

The Tandy 2000's New Operating System

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PCM Contributing Editor

The Tandy Model 2000 is an enigma. When Tandy Corporation introduced the 2000 in 1983, they sought to break new ground and improve on the IBM computer family. The Tandy 2000 exceeds many expectations in this respect. It is an outstanding machine with many superior capabilities. In fact, IBM has just equalled the 2000's technological achievements this past April with the introduction of the PS/2.

Unfortunately, Tandy's notable advances with the 2000 represented a significant deviation from the rapidly developing IBM standard. First versions of the disk operating system were a Tandy-flavored, generic MS-DOS version providing little compatibility with the IBM computers. More recent versions extended the compatibility by providing more and more common features.

This article will address the features contained in the most recent version of MS-DOS for the Tandy 2000. Version 2.11.03 is provided at a nominal upgrade cost (\$9.95, stock number 700-2701) and can be obtained from local Radio Shack Computer Centers. Figure 1 contains a listing of the files on

your new DOS distribution disk. This version is significant in two ways: It provides a substantial performance improvement in many areas, and it provides a far greater compatibility with the "standard."

Bug Busters

The previous version of DOS and BIOS code had some significant bugs and limitations in them that have been corrected. Foremost is the correction of the XON/XOFF inadequacy in the RS-232 driver. Prior versions failed to properly operate with serial peripheral devices where the software depended on the operating system for protocol maintenance.

Peripherals generally depend on a serial protocol known as XON/XOFF. This means that the serial device accepts data from the computer until it can accept no more. It then signals the computer with an XOFF code telling it to stop sending data. When the peripheral again has room, it sends the computer an XON code meaning the computer can continue to send data.

If the computer protocol handler does not recognize these codes, you can typically identify the problem by garbage in your output. This is a prevalent problem in DOS releases prior to 2.11.03. The computer basically ignored the XOFF code and continued to send data causing the peripheral to overrun its data buffer. The buffer overrun problems in the RS-232 driver, and all other known bugs, have been corrected with Version 2.11.03.

The previous BIOS version links the keyboard and video drivers with the CTRL-I keys for processing of graphics screen dumps. This has a disastrous feature of "locking" up the computer if you press these keys when the graphics print routine is not loaded. In the new version, this processing has been removed and these capabilities are now provided in the new GRAPHICS.COM program found on your disk. Several other minor deficiencies in the keyboard driver and video drivers have been corrected as well.

MS-DOS uses device drivers extensively to communicate with the outside world. You may access the character drivers through common names you recognize as CON, PRN and AUX. Several software packages will not work correctly on earlier DOS versions because not all "standard" device names are provided such as LPT1 and COM1. These device driver links have been added to the BIOS code.

New DOS Features

Table 1 is a list of all the new commands and drivers contained on the DOS upgrade disk. Many of the older files have been modified even if their file dates have not changed. Some file sizes are different and you cannot see the changes unless you run FC (the file compare utility) on the old and new versions of the file. I strongly recommend that you replace all files from previous versions with the commands on your new distribution disks.

The MODE command has been enhanced and now closely resembles its companion on most IBM Compatibles. The most important change here is the new ability to redirect printer output (LPT1) to the RS-232 device (COM1). This allows support of serial printers for many software packages. This new capability also includes the "standard" method of controlling the COM1 communications parameters.

Three tools profoundly increase printer support. LPDRVR.SYS provides an extremely capable method of controlling printers using uniform control sequences — even for those printers that do not have the supported features. You can also translate characters for those printers that need it. GRAPHICS.COM is a terminate-and-

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Table 1: New Tandy 2000 DOS Features and Commands

DOS Feature	Explanation of Function/Change
MODE	Enhanced to add more capabilities and to improve compatibility with other Tandy MS-DOS computers and IBM Compatibles
GRAPHICS	Provides capability to dump screen graphic images to printer
PATCH	Make minor corrections to disk files
LSETUP	Provides additional printer setup and control functions
LIB	MS-DOS object librarian, which creates and manages library files used by LINK
PCMAKER	Format floppy disks for use with IBM-compatible systems
LPDVR.SYS	Device driver for enhanced Tandy printer control
VDISK.SYS	Device driver that creates a RAM disk

