

Welcome to ADOS, a version of Color Disk Extended Basic to which many valuable enhancements have been added. ADOS may be used either as a utility to be loaded in from disk, or, because it has been designed to be ROM-able, ADOS may be burned into an EPROM chip that replaces the Disk Basic ROM chip inside your disk controller. As an EPROM, ADOS becomes instantly available as soon as your machine is turned on. Great care was taken in the design of ADOS to maximize compatibility with existing software. As a result, reports to date indicate compatibility with virtually 100% of commercial Color Computer software. None of the compatibility problems with older software that are frequently found with Radio Shack's newer version 1.1 of Disk Basic should exist with ADOS.

First, before you do anything, please make a backup copy of your ADOS disk. The disk contains seven files. One, ADOS/BIN, has start and end addresses &H2000 and &H3FFF, and is suitable for burning into an 8K EPROM to replace the Disk Basic ROM. Another, ADOS/BAS, is a loader program for using ADOS in RAM mode in a 64K machine. To use ADOS in this fashion, type RUN"ADOS". The ADOS/BAS program disables one command that is available under EPROM ADOS ("rom"), modifies another ("ram"), and provides for staying in 64K mode on reset. The two programs CUSTOMIZ/BAS and CUST/BAS are utilities for use in customizing ADOS to your taste, as described later. The RSV/BAS and RSV/BIN files provide you with a high-resolution text screen of 42, 51, or 64-character width, and are used by typing RUN"RSV". The final program, BOOT/BAS, is an extra utility that will permit you to run any program on a disk simply by using the up and down arrow keys to select the desired program from the disk directory. You may wish to put a copy of BOOT/BAS on each of your disks.

It should be noted that programs using 64K will be incompatible with the RAM version of ADOS, but should in virtually all cases work properly after ADOS has been burned into an EPROM. Programs employing a high-speed poke (POKE 65495,0) will also not work under the RAM version, and may or may not work under the EPROM version, depending on the hardware capabilities of the particular EPROM used.

I. Lowercase features

One goal that guided the design of ADOS was to enhance the usefulness of hardware or software-based means of providing lowercase for the CoCo. Accordingly, ADOS allows all Basic commands to be given in lowercase, and the machine initializes in lowercase mode on cold start (unless this aspect is modified by the customizing utilities). Program lines typed in lowercase are automatically converted to upper, except for characters in quotes or following an apostrophe (comments).

One exception to this rule is filenames. They are converted to uppercase even though enclosed in quotes. Furthermore, a command like 'A\$="test":load A\$' results in A\$ being converted to uppercase characters. This prevents the confusion that would occur from having both upper and lowercase filenames.

Some ML programs that create files without using Basic's filename scanning routine may put lowercase filenames on your disk if you type an output filename in lowercase. Such filenames may be converted to uppercase using the RENAME command, but you must use the following procedure. If you have a file called "test/BIN" that you wish to rename to "TEST/BIN", type 'a\$="test/BIN": rename a\$ to "test/bin"'. (The second filename may be typed in either upper or lowercase.) The straightforward command 'rename "test/BIN" to "TEST/BIN"' will not work, because the first filename is interpreted as uppercase; an NE error will result. Note that in defining a\$, both the filename and extension must be in the correct case. An alternate and slightly simpler form is 'a\$="test/BIN": b\$=a\$: rename a\$ to b\$'.

You will find that some programs demand uppercase input. A useful poke to be acquainted with in this connection is POKE 282,255. When added to a Basic program or to a loader for a machine language program, this command will cause the computer to enter uppercase mode.

II. Modified directory commands.

The "dir" command has been modified so that the number of free granules is printed at the end. A keypress is required at the end of the directory before Basic prints the OK prompt, thus allowing two extra directory lines to remain in view on the screen. A two-column directory, containing the filename and number of granules for each file, may be obtained with a new command, "cat". "Dirp" and "catp" output to the printer as well as the screen. You will find that "catp" produces output that is a very convenient size for attaching to a diskette envelope. If a "dirp" or "catp" is aborted with the break key, it will be necessary to type "prt off" (see extra commands, below) to shut off printer output.

