PCM-3110/3111 PC/104 PCMCIA module

The PCM-3110 is a PCMCIA driver in the PC/104 form factor. The PCM-3111 is a second PCMCIA socket when used in conjunction with the PCM-3110. The PCM-3110 is always designated as the master module and the PCM-3111 as the slave module. These two devices are easily joined by plugging the PCM-3111 onto the PCM-3110 and then connected together via a 80-pin flat cable, (included with PCM-3111).

Software Installation

Before you can use any PCMCIA card with your PCM-3110 unit, you must install the software provided. All PCMCIA cards require certain device drivers to be installed before you can use them and you should not attempt to use any type of PCMCIA card before the software has been correctly installed.

Because the original PC configuration did not include support for PCMCIA devices, your system will not be able to recognize such devices before the software has been installed. The PCM-3110 PCMCIA software provides all the drivers necessary to allow you to use SRAM and Flash memory cards and Type II and Type III I/O devices including modems, fax/modems, LAN cards and ATA hard disk drives.

The software includes a simple automatic installation program which will make the necessary modifications to your CONFIG.SYS file to allow you to access your PCM-3110 PCMCIA card slots. Please follow the instructions in this section carefully in order to ensure that the software is correctly installed.

The Installation Program

Installing the PCM-3110 software on your hard disk drive is a simple procedure thanks to the automatic installation program provided with your PCM-3110. To install the PCM-3110 PCMCIA drivers proceed as follows:

1. Insert the 3.5" PCM-3110 Software diskette into the A: or B: floppy disk drive.

2. Make the drive in which the diskette is inserted the current drive by typing A: or B: at the DOS prompt.

3. At the DOS prompt, type:

   ```
   A>>INSTALL
   ```

A message will appear on your screen explaining that the install program will create a directory called CMM on your C: drive and copy the PCM-3110 files to this directory. The install program will also modify the CONFIG.SYS file. By default, the install program will look for the PCM-3110 files on the A: drive. If you wish to specify a different directory than CMM, and/or if you are running the PCM-3110 install from the B: drive, you should abort the install batch program by pressing <<Ctrl>> C and retype the install

command with the required directory name and/or source diskette. For example if your PCM-3110 disk is in the B: drive and you wish to copy the files to a directory called PCMCIA on the C: drive, you would type:

```
B:INSTALL PCMCIA B
```

Note that PCM-3110 files must always be copied to the C: hard disk drive and you may not specify a different drive. Where d: is the hard drive on which you wish to install the software, and path is the sub-directory you wish to copy files to.

4. The automatic installation program will copy the PCM-3110 PCMCIA drive files to the C: hard disk drive and amend the CONFIG.SYS file to ensure the PCM-3110 PCMCIA drivers are loaded at boot up.

That is all you have to do to install the PCM-3110 Software, but before proceeding please read the next section on the CONFIG.SYS file to ensure that your CONFIG.SYS is correctly configured to enable the PCM-3110 drivers to be loaded.

CONFIG.SYS file with PCM-3110

During the automatic installation procedure described above, the following statements will automatically be entered in your existing CONFIG.SYS file:

```
device = C:\CMM\CMSS.SYS /M=D0
device = C:\CMM\CMCS.SYS
device = C:\CMMPCCARD.SYS
device = C:\CMM\IOCIC.SYS
device = C:\CMM\ATACARD.SYS /S1:2 /S2:2
```

If you specified a different directory name than CMM, this will be specified as the path rather than CMM.

The above listed statements load the various PCMCIA drivers at boot up and must always be present for all the PCM-3110 PCMCIA functions to be available.

Please note that in addition to the above statements the following statements MUST also be present in the CONFIG.SYS file for PCM-3110 to work correctly, and MUST appear BEFORE the PCM-3110 statements:

```
device = setver.exe
device = himem.sys
DOS = high, UMB
```

Note that these statements will NOT be automatically added by the PCM-3110 installation program if not already present. In most cases, they will already be entered in the CONFIG.SYS file, but if not, you should enter the above statements BEFORE those entered by the PCM-3110 install program. To edit the

CONFIG.SYS file you may use any text editor. Please refer to your DOS user's manual for details.

After editing, your CONFIG.SYS file should look something like this:

```
device = setver.exe
device = himem.sys
DOS = high, UMB
device = drive\path\CMSS.SYS
device = C:\CMM\CMCS.SYS
device = C:\CMM\PCCARD.SYS
device = C:\CMM\IOCIC.SYS
device = C:\CMM\ATACARD.SYS
```

Of course, you may have other statements in your CONFIG.SYS file not shown here and this does not matter. Some of these statements may appear between the first three statements shown above and the PCM-3110 driver statements and this also is no problem. As long as the first three statements are present and appear before the PCM-3110 driver statements, the PCM-3110 software will function correctly.

