/O   IRQ  # Brd   Start   Driver
    #           Size  Window  Port   #   Chnls   Chnl#   Support
  ─────────────────────────────────────────────────────────────
                  Driver configured for 0 boards.
 ┌                                                              ┐
 └                                                              ┘

Configuration Selections :            Use Arrow Keys  ▲ ▼ ◀ ▶

Q)uit   A)dd Board

Enter Selection :
```

The first time you run **XIDOSCFG**, the parameters will all be empty, because no boards have been configured.

Select **A)dd Board**. You will be presented with three options:

```
A) COM/Xi
B) PC/Xe
C) PC/Xi
```

Your choice will be entered under "Board Type", and you will be prompted for a memory window size (except COM/Xi boards, which are always 32K). If your board is a newer PC/Xe board (DIP switches on the end of the board), you can select an 8K, 32K or 64K window. In most cases, the 8K window is preferable. If you are installing an older PC/Xe board (DIP switches on top), you must select a 64K window. If you are installing a PC/Xi board, you can select a 64K or 128K window. Select the window size that matches the jumper setting of your PC/Xi board (64K is recommended).

Note:	When selecting the memory window size for newer PC/Xe boards, choose 8K unless you are running a multi-tasking environment such as DeskView. In multi-tasking environments, select 32K.

Next, you will be asked to select a starting address for the dual ported memory window. If your board is a newer PC/Xe (DIP switches on the end of the board), the board's address is defined by this step. If your board is an older PC/Xe, a PC/Xi or a COM/Xi, choose the address that corresponds to the setting of the DIP switches or jumpers on the board. NOTE—if your window size is 8K, the starting address selection is in two parts: you will first be asked for a 64K segment (e.g. 80000h, C0000h, D0000h), then for the actual starting address (e.g. D0000h, D2000h, etc.). All PC/Xe and PC/Xi boards may share the same starting address.

When asked for the I/O port address, choose the address that corresponds to the board's DIP switch or jumper setting.

Next, enter the IRQ number that you want assigned to the board (if the board is a COM/Xi, a PC/Xi or an older PC/Xe, enter the IRQ that is selected by the jumpers or switches on the board). In most cases, the IRQ can be disabled. IRQs are only required for applications which are specifically designed to use Character Ready interrupts to monitor the board's input buffer status.

Finally, enter the number of channels on the board.

Repeat the above procedure for any other boards that you wish to install. If you installed a PC/8i and a PC/2e board, your screen will now look something like the example below.

```
                    Digi CONFIGURATION PARAMETERS
   Board   Type Window  Memory  I/O   IRQ  # Brd  Start  Driver
     #           Size   Window  Port   #   Chnls  Chnl#  Support

     1     PC/Xi   64K   D0000  0100  10     8      4    DOS/EBIOS
     2     PC/Xe   8K    D0000  0120  15     2     12    DOS/EBIOS


Configuration Selections :            Use Arrow Keys  ▲ ▼ ◄ ►

Q)uit   C)hannel Parameters   O)ptions   A)dd Board   R)emove Board

Enter Selection :
```

By using the arrow keys, you can position the highlighted bar over any of the parameters for any of the boards. Each time a parameter is highlighted, a menu of alternative values is presented, and you may select a new value for that parameter. When a board number is highlighted, a menu is displayed with options to quit the configuration program, change channel parameters and options (see the following section), add new boards, or remove the board whose number is highlighted.

Channel Parameters and Options (All Boards)

Setting the Starting Channel Number

The Starting Channel Number (sometimes referred to as DX-LOW) is defined as the channel number of the first port on board #1, and is the lowest channel number that will be supported by the DOS device driver. All ports on all boards for which the device driver has been configured are numbered sequentially, beginning with the Starting Channel Number. The configuration display shows the Starting Channel Number for each board, but it can only be changed for the *first* board.

To set the Starting Channel Number, use the arrow keys to highlight the Starting Channel Number for board #1. When prompted, enter the new channel number.

NOTE: Standard serial ports (i.e. COM1, COM2, etc.), are numbered beginning with 0. When setting the Starting Channel Number, be sure to account for any standard ports that are already installed in your system. For example, if your system has two standard ports, COM1 and COM2, they use channel numbers 0 and 1. Start the Digi channels at 2. If your machine has four standard ports, COM1-COM4, start the Digi channels at 4 (COM1-COM4 are assigned channel numbers 0-3, respectively).

Driver Support

The DOS device driver can support DOS calling conventions (using a COM name such as COM5), Interrupt 14h BIOS calls and EBIOS functions (these functions are described in **INT14.TXT**, in the **DOS** directory of the distribution diskette). Interrupt 14h support is always included in the driver. DOS and EBIOS support can be removed from the driver to make it more compact. This is useful for application programs which use only Interrupt 14h commands to communicate with the boards.

Use the arrow keys to highlight the Driver Support item for any board. You will be given the option of including DOS support, EBIOS support, both, or neither along with the standard Interrupt 14h support.

Setting the Channel Parameters

Channel parameters are set on a board-by-board basis. To change the channel parameters for a board, use the arrow keys to highlight the number of the board for which you wish to change the parameters, then press the letter "**C**" to select **C)hannel Parameters**. You will be presented with a display similar to the example shown below.

