

Important Supplemental Information for System Three  
Computers Equipped with Double-Sided Drives

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**SCOTLANDS FIRST COMPUTER SHOP**

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Part No. 023-0095

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### Important Supplemental Information for System Three Computers Equipped with Double-Sided Drives

Your new System Three computer is now equipped with double-sided disk drives to give you twice the disk storage capacity. To take advantage of this additional disk storage you must use Series-2 CDOS (i.e., CDOS version 02.17 or higher), which is supplied on the floppy disk enclosed with this machine. CDOS version 00.20 or version 01.07 should not be used with this computer.

When you purchase Cromemco software packages for your new System Three computer, you may find the software is supplied with versions 00.20 or 01.07 of CDOS. These packages should be used only with the version of CDOS supplied on the diskette with this machine, not with the version of CDOS originally supplied with the software package.

### Information about the Diskette Supplied with this Machine

The Series-2 CDOS supplied on the diskette with this computer is recorded on one side only of the diskette. This is so this diskette can be operated not only on your new machine, which does have double-sided capability, but on older Cromemco systems as well. Notice that the diskette supplied has two index holes. One of these holes is used to indicate that the disk is recorded in single-sided format. The other is used for double-sided format. Since the disk supplied is recorded in single-sided format, a cover is affixed over the double-sided format hole.

### A Word about Your Media

If you plan to use the double-sided capability of your new computer, it is very important that you use diskettes that are certified and initialized for double-sided use. Further, only the double-sided index hole should be exposed on these diskettes. The INIT program supplied with Series-2 CDOS is capable of initializing double-sided diskettes. However, the diskettes themselves must be certified by the manufacturer for double-sided operation. All diskettes supplied by Cromemco are certified for double-sided operation. Large (8") disks supplied by Cromemco are initialized for double-sided operation as well.

### Additional Information about Series-2 CDOS

An unusual feature of Series-2 CDOS is that it is capable of supporting both single-sided and double-sided large (8") or small (5") diskettes and is also able to support the Cromemco Winchester hard disk. This makes it very easy to add a hard disk drive to your System Three should your need for data storage grow.

An important utility program supplied on your Series-2 CDOS diskette is CDOSGEN, which you can use to generate CDOS systems that use virtually any mix of hard and floppy disks up to a maximum total of eight (8) drives (the only constraint being that drive A is a floppy drive). CDOSGEN can also generate CDOS systems that use various amounts of machine memory (RAM) space. The CDOSGEN program itself must run under a 48K or larger version of CDOS. The CDOS supplied on your disk is a 64K version. For further information on Series-2 CDOS, please read the following pages carefully.

## Notes About Series-2 CDOS Handling Hard Disks and Double-Sided Drives

The CDOS supplied on the enclosed disk is a newly-completed version, which is designed for use with Cromemco double-sided disk drives and 11 Mbyte hard disks. All Cromemco utilities and most user programs should run correctly under this CDOS without modification.

There are, however, some significant internal differences between Series-2 CDOS and previously-released versions of CDOS, which will be described here. First of all, it should be noted that the Cromemco software supplied with this note and all Cromemco software in the near future will continue to be supplied on diskettes recorded as single-sided, single-density (although the second side may have been initialized).

[Note, however, that these and all blank diskettes purchased from Cromemco are tested and certified for double-sided, double-density use. To be sure this is the type of disk you have, look for a 1.35" (3.5cm.) slot on the small (5") disks and for two index holes on the large (8") disks. Please note that using the old style 5" disks having the 1.18" (3cm.) slots with a double-sided or double-density drive will ruin the drive, and that Cromemco considers this a non-warrantied misuse of equipment. Also note that when using the 8" disks having the two index holes in double-sided drives, one of the holes must be covered for error-free operation. Labels specially designed for this purpose are now supplied with all 8" diskettes.]

### Using Series-2 CDOS with Hard Disks

The 11 Mbyte hard disk supplied in your Z-2H or HDD must be properly initialized and labeled for CDOS to be able to access it correctly. This has been done by Cromemco prior to shipping your hard disk; therefore, Cromemco recommends that you not initialize your hard disk upon receiving it unless there is a particular reason for doing so. [Also, be sure to unlock the carriage of the hard disk before power-on and before attempting to use the disk.]

