

Chapter 4 Configuring the Terminal: PCMCIA Card Services

Introduction

PCMCIA Cards

The Personal Computer Memory Card International Association (PCMCIA) is a trade association of hardware and software vendors established to adopt a set of standards for adapter sockets and PCMCIA cards for portable PCMCIA accessories. A PCMCIA card is an integrated circuit card used to provide bus expansion capabilities for a micro, portable, laptop, or palmtop computer analogous to the internal cards and sockets on a desktop PC.

The PCMCIA standard defines the physical requirements, electrical specifications, and software architecture for the 68-pin cards and the sockets that accept them. This manual is concerned primarily with those elements of the software architecture that support operation on the PPT 41xx terminal.

The PPT 41xx terminal has two Type II (5.0 mm) sockets to be used for memory or I/O cards. The following PCMCIA cards are optional for use with the terminal:

- 512K Static RAM Card
- 1MB Static RAM Card (p/n 50-12100-086)
- 2MB Static RAM Card
- 4MB Static RAM Card
- The Megahertz Modem 14.4 DATA/FAX XJack Modem Card (p/n 50-12100-085)
- PCMCIA Spectrum One™ Radio Card
- Sun Disk AT Attachment (ATA) Cards
- PCMCIA Spectrum24 Radio Card

Installing PCMCIA Cards on the PPT 41xx

The PPT 41xx has two PCMCIA slots that accommodate two Type-I or Type-II cards.

Note: You must properly format the PCMCIA SRAM or ATA cards before using them in the PPT 41xx. Refer to *Chapter 7, Configuring the Terminal: Setting Up PCMCIA Cards* for information on formatting PCMCIA cards.

To insert PCMCIA cards in the terminal:

1. Remove the screw from the terminal end cap (see Figure 4-1) and lift the cover off.

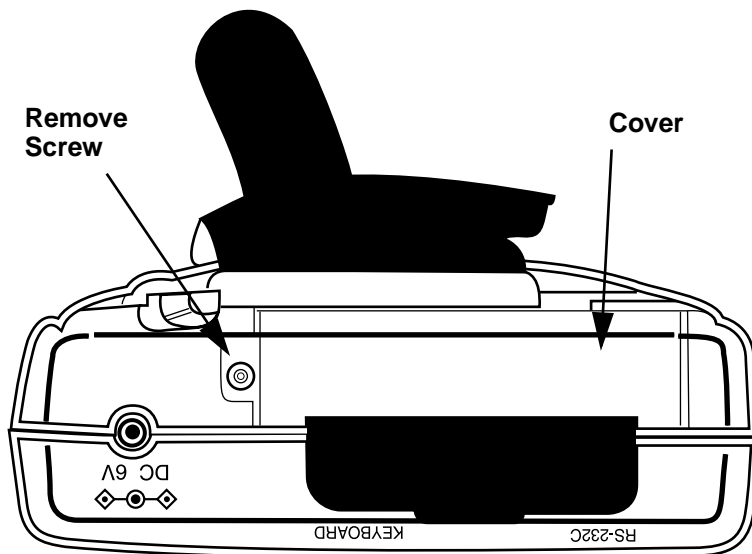


Figure 4-1. Removing PCMCIA Slot Cover

2. Slide the card in the slot as shown in Figure 4-2.

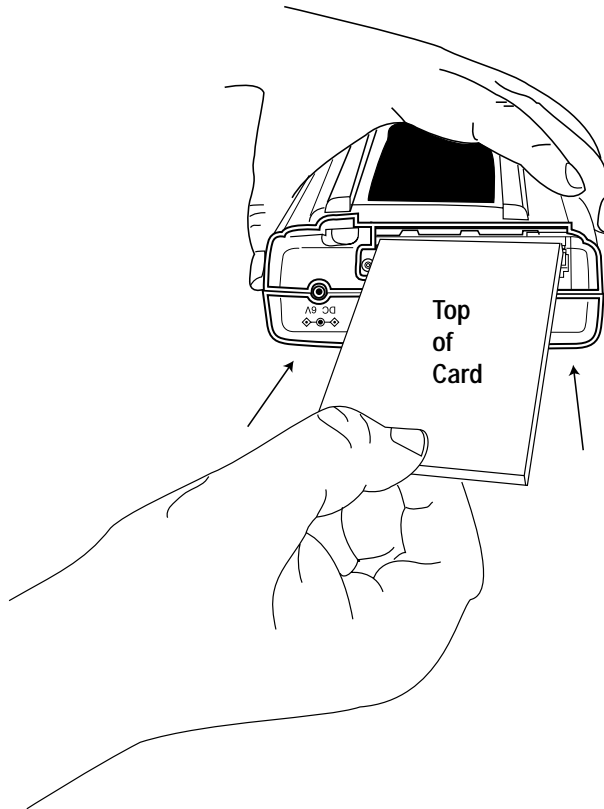


Figure 4-2. Inserting PCMCIA Card

1. Replace the cover over the slots.
2. Replace the screw and tighten to secure.

Removing PCMCIA Cards

To remove a PCMCIA card from the terminal:

1. Suspend the terminal.
2. Remove the screw from the terminal end cap (see **Figure 4-1**) and lift the cover off.
3. Pull the appropriate card out.
4. Power up the terminal.

Caution

For PPT 4140 terminals, do NOT remove the Spectrum24 radio card from the PCMCIA slot! Removing the radio card could damage the internal antenna.

Notes on PCMCIA Card Removal and Insertion

The PPT 41xx terminal is NOT designed to support “Hot” insertion and removal of PCMCIA cards (insertion and removal while the terminal is active). To avoid possible data corruption and/or software problems, PCMCIA cards should only be inserted or removed when the terminal is suspended.

Note: If you suspend and resume the PPT 41xx’s operation while a modem PCMCIA card is being used for communications, the communications session will fail. To recover, close the communications session and restart.

Removal and insertion of ATA or SRAM cards must be performed with caution to avoid the possibility of data loss and/or corruption. Data loss can occur if an ATA or SRAM card is removed while files are open on that card. If a new ATA or SRAM card is then inserted, the new card may experience data corruption.

To avoid problems, an ATA or SRAM card should only be removed when all files on that card are closed. This is best achieved by having the application inform the operator when it is safe to remove the card. If this is not done, data loss may occur.

To prevent data corruption as a result of inserting a new ATA or SRAM card after the “unsafe” remove of an old ATA or SRAM card, reboot the unit after inserting the new card.

The Software Development Kit (SDK) contains two separate sets of utilities that support the use of PCMCIA cards on these terminals. One set of utilities consists of PhoenixCARD Manager Plus software which use Card Services (see the next section in this chapter). The section that follows provides an overview of these utilities, and *PCM Plus Software Components/Drivers* describes them in more detail. The other set consists of utilities that do not use Card Services. A brief description of this set is given below in this chapter; *Non-Card Services PCMCIA Utilities* provides a more detailed description.

PCM Plus Services on the PPT 41xx

The PhoenixCARD Manager Plus (PCM Plus) software used on the PPT 41xx provides support for PCMCIA cards that conform to the architectural standards formulated by the PCMCIA in its Release 2.00 specification. PCM Plus is a system of programs that enables personal computers to access and use PCMCIA cards. It consists of the following components:

- **Information Utility**

This component displays information about the status of inserted cards.

- **Card Services**

This is a software utility that functions as an operating system for handling PCMCIA cards.

- **Socket Services**

This software utility provides the interface between the hardware of the PCMCIA card and the Card Services software. It is a BIOS-level, hardware-dependent interface that provides access to the sockets.

- **Clients**

These are device drivers for specific types of PCMCIA cards.

The Phoenix Super Client Driver (PCMSCD), which enables automatic recognition and configuration of cards, is the only client driver available for the PPT 41xx.

These PCM Plus services, as they apply to PPT 41xx operations, are described in *PCM Plus Software Components/Drivers*.

Once PCM Plus software has been installed in the terminal, various types of PCMCIA cards can be accessed. Table 4-1 lists the types of PCMCIA cards that are supported on the PPT 41xx terminal, along with the required drivers and the appropriate setup selections.

Table 4-1. PCMCIA Cards Supported on the PPT 41xx

Card Type	Setup Selection	Driver(s) Required	Notes
Modem	Card Driver	PCMCS.EXE PCMSCD.EXE	Setup must not map a diskette to the socket containing the modem.
SRAM	Diskette	None	This is the only method of using an SRAM card as a disk drive.
AT Attachment (ATA)	Card Driver	PCMCS.EXE PCMATA.SYS	Setup must not map a diskette to the socket containing the ATA.

