To use TEMMS20:

1. Use the MS-DOS copy command to copy temms20.sys to your hard disk.

2. Add a device command to your config.sys file:
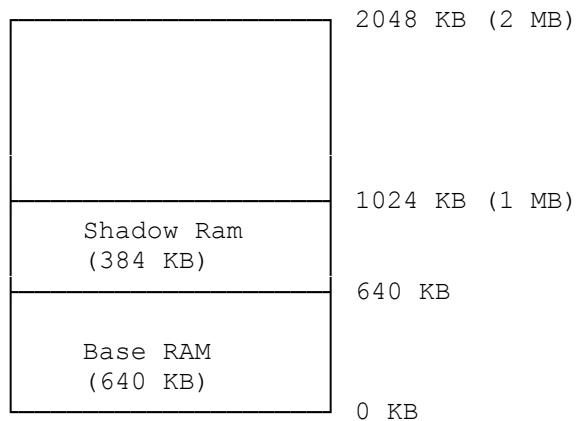
        device=\path\temms20.sys

In order to understand the function of this driver, you need to know the
definitions of shadow RAM, expanded memory, and extended memory.

SHADOW RAM

Your computer is equipped with 2MB (2048KB) of RAM (random access memory)
on the main logic board. By removing the 256KB SIMMS and installing 1MB
SIMMs, you can configure your system with as much as 5MB of RAM on the
main logic board.

The first 640KB of RAM in any system is called base RAM. Base RAM is
reserved for your operating system and applications. Memory from 640KB to
1024KB (a total of 384KB) is called shadow RAM. Your system BIOS (Basic
Input-Output System) uses a portion of shadow RAM. Video adapter BIOS and
SCSI BIOS (if applicable to your computer) might also use shadow RAM.

The following diagram illustrates base RAM and shadow RAM in a 2MB memory
configuration:

```
┌─────────────────────┐  2048 KB (2 MB)
│                     │
│                     │
│                     │
│                     │
│                     │
├─────────────────────┤  1024 KB (1 MB)
│   Shadow Ram        │
│   (384 KB)          │
├─────────────────────┤  640 KB
│   Base RAM          │
│   (640 KB)          │
└─────────────────────┘  0 KB
    Base RAM and
    Shadow RAM
```

EXPANDED MEMORY

Early microprocessors were not equipped to recognize memory address beyond
1MB (1024KB) of memory. When additional memory was required, systems
based on such processors relied on expanded memory. Expanded memory was
stored on a separate adapter, and it used a different addressing protocol
from base and shadow RAM. Expanded memory was accessed in blocks of
memory called pages. A group of pages is called a frame. The pages in a
frame are not necessarily adjacent in the available supply of physical
expanded memory.

The following diagram shows two examples of valid
frames. One includes sequential pages; the other does not.

```
8 MB
        +-----------------------+
        |       Block 511       |
        +-----------------------+
        |          |            |
        |          |            |          +-----------------------+
        +-----------------------+          |       Block 511       |
        |       Block 53        |          +-----------------------+
1 MB                                       |       Block 52        |
        |          |            |          +-----------------------+
        |          |            |          |       Block 2         |
        +-----------------------+          +-----------------------+
        |       Block 1         |
        +-----------------------+          +-----------------------+
        |       Block 0         |          |       Block 1         |
        +-----------------------+          +-----------------------+
0 MB                                       |       Block 0         |
                                           +-----------------------+
           Expanded Memory                       Examples of
                                              Expanded Memory Frames
```
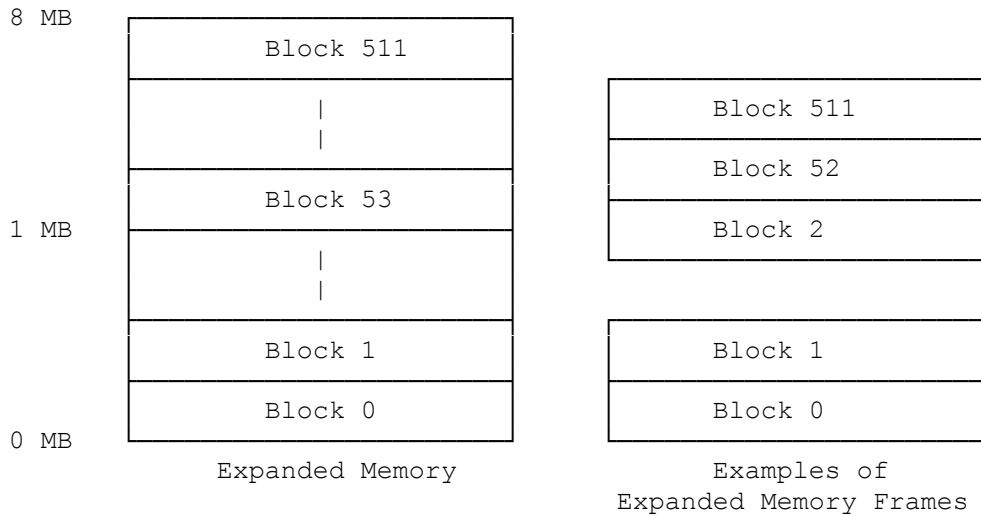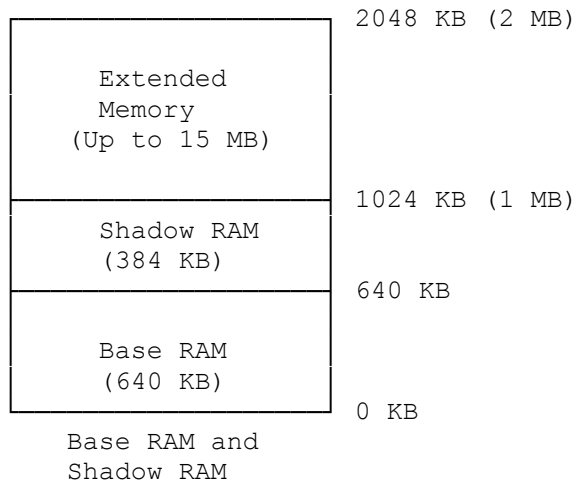
EXTENDED MEMORY