> **Note:** Please note also the section on SCSI devices on page 3.

PCM-3110 Driver Functions

Each of the PCM-3110 drivers has a specific function related to the use of PCMCIA functions. Below are listed the function of each of the drivers loaded from the CONFIG.SYS file by the statements added during installation:

CMSS.SYS

This program provides the "Socket Services" under the PCM-3110 Software. Socket Services are the functions related to the actual PCMCIA socket itself, such as the configuration of the I/O and memory interface and socket power voltage. This is a low level driver which allows the higher level drivers, operating system and applications to access the PCMCIA card slots.

CMCS.SYS

The PCM-3110 "Card Services" driver. This is the upper layer of the software and is hardware independent to provide a common interface for all kinds of PCMCIA cards. The Card Services driver manages competition for system resources and manages adapter and card resources and configuration.

PCCARD.SYS

The client of card services which provides support for Type I PCMCIA memory cards, including SRAM and Flash cards.

IOCIC.SYS

The client of card services which provides support for Type II PCMCIA I/O cards, such as fax/modem cards and Ethernet LAN cards.

ATACARD.SYS

The client of card services which provides support for Type II Sundisk ATA cards and Type III ATA hard disk drive cards. In addition to the above drivers being copied to the hard disk drive, the following two utility programs are also copied, though these programs are not loaded from the CONFIG.SYS file:

F2ERASE.EXE

A utility to erase Flash memory cards.

IOCFG.EXE

A utility to change the configuration of I/O cards and host resources.

PCM-3110 Driver Switches

When the PCM-3110 drivers are entered in the CONFIG.SYS file, they are entered without any "switches". Switches are commands that can be added to statements to alter the statement in some way. Depending on your system configuration, it may or may not be necessary to add switches to some of the PCM-3110 device driver statements to ensure that the software operates correctly. Details of all the switches that can be added to any of the PCM-3110 device driver statements are given here.

CMSS.SYS Switches

As described above, CMSS.SYS is the PCM-3110 low level driver, by default (i.e. when no switches are added), this driver is loaded into the memory address D0. It is not necessary to understand what the memory address is in detail, but basically speaking it is the location at which a program is situated in memory. The important thing is that no two devices can occupy the same memory address or there will be a conflict which will cause one of the devices to malfunction.

To change the memory address used by CMSS.SYS, you may use the /M switch. The syntax of this command is as follows:

```
device = drive\path\CMSS.SYS /M=[address]
```

where [address] can be either D0, D4 or D8. The meaning of each of these addresses is:

- D0 = 1st socket = D000H, 2nd socket = D400H
- D4 = 1st socket = D400H, 2nd socket = D800H
- D8 = 1st socket = D800H, 2nd socket = DC00H

If no switch is specified, the first setting is automatically assumed. If your system works correctly after the PCM-3110 software is installed it means the default setting causes no conflict and it will not be necessary to make any adjustments. If there is a memory conflict, however, use a text editor to add an /M switch to the CMSS.SYS statement to load CMSS.SYS at a different memory address.

ATACARD.SYS

The ATACARD.SYS driver is designed to support the use of ATA hard disk drives. The installation program copies the ATACARD.SYS statement to the CONFIG.SYS file with two switches, /S1:2 /S2:2, which are explained below. If these switches are not specified, the PCM-3110 software will support two ATA hard disk drives with one partition only. The switches must be present if an ATA hard disk drive with two partitions is used. The syntax of the command with switches is as follows:

```
device = \C:\CMM\ATACARD.SYS /S1:2 /S2:2
```

With the switches the PCM-3110 software will support ATA hard disk drives in socket 1 (S1) and socket 2 (S2), and both drives may have up to two partitions. Since the switches are automatically added during installation, it is

best not to alter this statement. Even if you are using an ATA hard disk drive with only one partition, the presence of the switches will not affect operation. In order to use an ATA hard disk drive with two partitions, however, the switches must be present.

Please see the note on the following page regarding booting from an ATA hard disk drive.

> **Note:** *In order to boot from an ATA hard disk drive the drive must have two partitions. The /S1:2 and/or /S2:2 switches must be present to support bootable ATA hard disk drives.*

Special Notes on Using SCSI Devices

If your system includes any kind of SCSI device, such as a hard disk drive or tape backup unit, there will be a statement in the CONFIG.SYS file to load this device. If so, you must ensure that the statement to load the SCSI device in the CONFIG.SYS file appears BEFORE the PCM-3110 driver statements.

