

*Version 2.0 for Models I and III.*

# The New NEWDOS 80

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**NEWDOS 80 Version 2.0**  
**Apparat, Inc.**  
**Denver, CO**  
**\$149.00**

**A**pparat revolutionized TRS-80 disk operation with their initial release of NEWDOS 2.1 several years ago, correcting TRSDOS bugs and adding several modifications. NEWDOS 80 followed in mid-1980, adding additional commands and routines to DOS and Disk Basic. With the release of NEWDOS 80 Version 2 for both the Model I and III, this group has produced an extensively revised system that can meet any challenger head-on! NEWDOS is a new operating system rather than a debugged and enhanced TRSDOS.

Apparat supplies seven other programs on the NEWDOS disk. Superzap allows direct disk access for applying corrections. Chainbid provides a mini-text editor for writing chain files. EDTASM is Radio Shack's Editor/Assembler with disk capabilities. LMOFFSET loads machine language programs from tape to disk and vice-versa, and applies a relocating appendage to keep them from crashing DOS while loading. Dircheck reads a directory to provide essential repair information. Disassem, a machine language disassembler, writes a source file readable by EDTASM to disk. H. S. Gentry's automatic spooler ASPOOL feeds a print file from disk to the printer while the computer processes another program. Version 1 owners note that none of these programs as supplied with Version 1 operate under Version 2. Read the documentation carefully when converting.

## Documentation

The most serious shortcoming of NEWDOS 80 Version 1 was its documentation. The new Version 2 manual consists of 258 pages, including a badly needed index.

Chapters are sectioned by DOS functions and Basic enhancements, instructions for other programs supplied with NEWDOS, and technical information on DOS routines for assembly programmers. A short chapter provides information on converting from Version 1 to Version 2, and converting from Model I to III. The operating system consists of 14 DOS overlay modules while Disk Basic is made up from one resident module and eight new overlays. Chapter 5 documents all modules; select only those modules necessary for each disk and kill the rest to provide more disk space.

Version 2 and Version 1 incompatibilities make some programs inoperative unless you incorporate changes. The same applies to TRSDOS, mainly with machine language programs that call certain DOS routines. New entry point addresses are documented if you need to make changes. Apparat also supplies zaps for Scripsit, Visicalc, APL80/CMD, and Racet's DSM and Infinite Basic so they function properly. As with other operating systems differing from TRSDOS, not all programs from other sources run correctly.

Technical jargon can be confusing even for knowledgeable operators. For example, Apparat coined the word "lump" to, in the words of the manual, "avoid using the words track and cylinder." Standard DOS operation for the Model I allows five sectors/granule and two grans/track, which gives 10 sectors/track. For the double density Model III this is three sectors/gran and six grans/track, or 18 sectors/track. NEWDOS 80 Version 2 maintains the five sectors/gran, but creates a "lump" which can be set by the user to contain 2-8 granules/lump, or 10-40 sectors/lump. Because the word "track" implies that a track could span several physical tracks on the disk Apparat created "lump." A lump can span several tracks, and a granule can start in one track and end in another. Double density and eight inch disks can use the maximum sector/track count and maintain the same directory structure. If grans/lump is set to eight, the directory can ac-

commodate 7,608 sectors which, again in the words of the manual, "might suffice for a while."

The manual provides an extensive explanation of the disk directory structure including the GAT and HIT sectors, File Directory Entries, File Primary Directory Entries, and File Extended Directory Entries. Apparat changed these structures by defining previously unused bytes. Other operating systems defining these bytes differently are incompatible with NEWDOS. The File Control Block structure is similarly explained.

## NEWDOS Zaps

A glossary of terms and a short error chapter appear at the end of the manual, along with an explanation of Apparat's updating procedure. Apparat provides NEWDOS owners with changes (zaps); to receive these return the registration card. Installation instructions are straightforward, but for those uneasy with zapping, Apparat provides an update service. Apparat will perform a full disk copy on your original NEWDOS 80 Version 2 disk from Apparat's master copy if you return your disk. Save any non-NEWDOS programs on another disk before the update or they will be lost.