III. Modifications to "copy" and "rename" commands

A new syntax form has been added to the copy command: 'copy <filename> to <drive number>'. The drive number may be a numeric variable name or expression if desired, as well as a constant.

The default extension for the destination file in a copy or rename command has been redefined to agree with the extension of the source file. (Standard Basic uses a blank extension when the destination file extension is omitted.)

The ?AE error ("already exists") that occurs in connection with the copy and rename commands has been eliminated. Instead, the message "File exists - replace? (Y/N)" is given. The break key may be used in place of the N response to abort. A yes response will cause the old file to be killed and the new one inserted in its place. Thus, rename can be used to replace an old file by a new version stored under a different name in a single operation.

IV. Bug fixes

The "head banger" and "head settle" bugs in Disk Basic, described by Marty Goodman in the July, 1983 Hot Coco and in the July, 1984 Color Computer Magazine, have been eliminated.

V. Initialization

In addition to initializing in lowercase, the startup routine also turns verify on, and sets the printer baud rate. These startup characteristics may be modified using the customizing utilities, as described in Section IX.

VI. New Commands

In addition to "dirp", "cat", and "catp", defined earlier, the following commands have been added:

A. runm <ML filename> <<,offset>>

This command is equivalent to 'loadm <filename> <<,offset>>: poke &hff40,0: exec'. (Poke &hff40,0 turns off the drive motor.) An optional offset may be used. (The double bracket notation indicates that an argument is optional.)

B. dos

This command is equivalent to the DOS command in Disk Basic 1.1, and may be used for booting OS-9.

C. auto <<start line>> <<,increment>>

This command produces automatic line number prompts for entering a Basic program. The start line and increment are optional; the default value is 10 in both cases. A line number prompt corresponding to an already existing line will be followed by an asterisk. Auto mode is exited either by pressing the break key or by pressing Enter immediately after the line number prompt. When the asterisk is displayed, either method of exiting will leave the previously existing line unchanged.

D. ram
rom

The 'ram' command, for use in 64K machines only, transfers the contents of the Basic ROM addresses &H8000 to &HFFFF to RAM, and leaves you in Map Type 1 (64K mode). While in this mode, the cursor is a ">". In RAM mode, you may use PCLEAR values up to 18. In addition, a small bug in Color Basic's floating point routines is patched while in RAM mode.

The 'rom' command is equivalent to POKE &HFFDE,0. It puts you in Map Type 0, the non-64K mode. This command is disabled by the ADOS/BAS loader program when ADOS is used in non-EPRom form. This loader also modifies the 'ram' command so that only the Color and Extended Basic ROMs, but not Disk Basic, are copied to RAM (otherwise ADOS would be overwritten by your old Disk Basic).

E. prt on
prt off

The "prt on" command causes a copy of all subsequent output to the text screen to be sent to the printer as well. Printer output is turned off by "prt off". An automatic "prt off" is done following completion of a "dir", "cat", or "scan" command. Pressing reset also turns printing off. Using reset instead of "prt off" to turn off printing may be advantageous in some instances, since it avoids the appearance of "prt off" in the printed output.

F. scan <ML or Ascii filename> <<,offset>>
scanp <ML or Ascii filename> <<,offset>>

When used with an ML filename, the scan command will display the start, end, and exec addresses of the file, expressed in hexadecimal notation. An extension of BIN need not be typed; it is the default for the scan command. An optional offset may be used.

When used with an Ascii file, the scan command displays the contents of the file. Shift-@ may be used to pause the listing. If a file scan is aborted with the break key, a 'close' command should be given to avoid a subsequent ?AO error (file already open). Omission of this step will not harm the disk. (A command that produces an AO error will generally work if repeated a second time without change, since files are automatically closed when an error occurs.)

If scanp is used instead of scan, output is sent to the printer as well as to the screen. If a scanp command is aborted with the break key, it will be necessary to type "close:prt off" to terminate printer output as well as closing the file.

G. peep

This command allows you to view a section of memory, and move the display window through memory using the arrow keys. When 'peep' is typed, memory page zero, addresses \$0-1FF, is displayed. The up and down arrow keys move you one page (\$200) higher or lower in memory. Shift up- or down-arrow moves you up or down by \$1000 (8 pages). Shift-clear returns you to page zero. Memory is treated as circular, so that the page below page 0 contains addresses \$FE00 to \$FFFF. The break key is used to exit 'peep' mode.