You will also need to check the ROM address used by the SCSI device to ensure that it does not conflict with that used by PCM-3110 boot ROM. The PCM-3110 boot ROM uses the address CC00:0. You should set the SCSI device ROM address as C800:0, or any valid address before CC00:0, in order to ensure that the SCSI device is loaded before the PCM-3110 boot ROM address.

Using Memory Cards

PCM-3110 supports the use of the two main kinds of memory cards - SRAM cards and Flash memory cards. Though both these types of cards have the same function, i.e. to store data, the way in which they are formatted and used to store data is different. In this section we detail how to prepare SRAM and Flash memory cards to store data, and the relative merits of these two types of memory card.

Memory Card
Drive Letter Assignments

Before you go on to learn how to use memory cards with the PCM-3110, it is important to understand how the drive letters are assigned to the PCMCIA slots. In particular you should note that the drive letter of the PCMCIA slot varies depending on whether the device inserted is a memory card or an ATA hard disk drive. This is different from a hard disk drive which is always fixed as C: or D:, etc.

When using memory cards the drive letter of the first PCMCIA socket (PCM-3110) will become the drive after the last hard disk drive. For example, if you have one C: hard disk drive with one partition, then the 1st PCMCIA socket becomes the D: drive and the second (PCM-3111 if present) the E: drive. If you have two hard disk drives with two partitions each, i.e. C:, D:, E: and F:, then the 1st PCMCIA socket becomes the G: drive and the second the H: drive. Remember that socket 1 is on the master module (PCM-3110) and socket 2 is on the slave module (PCM-3111).

PCM-3110 always reserves the first two volumes (i.e. drive letters) for the two memory card sockets. If you then insert

an ATA hard disk drive the socket volumes change, though for the moment we will not go into this.

Using SRAM Memory Cards

SRAM cards are the simplest PCMCIA medium for data storage, functioning in much the same way as floppy diskettes. They are easy to format and data can be written to and erased from the card as many times as needed. In general, SRAM cards are ideal for storing data files which may need to be frequently updated and/or deleted, since there is no restriction on the way in which, or the number of times, data can be deleted. Note that SRAM cards are available from a number of different manufacturers though the basic method of usage is always the same.

SRAM Card Beep Codes

When you insert any kind of PCMCIA card into a socket you will hear an audible beep which will inform you of the status of the card. With SRAM cards, there are two types of audible message to tell you whether the card is formatted or unformatted:

L H L = Unformatted

H L = Formatted

(L=low pitched beep, H=high-pitched beep)

Formatting SRAM Cards

SRAM cards can be formatted with the DOS File Allocation Table (FAT) just like floppy diskettes. To format SRAM cards, follow the instructions below:-

1. Insert the SRAM card in the PCMCIA slot. You should hear the Low-High-Low audible beep to indicate the card is unformatted.

2. At the DOS prompt type:

    ```
    C>> FORMAT d:/U
    ```

    where d: is the drive letter of the socket in which the card is inserted. You should add the /U (Unconditional) switch when formatting PCMCIA cards to ensure correct formatting.

3. Your SRAM card will be formatted and you may now proceed to copy data to the card.

Making SRAM Cards Bootable

Just like floppy disk drives, SRAM cards can be made bootable. To do this, simply add the /S switch to the FORMAT command to transfer the DOS system files to the SRAM card. Thus you should type:

```
C>> FORMAT d:/U/S
```

where d: is the drive letter of the socket in which the card is inserted.

Note that you must transfer the system using the format command and cannot use the SYS command to transfer the system to a pre-formatted SRAM card as you can with a floppy diskette.

After transferring the system to the card with the FORMAT command, you must then copy the PCM-3110 drivers and the DOS files HIMEM.SYS and SETVER.EXE from your internal hard disk drive to SRAM card. Create a CONFIG.SYS file on the card which loads the PCM-3110

---

drivers and includes the other statements necessary to load HIMEM.SYS and SETVER.EXE, and set DOS = HIGH with UMBs. If you do not do this, though you will be able to boot from the SRAM card, the PCM-3110 slots will not be activated for any other device since the drivers that are needed to enable the system to recognize the PCM-3110 software has not been loaded.

Deleting Data on an SRAM Card

You can copy data to and delete data from SRAM cards as many times as you want using the standard DOS COPY and DELETE commands. Since SRAM cards are formatted with the DOS FAT system, they function exactly like floppy diskettes and there is no restriction on deleting data from them.

