

**INSTALLATION AND SOFTWARE
MANUAL**

FOR

EMS-5150T® or EMS MODULE®
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INSTALLATION MANUAL

FOR

EMS-5150® or EMS MODULE®

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August 16, 1989

INTRODUCTION:

The EMS-5150® and EMS Module® RAM chip installation and board addressing are identical. The physical installation is different. The EMS-5150® is a stand alone board capable of supporting an additional EMS Module®. This facilitates the installation of 4 Mega Bytes in one slot.

The EMS Module® is designed to attach itself to another board with the dual row of header pins. This again allows the installation of two Micro Mainframe EMS expansion boards in one slot or the installation of one Micro Mainframe EMS Module® on a board already installed in the computer and capable of holding the EMS Module®.

Each of the boards, EMS-5150® and the EMS Module®, are expanded memory upgrade boards. These boards combined with the EMS software supplied by Micro Mainframe create a LIM 3.2 standard environment. This environment is compatible with the LIM 3.2 standard. Where LIM stands for Lotus®/Intel®/Microsoft.

This manual will instruct you in the installation of either the EMS-5150® board or the EMS Module®. This manual will also assist you in the installation of additional RAM chips. Micro Mainframe encourages the users of its products to expand the products to their highest potential.

First, this manual will explain the installation of each of the two boards, then proceed to explain the board's addressing and chip installation. The software aspects are covered in the EMS software instruction manual.

F. Y. I.

It has come to our attention that some users have experienced difficulties when filling their EMS boards to capacity with 2 Megabytes of memory (64 - 256K DRAM's). The problem appears as seemingly random errors appearing in known good banks of memory as additional banks are added to the board. Errors generally become increasingly severe with more than 4 banks loaded and are worse with all 8 banks loaded.

Preliminary testing indicates that the problem lies not in the EMS board, but in the memory chips being used. The problem stems from using mixed manufacturers and/or mixed speed grades of memory chips on one EMS board and becomes even more severe when mixing chips within the same bank. This problem was first observed when the memory shortages began. We have come to suspect that the

reason for it is that some of the DRAM's being sold were not quite meeting their specifications.

For those experiencing this problem we recommend swapping out any mismatched memory chips and filling the board with memory from one manufacturer only. The chips should preferably be of the same speed grade, with 150ns being the minimum acceptable (faster chips will also work).

We have not yet found an EMS board which failed to work under the above conditions. An alternate (though not recommended) solution, if you must mix chip manufacturers due to availability or other reasons, using 120ns or faster DRAM's may solve the problem. We cannot guarantee that this will entirely solve the problem.

If you are experiencing these problems and are unable to solve them with the suggestions above, please contact our technical staff and they will provide further assistance.

INSTALLATION EMS-5150®:

The EMS-5150® is installed similar to other cards installed in your PC computer. Instead of listing all the different types of computer cases we assume you can remove the cover of your computer successfully. *Please remember to turn off all the power and wait for at least 15 seconds before removing or installing any expansion board. Further, please insure that all power cords are removed from the wall outlets.*

With the cover removed from you computer you should see at least one open expansion slot. If you don't have an open expansion slot available you will be unable to continue.

Locate the open expansion slot, remove the metal back cover to release the space required by the EMS-5150® mounting bracket. Insert the EMS-5150® board so that the board card edge slides into the socket on the mother board. This should place the metal bracket into its slot on the back of the computer's case.

Press the card into the slot insuring that it is inserted all the way inside the connector. Then fasten the bracket to the computer with the screw removed from the blank metal cover.

Now proceed with **BOARD CHECK OUT!**

INSTALLATION EMS MODULE®:

The EMS Module® is installed similar to the other cards installed in your PC computer. Instead of listing all the different types of computer cases we will assume you can remove the cover of your computer successfully. *Please remember to turn off all the power and wait at least 15 seconds before removing or installing any expansion boards. Further, please insure that all power cords are removed from the wall outlets.*

The difference in installation of the EMS Module® resides in the fact that the module will connect to a row of pins on another card. This installation is fairly fail

safe. The only major thing to watch for is shorting of the board on the mother board and other surrounding boards. Also watch for bending of pins when inserting the EMS Module® on the mother board.

BOARD CHECK OUT:

The EMS boards are verified for operation at the factory but, there are methods in which you may verify the operation of the EMS environment in your computer. The EMS software documentation will cover the test procedures more thoroughly.

EMS BOARD ADDRESSING:

The EMS boards are designed to allow the user the ability to insert up to four (4) EMS boards in the computer. This requires the user to install jumpers on each of the EMS boards which are **not** board zero (0).