With Version 1, after all new zaps were applied to a master system disk, the user faced the tremendous task of copying the zapped files to all other disks that contained them. Since many disks contain only part of the original system this took time. In NEWDOS 80 Version 2 Apparat has modified Copy format six to recognize a Copy By File (CBF) parameter. Files are copied one at a time rather than as a full disk backup. This copy format recognizes two new parameters: Destination Files Only (DFO) copies only those files on both the destination and source disks; and Inclusion List File (ILF), specified by filespecs that you create and save on the master disk. The zap duplicating procedure could not be simpler. After you apply the zaps an ILF specifies those zapped files. Then use the following command:

## “You can set the number of tries at verifying a read or write to disk before declaring an error.”

COPY,0,1,,NFMT DFO CBF ILF = filespec:0

NFMT prevents the destination disk on drive one from being formatted and CBF indicates file copy. With this command the computer checks the ILF to find out which files to copy; DFO checks the destination disk to see if it already contains that file. If so, the zapped file is copied; if not, it is ignored. No other files are touched. After one disk is updated, enter R from the DOS Ready message to repeat the copy command for another disk. Single drive owners could not use the CBF option with Version 1 but can use it with Version 2. Several disk swaps are necessary but the procedure is greatly simplified. This new zapping ability alone justifies the price of NEWDOS 80 Version 2!

### System Customizing

System is a standard library command allowing you to specify options activated during each reset. Version 1 allowed 20 such options; Version 2 includes 36 for the Model I and 33 for the Model III. A few Version 1 options are no longer defined.

Several options are available through a built-in keyboard intercept routine included in NEWDOS 80 Version 2. JKL prints the screen to a printer, 123 invokes Debug, and DFG invokes Mini-DOS (more on this later). For older Model I's a debounce routine makes separate software unnecessary. You can selectively enable or disable all four of these options. Disable the entire intercept routine via a System option or by pressing the up-arrow key during a reset/power-up.

You can specify the number of disk drives to avoid wasting time searching for files on non-existent drives. Set any drive as the default drive for the DIR command. When you save a file the system searches all drives to see if it already exists. If not, you can specify the drive number to begin searching for free space. No drive less than this will be written to. This feature prevents writing a file to a system disk in drive 0 if you forget the write protect tab.

You can set the number of tries at verifying a read or write to disk before declaring an error. The usual number is 10 but five saves time. You can also set the number of write-with-verify tries. With this option you can force the system to rewrite and try again. If you set this at two and the other at five, the system writes a file and attempts verification five times. If an error occurs the process repeats, *including* a second write, before declaring an error. Previously, if the error occurred after five verifies, I/O

stopped and you had to try again.

You can protect high memory at each reset rather than specify a memory size. You can make any key repeat, and adjust the time from first hitting a key until repeat starts. If your printer cannot accept characters above a given ASCII code you can replace them in the LPRINT stream with spaces or periods. You can enable a DOS command that repeats the last DOS command by entering R; this is a great time-saver when you want to format more than one disk or make multiple copies. To make disk backup easier, you can perform full disk copy commands without passwords even if passwords are enabled for program use.

You choose a blinking cursor and specify the cursor character. You can force the system to perform a separate verify of all tracks after Format is finished in addition to the track verify performed after each track is formatted. In double density this helps to ensure that a disk is usable. By setting another option to Y or N the system knows whether a lowercase modification has been installed. If so, a lowercase driver can be activated, again eliminating separate software. A system shift-lock can be set to force all uppercase. Since I use The Patch for lowercase I cannot test these functions. You can tell the system to ask for the date and time at each power-up. These questions can be asked or bypassed at each reset as well. Version 2 permits active CPU speed-up mods during disk operations; you may set timing loops internal to the system according to the actual speed-up time.

In a business environment the user may not understand how the system works. To avoid accidental Break and Clear functions, disable these keys. To protect programs or data, enable passwords and place the system in a run-only mode which disables Break, prohibits any Basic direct commands, and disables 123, DFG, and JKL. You must then use an auto command to select and run the desired program or execute a chain

command file; the “DOS ready” message forces an endless loop in which case pressing R forces a reset. As with all other systems you can disable the Auto command by holding Enter at power-up or reset. You can also disable the Auto command by run-only, or you can selectively disable it by setting another option to N. If the system is brought up via a Chain file the commands are displayed as they are executed. To provide secrecy for program names and procedures, another option automatically eliminates all display, including DOS and Basic messages, until a program turns the display back on.

### DOS Features

Machine language programmers can invoke a Debug routine by pressing 123 simultaneously or by executing Debug from the “DOS is ready” message to inspect or change memory or disk or to single step the program. In addition your machine language program can access a DOS Call routine to execute any DOS command or other program. This routine is documented, including its entry point and use of registers. NEWDOS allows you to insert an interrupt routine into the DOS interrupt chain.