Using Flash Memory Cards

Flash memory cards are not as straightforward to use as SRAM cards and do not function in exactly the same way as floppy diskettes. The drivers included with the PCM-3110 allow you to format Flash memory cards with the standard DOS FAT system, though this creates certain restrictions. When using Flash memory cards formatted with a standard FAT system you cannot delete individual files from the card, but must reformat the card to delete all data. FAT formatted flash cards become WORM (Write Once Read Many-times) devices.

In addition, when you copy data to a FAT formatted Flash card, DOS will inform you of bad sectors on the card. Although these "bad sectors" are not actually present, and there is no risk of the data on the card being corrupted, a certain amount of space (albeit not very large) is taken up by these nonexistent bad sectors which increases with each copying operation. These phenomena occur because DOS does not yet fully support Flash memory card formats, and not because of any defect in the PCM-3110. In order to obtain correct operation of Flash memory cards under DOS, you must purchase a special software designed for this purpose, as explained in the section entitled Flash Card Formatting Software in this section.

Flash Memory Card Beep Codes

The beep codes for Flash memory cards are the same as for SRAM cards:

L H L = Unformatted

H L   = Formatted

(L=low pitched beep, H=high-pitched beep)

Formatting Flash Memory Cards

Flash memory cards can be formatted with the DOS File Allocation Table (FAT) as instructed below:

1. Insert the Flash card in the PCMCIA slot. You should hear the Low-High-Low audible beep to indicate the card is unformatted.

2. At the DOS prompt type:

```
C>> FORMAT d:/U
```

where d: is the drive letter of the socket in which the card is inserted. As for SRAM cards, you should add the /U (Unconditional) switch when formatting Flash cards to ensure correct formatting.

Note: Please note that the boot sequence of the PCM-3110 is to first check the second socket (PCM-3111) to see if the device is bootable, prior to checking the first socket (PCM-3110).

3. Your Flash card will be formatted and you may now proceed to copy data to the card. Note that a certain amount of bad sectors will be displayed after the formatting process, as explained above, but these will not endanger your data.

Deleting Data on an Flash Card

The main disadvantage of Flash memory cards formatted with the FAT system, is that individual files cannot be deleted from the card. If you wish to remove data from a flash card, you must clean the whole card by reformatting it. If you are using MS-DOS 5.0 or MS-DOS 6.0, to do this, simply follow the instructions for formatting Flash memory cards, above.

If you are using MS-DOS 6.2, you must first run the F2ERASE.EXE program included with your PCM-3110 software to erase the Flash card, and then reformat the card. Thus, you would type:

```
C>>F2ERASE n
```

where n is either 1 for socket 1 or 2 for socket 2. And then:

```
C>>FORMAT d:/U
```

where d: is the PCMCIA slot drive letter.

Making Flash Cards Bootable

The procedure for making FAT formatted Flash cards bootable is exactly the same as for SRAM cards. That is, simply add the /S switch to the FORMAT command to transfer the DOS system files to the SRAM card. Thus you should type:

```
C>> FORMAT d:/U/S
```

where d: is the drive letter of the socket in which the Flash card is inserted.

Note that as for SRAM cards you must transfer the system using the format command and cannot use the SYS command to transfer the system to a pre-formatted Flash card as you can with a floppy diskette.

Note also that you must create a CONFIG.SYS file and copy the necessary PCM-3110 and DOS drivers from the hard disk drive to the Flash card to ensure that the PCM-3110 drivers are loaded when you boot from the Flash card.

FFS2 & TFFS Flash Card Formatting Software

Microsoft's Flash File System 2 (FFS2) software and M-System's True Flash File System (TFFS) are designed specifically for Flash memory cards, and this software must be purchased separately to have full support for Flash memory cards. These software packages provide a program to format Flash memory cards in a special way. With this special format, files can be individually deleted and the problem of apparent bad sectors being displayed is resolved.

The PCM-3110 hardware fully supports the use of FFS2 and TFFS and if you intend to frequently use Flash memory

cards, it may be advisable to purchase one of these software packages.

Note: *If you wish to use FFS2 or TFFS with the PCM-3110, the FFS2 device = MS-FLASH.SYS statement and TFFS device = TFFSCS.SYS statement that is entered in the CONFIG.SYS file to load FFS2 must come AFTER the statements used to load the PCM-3110 drivers.*

Using I/O Cards

Unlike SRAM and Flash memory cards, I/O (Input/Output) cards are not used to store data but are actually devices to perform some special function. I/O devices are instruments that control incoming and outgoing data flow. Traditional I/O devices for desktop PCs come in the form of interface cards that are plugged into the slots on the mainboard of the computer and include such devices as network cards, modems and fax modems.