Table 2: New Features of GW-BASIC

BASIC Feature	Explanation of Function/Change
ENVIRON	Allows you to modify the current BASIC environment, which may be later passed to a child process
ENVIRON\$	String function that returns the contents of a specified environment variable
ERDEV	Integer function returning the DOS error code from the Critical Error Handler
ERDEV\$	String function returning the name of the device that caused the error
IOCTL	Statement allowing control string to be sent to a device
IOCTL\$	String function returning the control data from a previously opened device
LCOPY	Copies all text data on the screen to the printer (SHIFT-PRINT)
MKDIR	This BASIC version implements full
CHDIR	directory control using DOS Version 2
RMDIR	or later capabilities
ON PLAY	Implements event trapping for playing music in the music in the background mode
PLAY/trap	Explicit event control based on a timer interval of 1 to 86,400 seconds (24 hrs):
ON TIMER . . .	Graphics related function for mapping coordinates from screen mode to their world equivalents
TIMER/trap	Loads and executes a command as a child process of BASIC. This command may be any executable program, DOS Command or batch file
PMAP	Real function that returns the current number of seconds past midnight
SHELL	Creates a graphics or text viewport to redefine screen parameters
TIMER	Graphics command to remap the screen coordinates into more realistic values known as "world" coordinates
VIEW/Graphics	
VIEW PRINT	
WINDOW	

stay-resident program that allows printing graphic screen images on all Tandy printers, as well as those supporting the IBM graphics standard (Epson graphics).

This program links into the BIOS

code and you can print any screen simply by pressing the SHIFT-PRINT keys. Graphic images are printed in four shades of gray on non-color printers. LPSETUP defines headers, footers, page numbers, perforation

skip, and many other features for printer support.

The *Vdisk* device driver implements a disk structure in computer memory for rapid access of your data. Commonly called a RAM disk, *Vdisk* permits easy definition of the disk size, number of directory entries and sector size. For example, if I create a 40-kilobyte RAM disk for only one file, using 128-byte sectors and four directory entries ensures that I use the minimum amount of system overhead and minimize the amount of RAM taken from user applications.

RAM disks can speed up your computer applications dramatically, and I use one to store frequently used small utilities. Of course, this is the first search area specified in my PATH statement. Unfortunately, the Tandy 2000 does not support extended memory or enhanced memory and, therefore, all available RAM space is stolen from your applications. Even with the Envisions Designs memory extension to 896K, useful RAM disks can rob your vital resources.

GEE WHIZZ, IT'S BASIC

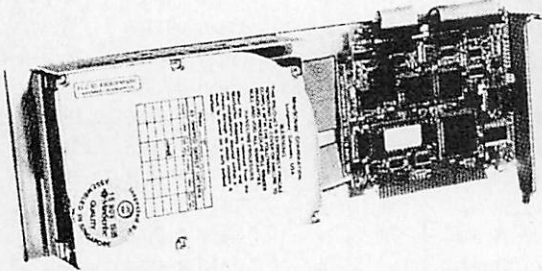
One feature absent from all the previous DOS releases is a version of Microsoft's GW-BASIC interpreter for the 2000. This upgrade includes a full implementation and really adds a tremendous amount of compatibility. For example, programs listed in PCM sometimes would not work on the Tandy 2000 because of the differences in BASIC. Now, unless these programs use the special graphics modes provided for the Tandy 1000 series of computers or dabble in the low-memory, hardware-dependent features of the IBM PC compatibles, all programs should run on the 2000.

Table 2 provides a list of the new features implemented with this release. I am going to address only some of these features and pass on a few comments about the interpreter. I was pleased to note the extended compatibility provided, but I found some serious bugs in this interpreter that I think you should know about.