```
                       BOARD 1 PARAMETERS
   CHANL     BAUD      MODE      RX FLOW        TX FLOW        NAME

     4       9600      8,N,1      NONE          DSR/CTS        COM5
     5       9600      8,N,1      NONE          DSR/CTS        COM6

Q)uit     S)et All                      Use Arrow Keys   ▲ ▼ ◄ ►

Select Parameter :
```

Use the arrow keys to highlight the parameter you wish to change. In each case you will be presented with the available options for that parameter. If you wish to have the same parameters for all channels, set up one of the channels in the table as desired, then select **S)et All** (you need to have the channel number highlighted). **S)et All** sets all parameters of all channels to match the selected channel.

Baud Rate

The following baud rates can be specified with the configuration utility: 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 76800 and 115200.

Mode

This parameter defines the character length (5, 6, 7 or 8 bits), type of parity checking (odd, even or none) and the number of stop bits (1, 1.5 or 2).

RX Flow

Specifies the type of flow control to use for incoming data. Available options are: XON/XOFF (software handshaking), DTR (Data Terminal Ready—hardware handshaking) and RTS (Request To Send—hardware handshaking). These options may be used singly or in combination.

NOTE: When selecting the DTR option, you will be given the choice of setting DTR High or Low when the board initializes. The default is High.

IMPORTANT: If you choose to set DTR Low when the board initializes, your application must change DTR back to High before data flow can begin.

TX Flow

Specifies the type of flow control to use for outgoing data. Available options are: XON/XOFF (software handshaking), CTS (Clear To Send—hardware handshaking), DSR (Data Set Ready—hardware handshaking) and DCD (Data Carrier Detect—hardware handshaking). These options may be used singly or in combination.

Name

Specifies the DOS name (e.g. "COM5") of each port. This is the name you would use in DOS commands such as "`COPY FILE.TXT COM5`". If the device driver is configured for Interrupt 14h only (see *Driver Support*, on page 58), no name is assigned to the port, and all references must be made by BIOS Interrupt 14h calls (BIOS Interrupt 14h functions are described in `INT14.TXT`, in the `DOS` directory of the device driver distribution diskette).

Enabling/Disabling the Character Ready Flags

The DOS device driver provides a method of quickly checking the status of the input buffers (received data) for an empty or not-empty condition, without having to set up and execute a BIOS Interrupt 14h function call each time you want to check. This is done through the Character Ready Flags, which are bytes in the host computer's RAM (they are located within the body of the device driver itself), which can be simply checked for a zero or non-zero condition to determine whether the associated input buffer is empty or not empty, respectively.

The FEPOS (Front-End Processor Operating System—the on-board software which controls the actual functions of the board) constantly monitors the input buffers for which Character Ready Flags are enabled, and as soon as a buffer changes from empty to not empty, the board generates an interrupt request (IRQ). The interrupt handler in the DOS device driver sets the appropriate Character Ready Flag and returns control to the application program, which must periodically check the flags to see if there is data waiting in the input buffer. If a flag is set (non-zero; the byte will actually contain FFh), there is at least one character in the receiving buffer. When the last character has been read from the buffer, the DOS device driver will automatically reset the flag to 00h.

Since the location of the flags is dependent upon where the DOS device driver has been loaded in memory, Interrupt 14h, Function 0Dh - Get Pointer to Character Ready Flag, has been provided (BIOS Interrupt 14h functions are described in **INT14.TXT**, in the **DOS** directory of the device driver distribution diskette). This function should be run as part of the initialization of any application program which will use the Character Ready Flags, and since each channel has its own flag, the function must be run for each channel to be monitored via Character Ready Flags.

The board and driver must be configured for an IRQ line for this feature to work.

To configure the DOS device driver to use the Character Ready Flags, use the arrow keys to highlight the number of the board you want to configure, and select **O)ptions** from the main menu, then select **C)har Ready Flags**. You will be presented with a screen similar to the example below.

