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**Envision Designs 640K RAM Board  
and  
Software**

The Envision Designs 640K RAM board allows the Tandy 2000 to have 896K bytes of user RAM (256K more than on the IBM PC!). Your machine must have 256K of existing RAM on the mother board. The 640K Envision Designs RAM board uses only one slot on the Tandy 2000, and give's a total RAM size of 896K. Thus with Envision Designs RAM board you can have a color graphics board, a hard disk controller board and a clock-mouse board in addition to the RAM board. Fortran, C and most compilers can use all the memory. BETTER BASIC has been used and allows a very large memory work space. Two programs are included with the RAM board. SYSMOD which modifies the boot file IO.SYS to recognize 896K memory and VDISK which is a RAMdisk (Random-Access-Memory based disk) program.

The Tandy 2000 Boot ROM only recognizes 768K of RAM. Therefore in order for MS-DOS to use the full 896K of RAM a hidden boot file IO.SYS must be modified. SYSMOD.COM is the program that modifies this file and is executed only once to modify IO.SYS. Instructions for use of SYSMOD can be found on page 2.

VDISK.SYS is the RAMdisk device driver file that establishes on system bootup a memory based disk up to 640K bytes. Instructions for use of VDISK can be found on page 3.

WORDSTAR is the only program which has been found not to work properly on 896K RAM memory. Patching instructions for WORDSTAR can be found on pages 4 & 5.

A limited warranty and important notes can be found on page 6. Board installation instructions are found on page 7 and should be read and followed carefully.

Envision Designs congratulates you for purchasing our 640K RAM memory board for your TANDY 2000 and hope you have many hours of enjoyment using it. If we can be of assistance to you on any questions concerning this product don't hesitate to contact us on (509) 627-5291 between 9-5 PST.

**Note:**

1. Tandy 2000 is a Trademark of TANDY Corporation.
2. BETTER BASIC is a Trademark of Summit Software Technology Inc.
3. MS-DOS is a Trademark of Microsoft Corporation.
4. WORDSTAR is a Trademark of MicroPro International Corporation.

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SYSMOD.COM

Version 1.0

SYSMOD.COM is a program to modify IO.SYS to recognize the full 896K memory on the Envision Design memory board. IO.SYS must be modified under a floppy disk system boot and prior to installation of the Envision Designs 640K RAM board. The use of this program is very simple and the procedure is as follows.

1. Format a disk and put the system files and COMMAND.COM on the disk(See note below). Also put SYS.COM on the disk.
2. Copy SYSMOD.COM to the formatted disk.
3. Put this disk in Drive A: .
4. Run SYSMOD.COM by entering the command SYSMOD.
5. When the program terminates, You now have a modified operating system which can run with or without the Envision Designs memory board.
6. Reboot the system using the Reset Switch.
7. Copy the system files to any disk which you want to boot from by using the SYS command.  
Leave the modified disk in drive A and put the disk to be modified in drive B: (or C: for a Hard Disk).  
Use the following command:

SYS B:

This copies the modified system to the disk in drive B. Be sure you have SYS.COM on disk A: before giving the SYS command. If you have SYS.COM on the disk in drive B then use the command :

B:SYS B:

NOTE: Do NOT use SYSMOD on your original system disk. Also do not run SYSMOD on a disk that already has the modifications applied as it then will not Boot.

The modified system files will be copied when the format command is used with the /S parameter. Also COMPDUPe and DISKCOPY will copy the modified system.

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VDISK

Version 1.1

VDISK is a RAMdisk program that allows the use of memory to act as a disk drive. For MS-DOS 2.11 on the Tandy 2000 it acts as Drive E. Memory sizes of 64K up to 640K may be used as a RAMdisk. VDISK is installed as a Device Driver. It is installed by putting the following command in the CONFIG.SYS file.

DEVICE=vdisk.sys -nK

where "n" is the size of the desired RAMdisk size in K bytes. Therefore for a 256K RAMdisk on Drive E: the command to be installed in the CONFIG.SYS file is:

DEVICE=vdisk.sys -256K

Note that there must be at least one space between vdisk.sys and the minus sign and the last character must be K. This version of VDISK will not run on an IBM PC since it uses instructions from the 80186 instruction set which are not available on the 8088 used in the IBM PC. It probably will work on any computer using MS-DOS with a 80186 or 80286 microprocessor (IBM AT), but it has only been tested for use on the Tandy 2000. The use of a RAMdisk is very useful as it is much faster than a Hard Disk. However, the contents will be lost upon a reboot, a loss of AC power, or turning off the computer. Therefore be sure to copy anything that you wish to save to a diskette or a hard disk before turning off the computer. All MS-DOS commands will work on the RAMdisk including the use of subdirectories. If you have many devices installed in your CONFIG.SYS file than the maximum size of the RAMdisk should not exceed 625K. If too large of a RAMdisk is used the computer may lock up as there will be insufficient space for most programs. RAMdisk's of 640K have been used on floppy disk systems, but caused problems with a hard disk with BUFFERS=15, FILES=15 and other device driver's in the CONFIG.SYS file. In this case a RAMdisk size of 625K worked properly.

