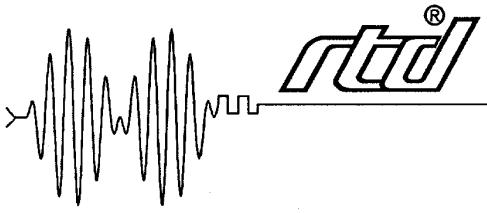
# CM105
# PCMCIA utilityModule™
# User's Manual



Real Time Devices, Inc.

*"Accessing the Analog World"®*

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# PCMCIA utilityModule™
# User's Manual

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# Table of Contents

# Introduction

This manual gives information needed to use the CM105 PCMCIA utilityModule, which offers two PCMCIA slots on a single PC/104 format card.

## CM105 PCMCIA utilityModule

The CM105 PCMCIA utilityModule was designed to provide PCMCIA support for the Real Time Devices cpuModules or other standard PC/104 modules.

### *Hardware Features*

- Two PCMCIA slots with ejectors
- Supports Type I, II, and III PCMCIA cards
- Accepts two Type I or Type II cards at the same time
- Supports SRAM, Flash, and ATA Flash memory cards
- Supports ATA hard disk drives, modems, and LAN and I/O cards
- On-board DC-DC converter supplies 12 volts for Flash memory cards
- Permits insertion and removal of cards with system power on
- 16-bit bus interface
- All CMOS design gives low power consumption

### *Software Features*

- Includes PCMCIA-compliant Socket Services, Card Services, and Client Services software
- Windows compatible
- Requires no changes to BIOS or application software
- Includes utilities for erasing, initializing, and formatting PCMCIA memory cards
- Can be configured to boot from formatted PCMCIA memory cards

### *Connectors*

The connectors provided are:

- Two PCMCIA slots with ejectors
- PC/104 Bus (AT)

### *Physical Characteristics*

- Dimensions 3.8" x 3.9" x 0.6"
- 4-layer PCB
- Operating conditions:
    - temperature: 0 - 75 degrees C
    - relative humidity: 5 - 95%
    - altitude: 0 - 3000m
- Storage temperature: -55 to +85 degrees C

### *Component Locations*

Figure 1 shows the locations of major components of the utilityModule.

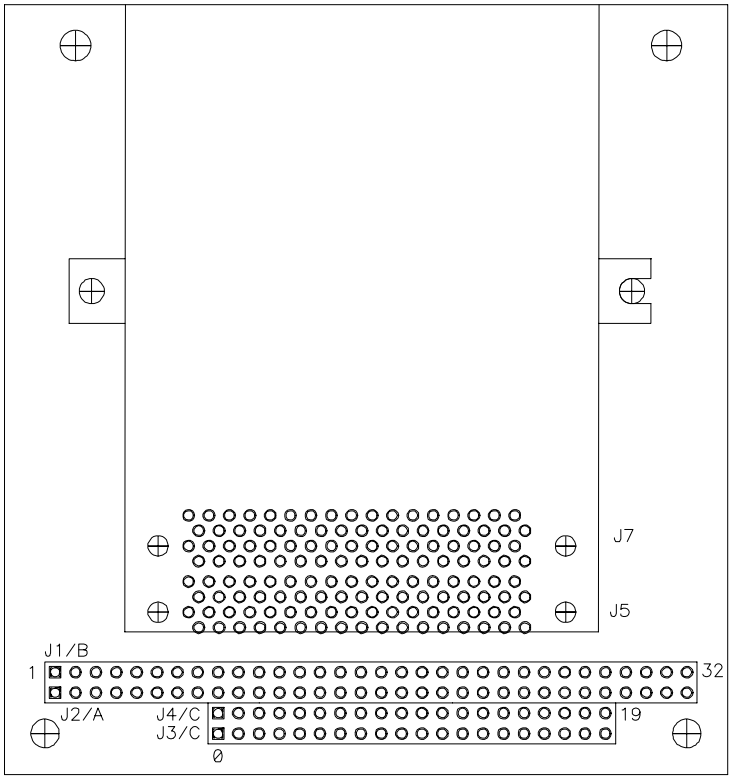


**Figure 1 Component Locations**

| Table 1.1 Connectors | | |
|---|---|---|
| **Connector** | **Function** | **Size** |
| J1/B<br>J2/A | PC/104 XT bus | 64 pin |
| J3/D<br>J4/C | PC/104 AT bus | 32 pin |
| J5 | PCMCIA Slot 1 | 68 pin |
| J7 | PCMCIA Slot 2 | 68 pin |

# Connectors

The following sections describe the connectors of the utilityModule.