By combining 'peep' with other commands, memory may be displayed in various graphics modes, rather than in text mode: 'pmode 4,1: screen1,1: peep'.

H. mon <<hex address>>

This command provides a memory examine and change feature that works similarly to the corresponding feature of the Zbug monitor that comes with Radio Shack's Edtasm+ assembler. The optional argument is expressed in hexadecimal, without the '&H'. If an argument is entered, the specified address and its contents will be displayed in hex notation. If the address contains the Ascii code of a printable character, that character will also be displayed immediately after the address. A new value may be typed (in hex) to replace the old contents if desired. This new value may be terminated either by down arrow (to go on to the next higher address), by the enter key (to prompt for entry of a new address), or by the break key (to exit 'mon' mode after making the change). The up or down arrow keys may be used to view higher or lower addresses. Holding the shift key down will produce key repeat for the up or down arrows.

If no argument is entered, a colon prompt is displayed. An address, followed by a slash, may be typed in to display the contents of this address. A slash alone will display the last address examined while in 'mon' mode (even if you have exited and done other things before re-entering the 'mon' command). The break key exits from 'mon' mode. Illegal entries will produce a "beep" and will be otherwise ignored.

I. disable

The "disable" command disables all of the Basic enhancements provided by ADOS, and should only be used when compatibility problems are encountered with a particular program. Reported incompatibilities with ADOS have been very rare. ADOS uses locations \$D7DD-DFFF that are unused by Radio Shack Disk Basic 1.0. After the 'disable' command has been given, all addresses above approximately \$D880 are freed for other uses. Without 'disable', addresses above approximately \$DBD0 may be considered available, so long as

none of ADOS's added commands are given. Thus, for example, Telewriter-64, which uses addresses \$DC00 and up, does not require a 'disable'. (Note: using ADOS with any 64K program requires that ADOS exist as an EPROM.) A cold start will restore ADOS to full operation after a disable command. If ADOS is running in RAM, rather than as an EPROM, EXEC &H8002 (preceded by POKE &HFFDF,0 if you have gotten out of 64K mode) will simulate a cold start for most purposes.

VII. Repeat command feature

A slash, entered in direct mode as the only character on a line, will allow editing of the previous command entered from direct mode. All of the standard edit subcommands are available. The line will be executed when you exit the editor by any subcommand other than "q". Slash-enter-enter will thus repeat the previous command without change. The repeat command feature will not work properly immediately after a cassette operation, due to the fact that the cassette buffer is used to store the previous direct-mode command.

VIII. Control-key command abbreviations

The down arrow key, held down while another key is pressed, functions as a control key. The following control-key abbreviations are included with ADOS; these may be modified if desired, as described in Section IX.

control-R	run"
U	load"
I	save"
F	runm"
J	loadm"
K	savem"
(mnemonic:	the three middle home keys are runm, loadm, and savem, with their Basic equivalents right above)
D	data (with a space following)
C	cat
X	exec
L	list
E	edit
M	mon
A	auto
V	copy"
Z	run"x
Q	runm"x
T	then
N	next
G	goto
P	fori=
up arrow	run"boot
H	&H

The next section tells how you may modify these control-key abbreviations.

IX. Modifying ADOS to your taste

Before you try to modify ADOS, MAKE CERTAIN THAT YOU HAVE BACKED UP YOUR ORIGINAL ADOS DISK! Modifications are made by editing the program CUST/BAS and resaving the modified version under a different name. The program CUSTOMIZ/BAS is a loader program for modified versions of CUST/BAS that have been created by you. It will prompt for the filename of your modified CUST/BAS and load in this program.

The CUST/BAS program is commented concerning changes you may wish to make in order to customize ADOS. Lines you may wish to change are preceded by a comment containing four asterisks. When you have made whatever changes you wish to the CUST/BAS file, resave it under a different name, then run CUSTOMIZ/BAS and supply the name you have resaved CUST/BAS under. When the customizing program finishes making your changes to ADOS, it will prompt for a filename for saving the modified version of ADOS/BIN that it creates.