Mini-DOS allows you to interrupt a main program to invoke one or more DOS library commands and then return to the main program where you left it. For example, by pressing DFG and entering Mini-DOS, you can examine directories and kill files while executing Scripsit even though these features were left out of Scripsit itself. You can then return to Scripsit by entering MDRET, or abort and return to the “DOS ready”

```
LOAD GSF/CIM
BASIC 1, 62168
DEFUSR = &HFE80
CLEAR
RUN "DIR/GSF"
```

Fig. 1. Chain File

DRIVE	1	A1A	08/23/81		39 TRKS		37 FDES		85 GRANS	
			EOF	LRL	RECS	GRANS	EXTS		SIUEC	UAL
SUPERCOP/OBJ			05/088	256	06	2	1		.....	UA0
EDTASM/CMD			35/000	256	35	7	1		.....	0
SUPERCOP/SRC			28/134	256	29	6	2		..UE	.....
DISASSEM/CMD			25/000	256	25	5	4		.....	0
NEWDOS/80 READY										

Fig. 2. Directory Command Display



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## "Mini-DOS supports chain files invoked from DOS or from a Basic program."

message by entering MDBORT. Caution: Do not interrupt disk I/O. You can execute only library commands, not programs, and use all commands except Append, Chain, Copy, and Format. A special Mini-DOS command, MDCOPY, copies one file at a time.

Mini-DOS supports chain files invoked from DOS or from a Basic program. In many instances a standard series of keyboard or disk input is necessary. The computer automatically processes these inputs in sequence whenever a chain file is called. An example from my own use is in Fig. 1. I wrote a disk directory program using the GSF sort routine. Entering the GSF initialization commands each time before running the program required looking up the correct procedure and a lot of typing. Now, by invoking the chain file via the Auto command CHAIN,CHAIN/JCL this is automatically completed at reset. Chain with NEWDOS is more versatile because you can separate

each file into sections identified by section ID's. The appropriate section is then invoked by CHAIN,FILESPEC1,SECTION #. One file on a disk is used by several programs; separate sections are called as needed by one program. Chaining also allows message display and user input requests. DOS command DO performs exactly like Chain. You can manually pause chaining with the right arrow key, restart it with Enter, and cancel it with the arrow key. Apparat includes a Basic program, CHAINBLD/BAS, for use in writing Chain files. You can also use Scripsit or Electric Pencil.

### Library Commands

NEWDOS 80 Version 2 supports all the usual TRSDOS library commands. Many are revised and several new commands have been added.

Use Attrib to prevent or allow DOS to allocate more space to a file during pro-

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*“...additions to Basic editing and programming features provide my Model I with most of the Model III capabilities.”*

gram execution, and to reallocate unused file space at a program Close to free the space. DOS marks each updated file in the directory. You can also use an Attrib parameter to remove or create this mark. You can remove the marks for all updated disk files at the same time by the PROT command with parameter RUF. Update marking is helpful in maintaining backup disks.

Blink enables and disables cursor blinking; Break does the same for the Break key. Clear clears all device routing, removes all user interrupts from the timing chain, can reset memory protection, and zeros memory in specified addresses. CLS performs the same as the Basic CLS.

The Create command allocates disk space for a file before it is used in a program. Designate in advance the file's name, logical record length, and allocation status. You can write a specified number of records

consisting of 00.

DIR has parameters in addition to A, I, and S. U displays only those files marked as updated; "/ext" limits the display to files having the stated filename extension; and P sends the directory to the printer. With single drive systems it was not possible to obtain a directory on a formatted data disk since system files are not present. Now, entering DIR \$ with a system disk on drive 0 prompts you to mount the target disk before the directory is shown. Under NEWDOS the A option provides much more information, as shown in Fig. 2. The last column provides for 12 flags; only eight are presently defined. These flags disclose password protection and protect level.

Killing unwanted files has always been a chore. NEWDOS provides Purge with two parameters to make life easier: USR leaves untouched all system and invisible files, while "/ext" removes all files with the speci-

fied extension. Purge is not automatic. It first displays each file specified by the parameters; you must respond Y to kill the file or N to leave it. A Q response ends purging.

Apparat has at last added a somewhat restricted device routine to Version 2. Routing is provided for the keyboard, printer, display, and null (transfer nothing) for the Model I; RS-232 input and output are added for the Model III. Routing can be to a specified memory address giving a user routine location. The best way to understand device routing is with examples. ROUTE PR DO: LPRINT'S go to the display (DO), not the printer (PR). ROUTE DO DO PR: display output goes to the display and the printer. ROUTE PR NL: discards printer output, NL = null. It is no longer necessary to have separate Print and LPRINT statements transmitting the same information.