In order to support portable computers, which do not support the installation of interface cards, these devices were designed as PCMCIA cards which could be plugged into the standard PCMCIA slot used for memory cards. I/O PCMCIA cards are usually Type II cards, i.e. cards of 5mm thick. In this section we explain how to use I/O PCMCIA cards with the PCM-3110. Note that we do not deal with Type II solid state hard disk drive cards, which are explained in detail in the next section.

I/O Card Beep Codes

Just as with memory cards, when an I/O card is inserted in the PCM-3110 PCMCIA slot, an audible beep is issued to inform you of the status of the card. There is only one kind of audible message with I/O cards, which is:

L H

This signal tells you that the I/O card is working correctly. If you fail to hear this beep signal when you insert the card, this may indicate that the card is faulty or damaged.

PCMCIA I/O Card Types

As we have mentioned, there are a number of different types of PCMCIA I/O cards and the key points regarding their use with the PCM-3110 are given here. Please note, that in order to be able to use PCMCIA I/O cards, you must have installed the PCM-3110 PCMCIA drivers. Although this type of PCMCIA card is not used to store data, and therefore requires no formatting, the PCM-3110 PCMCIA drivers must have been correctly installed in order to allow your system to recognize the PCM-3110 PCMCIA slot.

Modem and Fax/Modem Cards

Automatic COM Port Assignment

When installing an internal or external serial modem or fax modem, the device must be assigned a COM port. PCMCIA modems and fax modems are no different, and the correct COM port must be assigned in order for the devices to function correctly.

When you insert a modem or fax/modem in a PCM-3110 slot, the following COM port assignments are made:

- If no COM port is being used, the PCMCIA modem is automatically assigned to COM 1.
- If COM 1 is being used, the PCMCIA modem is automatically assigned to COM 2.
- If COM 1 & COM 2 are being used, the PCMCIA modem is automatically assigned to COM 3.

If for example, you have a mouse connected to COM 1 and you insert a PCMCIA modem card in socket 1 (PCM-3110) or socket 2 (PCM-3111), the modem is automatically assigned to COM 2. Although the hardware COM port assignment is automatic, in your communication software, you must specify that your communication device is connected to COM 2.

Assigning the COM Port with IOCFG.EXE

The PCM-3110 software includes a utility called IOCFG.EXE to allow you to configure all types of PCMCIA I/O cards. This program can be run directly from the DOS prompt and provides an easy way to configure I/O cards with a number of different options. For example, with a modem or fax/modem you may wish to assign it to COM 4, which cannot be done with automatic COM port assignment.

To run IOCFG.EXE, make sure you are at the DOS prompt in the directory in which the PCM-3110 PCMCIA files are stored, and type:

```
IOCFG
```

The full screen display will appear on your screen. The left side shows socket 1 (PCM-3110) and the right side socket 2 (PCM-3111). By default, socket 1 is selected for configuration using the IOCFG options. To switch to socket 2, type F2. The data listed under socket 1 and 2 will depend on the device installed, but for modems and fax/modems you can use the PgDn key to scroll through the COM port options. This will allows you to select COM 4 in case COM 1 through COM 3 are already occupied. When the desired option is displayed, press F5 to select. You will hear a Low-High audible beep to indicate that the selection was made. You may then press <<Esc>> to quit the program and your modem will have been reconfigured as required.

Note: *In order to guarantee reliable operation of PCMCIA I/O devices, make sure the AT Bus Clock of your system is set to run at <10MHz, 8MHz being the ideal setting. This setting can be made using the BIOS setup program. Please refer to your system manual for details.*

PCMCIA Network Cards

After fax/modem and modem cards, the most commonly available PCMCIA I/O device is a Local Area Network (LAN) card, which allows your system to be hooked into a network. The PCM-3110 hardware and software is fully compatible with most popular PCMCIA LAN cards, including those from IBM, National Semiconductor (NS) and D-Link, Accton, Svec and Socket Communications Inc.'s Socket EA card. These cards can be used with the PCM-3110 with no further configuration. Intel's Ethernet card can also be used, though please note the section below on using Intel's PCMCIA Ethernet Card.

Using Intel's PCMCIA Ethernet Card

If you wish to use Intel's PCMCIA Ethernet card, it is necessary to make certain adjustments to ensure correct operation. Intel's PCMCIA card comes with a complete software package which is installed on the hard disk drive. The Intel installation program will modify your CONFIG.SYS file and your AUTOEXEC.BAT files. The following statements are added to the AUTOEXEC.BAT file:

```
C:\CARDMGR\CCMGR.EXE
C:\INTELAN\LSL.COM
C:\INTELAN\INTEL595.COM
C:\INTELAN\IPXODI.COM
C:\INTELAN\NETX.EXE
```

No change need to be made to these statements.