To test your modified ADOS, load ADOS/BAS and edit line 40, changing the filename in the LOADM command in that line to agree with the name of the modified ADOS/BIN you have just created. If, for example, you have named your modified ADOS/BIN file as ADOST/BIN, change line 40 to read LOADM"ADOST", then save ADOST/BAS for future use. You will then be able to run your test version by typing RUN"ADOST".

The following aspects of ADOS may be changed using the CUST/BAS utility:

1. The default printer baud rate.
2. Whether ADOS initializes in lowercase or uppercase mode.
3. Whether verify should be on or off at startup.
4. The contents of the startup logo. Many users include their name in the startup message, which can serve as a form of theft protection for your machine once ADOS has been burned into an EPROM. CUST/BAS will halt with an error message unless you leave the "0" in the "V1.0" version number in its original position as the 29th character in the logo. This byte is required to be a "0" because several commercial programs check this logo byte in order to determine which version of Disk Basic is being used. The startup logo may be a maximum of 84 characters in length, counting a carriage return as one character. CUST/BAS will inform you if you attempt to use a logo that exceeds this limit.
5. The definitions of the control-key abbreviations. Any key, not just letters, may be used as a control key.

Control-key commands may include a terminating carriage return if you wish, in order to bypass having to press the Enter key after some commands. (But bear in mind that you may wish to enter a drive number after commands like 'dir' and 'run"boot'. And that an embedded carriage return may cause an unintentional command execution as a result of a typographical error.) The maximum number of control-key abbreviations that may be defined, and the maximum total number of characters that may be allotted to control-key definitions, are specified in CUST/BAS. The program will inform you if you attempt to exceed these limits.

Note that since control-key abbreviated input is active in direct mode only, defining control-key abbreviations for anything other than Basic commands would be of no value.

6. Lowercase output messages (such as "File exists - replace?" and the word "Free" at the end of the directory) may be changed to uppercase. This option will also convert any lowercase characters in the startup logo and the control-key definitions to uppercase.

7. The pause for a keypress following a cat or dir command (included to allow two extra screen lines of directory information to remain in view) may be removed.

8. The disk access time may be speeded up by halving the 1.2-second delay that is normally allowed after the disk motor is turned on for the disk rotation to reach full operating speed. Most Radio Shack and other drives will function properly with this reduced delay. Prior to burning this modification into an EPROM, you should check thoroughly that both disk input and output are reliable with it. Problems, if any, are most likely to be encountered in situations where the computer writes to an Ascii data file, starting and stopping the drive in the course of this operation.

9. Double-sided drives may be supported. If your drives are designed to allow double-sided operation, you may use CUST/BAS to define Drive 2 as the back side of Drive 0, and to define Drive 3 as the back of Drive 1.

10. If your drives are capable of operation with a step rate faster than the 30 millisecond value normally used, CUST/BAS will allow you to modify ADOS to take advantage of this capability. Be sure to test any modified step rate thoroughly for reliable operation before burning ADOS into an EPROM. The step rate for each individual drive in a multi-drive system can be independently specified.

11. You may choose to have your disks formatted with 40 tracks instead of 35, provided that you have 40-track drives. (Most grey Radio Shack drives for the CoCo will only support up to 36 tracks, although the white CoCo 2

drives are generally capable of 40 track operation.) This modification will give you an increase of 14% in the amount of storage space per disk. There are some considerations to think carefully about before making this modification permanent, however.

First, although you will still be able to read 35-track disks, other CoCo owners will be unable to read the last five tracks of 40-track disks you have prepared. Ordinarily, this will affect only disks that are fairly full, since tracks are used starting with the middle ones and working outwards alternately to the low and high numbered tracks. If you know in advance that you will be preparing a relatively full disk for someone else, possible compatibility problems can be avoided by running a short Basic program that will undo the 40-track modification while you are in RAM mode, so that you can format a 35-track disk. The program is as follows:

```
10 RAM:TRKS=35:GRNS=TRKS*2-2
20 POKE&HD1B0,TRKS:POKE&HD572,TRKS:POKE&HD595,TRKS
30 POKE&HD35F,GRNS:POKE&HC708,GRNS:POKE&HC78B,GRNS
40 POKE&HC7A0,GRNS:POKE&HC7BF,GRNS:POKE&HCC4C,GRNS
50 POKE&HCDD9,GRNS:POKE&HD446,TRKS-1:POKE&HC72A,74
```

A second consideration is that some disk utilities that have been designed for 35-track systems may not function properly in all respects under a 40-track system. Be aware also that the BACKUP command will function properly only if the source and destination disks have been formatted with the same number of tracks. Files can be transferred between disks of different formats by the COPY command, however.

