RAMBANK MEMORY EXPANSION BOARD USER'S MANUAL

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FCC STATEMENT ON CLASS B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

* *Reorient or relocate the receiving antenna.*
* *Increase the separation between the equipment and receiver.*
* *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
* *Consult the dealer or an experienced radio TV technician for help.*

NOTICE

(1) The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

(2) Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

RAMBANK Memory Expansion Board User's Manual

This user's manual applies to the RAMBANK Memory Expansion Board.

Before attempting to install and use the RAMBANK, read this operations manual thoroughly. If for any reason you should experience difficulty installing and operating your RAMBANK, please contact your dealer for assistance.

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SECTION I

- HARDWARE -

INTRODUCTION

The RAMBANK is a powerful expansion memory board for your IBM PC/XT/AT and their compatibles. With the accompanying software, it increases your computer's performance by providing expansion memory beyond the DOS's 640K limitation. The Virtual disks emulation program and printer buffer spool provide the best time-saving tip. Each RAMBANK card has as much as 2M bytes of additional memory. By using four fully packed RAMBANKs you can add up to 8M bytes of expansion memory. Using switch settings, it is easy for you to select either conventional memory or expanded memory.

Standard Features

1. Expansion memory can add up to 2048K bytes with 64K or 256K increment using 64K or 256K DRAM chips.

2. Fully socketed memory with parity check.

3. DIP Switch let you split the board's memory as Conventional memory or all Expanded memory.

4. Conventional memory

    Conventional memory refers to the memory that DOS recognizes. In the PC system, this is memory between 0 and 640K bytes. Because application programs let DOS manage their memory, they can use only conventional memory.

5. Expanded memory

   Expanded memory is accepted by a paging technique compatible to the Lotus/Intel/Microsoft Expanded Memory Specification. Although this memory is beyond DOS's 640K-byte limit, application programs such as Symphony release 1.1, Lotus 1-2-3 version 2.0, and Framework II that adhere to the Lotus/Intel/ Microsoft Expanded Memory Specification can use it for larger spreadsheets and data bases.

6. Up to four RAMBANKs can be added to your computer for a maximum 8M bytes of expanded memory.

7. EMS32.SYS and EMS40.SYS are device drivers that meet the LIM specification requirements to support application programs using expanded memory.

8. EMSDISK.SYS is an electronic disk emulation device using the expanded memory.

9. CMMDISK.SYS emulates the conventional memory as an electronic disk to speed up data retrieval without disk I/O.

10. PSPOOL/PSPOOLA print spooler software is supported for conventional or expanded memory.

11. BANKTEST is a program provided to test defective RAM chips on RAMBANK.

Software

Refer now to Chapter 5 in order to backup and transfer provided files to your system disk. This must be done before proceeding.

Board Layout and Description

The following is a Board Layout and brief description of relevant locations on your RAMBANK. (Figure 1-1)
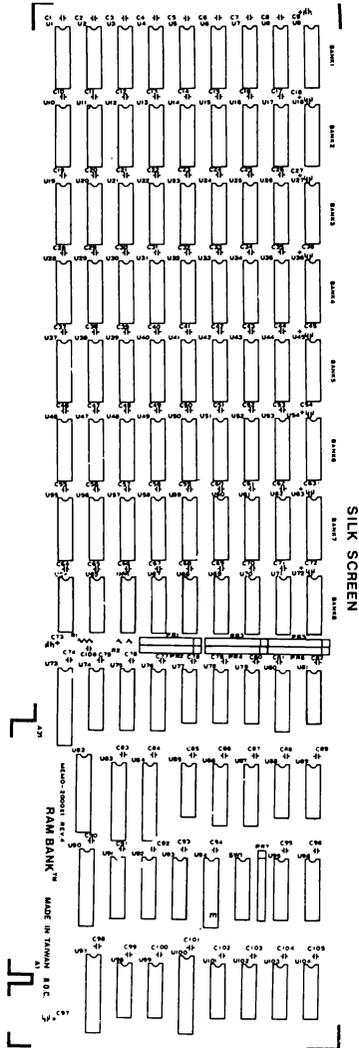
Figure 1-1. RAMBANK Board Layout

INSTALLATION INSTRUCTIONS

The following are step-by-step detailed instructions to install your RAMBANK on your PC/XT/AT and compatibles. Read these instructions carefully and double-check each step you make to insure that your installation is done correctly. If you have any questions about your PC/XT/AT system during the installation, please refer to the IBM "Guide to Operation and Installation and Setup" manual which came with your system unit.

STEP 1

Unlock your system unit, then turn off the power, and disconnect all power cords and cables.

STEP 2

Remove the system unit cover.

STEP 3

Use the RAMBANK to add expanded memory, set the I/O port address switch. (Refer to "Setting the I/O Port Address" of Chapter 3.)