## PCMCIA Slots, J5 and J7

J5 and J7 are the two PCMCIA slots, which accept standard Type I, II, and III PCMCIA cards with 68-pin connectors. The top slot (farthest from the circuit board) is considered the first slot, while the bottom slot (closest to the circuit board) is considered the second slot. See the *Using the utilityModule* section for information on the assignment of drive letters to the slots.

## PC/104 AT Bus Connectors, J1, J2, J3, J4

Connectors J1 through J4 provide the PC/104 AT bus connections. J1 and J2 carry the XT bus signals, while J3 and J4 carry the additional signals neeeded for the AT bus. The functions and definitions of the signals on these connectors conform to the IEEE P966 standard for the PC/104 bus.

The following table lists the pinouts of connectors J1 and J2:

**Table 1-11 PC/104 Bus Connector, J1 and J2**

| Pin | Row A | Row B |
|---|---|---|
| 1 | IOCHCHK* | 0V |
| 2 | SD7 | RESETDRV |
| 3 | SD6 | +5V |
| 4 | SD5 | IRQ9 |
| 5 | SD4 | -5V |
| 6 | SD3 | DRQ2 |
| 7 | SD2 | -12V |
| 8 | SD1 | ENDXFR* |
| 9 | SD0 | +12V |
| 10 | IOCHRDY | (KEY) |
| 11 | AEN | SMEMW* |
| 12 | SA19 | SMEMR* |
| 13 | SA18 | IOW* |
| 14 | SA17 | IOR* |
| 15 | SA16 | DACK3 |
| 16 | SA15 | DRQ3 |
| 17 | SA14 | DACK1* |
| 18 | SA13 | DRQ1 |
| 19 | SA12 | REFRESH |
| 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 |

The following table lists the pinouts of connectors J3 and J4:

**Table 1-12 PC/104 Bus Connector, J3 and J4**

| Pin | Row C | Row D |
|---|---|---|
| 1 | 0V | 0V |
| 2 | SBHE* | MEMCS16* |
| 3 | LA23 | IOCS16* |
| 4 | LA22 | IRQ10 |
| 5 | LA21 | IRQ11 |
| 6 | LA20 | IRQ12 |
| 7 | LA19 | IRQ15 |
| 8 | LA18 | IRQ14 |
| 9 | LA17 | DACK0* |
| 10 | MEMR* | DRQ0 |
| 11 | MEMW* | DACK5* |
| 12 | SD8 | DRQ5 |
| 13 | SD9 | DACK6* |
| 14 | SD10 | DRQ6 |
| 15 | SD11 | DACK7* |
| 16 | SD12 | DRQ7 |
| 17 | SD13 | +5V |
| 18 | SD14 | MASTER* |
| 19 | SD15 | 0V |
| 20 | KEY(nc) | 0V |

# Installing the utilityModule

Since the utilityModule uses a PC/104 stackthrough bus, the only hardware installation you will do is placing the CM105 on the PC/104 stack. To do this, you will simply plug the PC/104 bus connector composed of J1, J2, J3, and J4 onto the matching connector of your cpuModule.

We recommend you follow the procedure below to ensure that stacking of the modules does not damage connectors or electronics.

- Turn off power to the PC/104 system or stack.
- Select and install standoffs to properly position the utilityModule on the PC/104 stack.
- Touch a metal part of the rack to discharge any buildup of static electricity.
- Remove the utilityModule from its anti-static bag.
- Check that any keying pins in the bus connector are properly positioned.
- Check the stacking order; make sure an XT bus card will not be placed between two AT bus cards or it will interrupt the AT bus signals.
- Hold the utilityModule by its edges and orient it so the bus connector pins line up with the matching connector on the stack.
- Gently and evenly press the utilityModule onto the PC/104 stack.