X. High-resolution text screen utilities

The command RUN"RSV" will provide a high-resolution text screen containing 24 lines of text with either 42, 51, or 64 characters per line. As with any hi-res screen driver, some compatibility with existing software is sacrificed. For example, low-resolution SET/RESET graphics characters will not be seen while RSV is in use. Certain character codes have been assigned special functions in RSV. Thus, for example, PRINT CHR\$(1) will cause the foreground and background screen colors to reverse. These CHR\$ codes and their functions are listed as comments in the RSV/BAS file.

Two options may be changed by removing apostrophes from the appropriate lines within RSV/BAS. First, the background color may be changed from buff to green. The second option concerns the location in memory of the high-resolution text screen. As distributed, RSV puts the text screen in high memory, at \$E000. With the text screen in this location, text and graphics reside in different regions of memory. This avoids conflicts between RSV and machine-language

programs that load into the graphics area, and will keep text output from overwriting your graphics. For some applications, you may wish instead to have the text and graphics screens coincide, so that you may take advantage of RSV's capabilities by writing Basic programs that combine graphics and text on the same screen. Comments within the RSV/BAS file will tell you how to accomplish these changes. RSV is compatible with standard Disk Basic as well as with ADOS.

XI. Directory utility

The BOOT/BAS program will enable you to select a Basic or machine-language program to run by using the up and down arrow keys to move a cursor over a copy of the disk directory. Press enter to run the program that the cursor points to. Should you wish to slow down or speed up the rate at which the cursor moves, you can do so by hitting break and trying out various values in location \$2751 (original value = 6; larger values make the movement slower). The program can be resaved when you find a rate that is comfortable for you.

BOOT/BAS is compatible with standard Disk Basic as well as with ADOS. It is not compatible with the RSV screen driver, however.

XII. Getting ADOS burned into an EPROM

The most convenient EPROMs to use for ADOS are either 68764's or 68766's, since these 8K EPROMs will plug directly into the Disk Basic ROM socket without modification. (Use of a 68766, rather than a 68764, will usually allow your CoCo to retain use of the high-speed POKE 65495,0 mode, assuming the machine previously possessed this capability.) The 2764 EPROM is also usable, but requires minor modifications for use in the disk controller. This EPROM has the advantage of being less expensive and more easily obtainable than the 68764 or 68766. If the 2764 is rated at 250 ns or faster, it will generally allow operation in the high-speed mode.

At the present time, SpectroSystems does not burn or supply EPROMs, but we will attempt to put you in touch with a source for burning ADOS into a chip if you are unable to find such a source on your own. Price and availability of EPROMs vary greatly. Currently (9/84), we know of several sources that will burn a customized ADOS into a modified 2764 EPROM (250 ns.) for \$20, including the cost of the chip.

You may want to transfer your modified ADOS/BIN file to cassette for purposes of getting it burned into an EPROM, since most EPROM burners use the disk controller port. To make a clean cassette copy, first type PCLEAR 1:CLEAR

200,&H2000. Then LOADM your custom ADOS/BIN file and save it to cassette with the command CSAVEM"ADOS", &H2000, &H3FFF, &HB44A. An alternate method is to change the SAVEM command in your modified CUST/BAS to CSAVEM and re-run the customizing program.

To install your EPROM, you must first locate and unscrew the Phillips-head screw that holds your disk controller together. This screw is located beneath the silver sticker on the top of the controller, in approximately the position of the first digit of the catalog number given on the sticker. Locate the screw by feel, then puncture the sticker at that point. (The puncture mark will not show when the controller is plugged in.) When you have unscrewed the screw, you should be able to open the disk controller with some gentle prying. The Disk Basic ROM chip to replace is designated on the circuit board as U15 (or U1 for the Coco 2 controller). Use a nail file or similar instrument to very carefully remove the chip from its socket, taking care not to bend any pins. Then install the EPROM, making sure that the notch faces in the same direction as the original chip's notch. Be very careful that no pins are being bent under as you press the new chip into the socket. The controller can then be re-assembled and plugged in.