The following statements will be added to the CONFIG.SYS file:

```
DEVICE=C:\CARDMGR\SS365SL.EXE /ADA=0
DEVICE=C:\CARDMGR\CS.EXE
DEVICE=C:\CARDMGR\RTINIT.EXE /IO=260-26F
DEVICE=C:\CARDMGR\CMGRDRVR.EXE
```

The first thing you must do is check that the above statements appear after the statements used to load the PCM-3110 drivers which are detailed on page 3-3. If they do not, use any text editor to edit your CONFIG.SYS file and move the statements below the PCM-3110 statements.

The first two statements load System Soft's Socket services and Card Services software drivers which are used by Intel. Because your PCM-3110 software already provides its own socket services and card services drivers these statements should be removed or disabled to prevent conflict. To disable these two statements, simply add the REM (remark) statement in front of them.

To do this, use any text editor to call up the CONFIG.SYS file and edit the statements as below:

```
REM DEVICE=C:\CARDMGR\SS365SL.EXE /ADA=0
REM DEVICE=C:\CARDMGR\CS.EXE
```

Adding the REM statement will disable these two lines. You could also delete these two statements completely, though adding REM ensures they are still there for reference in case you need to use them in the future.

Disabling these two statements will ensure that your Intel PCMCIA Ethernet card will function perfectly with PCM-3110 and you can use all the other features. Note that if you delete the PCM-3110 socket services and card services drivers and use those provided with Intel's software, you will be able to use your Intel card but will not be able to access the second PCMCIA slot or use any other device.

Configuring Network Cards with IOCFG

In the case that a brand of LAN card not listed above fails to operate with PCM-3110, you should use the following procedure to initialize the card:

1. Insert the network card in a PCM-3110 PCMCIA slot.

2. Run the IOCFG program by type «MDBO»IOCFG at the DOS prompt.

3. Socket 1 (PCM-3110) is selected by default. If the card is in socket 2 (PCM-3111), press F2.

4. Make no setting adjustments and press F5.

5. Press <<Esc>> to quit.

Your LAN card will now be configured to run under the

PCM-3110 software. Note that it is not necessary to make any setting adjustments, but simply to select the card so the system can recognize it. If you wish to make any adjustments, use the options in IOCFG, though these will vary depending on the type of LAN card you are modifying.

PCMCIA LAN Card Software in General

Due to the complicated nature of LAN card configuration, most PCMCIA LAN cards come with their own software. It will usually be advisable to run this software to make sure you have the full range of configuration options available. In addition to allowing you to configure the LAN card, most PCMCIA LAN card software includes a complete set of PCMCIA drivers which may be installed in the CONFIG.SYS file in place of the PCM-3110 drivers. Since some LAN cards are not designed totally according to the PCMCIA standards and include proprietary technology, it may be the case the such cards will run better if the drivers provided with the card are installed.

Note that the PCM-3110 hardware fully supports PCMCIA drivers from third parties.

Using ATA Disk Drive Cards

PCMCIA ATA hard disk drives represent a major technological breakthrough in terms of portability and exchangeability of large amounts of data. Two main types are available solid-state devices such as the Sundisk ATA card which is a Type II device; and rotating media ATA hard disk drive cards which are Type III devices. Both types are supported by all models of PCM-3110. Both types of device function in the same way and all instructions in this section apply to both types.

These devices make large capacity hard disk drives as convenient to use as floppy diskettes. With the PCM-3110 installed on your system, you have instant access to the ATA hard disk drive you use in your notebook, and provides an easy way to install a second hard disk drive without having to open up your system and mess around with cables and connectors.

The PCM-3110 PCMCIA sockets provide full support for all brands of ATA hard disk drives, including the ability to boot from such devices. If you already have two hard disk drives installed on your system, with the PCM-3110 and PCM-3111 you can expand your system to three or four hard disk drives.

ATA Hard Disk Drive Beep Codes

Just as with memory cards and I/O cards, when an ATA HDD card is inserted in the PCM-3110 PCMCIA slot, an audible beep is issued to inform you of the status of the card. There is only one kind of audible message with ATA HDD cards, which is:

L H M

(L=low pitched beep, H=high-pitched beep, M=medium-pitched beep)

This signal tells you that the ATA card is working correctly. If you fail to hear this beep signal when you insert the card, this may indicate that the card is faulty or damaged.

ATA HDD Drive Letter Assignments (Non bootable)

The drive letter assigned to an ATA HDD card will depend on the configuration of your system. The basic rules for drive letter assignment are:

The first two drive letters above those existing on the system are reserved for memory cards in socket 1 and socket 2. The next four drive letters are reserved for an ATA HDD in socket 1 with 2 partitions and an ATA HDD card in socket 2 with 2 partitions.