NEWDOS does not provide a Backup function; instead, six different forms of the

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*“Because I often leave a GOSUB reference with an undefined line number . . . renumbering failed frequently unless I included dummy lines.*”

Copy command are available. The first four provide for single file copy, while five and six are for full disk copies. Form six, the most useful, allows a Copy By File (CBF) parameter. Check File With Operator (CFWO) displays each file name and prompts you for Yes copy, No copy, Restart, or Quit. The UPD parameter copies only those files marked updated. In addition to the ILF files mentioned in connection with zapping, Copy recognizes Exclusion List File (XLF). Any file name in an XLF file is not copied; all others are. Transferring programs from Version 1 to Version 2 disks is thus simplified. Via an XLF file on the NEWDOS disk your programs can be copied from old disks to Version 2 disks; all Version 1 programs are ignored.

For the Model III only, you can specify printer lines per page and characters per line with a Forms command. Setcom activates and deactivates the RS-232 inter-

face, and can set or change word length, baud rate, stop bits and parity. Setcom directs whether the input routine should wait until an input byte is received or an output byte is sent.

#### Basic Enhancements

Apparat has enhanced older Basic abilities and added new ones. Specify the number of files, memory protect size, and a Basic command sequence from DOS or by an Auto command. Two direct editing commands have been added: a colon scrolls one display page toward the start of the text, while @ does the same toward the end. DI and DU move lines from one area to another. A Renew command recovers programs lost by an accidental New.

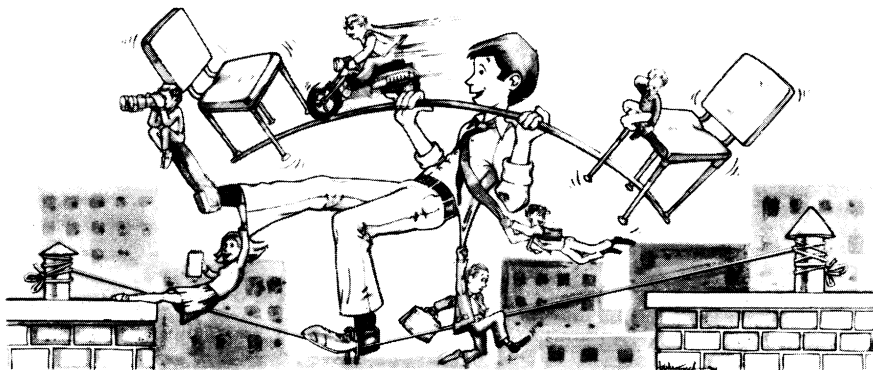
Chain programs without losing variables or file areas by appending “,V” at the end of a Run or Load command. All variables remain unchanged for the new program to use

except DEFFN variables; open file areas are left open. Merge can be called from within a program and functions for ASCII or packed files while protecting variables.

Version 1 contained a built-in Renum command with an annoying feature: Renumbering failed if any undefined line numbers were present. Because I often leave a GOSUB reference with an undefined line number until I write the actual subroutine, renumbering failed frequently unless I included dummy lines. Now you can use Renum with a new X option. As long as the undefined line number is not within the range of lines renumbered the procedure will function. The Reference command is similarly enhanced; it still provides a cross reference table to variables or line numbers and you can now use it to find strings, any Basic key word, or a series of keywords such as GOTO or LPRINT.

NEWDOS 80 Version 2 incorporates

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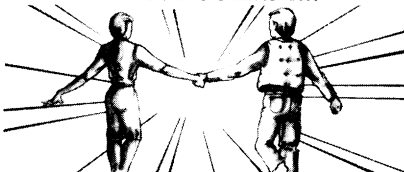
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## "If you are a Version 1 owner who gave up on these new files, try again."

Basic CMD functions similar to Model III TRSDOS. Command C removes spaces or remarks; E displays error messages; J converts calendar dates from Julian to day-of-the-year and back; and T and R disable and enable interrupts on the Model I. T and R are not implemented for the Model III. As in Version 1, you can call CMD "DOSCMD" from Basic to execute most DOS library commands and then return to the Basic program.

Apparat provides a greatly enhanced Basic sort routine with command O. You can implement a direct sort on up to nine single or multi-dimensional arrays. In addition, an indirect sort builds a new integer array which forms a table of pointers to elements of other arrays in sorted order without changing the other arrays. You can then use the new arrays to read the other arrays in sorted order. Both sorts function in ascending or descending mode.

Further refinements to delight any veteran programmer are available through nine CMD F functions. To bail out of complex programming and prevent program crashes, F = POPS purges all For. . . Next and GOSUB-Return controls; F = POPR purges only the current GOSUB level and For. . . Next controls at the same level; F = POPN purges only the current For. . . Next control; and F = POPN vn purges the For. . . Next associated with variable vn and any controls set while the vn loop was active. Further F functions change string area size without clearing variables, clear specified variables, keep specified variables and clear all the rest, delete program lines without stopping execution, and swap values between two variables.