```
Board 1 Character Ready Flag Status

      Chnl  4 : Disabled        Chnl  5 : Disabled
      Chnl  6 : Disabled        Chnl  7 : Disabled
      Chnl  8 : Disabled        Chnl  9 : Disabled
      Chnl 10 : Disabled        Chnl 11 : Disabled

Change :

T)oggle One Channel  E)nable All Channels  D)isable All Channels
Q)uit
```

To enable or disable the Character Ready Flag for an individual channel, select **T)oggle One Channel**, then enter the number of the channel to be modified. If previously disabled, that channel will now be enabled, and vice versa. There are also menu items to enable or disable Character Ready Flags for all channels with a single keystroke. When all channels have been set as desired, select **Q)uit** to return to the main menu.

Enabling/Disabling the Alt Pin Feature

"**Alt Pin**" is a special parameter that may be helpful for connecting modems to boards equipped with RJ-45 "modular" connectors. *It should not be enabled on boards equipped with DB-25 or DB-9 connectors.* Enabling "**Alt Pin**" causes the device driver to internally "swap" the signals DCD (Data Carrier Detect) and DSR (Data Set Ready). The DCD signal is normally on pin 10 of the RJ-45 jack, which makes it inaccessible to the more popular 8-pin plugs. When Alt Pin is enabled, pin 2 of the 10-pin RJ-45 jack is interpreted as the DCD signal. This corresponds to pin 1 of an 8-pin RJ-45 plug (which fits in the center of a 10-pin jack). Pin 10 then becomes DSR. See the section on connecting modems in the *Installation Guide* for your board for more information about Alt Pin and modem connections.

To configure the DOS device driver to use the Alt Pin feature, use the arrow keys to highlight the number of the board you want to configure, and select **O)ptions** from the main menu, then select **A)lt Pin**. You will be presented with a screen similar to the example below.

```
Board 1 Alt Pin Status

     Chnl  4 : Disabled        Chnl  5 : Disabled
     Chnl  6 : Disabled        Chnl  7 : Disabled
     Chnl  8 : Disabled        Chnl  9 : Disabled
     Chnl 10 : Disabled        Chnl 11 : Disabled

Change :

T)oggle One Channel  E)nable All Channels  D)isable All Channels
Q)uit
```

To enable or disable Alt Pin for an individual channel, select **T)oggle One Channel**, then enter the number of the channel to be modified. If previously disabled, that channel will now be enabled, and vice versa. There are also menu items to enable or disable Alt Pin for all channels with a single keystroke. When all channels have been set as desired, select **Q)uit** to return to the main menu.

Memory Enable/Disable Option (PC/Xe and PC/Xi Boards)

PC/Xe and PC/Xi boards' dual-ported memory is "stackable"—that is, all such boards in a system can share the same memory addresses, since only one board's memory is turned on at any given time.

The DOS device driver normally turns a board's memory off after a read or write operation to that board.

To configure the DOS driver to leave the PC/Xe, or PC/Xi board's memory enabled when not in use, highlight the board you wish to change (use the arrow keys), select **O)ptions**, then select **L)eave Memory Enabled**. You will see the following choices:

```
Current Status:
Leave Memory Disabled.

Leave Memory
D)isabled     E)nabled

Enter Selection
```

After making your selection, you will be returned to the main menu.

Note: This option is applicable only to PC/Xe and PC/Xi boards.

Exiting the Set-Up Program

Once all of the parameters have been set as desired for each board, exit the set-up program by selecting **Q)uit** from the main menu. If the driver is already loaded and the board(s) are installed, you will be asked:

Re-configure the Board? (y/*):

If you answer "yes", the changes will be made to the board and driver, and will take effect immediately. Next, you will be asked:

Save Changes to Disk for Re-Boot? (y/*):

Answer "yes" if you wish the changes to become permanent (you *must* answer "yes" if this is the first time you have configured the driver). Now you will be asked:

Quit? (Q/*):

Select "**Q**" to quit. Any other key will return you to the main menu of the set-up program.

You will be asked:

Would you like your CONFIG.SYS updated? (y/*)

Answer "yes" if you want the device driver command line to be added to **CONFIG.SYS** by the configuration program. If you answer no, you must manually update **CONFIG.SYS** to load the driver (see Loading the Device Driver, on the next page).

NOTE: If you reconfigure the board without saving the changes to disk, the changes will be effective only until DOS is rebooted. The driver will then revert to whatever parameters have been previously set.

Loading the Device Driver

Once the driver has been configured and the file **XIDOS5.SYS** has been created, the driver needs to be added to the system configuration. This was done automatically by the configuration program, unless you answered "no" to the question "**Would you like your CONFIG.SYS updated? (y/*)**". In this case, you need to add the line

DEVICE=C:\DIGI\XIDOS5.SYS

to **CONFIG.SYS** in the root directory (assuming that you have located the driver file in **C:\DIGI**). Use your favorite text editor to do this.

Now reboot your computer.

When the driver is loaded, the following information should be displayed (depending upon your system configuration and **AUTOEXEC.BAT** file, it may scroll by too quickly to read):