First, there is a tremendous bug in the environment string handling and passing to a child process. For instance, the ENVIRON command and ENVIRON\$ function allow manipulation of the character strings in the current environment. If I modified a

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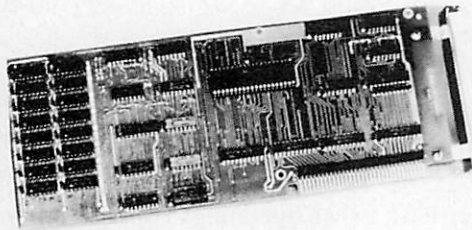
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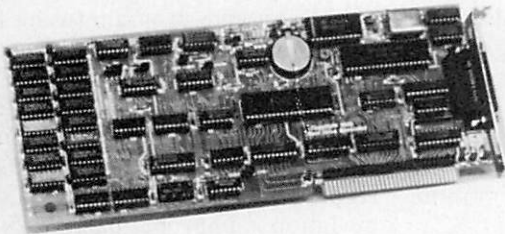
20 Meg	\$459.
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For the Tandy 1000, 1000A. Includes DMA, a PLUS port, and memory expansion to 512K on board.

OK	\$79.
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Multifunction boards

For the Tandy 1000, 1000A. Includes DMA, RS232C Serial Port, PLUS port, Clock/Calendar, Printer Spooler, Memory Disk, and memory expansion to 512K on board.

Multifunction OK	\$169.
Multifunction 256K	\$199.
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Clock/Calendar - RS232C - Serial Card

For the Tandy 1000, 1000A, 1000SX, 1200, 1000TX

.....	\$99.
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Clock/Calendar Card

For the Tandy 1000, 1000A, 1000SX, 1200, 1000TX

.....	\$29.
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RS232C-Serial Port

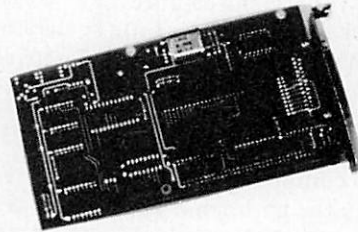
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.....	\$49.
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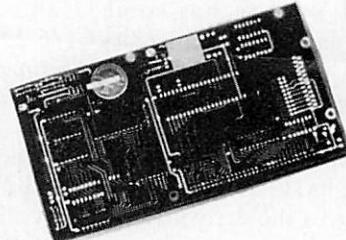
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Boards that mount on a PLUS type expansion PORT

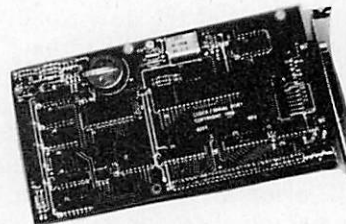
The Southwestern Digital new Add-On boards were developed for use with the Plus Card Port, (a piggy-back type, add on port established by Tandy to eliminate the need for an additional card slot). These cards are fully compatible with the Memory Expansion Plus Card from Southwestern Digital and the Memory Expansion Plus Board from Tandy.



RS232C-Serial PLUS card \$59.



Clock/Calendar Plus card \$49.



RS232C-Serial, Clock/Calendar PLUS Card \$129.

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string with the ENVIRON command and then used the SHELL command to execute a child process, I hung my computer system up every time. This is unsatisfactory performance in any product, let alone a product as mature as this one. Moreover, this performance is not noted in the GW-BASIC interpreter on my Tandy 1000.

With previous versions of BASIC, executing a SHELL 0,0,0 command disabled color burst mode and placed the 2000's monitor effectively in the monochrome text mode. This allows fast screen updating whereas the initial color mode is abysmally slow. This feature does not work in the newest version BASIC either, but you can simulate it with the command SHELL "MODE BWB0". However, you need to reserve 34 kilobytes of memory for the MODE command if you use this feature.

One of the nicer features is the full support for the MS-DOS file system. In addition to accessing files using full pathname support, BASIC now allows making, changing and removing directories. The FILES command has been changed to display the pathname and remaining space on the disk.

Graphics support in BASIC has always been outstanding on the Tandy 2000. This new version has some added commands that enhance its performance. The VIEW command defines a window or graphics area in the screen that all commands are limited to. If you attempt to display outside this area, BASIC automatically clips the drawing to the defined view port. VIEW causes the graphics to function as specified, but I could not get VIEW to properly set the background and border colors of the defined view port on my screen. The same program works fine with GW-BASIC on the Tandy 1000.

The WINDOW command is used to scale the screen coordinates to a more realistic "world" orientation. For example, to draw a graph of the function $y = \sin(x)$ from 0 to 2C in high resolution graphics, you must convert each x value to the proper screen range of zero to 639 pixels. Each function value lies somewhere in the range of -1 to 1 and must be converted to the range of zero to 399 pixels. Also note that the graphic screen orientation increases the y value down the screen, which differs from the normal Cartesian orientation.