The PCM Plus information utility (PCMINFO) can be used to display information about the PCMCIA cards that are installed. With the exception of PCMINFO, all PCM Plus Software components should be loaded as drivers in the CONFIG.SYS file on the terminal.

PCMCIA Card Utilities That Do Not Use Card Services

The utilities listed in Table 4-2 are also included on the Software Development Kit diskettes. These utilities support PCMCIA cards on the PPT 41xx terminals but do not work with Card Services. They are described in *Non-Card Services PCMCIA Utilities*.

Table 4-2. Non-Card-Services PCMCIA Utilities on the PPT 41xx

Card Type	Setup Selection	Driver/TSR Required	Notes
Modem	Card Driver	MODEMPE.EXE	Loaded as a TSR program in the AUTOEXEC.BAT file.
Sun Disk ATA	Card Driver	SDPSYM41.SYS	Loaded as a device driver in the CONFIG.SYS file.

PCM Plus Software Components/Drivers

Installation

The PCM Plus software components used with Card Services are installed on the development PC via the SDK (Software Development Kit) installation diskette. Refer to *Chapter 2, Software Installation on the Development PC*, for the detailed SDK installation procedure. The PCM Plus files and the subdirectories to which they are installed are shown in Table 4-3.

Table 4-3. PCM Plus Files and SDK Subdirectories

Filename	Description	SDK Subdirectory
PCMCS.EXE	PCM Plus Card Services 2.0	\SDK41xx\SYSTEM\PCMPLUS
PCMINFO.EXE	PCM Plus DOS Information Utility	\SDK41xx\SYSTEM\PCMPLUS
PCMSCD.EXE	Phoenix Super Client Driver	\SDK41xx\SYSTEM\PCMPLUS
PCMATATA.SYS	PCMCIA Fixed-Disk Support Driver	\SDK41xx\SYSTEM\PCMPLUS

PCM Plus Software Components

This section describes in detail the components and associated files of the PCM Plus software installed on your development PC and installable on your PPT 41xx terminal. The purpose of this section is to provide the ability to customize PCM Plus by adjusting individual command-line parameters in CONFIG.SYS or AUTOEXEC.BAT.

The PCM Plus software installed on your development PC and installable on your terminal is described in the following subsections:

- PCM Plus Information Utility for DOS (PCMINFO.EXE)
- Card Services 2.0 (PCMCS.EXE)
- PCM Plus Super Client Driver (PCMSCD.EXE)
- PCMCIA Fixed-Disk Support Driver (PCMATA.SYS)

Note: Socket Services for the terminal are provided in the BIOS.

PCM Plus Information Utility for DOS (PCMINFO.EXE)

PCMINFO is the PCM Plus information utility that is executed at the DOS prompt or by way of a statement in the AUTOEXEC.BAT file. The command line syntax is:

PCMINFO /d /t /h

where the switches are optional and have the results described in the Table 4-4.

Table 4-4. PCMINFO Switch Options

Switch	Description
/d	Invokes interactive display mode and continuously displays the PCMINFO screen, allowing instantaneous update of the PCMCIA socket information.
/t	Suppresses the timer tick display.
/h	Displays the available command line options for this utility. Note: The /? switch produces the same result.

Executing PCMINFO displays a screen like the one shown in [Figure 4-3](#).


```
Phoenix PCMCIA Information Utility Version 1.0
Copyright (c) 1993 Phoenix Technologies Ltd. All rights
reserved.

PCMCIA Card Services (c) 1993 Phoenix Technologies Ltd
PCMCIA version: 2.00, Vendor version: 1.00, Sockets: 2
System Ticks: 000003350, Last Event: 0x00

Socket 1: 1.0 Memory CardSocket 2: MEGAHERTZ

product: UNDEFINEDproduct: XJ1144

line 3: UNDEFINEDline 3: A5

line 4: UNDEFINEDline 4: PCMCIA MODEM

Device Type: 1.0 Memory Card Device Type: I/O

Configured: YES
```

Figure 4-3. PCM Plus Information Screen

The screen shown in Figure 4-3 displays the following information for each socket and PCMCIA Card:

- Card services vendor version number
- Number of sockets in the system
- Number of sockets active (card/device installed) or inactive (card/device not installed)
- Last event status
- Card/Device manufacturer's name
- Product name
- Device type
- Configuration status (Yes or No)

Card Services 2.0 (PCMCS.EXE)

The Card Services component (PCMCS.EXE) of PCM Plus functions as a subsidiary operating system that:

- interfaces directly with Socket Services 2.0 provided in the terminal BIOS
- coordinates access to the PCMCIA cards
- allocates the built-in PCMCIA system resources among client drivers, i.e., device drivers that support PCMCIA cards

A client driver is a device driver (hardware-specific software), designed to support one or more PCMCIA Cards. Card Services 2.0 is provided as a DOS loadable driver.