STEP 4

Set the memory starting address switch if you are using the RAMBANK to add conventional memory. (Refer to "Setting the System Board Switch for Conventional Memory" of Chapter 3.)

STEP 5

Set SW1 for the proper amount of conventional memory and expanded memory installed on your RAMBANK. (Refer to "Memory Switch Settings" of Chapter 3.)

STEP 6

Make sure that the pins on your RAMBANK are aligned correctly.

STEP 7

Install your RAMBANK into an open expansion slot.

STEP 8

Re-install the system unit cover.

STEP 9

Reconnect the power cords.

STEP 10

Run the BANKTEST program to test any defective RAM chips.

STEP 11

Reboot your system with the newly installed RAMBANK.

MEMORY CONFIGURATION

Your RAMBANK's memory is based upon 8-bit architecture. It includes fully socketed memory with parity check and is expandable to a maximum of 2M bytes in 64K or 256K increments. Before using the memory on your RAMBANK, you must properly configure both the RAMBANK and your PC/XT/AT system board.

Setting the I/O Port Address

When setting up your RAMBANK, you need to check for I/O port conflict. If another board in your system is configured with the same I/O port address, you must select an alternative I/O port to avoid the conflict. Your RAMBANK allows for the selection of sixteen different I/O port configurations.

Set DIP Switches 1, 2, 3 and 4 on DIP Switch Bank 1 (SW1) on your RAMBANK to select the I/O port address as follows:

Switch Settings				I/O Port Address
S1	S2	S3	S4	(in hexadecimal)
ON	ON	ON	ON	208H & 209H
		(default 3)		
OFF	ON	ON	ON	218H & 219H
		(default 4)		
ON	OFF	ON	ON	228H & 229H

| Switch Settings | | | | I/O Port Address |
S1	S2	S3	S4	(in hexadecimal)
OFF	OFF	ON	ON	238H & 239H
ON	ON	OFF	ON	248H & 249H
OFF	ON	OFF	ON (default 1)	258H & 259H
ON	OFF	OFF	ON (default 2)	268H & 269H
OFF	OFF	OFF	ON	278H & 279H
ON	ON	ON	OFF	288H & 289H
OFF	ON	ON	OFF	298H & 299H
ON	OFF	ON	OFF	2A8H & 2A9H
OFF	OFF	ON	OFF	2B8H & 2B9H
ON	ON	OFF	OFF	2C8H & 2C9H
OFF	ON	OFF	OFF	2D8H & 2D9H
ON	OFF	OFF	OFF	2E8H & 2E9H
OFF	OFF	OFF	OFF	2F8H & 2F9H

We suggest you use I/O ports, 258, 268, 208, and 218, because if you don't specify any parameter, EMS##.SYS will check these ports by default. However, the EMS##.SYS allows you to select the I/O ports you want. Please refer to Chapter 6 for detailed information about EMS##.SYS.

Memory Switch Settings

Your RAMBANK provides a split memory mapping option that uses a portion of the board's memory to bring the system's basic RAM from 64K up to 640K. That is to say, you may divide the RAMBANK's memory into conventional and expanded memory, or set all the memory on your RAMBANK to be expanded regardless of the amount of conventional memory in your computer.

Set Switches 5, 6, and 7 on your RAMBANK DIP Switch Bank 1 (SW1) according to the amount of memory currently resident in your system. Consult the following chart for configuration settings:

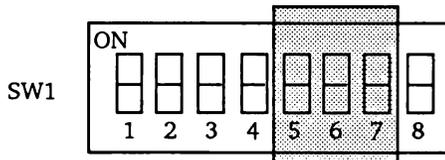| Switch Setting			Amount of PC Memory
S5	S6	S7	before RAMBANK is installed
OFF	OFF	OFF	64K
OFF	OFF	ON	128K
OFF	ON	OFF	256K
OFF	ON	ON	384K
ON	OFF	OFF	512K
ON	OFF	ON	640K All memory on the
ON	ON	OFF	640K RAMBANK is expanded
ON	ON	ON	640K memory.

SW1

Figure 3-1

Selecting the RAM Chip Types

Your RAMBANK can be upgraded at any time by installing 64K or 256K RAM sets. Both 64K and 256K DRAM with 200 nanosecond or 150 nanosecond access time are recommended. All RAM chips should be +5 Volt.

Each RAMBANK can provide your computer with as much as two megabytes of memory per card. The maximum amount of memory on a RAMBANK depends upon the type of memory chips you use one each board. The following memory chips are compatible with your RAMBANK:

Intel	2164A-15
Fujitsu	MB8264-15
Hitachi	HM4864-2
Mitsubishi	M5K4164-15
Nippon Electric	D4164-2
Texas Instruments	TMS4164-20
Intel	51C256-15
Hitachi	HM50256-15
Mitsubishi	M5M4256-15
Nippon Electric	D41256-3

Set Switch 8 on your RAMBANK DIP Switch Bank 1 (SW1) to match the type of memory chips you have installed.