This is all solved with one statement: WINDOW (0,1)-(6.28318,-1).

SDIR --> Directory of A:*.*

194560 bytes available out of 731136 bytes.

File-----	---Size	--Date	-Time	Attr	File-----	---Size	--Date	-Time	Attr
ansi.sys	4421	051484	00:06	a---	lib.exe	23168	052284	15:27	a---
backup.exe	43274	080185	10:43	a---	link.exe	42330	040183	14:21	a---
basic.exe	67520	022886	14:53	a---	lpdrv.sys	3425	091785	14:59	a---
chkdsk.com	6468	101983	19:51	a---	lpsetup.com	5911	032086	08:22	a---
command.com	15957	101983	19:51	a---	maillist.bas	13056	091984	09:31	a---
compdupe.com	1704	010180	00:29	a---	mode.exe	34016	022786	10:19	a---
confighd.bat	34	010180	00:00	a---	more.com	4364	101983	19:51	a---
copydos.bat	132	092584	09:24	a---	msdos.sys	17176	051684	11:35	arsh
debug.com	12223	101983	19:52	a---	patch.com	621	031786	10:55	a---
diskcopy.com	1409	101983	19:51	a---	pcmaker.com	5077	010180	01:56	a---
edlin.com	8080	101983	19:51	a---	print.com	3808	051584	15:58	a---
exe2bin.exe	1649	101983	19:51	a---	readme.doc	46363	090586	15:27	a---
fc.exe	2585	101983	19:51	a---	recover.com	2295	101983	19:51	a---
find.exe	6331	101983	19:51	a---	restore.exe	49228	080185	10:43	a---
format.com	6519	010180	00:02	a---	sc.com	10386	010180	00:11	a---
graphics.bas	9209	022586	17:46	a---	sort.exe	1632	051584	15:21	a---
graphics.com	3732	022686	11:38	a---	sys.com	922	101983	19:51	a---
hformat.com	7683	120784	09:12	a---	vdisk.sys	2151	102485	13:00	a---
io.sys	32504	051684	11:47	arsh					

37 file(s) displayed containing 497363 bytes.

These file(s) actually occupy 536576 bytes with 7.31 percent slack

Figure 1: Tandy 2000 MS-DOS 2.11.03 Files

This tells BASIC that the upper-left corner of the screen is the point (0,1) and the lower-right corner is (6.28318,-1). PSET, LINE and DRAW commands are automatically mapped into the window.

Conclusion

I am both impressed and dismayed by this current disk operating system release from Tandy. Impressed because they obviously have listened to many of our complaints about the lack of GW-BASIC, the numerous bugs we have noted, and the need for a more compatible operating system.

I am dismayed because of the overwhelming number of bugs I noted in the BASIC interpreter. Tandy has stated that this is the last release for the Tandy 2000. I thought the new DOS release would have been virtually error-free after approximately three years of revision.

Moreover, several of us have resorted to Envision Designs' third-party hardware enhancements for the Tandy 2000. In particular, hard disks larger than 10 megabytes really require DOS Version 3 for efficient allocation and use. Many of the other commands (see my article on the DOS 3.2 upgrade in last month's issue) also provide significant enhancements

when operating in this larger hard disk environment. Even with DOS 2.11.03, using 8 kilobyte clusters on a 10 megabyte hard disk is horribly inefficient.

From a programmer's point of view, this newest release is great. I have found that I can develop virtually any "nice" software program (using DOS and BIOS calls only) and be assured that it will work on any IBM-compatible computer. In fact, there are only a few deviations from the hardware/software-compatible configuration at the BIOS level. One deviation is improper handling of the "busy" bit for the printer returned through BIOS interrupt service 17H. The remaining differences pertain to the video (interrupt service 10H), which arise because of the fundamental disparity between the two computer systems' video hardware.

If you have recently purchased a Tandy 2000 during one of the close-out sales and do not have a copy of the newest operating system, I highly recommend you get it from your local Radio Shack Computer Center now. If you are a more mature owner and have not yet upgraded, do not wait too long. I suspect this upgrade won't be available forever.

PCM