**CAUTION**: Do not force the module onto the stack! Wiggling the module or applying too much pressure may damage it. If the module does not readily press into place, remove it, check for bent pins or out-of-place keying pins, and try again.

# Installing the utilityModule Software

The CM105 is supplied PCMCIA-compliant software drivers for Socket Services, Card Services, and Client Services. Usually you will want to install these device drivers on the cpuModule's Solid-State Disk. You also may install the drivers on a hard drive, floppy drive, PCMCIA SRAM drive, or PCMCIA Flash drive. The following sections explain the procedures for installing the software drivers.

## Installing Software on a Non-PCMCIA Boot Drive

If you wish to install the software drivers on a non-PCMCIA boot drive such as a hard drive, use the following procedure:

1) Create a sub-directory named CARDTALK on the disk from which the system will boot.

2) Copy the files MKHPV.SYS, CTALKCS.EXE and CARDTALK.SYS from the CM105 Software Drivers disk to the CARDTALK sub-directory you just created.

3) If you plan to use your PC/104 sytem with Windows, copy the CARDTALK.386 file from the CM105 Software Drivers disk to the CARDTALK sub-directory.

4) If you want to use the Microsoft FFS2 Flash File System, you must copy the file MS-FLASH.SYS to the CARDTALK sub-directory. Please note that Microsoft Flash File System software is *not* included with the CM105 and must be purchased separately.

5) Using a text editor, add the following lines at the beginning of your CONFIG.SYS file:

```
DEVICE=\CARDTALK\MKHPV.SYS

DEVICE=\CARDTALK\CTALKCS.EXE

DEVICE=\CARDTALK\CARDTALK.SYS /A

FILES=20

BUFFER=20

LASTDRIVE=Z
```

6) If you are going to use the Microsoft FFS2 Flash File System, also add the following line to your CONFIG.SYS file:

```
DEVICE=\CARDTALK\MS-FLASH.SYS
```

7) Add the CARDTALK sub-directory to the PATH specified in the cpuModule's AUTOEXEC.BAT file. See your DOS manual if you need details on using the PATH command.

After these steps are completed, you can re-boot the system and the CM105 drivers should load. While they are loading, information is displayed on the screen, including the drive letters assigned to the PCMCIA slots. If the CM105 is not installed correctly or cannot find software drivers, error messages will appear on the screen.

## Installing Software on a PCMCIA Card

It is possible to install the CM105 software drivers on a properly-formatted PCMCIA SRAM or Flash memory card, thereby allowing the system to boot from the PCMCIA card. To do this, you must install the CM105 Socket Services driver as a BIOS extension in ROM.

If you are using a Real Time Devices cpuModule with your CM105, refer to your cpuModule User's Manual for information on making the Socket Services driver into a BIOS Extension. If you are using another brand of processor board, please contact the processor board manufacturer for assistance creating a BIOS extension.

## Setting I/O and Memory Windows

Some PCMCIA devices such as LAN cards and I/O cards require an I/O window and/or a memory window. The default I/O window for the CM105 is located at I/O addresses 300h to 31Fh. The default memory window is located at addresses D0000h to D7FFFh.

Note that these default I/O and memory addresses are frequently the defaults for other PC/104 modules and Solid State Disks. You may therefore need to change the location and size of the I/O window and memory window to prevent conflicts and ensure proper operation.

You can change the I/O and memory windows by appending the following text to the command line in the CONFIG.SYS file that loads the CARDTALK.SYS device driver:

**/IOW=uuu-vvv /MEMW=xxxx-yyyy**

Where:

**uuu** is the I/O window starting address (3 hex digits), and **vvv** is the I/O window ending address (3 hex digits).

**xxxx** is the memory window starting address (first 4 hex digits), and **yyyy** is the memory window ending address (first 4 hex digits).

Note that if the **/IOW=** text is added without the **uuu-vvv** argument, the I/O window is disabled entirely. Also, if the **/MEMW=** text is added without the **xxxx-yyyy** argument, the memory window is disabled.