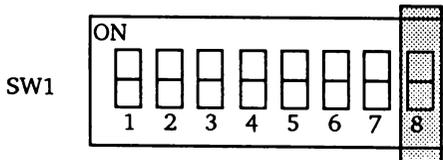| Status	S8
256K RAM Chip	ON
64K RAM Chip	OFF

Figure 3-2

Note: Always insert RAM chips with the small horseshoe shaped indentation facing to the left of your RAM-BANK. RAM chips installed incorrectly may result in damage to the chips and to your RAMBANK. Furthermore, you should be sure to check the leads on the RAM chips when installing them. If they are bent in or out, they may need to be adjusted before inserting into the sockets on your RAMBANK. After insertion, check to make sure that the pins have not been bent under or out. Finally, check the DIP Switches to insure proper settings for the additional RAM.

Setting the System Board Switch for Conventional Memory

You must set your system board switches to reflect the total memory currently installed in your computer. Set the switches on the system board, DIP Switch Bank 1 (SW1) for PC/XT to match the system board switch settings shown in table 3-1. Please refer to your PC manual for more details.

Handling Precautions

Your RAMBANK, like all LSI/MOS devices is static sensitive. Care should be taken when installing your RAMBANK, that no excessive amount of static-electricity is present. To prevent any static related problems on your RAMBANK, always AVOID TOUCHING THE GOLD EDGE CONNECTORS. These connectors need to be kept clean and static free to insure reliable operation of the RAMBANK as well as with all of your interface cards.

Installing Your RAMBANK

Your RAMBANK is designed to be inserted in any available slot in your IBM PC, PC/XT/AT, PC Portable or compatibles. In order to gain access to the expansion slots and the program switches on the motherboard, follow the steps listed below: (These explain how to prepare your unit for RAMBANK installation.)

1. Turn off all power sources to your computer and all peripheral devices before installing your RAMBANK card.

2. Disconnect your AC power line cord.

3. Remove the cover of the computer.

4. Insert your preconfigured RAMBANK into any available slot. Be careful not to touch the gold edge connectors. Make sure your card is FIRMLY seated in the chosen slot.

5. Replace the cover of the computer.

6. Reconnect your AC power line cord.

You are now ready to utilize your new RAMBANK.

Caution: Check that all DIP Switches on your RAMBANK and DIP Switches on your motherboard are properly set for correct system compatibility. Consult your system manual for proper DIP Switch settings on your motherboard.

Table 3-1. Setting the System Board Switch for Conventional memory

Conventional memory before Rambank Installed	PC Switch Settings		XT Switch Settings	
	System board Switch SW2	Rambank Switch	System board Switch SW1	Rambank Switch
64K	(switch setting)	(switch setting)	(switch setting)	(switch setting)
128K	(switch setting)	(switch setting)	(switch setting)	(switch setting)
256K	(switch setting)	(switch setting)	(switch setting)	(switch setting)
384K	(switch setting)	(switch setting)	(switch setting)	(switch setting)
512K	(switch setting)	(switch setting)	(switch setting)	(switch setting)
640K	(switch setting)	(switch setting)	(switch setting)	(switch setting)

TROUBLESHOOTING

In the event you experience problems with your RAM-BANK, please review and verify that the following has been completed.

1. Do you have two RAMBANKs or other cards in your PC using the same I/O port? If so, please change the I/O port on one of them. (Refer to "Setting the I/O Port Address" of Chapter 3.)

2. Did you set the memory configuration switches properly? Only one RAMBANK in your PC can contribute to conventional memory. (Refer to "Setting the System Board Switch for Conventional Memory" of Chapter 3.)

3. Are all the memory banks filled in correct locations? Bank 1 should be installed first, and is located on the board edge of your RAMBANK. (Position on U1 to U9)

4. Are you mixing 64K DRAM chips with 256K DRAM chips in each memory bank?

5. Is each populated memory bank completely filled? If not please fill them completely.

6. Are all DRAM chips installed with pin 1 in the lower left hand corner? Please check each chips' orientation.

SECTION II

- SOFTWARE -

INTRODUCTION

About this Section

This section describes the usage and operation of RAM-BANK programs, including the LIM expanded memory specification (EMS) compatible device driver, virtual disk device driver, printer spooler, and much more.

Your RAMBANK comes with a RAMBANK SOFTWARE diskette which includes following programs:

NOTE: ## defines the EMS Version number. Use either EMS Version number 32 or 40, depending on the application program you intend to run.