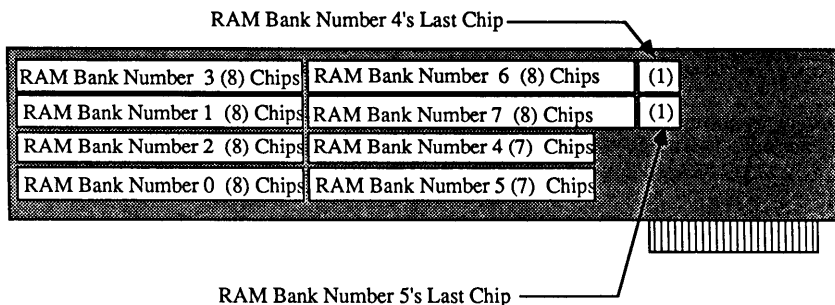
The EMS board jumper configuration is easy to install and understand. The following table will assist you in setting the jumpers correctly for your installation.

<u>A1</u>	<u>A2</u>	<u>BOARD ADDRESS</u>
OUT	OUT	BOARD 0
IN	OUT	BOARD 1
OUT	IN	BOARD 2
IN	IN	BOARD 3

INSTALLATION OF RAM CHIPS IN THE EMS BOARDS

Both EMS boards from Micro Mainframe accept the additional RAM chips in the same fashion. The diagram below will show you the position where the chips should be placed for expansion. Please note that **all pin one locators** are to be placed towards the **top** of the board when the connector of the EMS board is facing you.

EMS RAM Position Diagram



As you can see from the above diagram it is divided into different sections. Each of the sections divides the EMS RAM into 256K byte areas of EMS memory. To see this examine the table below. This table will show how the additional banks add to the total EMS RAM available.

<u>Bank Number</u>	<u>Total EMS RAM Available</u>
0	256K
1	512K
2	768K
3	1024K
4	1280K
5	1536K
6	1792K
7	2048K

You **MUST** begin expanding the EMS boards by starting at the lowest bank and fill toward bank number 7. (*from lower bank number to higher bank number.*). Not only is this normal but, it will increase the speed of the LIM software. The only other consideration is that each bank **MUST BE** completely full of RAM chips. That is to say you must install all eight (8) chips for the bank installed.

It is also recommended, depending upon the speed of your computer, that you use 150ns or better chips. These are available from several sources. Check with Micro Mainframe for availability.

This completes the installation documentation. Thank you for using Micro Mainframe products. Remember Micro Mainframe is the **BEST!**, and has been around longer than the **REST!**

Micro Mainframe EMS Software Documentation

August 16, 1989

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EMS Software Driver

The Micro Mainframe EMS Software has been designed to support the Lotus®/Intel®/Microsoft® standard (LIM). The version is 3.2 which does not contain support for functions 10 and 11 (*Which was specified by Lotus Development Corporation.*).

The name of the file which provides the drivers for the Micro Mainframe EMS board is called "EMS32.BIN". This file **MUST** reside on the system disk in the *ROOT* directory.

You must also create a file on your "*BOOT*" disk called "CONFIG.SYS". If you already have a file on your disk called "CONFIG.SYS" then you need to modify it. You may obtain further information on how to do this by consulting your DOS manual.

The "CONFIG.SYS" file as a minimum must contain the following line to install the EMS driver software:

```
DEVICE = EMS32.BIN
```

When the computer "*BOOTS*" from the disk it will load the EMS driver program called "EMS32.BIN" and initialize the EMS RAM. This driver software checks the EMS RAM for memory errors, and determines the amount of RAM present, sets its internal parameters and exits to DOS.

There is one option for the EMS invocation line. Micro Mainframe has provided a "*QUICK*" check of the EMS RAM. As you well know the PC can take sometime to test its memory, so we have provided an option to quicken the long memory test related only to Micro Mainframe's EMS RAM. To use this option you need to append to "CONFIG.SYS" file as follows:

```
DEVICE = EMS32.BIN (space)/Q
```

Where the "/Q" is the option switch. This enables the "*QUICK*" check of the EMS RAM. As an added bonus the "*QUICK*" check also performs a non-destructive RAM test. This enables the EMS RAM DISK software to detect the presence of a constructed RAM disk. This allows you to "re-boot" your computer (*without power loss*) and still have the contents of the Micro Mainframe EMS RAM DISK. (*See the EMS RAM DISK documentation for more details*)

This completes the information required to install the EMS software. Please consult the technical information for further details on how to use the EMS software in your programs.