### *Example*

To open an I/O window from 300h to 33Fh and a memory window from E0000h to E3FFFh, you would modify the line in your CONFIG.SYS file which loads the CARDTALK.SYS device driver to read:

```
DEVICE=C:\CARDTALK\CARDTALK.SYS /A /IOW=300-33F /MEMW=E000-E3FF
```

## I/O Address Map

**NOTE:** To ensure correct operation, you must make *absolutely certain* that I/O and memory addresses used by the CM105 are *not* used by other devices in the system (dataModules, cpuModule, Solid State Disk, etc.).

The CM105 always uses I/O addresses 0240h through 024Fh. For proper operation, you must make absolutely certain no other board in your PC/104 system uses those I/O addresses.

If you are using a PCMCIA I/O card which requires an I/O address window, you must also ensure that the addresses in that window are not used by other boards in your PC/104 system.

If you are using a PCMCIA ATA drive, I/O address 0170h is also used. You must ensure that that address is not used by any other board in your PC/104 system. Note that this particular I/O address can be changed if absolutely necessary. Contact factory technical support for details.

Note that the CM105 only decodes address lines A0 through A9 on I/O accesses.

## Assigning Interrupt Channels to COM Ports

When you use a PCMCIA card (such as a modem) that requires a COM port, the CM105 driver software must assign a COM port to the PCMCIA card. When such a card is detected, the software will assign the next COM port not already is use by the system. When the software assigns the port it also assigns an associated interrupt (IRQ) channel. The default interrupt channel for each COM port is shown below:

| Default Interrupts for COM Ports | |
|---|---|
| **COM Port** | **Default Interrupt** |
| COM1 | IRQ4 |
| COM2 | IRQ3 |
| COM3 | IRQ4 |
| COM4 | IRQ3 |

You may override the default and select the interrupt channel assigned to a particular COM port by appending the following text string to the line in your CONFIG.SYS file which loads the CARDTALK.SYS device driver:

/COMnIRQ=c

Where the letter 'n' is replaced with the COM port number and the letter 'c' is replaced with the interrupt channel to be assigned. The COM port number can be 1, 2, 3, or 4, and the interrupt number can be: 3, 4, 5, 6, 7, 10, 11 or 14.

**NOTE:** The interrupt used for the slot-event interrupt (by default IRQ11) cannot be assigned to a COM port. Refer to the next section for information on the slot-event interrupt.

### *Example*

If you wish to assign interrupt channel 5 (IRQ5) to COM port 3, you would modify the line in your CONFIG.SYS file which loads the CARDTALK.SYS device driver to read:

DEVICE=\CARDTALK\CARDTALK.SYS /A /COM3IRQ=5

## Assigning Interrupts for the PCMCIA Slots

The PCMCIA controller on the CM105 requires one interrupt line to signal slot events such as card insertion. The default interrupt used by the CM105 is IRQ11. The slot-event interrupt can be changed by modifying your CONFIG.SYS file.

To change the interrupt, append the following text string to the command line which loads the MKHPV.SYS driver:

/SCIRQ=c

Where the letter 'c' is replaced with the desired interrupt number: 3,4,5,6,7,10,11, or 14

### *Example*

If you wished to use interrupt IRQ5 as the slot-event interrupt, you would change your CONFIG.SYS file so the line used to load the MKHPV.SYS driver reads:

DEVICE=\CARDTALK\MKHPV.SYS /SCIRQ=5

# Using the utilityModule

The following sections describe the use of the CM105 utilityModule.

## How Software Assigns Drive Letters

When the CM105 drivers are loaded, the software assigns drive letters to the PCMCIA slots. On the standard CM105 utilityModule with two slots, the upper slot is assigned the first drive letter not in use by Solid State Disks, floppy drives, or hard disks already in the system. The lower socket is assigned the second unused drive letter. On boards ordered with the option of a single slot, that slot is assigned the first unused drive letter.

If your application requires use of memory cards with multiple partitions, more than one drive letter can be assigned to a single socket. If you find you need to do this, please contact factory technical support for assistance.

## Card Recognition Beep Codes

If a speaker is present in your PC/104 system, the CM105 utilityModule will cause it to beep when PCMCIA cards are inserted. The number of beeps indicate whether the card has a valid CIS (Card Indentification String), which identifies it as a valid PCMCIA card type, and whether it is formatted properly.