1. EMS32.SYS

EMS32.SYS is a device driver conforming to the Lotus/Intel/Microsoft's EMS Version 3.2 (Expanded Memory Specification). You must tell DOS to install the EMS driver by including a command line in the CONFIG.SYS file for application programs using the expanded memory.

2. EMS40.SYS

EMS40.SYS is a device driver conforming to the Lotus/Intel/Microsoft's EMS Version 4.0. EMS40.SYS uses the same optional parameters as EMS32.SYS, except that it has two more optional command switches, /S and /H.

3. EMSDISK.SYS

EMSDISK.SYS is a device driver using expanded memory to simulate a virtual disk. In CONFIG.SYS file, the command line to use EMSDISK.SYS must be placed after the command line which defines EMS##.SYS.

4. CMMDISK.SYS

CMMDISK.SYS is a device driver using the memory whose address is below 640K (Conventional Memory) to simulate a virtual disk.

5. CONFIG.SYS

CONFIG.SYS is a configuration file which contains some command lines to instruct DOS to load the specified device drivers each time you boot up the DOS system. We include a working sample in CONFIG.SYS which shows you how to build the RAMBANK's device drivers.

6. PSPOOL.COM

A program which uses a portion of PC memory (below 640K) as a print buffer and enables your PC to perform other tasks even while printing. Your print output data is queued in a predefined area of memory and will be printed using PC system interrupt.

7. PSPOOLA.COM

A program which uses parts of expanded memory (above 640K) as a print buffer, and enables your computer to perform other tasks even while printing. Your print output

data is queued in a predefined area of memory and will be printed using PC system interrupt.

8. PSPLHELP.COM

This utility lists the PSPOOL and PSPOOLA operations menu. It also gives you a brief listing of all options, types, and their meanings. When you are unsure how to enter a command, execute this utility to go back to the operation menu.

9. BANKTEST.EXE

A program which tests the RAMBANK's page segment.

Backing up Your RAMBANK SOFTWARE Diskette

The RAMBANK SOFTWARE diskette is a single-sided, eight sector non-system diskette. It can be used with PC-DOS 2.0 or above. The following steps are used to back up your RAMBANK SOFTWARE programs.

STEP 1

You should write-protect your original RAMBANK SOFT-WARE diskette. Put a tab on the original diskette. This will prevent accidental erasure during the copying process.

STEP 2

Boot your PC system.

STEP 3

Copy the RAMBANK SOFTWARE programs to your new diskette.

a. If you have only one floppy drive, type:

        COPY B:*.* A: <Enter>

    The system will prompt you to change source and des-tination diskettes.

b. If you have two or more floppy drives, place the RAMBANK SOFTWARE diskette in drive B: and type:

        COPY B:*.* A: <Enter>

    The system will copy all of the programs in B: into A:

STEP 4

The programs on your RAMBANK SOFTWARE diskette will be copied to your new diskette.

Note: The RAMBANK SOFTWARE diskette should be kept in a safe place and should not be used during system operation.

USING THE EXPANDED MEMORY

About This Section

The Lotus/Intel/Microsoft Expanded Memory Specification defines the software interface of the Expanded Memory Manager (EMM); a device driver that controls and manages the interface between DOS application programs and expanded memory. EMS##.SYS is the device driver which meets the LIM Expanded Memory Specification. The EMS standard supports up to four RAMBANK cards with 8M bytes of expanded memory.

You can select the I/O port and base segment addresses of the RAMBANK expanded memory by properly specifying the parameters.

Getting Started

To install the EMS##.SYS, the expanded memory manager, create or modify the CONFIG.SYS file in your system disk's root directory by typing the following. The DOS EDLIN.COM file must be on your disk to begin this process.

Prompt	Command to type	
A>	EDLIN CONFIG.SYS	\<Enter>
*	I	\<Enter>
1:*	DEVICE=EMS##.SYS {parameters}	
2:*	\<F6>	\<Enter>
*	E	\<Enter>

EMS##.SYS Parameters Specification

Format: EMS32.SYS [/B=xxxx][/P=yyy[;yyy]]
EMS40.SYS [/B=xxxx][/P=yyy[;yyy]][/H=hh][/S=ss]

[ ] indicates an optional term. The [ ] is not part of the input.

/B=xxxx

XXXX is the EMS page frame base address in hexadecimal. In expanded memory management, a contiguous 64K page frame segment must be reserved in the memory address range C800H-E000H. Data stored in EMS memory must be swapped into and out of this 64K page frame in order to be accessed by DOS applications programs. The following are valid page frame base addresses you may specify: C800, CC00, D000, D400, D800, DC00 or E000.

Only one page segment address can be specified, even if you are installing more than one RAMBANK. If you do not specify the base segment, the default segment value will be C800.