Apparat's new system also incorporates a Basic program single stepping routine to help debug programs. When you invoke this routine direct command or during program execution, the program pauses at the end of each line and displays the next line number on the screen. Enter executes the next line and updates the displayed number. You can specify the line number at which to commence single stepping. This routine is strictly line oriented; one full line executes with each Enter. If there are multiple statements per line the routine executes all statements and pauses at the next line. This may not be as powerful as Boss but is extremely useful.

### Disk File Enhancements

TRSDOS defined sequential and random disk file structures. NEWDOS 80 Version 1 redefined these files and added two other file types with a total of five subtypes. Sequential files became print/input files; ran-

dom files became field item files. Apparat added "marked item" files with subtypes MI, MU, and MF, and Fixed Item files with subtypes FI and FF. Because Apparat's documentation was poor, I doubt that very many Version 1 users took advantage of the vast file structure improvement.

Version 2 leaves all five file types. The new documentation is much better. Twelve pages and two separate appendices providing numerous examples of actual use accompany Version 2. Understanding these file structures is still not easy and requires time and effort, but no more than the original TRSDOS manual. If you are a Version 1 owner who gave up on these new files, try again. Their ease of use with experience will surprise you.

### Disk Drives

PDRIVE allows various combinations of disk drive sizes and densities. Version 2 supports up to four physical drives; the PDRIVE table maintained by the system allows for ten. I do not know if we can expect more in the future, but the possibilities are exciting.

Version 2 supports standard single density disks along with PERCOM, LNW, and Apparat double density boards on 35, 40, 77, and 80 track single or dual headed five inch or eight inch drives. You can implement any combination. Version 2 treats double sided drives as a single disk with one directory and the tracks divided between the two sides. Mixing such drives with single sided drives may present problems, but the documentation says this has been done. Dual head drive users should contact Apparat for further information. Version 2 does not accept five inch double sided double density disks created with Version 1. You must transfer the files to new disks for use.

Double density presents certain problems with data transmission. To ensure that a formatted disk is stress tested, Apparat supplies two optional zaps using the byte 6DB6 for formatting in place of the standard Model I E5E5 or Model III 5B5B patterns. The manual states that up to 30 percent of disks not certified for double density may fail using the worst case 6DB6 formatting. Since I just added double density none of my old disks are DD certified. Using 6DB6, NEWDOS 80 Version 2, and the new Percom Doubler II, only three percent failed. Apparently Version 2 and the Doubler II are a perfect team!

The PDRIVE command specifies each drive's type, track count, head step rate, grants per lump, starting lump for the direc-

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tory, and directory size between two and six granules. You can set step pulses between tracks to allow 80 track drives to read 40 track disks. This is enough to accommodate any drive available.

Model III TRSDOS disks can not be read by NEWDOS 80 Version 2 due to a difference in disk structure. However, the Model III Convert utility works on Version 2 five inch single density disks if the directory is properly laid out. Also, Version 2's Copy command, combined with the proper PDRIVE specification, allows you to transfer files between the two systems. You can swap disks between Model I and Model III if you follow certain limitations and specifications.

#### Choosing an Operating System

Choosing an operating system in 1979 was easy since only NEWDOS 2.1 and TRSDOS were available. With the addition of LDOS, ULTRADOS, VTOS 4.0, and DOSPLUS the choice is more difficult.

NEWDOS 80 Version 2 represents an improvement over Version 1 and is a worthwhile investment. Its extensive additions to Basic editing and programming features provide my Model I with most of the Model III capabilities. Apparat goes to a great deal of time and effort to remove bugs from NEWDOS, but does not supply phone support personnel. Apparat also charges for new on-disk copies of NEWDOS zaps.

There are trade-offs in any operating system. The NEWDOS routing capabilities should suit most needs although they do not approach the niceties provided by the LDOS phantom device routing. LDOS also allows you to customize key entry. However, LDOS does not supply Disk Basic, choosing instead to apply patches to the user's TRSDOS Disk Basic which provide features incorporated by NEWDOS. To my knowledge no one supplies a facility in any way similar to NEWDOS Mini-DOS, or the various disk file structures briefly mentioned. NEWDOS support of the Percom Doubler II makes double density operation easy for the Model I. Also, NEWDOS will not crash a disk if a file is killed while open. This can happen with LDOS, and is completely disastrous with TRSDOS.

The best way to choose between all alternatives would be to use them, but expense prohibits this. For the same reason no one has yet provided a comprehensive side-by-side comparison article. NEWDOS 80 Version 2 still represents the state of the art. ■

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