The Card Services component is primarily responsible for managing all PCMCIA system resources available for PCMCIA Cards. When a PCMCIA card is located in a socket, Card Services 2.0 determines the resources that can be provided for that card.

For more information on the additional responsibilities and services performed by Card Service, refer to the *PCMCIA Card Services 2.0 Interface Specification*.

The PCM Plus installation procedure loads Card Services as a device driver by inserting the following statement in the CONFIG.SYS file:

```
DEVICE=drive:\path\PCMCS.EXE options
```

where:

drive is the disk from which the terminal is booted.

path is the full path to the directory in which the Card Services software resides.

options is one or more of the switches described in Table 4-5.

Table 4-5 lists the PCM Card Services (PCMCS) options that must be included in the CONFIG.SYS **DEVICE** statement that loads this PCM Plus software component for the PPT 41xx. Note that options are entered in the **DEVICE** statement with a forward slash (/).

Table 4-5. PCMCS DEVICE Statement Options

Option	Description
/ADDR=xx	Sets internal memory window to address xx00:0000. For the PPT 41xx this option must always be used and xx must be set to CE or CF.
/POLL	Uses polling instead of interrupts for card events. This option must always be used for the PPT 41xx.

The following are more detailed descriptions of the Card Services options listed in Table 4-5.

PCMCIA Card Configuration Address (/ADDR=xx)

The parameter value (**xx**) in this command line option specifies the starting segment address for Card Services for PCMCIA Card configuration. The starting segment must be located within the first 1MB address space and must specify the start address of a 2-digit hexadecimal segment address.

The range for **xx** is C0 - CF.

Note: CC is used by Spectrum24 on the PPT 4140.

For the PPT 41xx, **xx** must be specified and must be one of CE or CF.

PCMCIA Card Events (/POLL)

This option enables sense-driven rather than interrupt-driven card events. It is useful for noisy hardware environments or when an IRQ is not available.

Note: This option **must** be specified for use on the PPT 41xx.

Phoenix Super Client Driver (PCMSCD.EXE)

The Phoenix Super Client Driver (SCD) is a Card Services client that enables and configures PCMCIA cards. Configuration enables system applications to recognize the PCMCIA card as a component or device of the system such as a modem with allocated resources such as I/O, interrupts, and memory.

PCMSCD obtains the configuration data for modem cards in command line arguments and in the Card Information Structure (CIS).

Note: If PCMSCD is to be loaded, it must be loaded **after** PCMCS.

Load the Super Client Driver as a device driver by inserting the following statement in the CONFIG.SYS file:

```
DEVICE=drive:\path\PCMSCD options
```

where:

`drive` is the disk from which the terminal is booted.

`path` is the full path to the directory in which PCMSCD.EXE resides.

`options` is one or more of the switches described in Table 4-6.

Table 4-6 lists the PCMSCD options that must be included in the CONFIG.SYS **DEVICE** statement that loads the Phoenix Super Client driver for the PPT 41xx. Note that options are entered in the statement with a forward slash (/).

Table 4-6. PCMSCD DEVICE Statement Options

Option	Description
/COM= <i>n</i> ,...	Specifies port number(s) <i>n</i> (,...) for one to four COM ports, where <i>n</i> can be 1, 2, 3, or 4. For the PPT 41xx, you must use 3 or 4.
/MIRQ= <i>n</i> ,...	Specifies an interrupt <i>n</i> for each of the COM ports that are specified in the /COM option. The value for <i>n</i> can be 1 to 7. For the PPT 41xx, use: 6, if you are also using radio 2, if you are not also using radio

The following are more detailed descriptions of the Super Client Driver options listed in table 4-6.

COM Ports (/COM=*n*,...)

This option specifies port number *n* for 1 to 4 COM ports, where *n* is 1, 2, 3, or 4. Each port number must be unique. Multiple port numbers must be separated by commas. Example: /COM=3,4 specifies COM3 and COM4.