For details on how to change the name, date, or number of directory entries of your hard disk, refer to the labeling (/L) portion of the STAT section. Your hard disk has been supplied with 512 directory entries (the maximum value) as the default.

The CDOS supplied on the enclosed small (5") diskette has been configured for three drives: drives A and B are expected to be double-sided small floppy drives, and drive C is the hard disk. (The enclosed "CDOS disk" must be booted up in drive A. Note that it requires 64K of RAM to boot correctly.)

You may change the drive configuration using the supplied program CDOSGEN. Changing the specification of the hard disk to another logical drive than drive C does not require that you re-label the hard disk. The label is used by CDOS only to determine certain parameters for file access on that drive. (Refer to the section describing STAT for more information.)

#### Using Series-2 CDOS with Double-Sided Floppy Drives

The 4FDC and double-sided floppy-disk drives supplied with your system are capable of accessing double-sided diskettes. You will probably want to take advantage of this by labeling a blank diskette for double-sided use and transferring all the enclosed programs onto this disk. This is done by following the instructions below. [Note that large (8") disks supplied by Cromemco and having two index holes are already initialized on both sides. When using these disks, it is recommended that you skip step 2 below.]

1. Boot up with the "CDOS Disk" in drive A and insert a blank disk into drive B. (The CDOS disk requires 64K of RAM to boot correctly.)
2. Initialize the disk in drive B for double-sided use by executing the program INIT. Be sure to answer correctly the questions the program asks. (This step may be skipped if you are using 8" disks supplied by Cromemco.)

3. Label the disk as double-sided by typing the command line "Stat/L B:". Answer the four questions asked by STAT, and the label will then be written. (You may press the RETURN key in response to the questions to select the default values built into STAT.) This procedure labels the disk in drive B and completes its preparation for double-sided use. For more information on labeling disks, refer to the section on STAT.
4. At this point you may transfer all the programs on the single-sided disk in drive A to the newly-completed double-sided disk in drive B by typing the command line: Xfer/V B:=A:\*.\*.
5. It is very important to understand the difference between double-sided diskettes and double-sided drives. The CDOS supplied on the enclosed disk can access double-sided diskettes in double-sided drives. However, the enclosed disk itself is formatted as single-sided.

If you were to use a CDOS which had been set up by CDOSGEN to access single-sided drives only, and you then attempted to operate this CDOS with double-sided diskettes, an error would occur. This same CDOS is capable of accessing double-sided drives by treating them as single-sided (it will use only one of the heads of each drive).

Thus, after performing steps 1 through 3 above, you should execute CDOSGEN and, by answering the questions, tell it that you wish to create a CDOS which accesses double-sided diskettes. Then, answer the last two questions of CDOSGEN with "B:CDOS" and "B:", to write both an operating system and a boot loader capable of accessing double-sided diskettes to drive B, respectively. Finally, remove your newly-created double-sided diskette from B, replace it in A, and boot up. Executing STAT will verify to you that both sides are, in fact, being used. Total capacity for a double-sided diskette is 173K (5" disks) or 494K (8" disks).

The following additional information is provided for interested users:

1. The program CDOSGEN is too big to be executed under a 32K CDOS. Execute under a 48K or larger CDOS.
2. The maximum number of directory entries (extents) allowed with this version of CDOS is 512 (dec.) for floppies and hard disks. The first File Control Block (FCB) on the disk is permanently allocated to the disk label, so the effective maximum number of entries is 511. The default number of entries supplied by STAT is 64 for all types of floppy drives except double-sided 8", which have 128 as the default. The default number of entries for hard disks is the maximum, 512.
3. The disk label just mentioned is used by CDOS to determine cluster size and maximum number of entries. The label has been preset to the name "Userdisk" for floppies and "Harddisk" for hard disks by the program STAT/L.



## System Status Program Instructions

### System Status

The program STAT is used to display and change a variety of parameters used by the operating system. Its simplest use is to provide a printout on the console which is a complete summary of all aspects of the computer system. This can be done by typing the word "Stat" on the console in response to the CDOS prompt and then pressing the RETURN key to commence execution. STAT responds with the following information, if it's applicable:

Time and Date: Printed on heading line if previously stored in CDOS.