In selecting a page frame base address, you must avoid memory conflict with other hardware that uses memory in the C8000-F0000 range. Check other hardware to determine if they use memory within this range. The most common conflicts arise with certain Network cards, Enhanced Graphic Adapters and Hard disk controller cards.

/P=yyy[;yyy] [;yyy] [;yyy]

YYY is an I/O port address for the RAMBANK as described in Chapter 3. Each RAMBANK installed must be set at a

different I/O port address, and you can specify a maximum of four ports. The valid I/O ports range from 208H to 2F8H.

If you did not specify the /P parameter for the EMS40.SYS, it will check I/O ports 208H-209H, 218H-219H, 258H-259H and 268H-269H. The EMS40.SYS checks a port by writing data to it. If another expansion card is using a port that is being checked, data in the other card will be corrupted. We suggest that you always specify the /P parameter. Only the port(s) specified will be checked, so there is no possibility that data in other cards will be damaged.

/H=hh

hh is the maximum number of active handles in hexadecimal. The default value is 40 in hexadecimal or 64 in decimal.

/S=ss

ss is the maximum internal stack size reserved to save the hardware context of active handles. The default value is 40 in hexadecimal or 64 in decimal. ss will be adjusted to the same value as hh if you specify ss larger than hh.

Examples Using EMS##.SYS

NOTE: Install only one device driver. Use either the EMS32.SYS or the EMS40.SYS driver depending on the application program you intend to run.

Example 1

To install a RAMBANK card whose I/O port address is 2E8H

and page frame address is CC00H, insert following line in the CONFIG.SYS file:

DEVICE=EMS##.SYS /B=CC00/P=2E8
<Enter>

Example 2

To install three RAMBANK cards with I/O ports set at 208H, 258H, and 2E8H, and with the page frame address set at C800H, insert the following line in the CONFIG.SYS file:

DEVICE=EMS##.SYS /P=208;258;2E8/B=C800
<Enter>

Example 3

If you install two RAMBANK cards with their I/O ports set at 258H and 268H, and you would like to use the default page frame base address of C800, you may specify the line in CONFIG.SYS as follows.

DEVICE=EMS##.SYS <Enter>

Note: We suggest you to specify the needed I/O ports, otherwise, data corruption might be occurred if you have other cards at ports 208H-209H and 218H-219H. To avoid this situation, we recommend that you do the following way:

DEVICE=EMS##.SYS /P=258;268 <Enter>

USING VIRTUAL DISKS

What is a Virtual Disk

A Virtual disk, unlike an ordinary disk drive, has no mechanical parts. This simulated high speed (virtual) disk has access speed much faster than a physical disk. Thus, if users place frequently used data files and programs in Virtual disks, the performance can be greatly improved.

If you want to have a Virtual hard disk on your RAMBANK, you must prepare it before you use it. The following describes how to use EMSDISK/CMMDISK to prepare a Virtual hard disk for your system. Normally, you should do this only once after setting up your PC.

EMSDISK.SYS and CMMDISK.SYS are block device drivers for Virtual disks. They are installed when DOS is booting up after inserting EMSDISK.SYS and CMMDISK.SYS command lines in the CONFIG.SYS file to utilize the LIM expanded memory and conventional memory respectively.

How to use EMSDISK.SYS

As you wish, you may set up many Virtual disks as long as you have enough memory. To set up a Virtual disk using EMS memory, users must first install the expanded memory manager, EMS##.SYS, then place the command entry EMSDISK.SYS following the entry of EMS##.SYS in the CONFIG.SYS file, as the example shown:

> device=ems##.sys
> :

device=emsdisk.sys
[device=emsdisk.sys]
:

The term in [] indicates that you can install another virtual disk if you place other terms in config.sys file.

How to specify the parameter of EMSDISK.SYS

The syntax of the EMSDISK.SYS in CONFIG.SYS is the following:

device=emsdisk.sys [nnnn]
[device=emsdisk.sys [nnnn]]

where

[]   indicates an optional term and is not part of the syntax.

nnnn is the size (in kilobyte) of virtual disk to be installed. The input parameter must be greater than 16. If omitted, the default is 512 kilobytes.

Message regarding to the installation

Msg1: EMSDISK.SYS Version information

* * * EMSDISK.SYS Version X.XX Installed !

X.XX is the version indicator.

Msg2: Virtual Disk information

EMSDISK "X" Reserves "dddd" KB for Expanded
Memory
"rrr" Root directory entries
"ff" Fat sectors
"aaaaa" Available data sectors

where

X   is the drive name assigned to virtual disk.
dddd   is the size of expanded memory allocated by
        emsdisk.
rrr   is the number of directories in ROOT.
ff   is the file allocation table size.
aaaaa is the remaining data sectors available to
        user.
        A sector size is 512 bytes.