For the PPT 41xx, this option must be specified and *n* must be either 3 or 4.

COM Interrupts (/MIRQ=*n*,...)

This option assigns the interrupt **n** to each of the COM ports specified in the **/COM** option. Each **n** must correspond in position to the related COM port specified in the **/COM** option. For example, if **/COM=3,4** is specified in the CONFIG.SYS **DEVICE** statement that loads the Super Client Driver, then **/IRQ=6,2**, specified statement, assigns IRQ6 to COM3 and IRQ2 to COM4.

For the PPT 41xx, this option must be specified and **n** must be either 6 (if radio is being used) or 2 (if radio is not being used).

PCMCIA ATA Fixed-Disk Support Driver (PCMATA.SYS)

The Phoenix logical block device driver (PCMATA.SYS) provides support for using the PCMCIA socket as a logical drive for a PCMCIA AT Attachment (ATA) compatible fixed disk.

This driver registers as a bulk memory client to Card Services. For access to the PCMCIA ATA IDE fixed disks, PCMATA.SYS talks directly to the IDE interface to read or to write data. For this driver to function properly, all PCMCIA ATA IDE disks must be recognized and properly configured by Card Services.

Note: If PCMATA is to be loaded, it must be loaded **after** PCMCS.

To load PCMATA.SYS as a device driver, insert the following statement in the CONFIG.SYS file:

```
DEVICE=drive:\path\PCMATA.SYS /ADDR=xx {socket /n}
```

where:

drive is the disk from which the terminal is booted

path is the full path to the directory in which PCMATA.SYS resides.

xx = CE or CF

n = 1 or 2 (i.e., /1 or /2) to specify the socket; default is /1.

Note: If a system has two PCMCIA slots, only one can be occupied by an ATA card at any given time. Simultaneous insertion of two ATA cards may cause upper-memory window collisions. This address option must be specified as CE or CF on the PC/Chip.

Memory Management

This section provides information on optimizing memory use with PCM Plus.

The driver memory requirements for the Card Services (PCMCS.EXE) and Super Client Driver (PCMSCD.EXE) components are given, below, in Table

4-7. To reduce memory requirements, we advise loading only those drivers that are absolutely required for the cards you are planning to use. For example, you should load PCMCS and PCMSCD only if you are going to use a modem card.

Table 4-7. Driver Memory Requirements

Driver	DOS Memory Required (Approx.)	Recommended Switches	Required Switches
Client Services (PCMCS.EXE)	37K	/ADDR=CE	/ADDR=CE, or /ADDR=CF and /POLL
Super Client Driver (PCMSCD.EXE)	17K	/COM=3 /MIRQ=6 or /COM=4 /MIRQ=2	/COM=3, or /COM=4 /MIRQ=2, or /MIRQ=6
ATA Fixed-Disk Support Driver (PCMATA)	10K	/ADDR=CE /n1 or /ADDR=CE /n2	/ADDR=CE, or /ADDR=CF/

Non-Card Services PCMCIA Utilities

Installation

The PCMCIA utilities that do not use Card Services are installed on the development PC via the SDK (Software Development Kit) installation diskette. Refer to *Chapter 2, Software Installation on the Development PC*, for the detailed SDK installation procedure. The files and the subdirectories to which these utilities are installed are shown in Table 4-8.

Table 4-8. PCM Plus Files and SDK Subdirectories

Filename	Description	SDK Subdirectory
MODEMPE.EXE	Modem Point Enabler for the PPT 41xx	\SDK41xx\SYSTEM\MODEMPE
SDPSYM41.SYS	Sun Disk ATA Driver	\SDK41xx\SYSTEM\SUNDISK

Modem Point Enabler

Product Overview

When a PCMCIA card is installed onto a laptop or a PDA, the PCMCIA Specification 2.0 requires that the card be configured. Some cards require the use of I/O address space, and some require memory windows before they can perform the desired functions. Normally these resources are allocated to a card by a client driver interfacing to Card Services, which monitors and detects card insertions and removals.

Unfortunately, the amount of memory needed to use Card Services and the associated client driver can be prohibitive and restrict the amount of memory available to application programs.

The Modem Point Enabler (MPE) is a DOS-based TSR program that interfaces directly to Socket Services 2.0 to provide the necessary configuration of modem cards. The use of this TSR requires that Card Services not be loaded. At the time the TSR is loaded, the user may provide a COM port and IRQ which the MPE will use to configure a modem card when it is detected. The MPE will configure any type of card that uses COM3 or COM4 port addresses.