Current microprocessor technology supports memory beyond 1MB, so expanded
memory is no longer required. Instead, current technology uses extended
memory, defined as all memory (RAM) beyond the 1MB boundary, to emulate
expanded memory.

To emulate expanded memory, the processor copies a frame of extended
memory into a segment of RAM between 640KB and 1024KB. The beginning of
the RAM segment is called the frame address. Since RAM from 640KB to
1024KB is within the 1MB boundary, it is accessible to the processor.

The following diagram shows base RAM, shadow RAM, and extended memory:

```
        +-----------------------+  2048 KB (2 MB)
        |                       |
        |      Extended         |
        |      Memory           |
        |    (Up to 15 MB)      |
        |                       |
        +-----------------------+  1024 KB (1 MB)
        |    Shadow RAM         |
        |    (384 KB)           |
        +-----------------------+  640 KB
        |                       |
        |    Base RAM           |
        |    (640 KB)           |
        +-----------------------+  0 KB

         Base RAM and
         Shadow RAM
```

USING TEMMS20

You can install up to 5MB of memory on the main logic board in your
computer. All memory above 1MB is extended memory.

TEMMS20.SYS uses extended memory to emulate expanded memory as defined in the LIM (Lotus/Intel/Microsoft) 4.0 memory specification.

TemmS20 does not use any memory that is not on the 32-bit memory adapters in your computer.

To use TemmS20:

1. If you have not already done so, copy temms20.sys from the utilities diskette to your hard disk. To do this, insert the Utilities Diskette into Drive A and type the following command at the MS-DOS system prompt (A> or C>):

        copy a:temms20.sys c:

    Then, press ENTER.

2. Add a device command for Temms20 to your config.sys file. The format for the Temms20 device command is:

        device=temms20.sys [/s] [xxxx] [ly] [Mz]

The following table summarizes the TemmS20 device command parameters.

Switch	Function
/s	Enables the software to access shadow RAM.
xxxxx	Specifies the Amount of expanded memory (in kilobytes) to be emulated. Use a value from 304 to 8192 if you are using /s or 16 to 8192 if you are not using /s. Use a value that is a multiple of 16. The default value is 304KB with /s or 1024KB without /s.
Iy	Identifies the I./O port addresses emulated by temmLx.sys. If one or more options in your computer access port addresses that conflict with the addresses emulated by temms20.sys, use the following chart to select address that can be emulated without conflict. The default y value is 5.

y	Port Addresses Used (Hex)			
0	208	4208	8208	C208
1	218	4218	8218	C218
5	258	4258	8258	C258
6	268	4268	8268	C268
10	2A8	42A8	82A8	C2A8
11	2B8	42B8	82B8	C2B8
14	2E8	42E8	82E8	C2E8

Mz	Frame Address (Hex)
0	C400 - D400
1	C800 - D800
2	CC00 - DC00
3	D000 - E000
4	D400 - E400

```
   5   │  D800 - E800
   6   │  DC00 - EC00
   7   │  E000 - F000
```

NOTES:

*   Do not use Temms20.sys with software that uses the protected mode
    features of the 80386SX processor.

*   If you want to use expanded memory with other device drivers,the
    temms20.sys device command must be the first device command in
    your config.sys.

*   Do not use a frame address that overlaps addresses used by the
    hardware.