Msg3: Missing EMS##.SYS in CONFIG.SYS file

ERROR: EMS driver not installed !

This message shows if EMS##.SYS command line
doesn't exist.

Msg4: No usable EMS memory installed or Memory was
used up by other drivers.

ERROR: No available page memory !

Msg5: Invalid argument in EMSDISK.SYS syntax

ERROR: Invalid parameter found !

Some restrictions about EMSDISK.SYS

Some device specific commands like "DISKCOPY", "FDISK", "FORMAT A:/S" ..., etc., can not work when you are in virtual disk drive or do the operations on virtual disk.

How to use CMMDISK.SYS

To set up a virtual disk using the conventional memory, users must insert a command entry of CMMDISK.SYS in the CONFIG.SYS file, as the example shown:

> device = cmmdisk.sys
> [device=cmmdisk.sys]

The term in [] indicates that you can install another virtual disk if you place other terms in CONFIG.SYS file.

How to specify the parameter of CMMDISK.SYS

The syntax of the CMMDISK.SYS in CONFIG.SYS file is shown below:

> device=cmmdisk.sys [nnn]
> [device=cmmdisk.sys [nnn]]

where

> [] indicates an optional term and is not part of the syntax.

> nnn is the size (in kilobyte) of virtual disk to be installed. The input parameter must be greater than 16. If omitted, the default is 64 kilobytes.

Message regarding to the installation

Msg1: CMMDISK.SYS Version information

   * * * CMMDISK.SYS Version X.XX Installed !

   X.XX is the version indicator.

Msg2: Virtual Disk information

   CMMDISK "X" Reserves "ddd" KB for Expanded
                 Memory
                 "rrr" Root directory entries
                 "ff" Fat sectors
                 "aaaa" Available data sectors
where

   X   is the drive name assigned to virtual disk.
   ddd   is the size of expanded memory allocated by
           emsdisk.
   rrr   is the number of directories in ROOT.
   ff   is file allocation table size.
   aaaa   is the remaining data sectors available to
           user.
           A sector is sized 512 bytes.

Msg3: No usable conventional memory or memory was
      used up by other drivers.

   ERROR: Insufficient Conventional memory !

Msg5: Invalid parameters found in CMMDISK.SYS

   ERROR: Invalid parameter found !

Some restrictions about CMMDISK.SYS

Some device specific commands like "DISKCOPY", "FDISK",
"FORMAT A:/S" ..., etc., can not work when you are in
virtual disk drive or do the operations on virtual disk.

USING THE PRINT BUFFER

About this Section

The PSPOOL/PSPOOLA program is a print spooler which provides queued print-out data to a parallel or serial printer during concurrent processing of other programs. Files to be printed will be output to the pspool queue, the pspool program will handle the output to the printer at printer speed.

PSPOOL/PSPOOLA has the following features:

1. Provides queued output of print data to either a parallel or serial printer.

2. Allows you to define the size of the spooler queue.

3. Allows stop/restart, and line per page controls.

Preparing PSPOOL on Your Personal Computer

PSPOOL and PSPOOLA commands allow you fully use of the conventional memory or expanded memory. Prior to entering your PSPOOL or PSPOOLA commands, you must enter the DOS MODE command to disable the redirection of printer LPT#: This can be done by typing:

MODE LPT1: <Enter>

If you want to assign the print data to your serial printer, you must do the following steps:

1. Refer to the DOS MODE command which initializes the Asynchronous Communications Adapter by using option 3.

2. Use the PSPOOL or PSPOOLA commands to redirect LPT1: to a serial printer.

Getting Started

To start PSPOOLER, you must copy three utility programs into your DOS diskette, the utilities are:

PSPOOL.COM or PSPOOLA.COM
PSPLHELP.COM

Insert the DOS diskette into drive A, and type the command you wish to execute.

The PSPLHELP command

The PSPLHELP command provides you an operations menu, type "PSPLHELP" after the prompt.

A>PSPLHELP <Enter>

Your screen will display:

PSPOOL(A) HELP INFORMATION

Command Format: <Enter>

PSPOOL(A) LPTn: [=COMn:][/U=xxx][/M=xxx]
                  [/L=xx][/S][/C][/R][/I][/ON=]
                  [/OFF=][/P]

LPTn: -- Selects parallel printer.

=COMn: -- Redirects parallel printer output to a serial port.

/U=xxx -- Reserves memory space size for user application programs.

/M=xxx -- PSPOOL(A) queue size specification.

/L=xx   -- Sets the number of lines per page.

/S   -- Stops output of print data.

/C   -- Continues output of print data.

/R   -- Continues output of print data at the beginning of the current page.

/I   -- Initializes the PSPOOL queue, all print data will be purged.