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## WORDSTAR Patching Procedure

### Version 1.0

The only program which has been found not to work properly with the 896K RAM memory is WORDSTAR. This has been found to be due to a poor procedure used to determine the maximum memory size and the location of the monochrome video memory address (It tests for the memory size and stops at 768K). If other programs have any problems please contact Envision Designs. A simple patching procedure has been developed to fix video problems with WORDSTAR and is presented below.

The patching procedure is given below and requires the use of the program DEBUG. It can not be stated too strongly only patch a copy of WORDSTAR. Do not try patching your original disk or your first backup ! Any mistake on applying a patch to any program may lead to the loss of the program. Therefore, before proceeding to patch WORDSTAR make a copy and only patch the copy and test thoroughly before using. Actually the patch is very easy but check your work carefully before saving the patched WORDSTAR program. This patch must be applied to WORDSTAR 3.3 if you plan to use it on the Tandy 2000 with the 896K RAM installed by using SYSMOD.

The WORDSTAR Patching procedure is as follows:

1. PUT a disk containing a copy of WS.COM and Debug in Drive A.

2. Login drive A: if you are not on drive A keyin the command

A: <Enter>

3. Next enter the command

DEBUG WS.COM <Enter>

4. Now enter the command

D4B90 <Enter>

5. You should now have the following information displayed on the first line of the dump.

xxxx:4B90 50 CD 12 B3 C0 3D 80 00 B7 1E 7E 1E 3D 00 01 B7

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The value xxxx is not important, but if you do not see this line then quit by typing Q <Enter> as your version is different from those which we have seen and a different patch is required.

6. If you have the line listed as shown above continue by entering the commands shown below :

```
A4B95 <Enter>
PUSH DS <Enter>
MOV AX,CS <Enter>
MOV DS,AX <Enter>
MOV bh,[3] <Enter>
POP DS <Enter>
POP AX <Enter>
RET <Enter>
<Enter>
```

In the above commands, <Enter> means to press the enter key.

7. Your patch to WORDSTAR is now complete (as you can see it is very easy), but the modified version only resides in memory not on your disk. Next enter the following command:

```
W <Enter>
```

This command writes the modified version of WORDSTAR to the floppy disk in drive A.

8. After the disk drive stops exit the program DEBUG by entering the following command.

```
Q <Enter>
```

You should have now exited the program DEBUG and the patch version of WORDSTAR is now on drive A: called WS.COM.

9. Test the operation of WORDSTAR. If the patch was properly applied, the patched version should work normally. If your screen display is not functioning properly, an error was made in patching your version. Redo steps 1 through 9 if this occurs. If the same results continue contact Envision Designs.

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#### LIMITED WARRANTY

Envision Designs provides a limited warranty on the 640K memory board for a period of ninety (90) calendar days from the date of sales document received upon purchase of the equipment. The warranty is void if the equipment has been subjected to improper or abnormal use. Under this warranty period, Envision Designs will repair or replace a defective 640K memory board at its sole expense. After the warranty period, Envision Designs will repair a defective 640K memory board for a fixed charge plus the cost of defective parts.

#### DISCLAIMER

In no event shall Envision Designs be liable to User, its customers or any other person for any special, incidental or consequential damages of any kind arising out of the use of the 640K memory board and support software or the furnishing to the user or any materials related thereto. User will indemnify, defend and hold Envision Designs harmless from and against any claims, losses and damages arising on account of the use of this 640K memory board and support software or its results by User, User's customers and any other person who may use the hardware or any such materials.

#### IMPORTANT NOTE

Upon startup, it is very important that your Tandy 2000 check for parity. Some Tandy 2000's, however, currently do not do this. To see if your Tandy 2000 is one of these models, which require a slight modification, look at the code that is stamped under the front edge of the computer. If the code contains a "double A" (AA) sequence, take your computer to your nearest Radio Shack Computer Center where it can be properly modified. The Envision Designs 640K RAM memory board is actually a customized Tandy 2000 External 128K RAM board and thus will not operate properly if your computer is not properly modified by Radio Shack to support parity check.

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## BOARD INSTALLATION INSTRUCTIONS

The following steps should be used when installing the 640K Envision Designs Memory Board:

1. Turn off all equipment. If it is on you could damage the central processing unit, as well as the RAM board.
2. To avoid possible static charge buildup, touch a metal object to ground yourself before you begin.
3. You can install the External 640K RAM board in any slot. If, however, you have a Monochrome Graphics Option Board, do not install the memory board in the lowest slot. The graphics board must go there. After selecting a slot, "unlock" the panel covering it. Do this by pulling the buttons on either side of the panel. Do not try to remove the buttons. Remove the panel.
4. Unlock the buttons on the 640K RAM board's panel. (Note: Handle the pan containing the board, not the board itself.) Slowly slide the pan between the guides along the sides of the card slot until the board meets the connector.
5. Then apply steady, equal pressure to both edges of the panel (near the buttons) to push the pan all the way in and "seat" the connector. Push the buttons in to lock the board into position.
6. To test your memory board, start up MS-DOS as instructed in Introduction to the Model 2000. Check the correct amount of memory by using the MS-DOS utility CHKDSK and the screen display should show 910,336 bytes of RAM Memory. The newer version of Tandy's boot ROM causes the screen to show a multiple line test pattern. This pattern exists only for a short time on bootup then the screen should clear and start normal boot MS-DOS display sequence. If this is not the case, contact Envision Designs for further assistance.

THANK YOU !

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