Please also **NOTE** that if any software is installed through the "CONFIG.SYS" file and it uses the EMS MEMORY you **MUST** have the "DEVICE = EMS32.BIN" appear first. Otherwise the installed software will **NOT** be able to locate the EMS software as it has not been installed yet.

Compatibility Mode for DesqView and PC Tools

It has been noted that DesqView and PC Tools (version 5 and above) can cause system crashes when used in conjunction with the MMF EMS board. We have implemented a special 'compatibility' mode in our EMS software which allows you to use these programs without experiencing this problem.

In order to use this mode you need to add a "/C" option switch in your "CONFIG.SYS" file as shown below:

```
DEVICE=EMS32.BIN (space)/C
```

This mode may also be used in conjunction with the "QUICK" RAM test discussed above. To do this simply add "/QC" as the option switch instead of "/C".

Please note that if you are experiencing problems with your software and the EMS memory, please verify that it will work with LIM specification 3.2. If so, the problems may be eliminated through the use of the compatibility mode.

EMS RAM DISK Software

The EMS RAM Disk software is a file on the disk named "EMSRAMDK.BIN". This file is the interface between your computer's MS-DOS and Micro Mainframe's EMS software.

The software provides the necessary information to the DOS for use as a block device (*disk drive*). The disk device can be set for several different sizes. The smallest unit is 16K (16384 bytes). The reason for this is the EMS software standard switches memory on 16K blocks or pages.

You tell your computer to install the EMS RAM Disk software by entering lines in the "CONFIG.SYS" file. Your DOS manual should provide the necessary information on how to modify the "CONFIG.SYS" file. The line in the "CONFIG.SYS" file should take on the following appearance:

```
DEVICE = EMSRAMDK.BIN (space)/B=n  
or  
DEVICE = EMSRAMDK.BIN (space)/B=A
```

Where (*n*) is the number of 16K pages of memory to use in the RAM DISK. The number (*n*) can range from 1-512, but is dependent upon how much EMS RAM is available. A board with 2 Megabytes of memory installed can use 128 pages of EMS RAM. This would leave the system with NO available EMS RAM and a 2 Meg RAM DISK.

If the (*n*) is omitted then the software will use a default value of 1. This would yield a 16K RAM DISK. The RAM DISK software would inform you of the default usage. If you wish you may use the /B=A option. This option tells the driver to use all of the EMS memory that it finds for the RAM disk. As you add additional memory the RAM disk will automatically grow.

You may optionally specify the name of the RAM DISK as it appears on your directory listings. The option switch is "/L=name". Where name can be up to 11 characters. The "CONFIG.SYS" file would look like the following for a 160K RAM DISK and a volume ID of TOM'S Disk:

```
DEVICE = EMSRAMDK.BIN (space)/B=160,L=TOM'S Disk
```

That's it!

Please remember that you must have first installed the EMS driver program "EMS32.BIN" before the "EMSRAMDK.BIN" program can function. This again is done by entering the DEVICE=EMS32.BIN command in the "CONFIG.SYS" file before the DEVICE = EMSRAMDK.BIN command.

Now if your computer is reset and you have some important information in your EMS RAM DISK you need not fear if you have used the quick test mode in the loading of the EMS software configuration. The RAM DISK software **MUST** however see that the information in the directory is correct and your "BOOT" disk must contain the same parameters as the old disk contained.

If the above conditions are met then the RAM DISK software will indicate the contents of the RAM DISK have been preserved. This simply means that the directory information and the FAT table have not been reset to zeros.

There is **NO** guarantee that the other information in the EMS RAM DISK was undisturbed. But, if the information was undisturbed then you have the opportunity to copy it to a regular diskette or hard disk.

It is good practice **NOT** to leave important information in the RAM DISK when done. You should move your information to another less volatile storage location, such as a diskette or hard disk.

The main point is that Micro Mainframe tries to give you the opportunity to recover from an otherwise horrible disaster.

I WANT TO HURRY UP AND TRY THE BOARD AND RAM DISK

How to build a quick let's see the EMS and RAM Disk work "CONFIG.SYS" file!

All the information in uppercase would be supplied by your key strokes. Your computer's information will be listed in lowercase. It is assumed that you have a non-write protected system disk in drive A: and the EMS software has been copied onto it. It is also assumed that there is some space left on the diskette to hold the "CONFIG.SYS" file.

```
a:>COPY CON: CONFIG.SYS
DEVICE=EMS32.BIN
DEVICE=EMSRAMDK.BIN (space)/B=A/L=NICE_FAST
^Z
```

1 File(s) Copied

Now the (^Z) is performed by pressing the control (CTRL) key and holding it while you press the "Z" key you then release both keys (CTRL and "Z"). Then press the return key. The control "Z" as it is called is an end of file indicator to the DOS system. This tells the DOS you are done with the file.