In order to make this understandable, it is best to take an actual example. If your system has two floppy drives and one hard disk drive formatted into two partitions, the drive letter assignment will be as follows:

- Floppy disk drive 1 - A: (no change)
- Floppy disk drive 2 - B: (no change)
- Internal hard disk drive partition 1 - C: (no change)
- Internal hard disk drive partition 2 - D: (no change)
- Memory card in PCM-3110 socket 1 - E:
- Memory card in PCM-3111 socket 2 - F:
- Partition 1 of ATA HDD in PCM-3110 socket 1 - G:
- Partition 2 of ATA HDD in PCM-3110 socket 1 - H:
- Partition 1 of ATA HDD in PCM-3111 socket 2 - I:
- Partition 2 of ATA HDD in PCM-3111 socket 2 - J:

If your system has two floppy drives and two hard disk drives both formatted into two partitions, the drive letter assignment will be as follows:

- Floppy disk drive 1 - A: (no change)
- Floppy disk drive 2 - B: (no change)
- Internal hard disk drive 1 partition 1 - C: (no change)
- Internal hard disk drive 2 partition 1 - D: (no change)
- Internal hard disk drive 1 partition 2 - E:: (no change)
- Internal hard disk drive 2 partition 2 - F:: (no change)
- Memory card in PCM-3110 socket 1 - G:
- Memory card in PCM-3111 socket 2 - H:
- Partition 1 of ATA HDD in PCM-3110 socket 1 - I:
- Partition 2 of ATA HDD in PCM-3110 socket 1 - J:
- Partition 1 of ATA HDD in PCM-3111 socket 2 - K:
- Partition 2 of ATA HDD in Card PCM-3111 socket 2 - L:

The important thing to note is that the first two drive letters are always reserved for memory cards, so when you insert an ATA HDD card, the drive letter will jump to two above the highest already installed on the system. Thus in our first example above, the highest internal drive on the system is D:, so if you insert an ATA HDD in socket 1 it becomes G:, and if you insert an ATA HDD in socket 2 it becomes I:. In the second example, the highest internal drive is F: and so an ATA HDD in socket 1 becomes I:, and in socket 2 becomes K:.

Making ATA HDDs Bootable

The PCM-3110 hardware includes a boot ROM which allows you to boot from both memory cards and ATA hard disk drive cards. The procedure for making memory cards bootable is carried out using the standard DOS FORMAT / U/S command. As with normal hard disk drives, ATA drives require the use of MS-DOS's FDISK command to create bootable partitions and make them bootable.

The rules for making ATA HDD cards bootable are as follows:

- The ATA hard disk drive card must contain two partitions

    Note: *In order for an ATA HDD to support two partitions you must specify the ATACARD.SYS /S1:2 /S2:2 switch in the CONFIG.SYS file.*

- The first (bootable) partition must not be greater than 3MB. The remainder of the card will become the second partition.

    Note: *If you have two physical hard disk drives (i.e. two separate devices, not just two partitions) in your system, you must use the BIOS setup program to disable the second hard disk drive before making an ATA card bootable.*

The step-by-step procedure for making ATA HDDs bootable is as follows:

1. Turn on your system and boot up from your internal HDD as normal.
2. Check the ATACARD.SYS statement in the CONFIG.SYS file to make sure the /S1:2 and (optional) /S2:2 switches are present.
3. Insert the ATA HDD card in socket 1 or socket 2 of the PCM-3110 PCMCIA slots.
4. Run the DOS FDISK command by typing FDISK at the DOS prompt in the relevant directory.
5. If you have one physical hard disk drive installed in your system, select the 2nd drive in FDISK to partition the ATA HDD card.
6. If you have two physical hard disk drives (i.e. two separate devices, not just two partitions), QUIT FDISK NOW! As warned above, you must use the BIOS setup program to disable the second hard disk drive before commencing with this procedure. Having disabled the 2nd hard disk drive, reboot and run FDISK. Select the 2nd drive to partition the ATA HDD.
7. Use the FDISK commands to create a primary DOS partition of 3 MB or less (please refer to your DOS user's manual for details of how to use FDISK). The remainder of the card space is used for the second partition.
8. Having created these two partitions, unplug the ATA drive card, quit FDISK and reboot your system. If you disabled the second physical hard disk drive in your system, you may now re-enable this drive using the BIOS setup program.
9. After the system has rebooted, reinsert the ATA hard disk drive and at the DOS prompt, type C>>FORMAT d: /S/U, where d: is the drive letter of the ATA HDD card.