The MPE is designed to run only on PPT 41xx terminals. It should not be used on any other platform (e.g., laptop).

Theory of Operation

Typically, the Modem Point Enabler TSR is loaded via the AUTOEXEC.BAT file that is executed at the time DOS is loaded. It uses services provided by:

- Socket services 2.0 or higher
- XSYMBIOS 1.0 or higher

The TSR program (MODEMPE.EXE) is invoked as follows:

```
MODEMPE [/SOC=x] [/COM=y] [/IRQ=z] [/BEEP]
```

where:

x = PCMCIA Socket Number (1 or 2). The default is **2**.

y = **3** means to configure modem for use on COM3.

y = **4** means to configure modem for use on COM4. The default is **3**.

z = **6** means that IRQ 6 interrupt is used.

z = **2** means that IRQ 2 interrupt is used. The default is **6**.

/BEEP causes the terminal to beep with a high pitch tone at resume if it detects and configures a card and to beep with a low pitch tone at resume if it is unable to configure the card. The default is no beep.

When the MPE is loaded:

1. It checks to ascertain that Card Services are not installed.
2. It registers with XSYMBIOS to be notified of System Resume events. (See **Note 1** on the following page.)
3. It checks to see if a card is installed in the requested socket. (See the second paragraph of **Note** below.)
4. If a card is detected, the card's Card Information Structure (CIS) is examined to determine if it is a device that can be configured on the requested port. (See third paragraph of **Note** below.)
5. If the detected card cannot be configured, the MPE issues a beep with the frequency that indicates that it is unable to configure the detected card.

Otherwise, the MPE:

- requests the relevant I/O window from Socket Services along with the requested IRQ
- configures the card
- issues a beep with the frequency that indicates that a card has been detected and

configured.

6. It terminates and stays resident.

Note: When a PPT 41xx unit is suspended, all power is lost to the PCMCIA sockets. This means that when power is resumed, the card has lost its configuration. MPE will detect the resume and perform the same procedures as in the initial TSR load.

The MPE does not support “hot insertion.” In order for a modem card to be configured, it must have been installed in the system at the time the TSR is loaded. To configure a modem card that is installed into the system after the TSR is loaded, the system should be suspended, the modem card inserted, and then the system resumed. When the system resumes, the modem card will be configured.

The MPE will work only with modem cards that have a valid and correctly linked CIS in attribute memory.

No attempt should be made to load Card Services after the MPE has been installed. Card Services blocks all calls to Socket Services and thereby renders the MPE inoperative.

Sun Disk AT Attachment Driver (SDPSYM41.SYS)

The Sun Disk AT Attachment (ATA) driver is a driver for the PCMCIA Sun Disk ATA card. This program works with Socket services to map the ATA card as drive D: or drive E:.

The Sun Disk ATA Driver is installed from the CONFIG.SYS file with the following statement:

```
DEVICE=drive:\path\SDPSYM41.SYS [/Sn]
```

where:

drive is the disk from which the terminal is booted

path is the full path to the directory in which the Card Services software resides

n = **1** maps Socket 1 for the ATA drive.

n = **2** maps Socket 1 and Socket 2 for ATA drives.

Note: The socket with the ATA Card must be set for "Card Driver" in the setup selection. (See **Table 4-2.**)

This driver uses PCMCIA window 1 at CE00 segment for socket 1 and PCMCIA window 2 at CF00 segment for socket 2.

Memory Management

This section provides information on optimizing memory use with the TSR program and device driver described in this chapter.

The memory requirements for the Modem Point Enabler and the Sun Disk ATA Card Drive are given below, in Table 4-9. To reduce memory requirements, we advise loading only those drivers that are absolutely required for the cards you are planning to use.

Table 4-9. MPE and Sun Disk ATA Driver Memory Requirements

Driver	DOS Memory Required (Approx.)	Recommended Switches	Required Switches
Modem Point Enabler (MODEMPE.EXE)	3K	Use defaults: Socket No. x=2 Configure modem for use on COM3 y=3 Use IRQ 6 interrupt z=6 No beep.	None required. All switches have default values.
Sun Disk ATA Driver (SDPSYM41.SYS)	6K	Use default: Map Socket 1 and Socket 2 for ATA drives, i.e., /S2.	None required. The switch /S has the default value 2.