In the above "CONFIG.SYS" file creation we have omitted the "/Q" Quick test mode to see all of your EMS RAM tested. This will give you a visual account of the EMS RAM testing sequence. Using the long test will also give you an indication of whether or not the EMS Board is functioning correctly.

NOW PRESS "CONTROL ALTERNATE and DELETE" at the same time. Wait for your computer to "*boot-up*" and you should see all of the messages from the EMS system and the EMS RAM disk software. The RAM disk device designation will be the next one from your last device. So if you have a hard disk then your EMS RAM Disk will be called D: or if you have only two floppies then it will be called C.

Other programs provided for use with the EMS Boards:

PRINT SPOOLER:

Micro Mainframe has also provided an EMS print spool. This program, called ESPOOL.EXE, will send information to the printer and also catch what your computer is sending to the printer to keep the computer moving along quickly and not waste valuable time waiting for the printer.

The ESPOOL program has several operations which it will perform. The first is the print spooling function. Others include "*Status of spool*" and "*Clear spool*".

To invoke the printer spool you need to include on the command line the size you wish to allocate in EMS pages to the print spooler. You also need to tell the spooler which printer it is to spool for.

The command line would appear as follows for a 2 EMS page spool using the default printer.

```
A>ESPOOL (space)/B=2
```

The "B" stands for blocks of EMS memory. The numeric range is 1-512. You must however have sufficient free EMS pages to fill the request or the spooler will not be installed and an error message will be displayed.

If you wish to have the spooler spool information for another printer other than 0 (*zero*) you need to tell the spooler at installation time of that request.

```
A>ESPOOL (space)/B=10/P=1
```

This will spool information for printer number 1 using 10 pages of EMS memory or 160K of space.

Once the spooler has been loaded you may perform either of the two following commands. The first is a "*Status*" request.

The status request will display the number of bytes currently awaiting to be delivered to the printer, the number of EMS pages allocated to the spooler and the printer number the spool is active for.

To invoke the status request simply enter the command "ESPOOL" and press return. The spooler software will see that you have requested a status and deliver the information to you. Note that if you invoke a status request but have not yet invoked the spooler and error message will appear.

If you have found that you need to **EMPTY** the spool of the information previously sent to it you can issue the "*CLEAR SPOOL*" command.

The CLEAR SPOOL command is given on the command line. The following will zero all input and output buffers and ready the spool to receive new printer information. The following will illustrate the command line.

```
A:> ESPOOL (space)/C
```

One final option provides additional support for faster printers. ESPOOL.EXE will wait a programmable amount of time before determining that the printer is busy. Feel free to experiment with different delay values to find the best performance. Factors that influence the delay value are CPU speed clock speed, printer interface electronics, and computer. Please note: Take care not to over extend the delay. Doing such could cause your computer to miss interrupts.

The option switch to control the delay is [/D=n] where N= 1 to 65535. The default is 200. An example of using the delay option appears in the following command line:

```
A:>ESPOOL(space)/B=2/D=160
```

This would setup a spooler using 2 pages of EMS memory and a delay of 160.

EMS UTILITIES:

EMSMAP.EXE Displays a use map of the EMS memory system.

EMSSTAT.EXE Displays a use map of the internal save area.

To invoke either of these utilities simply type in their names at the DOS prompt. The EMSMAP.EXE program is the most useful. This will give you some idea of the mapping of the EMS memory. This will aid programmers in their understanding of the EMS mapping.

The EMSSTAT.EXE program is useful when interrupt driven tasks are consuming space in the save area. The programmers and users are able to see the consumption of time in the EMS swap. It is also an indication of how many pending tasks are present.

EMS Software Technical Manual is available from Micro Mainframe for an additional charge. The EMS technical manual covers all aspects of the EMS software interface and also some unique features of the Micro Mainframe implementation of the LIM 3.2 standard.

If you would like additional information regarding this manual please call Micro Mainframe directly (916) 985-7501. There is a nominal charge for the duplication costs and shipping charges.

If you are a programmer then the EMS technical manual is a must. If you wish to tinker around with the software then again you must get the EMS manual. The Micro Mainframe implementation of the LIM 3.2 has some extensions which would be of interest to all programmers. These extensions give the programmer greater flexibility in using the EMS memory.

Have fun and remember that Micro Mainframe is your source for expansion products for your computers.

Thank you for selecting the best and remember that Micro Mainframe has been around longer than the REST!

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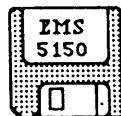
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