SYSTEM MEMORY: Description of amount and configuration of machine memory.

DEVICE CONFIGURATION: Description of device assignment.

DISK MEMORY: Description of total, used, and available disk space (in kilobytes).

DISK CONFIGURATION: Description of total, used, and available disk space (in directory entries).

DRIVE: Description of the selected drive.

DISKETTE: Description of floppy diskette mounted in the selected drive.

The general format of the command line for STAT includes a way to request information on any of the disk drives of the system:

```
Stat[/o1][/o2][/...] [d:][parameters]
```

where the oi represent one or more of the options described next, d: represents one of the disk drive specifiers (A-H), and parameters represents any of a number of other parameters which may be required by the options. If the drive specifier is omitted, STAT will default to the current drive. Also note that multiple options may be specified; e.g., "Stat/A/S" and "Stat/DTB" are both legal expressions.

A Option (alphabetical directory listing)

This option will produce an alphabetical directory of file names on the selected disk, along with the space allocated to each one and their system attributes. The format of the command is:

```
Stat/A [d:][filename.ext]
```

where d: represents a disk specifier (A-H) and filename.ext represents any single or ambiguous file name on that disk. Normal system status information is not displayed with this option unless the S option is invoked simultaneously.

B Option (brief system status)

This option allows the user to obtain a quick summary of available disk and machine memory if the normal full system status report is not desired. Upon typing "Stat/B" to select this option, the user is prompted with a display similar to the following:

```
User memory size          49 K
Total disk space          243 K
Disk space left           34 K
Directory entries left    24
```

D Option (set system date)

This option allows the user to store the current date in CDOS. This date may then be accessed by system or user programs through the Read Date system call (no. 144). The appropriate values will be returned in the A, B, and C registers (see CDOS Instruction Manual) in binary. Upon typing "Stat/D" to request this option, the user is prompted with

```
(mm/dd/yy):
```

and is expected to respond with the current month, date, and year. STAT will respond by printing the full date along with the day of the week. Subsequent executions of STAT will display the date on the header line if it has been previously set using the D option.

If CDOS is rebooted, the date stored is reset to 00/00/00. The normal printing of system status

information is suppressed when the D option is specified. Also note that the date option may be used in conjunction with the time option by typing "Stat/DT".

Pressing the RETURN key only in response to the date prompt above leaves alone the stored values for date in CDOS. This can be used if the user requested to set the date by means of Stat/D and then found it had been set previously.

#### L Option (set label)

This option is used to label a disk. Disk labels are a feature of Series-2 CDOS, which both allows users to assign a name and a date to their disk, and enables CDOS to obtain certain important information about that disk for file access. All system disks (including hard disks) may be labeled using the L option at any time; however, it is generally best to label a disk when it is completely blank (no files or data have been stored).

The label option is invoked by typing "Stat/L". Following the normal printout of system status, the user will be prompted for either three or four items of information which comprise the disk label: 1) the disk name, 2) the date, 3) the number of directory entries, and optionally for floppies, 4) whether the disk is single-or double-sided.

All of these questions are supplied with a default quantity printed in brackets, which the user may specify by pressing the RETURN key only. If the disk has been previously labeled, the defaults will be the values stored in the existing label on the disk. If the disk has no label, the defaults will be those supplied by the STAT program; e.g., "Harddisk" and "Userdisk" are the built-in default names for hard disks and floppy disks, respectively. If a user has previously specified a date using the D option and no date is currently stored on the disk, the default date will be the current date.

The label option may be used to change the number of directory entries of a particular disk. The default values are 64 entries for all floppies except double-sided 8" disks for which the default

is 128, and 512 entries for a hard disk. It is frequently desirable to have more than 64 entries on a floppy disk if a large number of short files are being stored. There is, however, a trade-off: increasing the allowed number of entries above 64 uses additional disk space for the directory. STAT will allow you to enter any value between 64 and 512 for the number of directory entries, but it will round the entered quantity to the next lower number evenly divisible by 4 (thus, 67 would be rounded to 64). In general, to make most efficient use of the disk, the number you enter for directory entries should be a multiple of 32 times the cluster size. For example, hard disks have a cluster size of 2 Kbytes and thus should have  $n*(32*2)$  directory entries, where  $n=1,2,3,\dots,8$ . You can determine the cluster size for a particular disk from the normal system status display under DISK CONFIGURATION.