XIII. Acknowledgments

I am indebted to Bill Dickhaus for providing the code on which the "repeat command" feature is based. Marty Goodman provided the "head banger" and "head settle" bug patches, the "dos" command, and the BOOT/BAS utility. The 40-track modification is due to Sandy Trevor. I especially thank Steve Odneal and the Color Computer Magazine for their kind permission to include the RSV utility in the ADOS package.

In addition, I owe a debt of gratitude to the many folks who contributed to ADOS by suggesting useful additional features or enhancements to existing ones while ADOS was under development, particularly Ken Beasley, Wayne Day, Don Hutchison, Arnold Kahn, George McVay, William Van Nest, Mike Ward, and the members of the Color Computer SIG on CompuServe.

ADOS contains portions of code from Tandy's Disk Extended Color Basic 1.0, and is sold with the understanding that the buyer has purchased a disk controller from Radio Shack containing a Disk Basic ROM. Resale or giving away of your Radio Shack Disk Basic ROM after you have had ADOS burned into an EPROM constitutes a violation of Tandy's copyright.

Supplement to ADOS Instructions

Error Trapping

ADOS now contains the equivalent of an ON ERROR GOTO command. In order to make room for this feature, since ADOS must fit within an 8K EPROM, the PEEP command was eliminated. However, if you prefer having PEEP to having error trapping, do not despair: the customizing program CUST/BAS now contains an option that permits you to restore the PEEP command to ADOS at the expense of eliminating the error trapping feature. It is also possible (see comments in CUST/BAS) to save the PEEP routine contained in CUST/BAS as a free-standing machine-language program, to be run from disk, while retaining error trapping in ADOS.

The syntax of the error trapping command is ERROR <<line number>>. After this command has been executed within a program, any errors encountered in the program will cause Basic to transfer control to the specified line number after displaying the type of error and line number of the error on the screen. Error trapping is in effect only in program mode; direct mode errors are unaffected. Any previous error trapping command is cancelled when RUN is typed. The command ERROR, with no argument, may be used within a program to shut off error trapping. The line number argument of the ERROR command is not adjusted when a program is renumbered; if an adjustment is required, the editor must be used.

You may possibly wish to have the action that your program takes following the trapping of an error depend on the line number and/or type of error detected. For this purpose, a three-line Basic routine is included at the end of the CUST/BAS program that will store the line number of the error and the two-letter error code into Basic variables whose values can be tested using an IF statement. These lines can be separated from CUST/BAS (by deleting the previous lines) and saved in Ascii format for future use in Basic programs. (Ascii format is required by the MERGE command.)

Using ADOS with the PBJ WordPak

ADOS is compatible with the PBJ WordPak 80-column hardware device. However, the WordPak driver program supplied by PBJ will disable the control-key feature of ADOS and the ability to issue edit subcommands in lowercase. It is possible to retain all ADOS features while using the WordPak, but doing so requires the WordPak driver program's screen editing function to be disabled. The program WORDPAK/BAS supplied on the ADOS disk will accomplish this if used in place of the V1/BAS program that is supplied with the WordPak.

Known Incompatibilities

As this is written, ADOS has undergone extensive compatibility testing by a substantial number of users over a six-month period. During this time, only five cases of incompatibility--programs unable to run under EPROM ADOS, even with 'disable'--have emerged. In one case, the incompatibility is with old program versions no longer being sold, and in another, the incompatibility is easily rectified. The programs are: (1) DiskUtil (Spectrum Projects), versions prior to 2.0. Current versions are compatible. (2) 40K Basic (Spectrum Projects). (3) Spectrum DOS (Spectrum Projects). (4) DBASIC for FHL Flex (Frank Hoag Laboratories). (5) Double DOS (Double Density Software). In the latter case, for Version 2.0, changing the contents of \$E5F from \$D8 to \$D9, and the contents of \$E6B from \$D9 to \$DA will restore compatibility if 'disable' is used.