```
Digi Intelligent DOS Driver Version 4.1.2
Copyright (C) Digi International Inc. 1995

Board 00 - Initializes Successfully.
Board 01 - Initializes Successfully.
```

(This is what you would see if you had installed two boards.)

The DOS device driver is now loaded and ready for use.

Important! If your system is running an expanded memory manager (e.g. EMM386, QEMM, etc.), be sure to exclude the memory address range used by the board (8K, 32K or 64K, depending on the board type). This is usually done with a command line option in the **DEVICE=** line for your memory manager in **CONFIG.SYS**.

EXAMPLES (**EMM386.EXE**; boards addressed at D0000h):

    PC/Xe (8K version)
        DEVICE=EMM386.EXE [...] **-X D000-D1FF**

    PC/Xe (64K version) and PC/Xi (64K)
        DEVICE=EMM386.EXE [...] **-X D000-DFFF**

    COM/Xi (32K)
        DEVICE=EMM386.EXE [...] **-X D000-D7FF**

Consult the documentation for your expanded memory manager for instructions.

Uninstalling the Device Driver

To uninstall the device driver, simply remove the **DEVICE=** line from **CONFIG.SYS**, and delete the files in **C:\DIGI** (or whatever directory you copied them to).

Alternatively, if you just want to temporarily disable the driver without losing your configuration information, you can "comment out" the driver by putting "**REM**" in front of the **DEVICE=** line in **CONFIG.SYS**.

Error Messages

During the initialization of the DOS device driver and the boards (at boot-up time), the following messages might appear on your console. In general, unless precisely the same configuration has been known to work previously, these messages indicate that the board(s) and driver were not configured with matching parameters, or that the configuration is in conflict with some other device in the system. If the system has been working as configured, and no other software or hardware changes have been made in the mean time, these error messages may indicate a board failure.

Important! *Before calling Technical Support, be sure to run the Memory Map utility to find the required amount of available address space, and the User Diagnostics to verify that the board is working correctly. See the Installation Tips section of the Installation Guide for your board for details.*

`Board 00 - Port 320h not found.`
> The driver was configured for a board with an I/O port at 320h, but could not find a board at that address.
>
> Verify that the board's DIP switches or jumpers are set for the correct I/O Port address, as defined with the set-up program (if the board is an MC/Xe or MC/Xi board, check the POS).

`Board 00 - Port at 320 fails hardware reset.`
> The driver could not reset the board. This usually indicates a hardware mal-function, but could also result from an I/O Port address conflict with some other device in your system.
>
> Reconfigure the board for a different I/O Port address. Make sure to run the set-up program to reconfigure the driver accordingly.

`Board 00 - Memory Not Found`
> No memory was found at the address specified during driver configuration.
>
> Make sure that the board is securely seated in the computer's I/O bus slot.

```
Board 00 - Fails BIOS Initialization.
Board 00 - Fails FEPOS Initialization.
Board 00 - Fails Command Buffer Initialization.
```
These messages indicate that the initialization process failed while the driver was attempting to load or use on-board code. Failures of this kind may be caused by a board hardware malfunction or by memory address conflicts with another device in your system.

Try rebooting your system. If the message still persists, check your system for possible address conflicts.