If adding or changing a label on a disk necessitates destroying a portion of the present disk directory, STAT will automatically ask whether or not it's OK to do so. Responding "N" to this question cancels the label request and no label is written. Responding "Y" to this question clears the present directory and writes the label. Be aware that this effectively creates a blank disk because, even though data may still be stored on the disk, there will be no way to retrieve that information once the directory is cleared.

Some users may be interested in what is physically written to the disk when writing a label. For hard disks and floppies the label becomes the first entry of the disk. It has roughly the same format as a file FCB (see CDOS Instruction Manual), containing both the label name in bytes 2-9 and the cluster numbers allocated to the directory in bytes 16-31. The first byte of the entry will be 81H, which indicates that this is a label.

Be aware that since the label always occupies the first entry of a disk, a disk allowing a total of  $n$  directory entries will have only  $n-1$  entries available to files. It is also important to note that directory entries of a hard disk represent the space assigned to that file through directory extensions which are transparent to the user. This means that the number of declared directory entries (minus one for the label) is the actual maximum

number of files which may be stored on that hard disk. For floppy disks, however, each directory entry represents a maximum of 16 Kbytes of file space. This means that individual files which are allocated more than 16 Kbytes of disk space will be assigned another directory entry for each additional 16K used.

For floppy disks only, there is a second part to the label which is written to the last 8 bytes of the first sector on the disk (in double-sided drives this is cylinder 0, side 0, sector 1). These 8 bytes will be used by CDOS in conjunction with future products capable of handling double-sided and double-density disk drives. The format of these bytes is as follows:

- bytes 1,2: The ASCII characters "LG" for large or "SM" for small diskettes.
- bytes 3,4: The ASCII characters "SS" for single-sided or "DS" for double-sided diskettes.
- bytes 5,6: The ASCII characters "SD" for single-density or "DD" for double-density diskettes.
- bytes 7,8: Reserved for future expansion.

If any of bytes 3 through 6 are missing from a diskette (for example, if all 8 bytes are E5H as on a new diskette), CDOS assumes single-sided and/or single-density.

Finally, some programmers may find it useful to read and check the disk label from programs to determine whether or not the user has inserted the proper diskette. This may be done through the Read Disk Label system call (no. 149) with the DE register pointing to 9 bytes of free memory where the label name can be stored. The byte pointed to by DE should contain a 0 to read the label of the current disk, and 1-8 to read the label of drives A-H, respectively.

The desired label name will be read into the 8 bytes beginning with the memory location pointed to by DE+1. Disk labels, unlike filenames, may be both upper and lower case so user programs checking for a particular label should typically translate all characters in the label name to upper case. A label name which is returned as all ASCII periods (2EH) indicates that that disk has not yet been

logged-on. A label name which is returned as all ASCII spaces (20H) indicates that that disk does not have a label (single-sided, single-density floppy).

#### S Option (status printout at same time)

The S option is used in conjunction with the date (D), time (T), or alphabetical directory (A) options to cause the normal system status display to be performed in addition to the function requested.

Any of the options described in this section may be specified together; e.g., "Stat/A/S" and "Stat/DTS" are both legal expressions.

#### T Option (set system time)

This option is similar to the date option except that it allows the the user to enter the time. This will also be stored in CDOS, and may be used to set the time of a hardware clock device if the CDOS I/O Drivers have been appropriately changed. Users of Series-2 CDOS with 3102 terminals will find that the T option sets the internal clock of the terminal. This may be displayed at any time by pressing CTRL-1 to view the status line.

The time may be accessed by system or user programs through the Read Time system call (no. 146). The appropriate values will be returned in the A, B, and C registers (see CDOS Instruction Manual) in binary. Subsequent executions of STAT will display the time on the header line if it has been previously set using the T option.

If CDOS is rebooted, the time stored is reset to 00:00:00. The normal printing of system status information is suppressed when the T option is specified. Also note that the time option may be used in conjunction with the time option by typing "Stat/TD".

Pressing the RETURN key only in response to the time prompt printed by the T option leaves alone the stored values for time in CDOS. This can be used if the user requested to set the time by means of Stat/T and then found it had been set previously.