/ON=   -- Turns on serial printer port handshake line protocol options.

/OFF=   -- Turns off serial printer port handshake line protocol options.

/P   -- Discards previous PSPOOLA setting in RAMBANK expansion memory.

[ ]   -- Indicates an optional term. The [ ] is not part of the input.

PSPOOL/PSPOOLA parameters specification

PSPOOL/PSPOOLA, just like DOS commands, must be initialized each time you turn on your PC. This section describes the various commands and options you can use and the format in which they should be entered. The PC normally sends all printer output to LPT1 unless the user takes steps to redirect the output to a different port. When either a serial or parallel port is assigned for printer output with PSPOOL/PSPOOLA, the port cannot be used by any other program for any purpose until the port is redirected by the PSPOOL/PSPOOLA command once again.

To install PSPOOL or PSPOOLA, use the following command format.

```
PSPOOL LPTn:   [=COMn:][/U=xxx][/M=xxx][/L]
               [/S][/C][/R][/I][/ON=OPTION]
               [/OFF=OPTION]
```

or

```
PSPOOLA LPTn:  [=COMn:][/U=xxx][/M=xxx][/L]
               [/S][/C][/R][/I][/ON=OPTION]
               [/OFF=OPTION][/P]
```

PSPOOL uses a portion of the PC system's RAM memory (below 640K) and invokes the PSPOOL program's command handler routines. The remainder of the command syntax specifies the various options. They are described as below.

PSPOOLA uses the expansion memory (above 640K) on your RAMBANK and provides the same functions as PSPOOL.COM.

LPTn: Selects one of the three possible parallel ports.

=COMn: Redirects parallel printer output to a serial port. LPTn now responds as LPTn+1. Note that you must initialize the Asynchronous Communication Adapter by using DOS command MODE before you select this option.

/U=xxx   This option reserves a minimum of xxxK bytes of memory for the user application programs, and its work space. If this option is omitted, PSPOOL will reserve a minimum default program space of 64K of memory space; PSPOOLA reserves no memory for users.

/M=xxx   This option reserves a minimum of xxxK bytes of memory for PSPOOL queue. If this option is omitted, the default queue size is 64K. If =xxx is omitted as much memory as possible will be allocated to PSPOOL queue.

/L=xx   Sets the number of lines per page. Default is 66.

/S   Stops output of print data. No data will be lost, and data output can be restarted by using /C or /R option.

/C   Continue output of print data.

/R   Continue output of print data at the beginning of the current page.

/I   Immediately purge all data from pspool queue, the queue is empty.

/ON=   Turn on serial printer port handshake line proto-
         col options.

/OFF=   Turns off serial printer port handshake line
         protocol options.

The handshake line protocol options are XON, DCD, DSR,
CTS. Default ON=CTS, DSR; OFF=XON, DCD.

/P   Discard previous setting of printer spooler in
         your AT-RAMBANK expansion memory.

Examples Using PSPOOL

The following examples are provided to help to clarify how
the PSPOOL commands are used.

PSPOOL LPT1: <Enter>

Spooler printer output to LPT1.

PSPOOL LPT1:/U=192/M <Enter>

Spooler printer output to LPT1, reserves a minimum of
192K for the application program. Use as much memory
space as possible for spooler queue.

PSPOOL LPT1:=COM1:/ON=CTS <Enter>

Redirects to serial printer 1, with CTS handshake line
protocol control.

Now, we will take you step by step through the process of
creating and using PSPOOL.

STEP 1

Prepare DOS for PSPOOL by using MODE command.

A>MODE LPT1: <Enter>

STEP 2

Create PSPOOL by entering a command as follows:

A>PSPOOL LPT1: <Enter>

PSPOOL   Version x.xx
PSPOOL   total queue space xxxxxx bytes

A>

STEP 3

To use the spooler you can give a print screen command (shift-prtsc), or give a print out file XYZ.LST to LPT1: by entering the following command :

A>COPY A:XYZ.LST LPT1: <Enter>

At this point, you can proceed executing whichever pro-gram you want while PSPOOL is printing out your specified data files.

PSPOOL/PSPOOLA Error Messages

PSPOOL/PSPOOLA may give you an error message under certain conditions. The messages are described below:

1. PRINTER NOT AVAILABLE

   No such printer port in the system or printer not on line.

2. INVALID PARAMETER SPECIFIED

   This indicates an invalid parameter has been specified.

3. CANNOT BE REDIRECTED

   Redirect parameter specified error.

4. NO AVAILABLE MEMORY SPACE

   This indicates that there is no available memory space for printer queue.

BANKTEST

The BANKTEST.EXE is a useful program which assists you to detect whether the RAM chips on your RAMBANK are correctly inserted. To execute the BANKTEST execution file, type "BANKTEST" after the prompt.