```
Board 00 - Fails IRQ Test - Check IRQ Setting.
```
This message indicates the board was initalized properly but interrupts could not be generated by the board. This usually means that there is an IRQ conflict with another device in your system. Check and rectify any differences or conflicts. If the error persists, it is probably related to faulty hardware.

Programming Information

The MS-DOS device driver is accessed via an extended set of BIOS and EBIOS Interrupt 14h function calls. These functions provide character and string read/write capability, channel parameter control, I/O buffer management and status information. For details on specific functions, see the file **INT14.TXT** in the **DOS** directory of the distribution diskette.

Digi Support Services

The Digi Bulletin Board System

Digi provides an electronic bulletin board service (BBS) for our customers. This bulletin board provides general and technical information about Digi's products.

The Digi BBS allows users to download software drivers as soon as they become available. There is also a feature to allow users with problems or questions about Digi products to leave messages to Digi Technical Support.

Using the Digi BBS is easy. Simply dial **(612) 912-4800**. In Europe, dial **+49 221 9205211**; in Asia, dial **+65 735 2460**.

The recommended modem communications parameters are 8 bits, no parity and one stop bit (**8 N 1**). Other settings may also work.

Download protocols include Zmodem, Xmodem, Ymodem, Kermit and others.

Internet FTP Server

Digi has set up an Anonymous FTP server for those with access to the Internet network. The address is **ftp.dgii.com**. Log in as **anonymous**, and enter your E-mail address when asked for a password. Drivers and installation tips are located in the **/drivers** directory. A text file, **download.doc**, gives information on uncompressing the files after downloading. Tip: Be sure to enter "**bin**" before downloading, to ensure binary transfer of files.

World Wide Web Server

Product information, manuals, new product announcements, programs, application stories and more can be obtained through the World Wide Web. Our address is **http://www.dgii.com**.

DigiFACTs FaxBack Server

Manuals and technical information can also be obtained by FAX. To use the FaxBack server, simply call (612) 912-4990 on a touch tone phone.

Information About Your System

Serial number of your Digi product: _____

Make, model and clock speed of your computer: _____

_____

How much RAM does your computer have? _____

Hard disk controller: Type: _____   Memory addressed at: _____

          I/O port used: _____   IRQ: _____

LAN card: Type: _____   Memory addressed at: _____

          I/O port used: _____   IRQ: _____

Other: Type: _____   Memory addressed at: _____

          I/O port used: _____   IRQ: _____

Operating system: _____   Version: _____

Digi device driver version: _____

Technical Support

At Digi, we are proud of our products, and support them. Our dealers and distributors are fully trained on our product line, so that they can help you on a technical level should assistance be needed.

Your first level of support is your Digi dealer, the place where you purchased your Digi product. Your dealer has the training to help you with any installation questions or difficulties you might have.

If you still experience difficulties (after contacting your first level of support), Digi has a staff of Technical Support Specialists that can assist you. They can be reached at **(612) 912-3456**. In Europe, call **+49 221 920520**, and in Asia, call **+65 732 1318**. FAX numbers are: (612) 912-4958 (USA), +49 221 9205210 (Europe) and +65 732 1312 (Asia).

When you call Digi Technical Support, please call from a position where you can operate your system. Also, please fill out the form on the preceding page before calling, so your Technical Support representative can have a clear picture of your system and any potential conflicts between devices.

Digi Technical Support can also be reached via Internet E-mail. Please send correspondences to **`support@dgii.com`**, and include your voice and FAX phone numbers.

Customer Service

Digi also has a staff of Customer Service representatives to help you with software and documentation update requests, as well as Returned Merchandise Authorizations (RMAs) in case you need to return your Digi product for repair (see page *75*). They may be reached at **(612) 912-3456**. Digi Customer Service may be contacted by FAX at (612) 912-4959.

Digi Customer Service can also be reached via Internet E-mail. Please send correspondences to **`cust_serv@dgii.com`**, and include your voice and FAX phone numbers.

Return Procedures

All Digi products have a five-year parts and labor warranty, and we are ultimately responsible for any defective parts, according to the limits specified in the warranty. However, many of the reported problems are due to factors other than defects in the product itself. To save you time and possibly additional cost, Digi asks that you *first* try to resolve any difficulties by contacting our Technical Support representatives at **(612) 912-3456.**

Important!   *Be sure to have the serial number of your Digi product at hand before calling Technical Support.*

Returns should be directed to the dealer or distributor from whom you purchased the product. If you need to return your Digi product for repair, it is first necessary to obtain an RMA (Returned Merchandise Authorization) number from Digi, by speaking to a Digi Customer Service representative. Authorized returns should be shipped to Digi International, 10000 West 76th Street, Eden Prairie, MN 55344. The RMA number should appear on the shipping carton, on or near the address label.

Note: *Products received without an RMA number clearly marked on the outside of the package will be returned, unopened, to the sender*

DOS Device Driver Package