The following table lists the Card Recognition Beep Codes and their meanings:

| Card Recognition Beep Codes | |
|---|---|
| **Number of Beeps** | **Meanings** |
| 1 | ATA or modem card with valid CIS was inserted<br>OR<br>Formatted SRAM or Flash card inserted |
| 2 | Unformatted SRAM or Flash card inserted<br>OR<br>LAN card with valid CIS inserted |
| 3 | Card without valid CIS inserted |

## Using the Utility Programs

A range of utility programs are provided on the CM105 Utilities disk. You may use these programs to:

- Format SRAM memory cards
- Format Flash memory cards with Flash File System
- Erase Flash memory cards
- Format and copy files to Flash cards without Flash File System

You may install these utility programs in an end product or may use them only in the development system.

The following sections briefly discuss use of the utility programs to perform common tasks. For in-depth documentation of the utilities programs, please contact factory technical support to obtain the Databook CardTalk[tm] Reference Manual.

**NOTE:** In the following sections, it is assumed that the PATH command in the AUTOEXEC.BAT file includes the drive and sub-directory containing the utility programs.

### *Formatting ATA Memory Cards*

You can format ATA Flash and ATA hard drive cards without using the utility programs, by using the standard DOS FORMAT command. Please refer to your DOS manual for information on the FORMAT command.

Note that once formatted, ATA cards appear to DOS as conventional hard drives. Please keep in mind that PC/104 systems cannot be booted from ATA memory or hard-drive cards.

### *Formatting SRAM Memory Cards*

You format SRAM memory cards using the TCFORMAT.EXE utility program provided on the CM105 Utilities disk.

For example, to format an SRAM card in the D: drive socket, enter the following at the DOS prompt:

```
TCFORMAT  D:
```

Note that after an SRAM card has been formatted, it appears to DOS as a conventional hard drive.

### *Formatting Flash Cards with Microsoft FFS2*

To format a Flash card with the Microsoft FFS2 Flash File System, you must perform two steps. First, you must erase the card using the TCERASE utility program and then you must format the card using the TCFORMAT utility. Both utilities are provide on the CM105 Utilities disk.

To erase a Flash card in the D: drive socket using the TCERASE.EXE utility, enter the following at the DOS prompt:

```
TCERASE D:
```

After erasing the card, you must format it using the TCFORMAT.EXE program provided on the CM105 Utilities disk.

For example, to format a Flash card (located in the D: drive socket) with the FFS2 Flash File System, enter the following at the DOS prompt:

```
TCFORMAT -TYPE FLASH D:
```

Once you have formatted a Flash card with the Microsoft FFS2 Flash File System, it appears to DOS as a conventional hard drive (as long as MS-FLASH.SYS has been loaded). Please note, however, that the CHKDSK command cannot be used on Flash cards formatted with the Flash File System.

### *Formatting Flash Cards without Microsoft FFS2*

To format a Flash card without the Flash File System, you must perform two steps. First, you must erase the card using the TCERASE utility program and then you must format the card using the TCXCOPY utility. Both utilities are provide on the CM105 Utilities disk.

To erase a Flash card in the D: drive socket using the TCERASE.EXE utility, enter the following at the DOS prompt:

```
TCERASE D:
```

After erasing the card, you must format and copy files to it using the TCXCOPY.EXE program provided on the CM105 Utilities disk.

For example, to format a Flash card located in the D: drive socket and simultaneously copy all the files in sub-directory C:\TMP to the card, enter the following at the DOS prompt:

```
TCXCOPY C:\TMP\*.* D:
```

Once you have formatted a Flash card with the TCXCOPY.EXE program, it appears to DOS as a read-only device. You cannot edit or delete individual files on the card, but you can append additional files using the TCXCOPY.EXE program as described above.

NOTE: When displaying the directory of a Flash card formatted with the TCXCOPY.EXE utility, DOS will indicate "0 bytes free" no matter how much space is actually available. This is normal.

# Hardware Reference

## Mechanical Dimensions

The following illustration shows the dimensions of the utilityModule in inches (+/- 0.005").

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