>BANKTEST <Enter>

Follow these steps before you use BANKTEST.EXE:

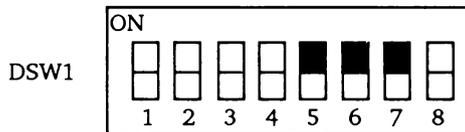A. Set Switch 5, 6 and 7 on your RAMBANK DIP Switch Bank 1 (SW1) at ON position.

Figure 9-1

B. Each expanded memory page segment is carefully examined. It takes you a few minutes to complete the memory test, depending on how many banks of RAM chips you have installed.

C. If an error RAM chip is detected, an error message with the chip's U-number will be displayed on the screen. Please power off your system before you correct the wrong installed RAM chips, or you will damage the board.

D. If no error is detected, it will display the message:

"BANK TEST OK!"

This means the ram chips are correctly installed and working properly.

Note: Please reboot your system after executing BANKTEST to ensure that your system is properly initialized. Note that the C400h selection is not utilized by the EMS driver.

PREPARING YOUR WORKING DOS DISKETTES

After installing your RAMBANK on your computer, you may prepare your working DOS diskettes to automatically initialize the memory size, device drives, virtual disks and print spooler each time you boot the system. This chapter lists the processes used to invoke your RAMBANK software.

STEP 1

If your working DOS diskette has no CONFIG.SYS file, then go straight to STEP 2. If your working DOS diskette already has a CONFIG.SYS file, then you need to alter this file to include the device drives which enable your RAMBANK to work. To see the current contents of your CONFIG.SYS file, insert the working DOS diskette in drive A: and type "TYPE CONFIG.SYS" after the prompt:

A>TYPE CONFIG.SYS <Enter>

The contents of your CONFIG.SYS file will be listed on your CRT screen. Now you need to add the RAMBANK's device drives in the configuration file. You can use the EDLIN command to insert lines of text in your CONFIG.SYS file or the COPY CON: command to create a new CONFIG.SYS file.

Example 1

Insert your working DOS diskette in drive A:, and type as following:

Prompt	Command to type	
A>	EDLIN CONFIG.SYS	\<Enter\>
*	I	\<Enter\>
1:*	DEVICE=EMS##.SYS {parameter}	\<Enter\>
2:*	DEVICE=EMSDISK.SYS {parameter}	\<Enter\>
3:*	DEVICE=CMMDISK.SYS {parameter}	\<Enter\>
4:*	\<F6\>	\<Enter\>
*	E	\<Enter\>

Note: Please consult with the previous chapter for proper parameter input format.

Example 2

Insert your working DOS diskette in drive A:, and type as following:

Prompt	Command to type	
A>	COPY CON: CONFIG.SYS	\<Enter\>
	DEVICE=EMS##.SYS {parameter}	\<Enter\>
	DEVICE=EMSDISK.SYS {parameter}	\<Enter\>
	DEVICE=CMMDISK.SYS {parameter}	\<Enter\>
	.	
	.	
	\<F6\>	\<Enter\>

Example 3

Ordering should be awared, if you intend to install VDISK, EMS device driver, and its virtual disk driver, EMS##.SYS must always be installed before VDISK.SYS and EMSDISK.SYS. Insert your working DOS diskette in drive A: and type as following:

Prompt	Command type	
A>	COPY CON: CONFIG.SYS	<Enter>
	DEVICE=EMS##.SYS {parameter}	<Enter>
	DEVICE=EMSDISK.SYS{parameter}	<Enter>
	DEVICE=VDISK.SYS {parameter}	<Enter>
	.	
	.	
	.	
	<F6>	<Enter>

Now the RAMBANK's device driver has been built in the configuration file each time you start your computer.

STEP 2

Copy the programs which are on your RAMBANK SOFT-WARE diskette to your DOS diskette.

STEP 3

If your working DOS diskette already has an AUTOEXEC.BAT file, then you need to alter this file to include the RAMBANK SOFTWARE commands. To see the current contents of your AUTOEXEC file, insert the working DOS diskette in drive A: and type "TYPE AUTOEXEC.BAT" after the prompt.

A>TYPE AUTOEXEC.BAT <Enter>

The contents of your AUTOEXEC file will be listed on your CRT screen. You now need to create a new AUTOEXEC file in which the RAMBANK's commands proceed other commands. The following sequence will do this for you:

```
COPY CON: AUTOEXEC.BAT    <Enter>
PSPOOLA LPT1:             <Enter>
       .
       .
(press F6)                <Enter>
```

If your working DOS diskette does not have an AUTOEXEC
file, then you should use the above sequence to create one.

STEP 4

If necessary, use PSPOOL command to setup printer
spooler in your system memory.