    This command will format the first partition of 3MB or less and copy the system to the drive. You should then go ahead and format the second partition in the same way.
10. You should now copy the PCM-3110 drivers and the DOS files HIMEM.SYS and SETVER.EXE from your internal hard disk drive to the ATA drive. Create a CONFIG.SYS file on the drive which loads the PCM-

3110 drivers and includes the other statements necessary to load HIMEM.SYS and SETVER.EXE, and set DOS = HIGH with UMBs. If you do not do this, though you will be able to boot from the ATA drive, the slots will not be activated for any other device since the drivers that are needed to enable the system to recognize PCM-3110 have not been loaded.

You may now boot your system from your ATA hard disk drive, though please note the details of drive letter assignment given below when booting from an ATA hard disk drive.

### Bootable ATA HDD Drive Letter Assignments

If you boot from an ATA HDD the drive letter assignment of your entire system is changed. After boot up, the bootable drive will become the A: drive, as shown by the A>> DOS prompt.

In this case the original A: floppy disk drive becomes the B: drive. If you have a second floppy disk drive on your system, this will be inaccessible. To rearrange the entire drive letter assignment back to normal and have access to the second floppy drive, proceed as follows:

1. Boot up from the ATA HDD card.

2. Disconnect the ATA HDD card by pulling it halfway out of the socket.

3. Insert any floppy diskette in the A: floppy disk drive.

4. At the DOS prompt, type A>>DIR. The A: directory of the A: floppy disk drive will be displayed.

5. The A: floppy is now restored as A: and the B: floppy can be accessed on B: as normal. All other drive letter assignments are as described in the section above.

6. Re-insert the ATA HDD in the socket. This card will now be designated as G: (or H:, I:, etc. depending on how many hard disk drive partitions are on your fixed hard disk drive).

Jumper Settings

The PCM-3110 module has four jumpers for the configuration of BIOS address (enable/disable), and down-load Boot ROM (enable/disable). These are situated on the module next to the module connection sockets as shown below:
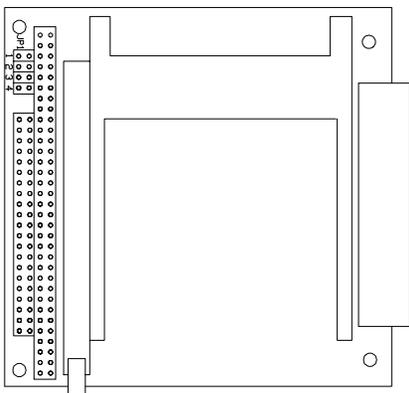
JP1 Jumper Functions

JP1 Jumper Functions

JP1 setting	Function
1 2 3 4	Enable Boot ROM address CA000~CB000
1 2 3 4	Enable Boot ROM address CC000~CD000
1 2 3 4	Enable Boot ROM address CE000~CF000
1 2 3 4	Disable Boot ROM function

PC/104 Bus signal Assignments

The following table lists the signal assignments for PC/104 modules:

PC/104 Bus signal assignments

Pin	J1/P1 Row A	J1/P1 Row B	J2/P2 Row C	J2/P2 Row D
0	--	--	0V	0V
1	IOCHCHK*	0V	SBHE*	MEMCS16*
2	SD7	RESETDRV	LA23	IOCS16*
3	SD6	+5V	LA22	IRQ10
4	SD5	IRQ9	LA21	IRQ11
5	SD4	-5V	LA20	IRQ12
6	SD3	DRQ2	LA19	IRQ15
7	SD2	-12V	LA18	IRQ14
8	SD1	ENDXFR*	LA17*	DACK0*
9	SD0	+12V	MEMR*	DRQ0*
10	IOCHRDY	(KEY)[2]	MEMW*	DACK5*
11	AEN	SMEMW*	SD8	DRQ5
12	SA19	SMEMR*	SD9	DACK6*
13	SA18	IOW*	SD10	DRQ6
14	SA17	IOR*	SD11	DACK7*
15	SA16	DACK3*	SD12	DRQ7
16	SA15	DRQ3	SD13	+5V
17	SA14	DACK1*	SD14	MASTER*
18	SA13	DRQ1	SD15	0V
19	SA12	REFRESH*	(KEY)[2]	0V
20	SA11	SYSCLK	--	--
21	SA10	IRQ7	--	--
22	SA9	IRQ6	--	--
23	SA8	IRQ5	--	--
24	SA7	IRQ4	--	--
25	SA6	IRQ3	--	--
26	SA5	DACK2*	--	--
27	SA4	TC	--	--
28	SA3	BALE	--	--
29	SA2	+5V	--	--
30	SA1	OSC	--	--
31	SA0	0V	--	--
32	0V	0V	--	--