DISKWIZ-II

ENTER: SECTOR(DEC/HEX)/LETTER/OR +,-

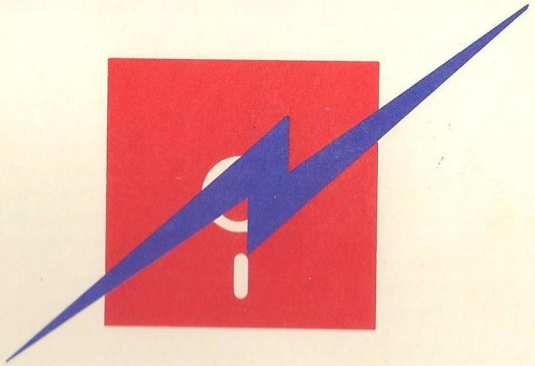
A>ALTER DATA	R>RENUMBER/MOVE
D>DUP SECTORS	S>SECTOR LINK
E>ENTRY:DIR. FILE	T>TRACE FILE
F>FORMAT:DIRECTORY	U>UTILITY MENU
G>GRAFIX PRINT	V>VTOC/BIT MAP
H>HEX-DEC-ASC CONV	W>WRITE SECTOR
L>LIST COMMANDS	X>DISASSEMBLE
M>MAP DISK	Y>SPEEDCHECK
P>PRINTOUT	Z>SEARCH

RETURN TO REDISPLAY DATA

SRESET TO ABORT

FOR ATARI*
400/800/1200

diskwiz-II



COMPLETE & AFFORDABLE
DISK EDITING REPAIR & DUPLICATION
SYSTEM FOR ATARI COMPATABLE DRIVES

• single load • fast mach. lang. • repair, elplore, dup dos/non-dos sectors • simultaneous hex/ascii display and editing • print out all modes to any printer • dumps special & inverse chars to EPSON*, NEC 8023*, PRO-WRITER*, GEMINI*, M-T SPIRIT* • fast mapping and byte searches • file link trace • speedcheck and adjust • block move • auto link pointer, file code change • vtoc bit map changes or check • cross sector disassembler • fast/slow copy • 1 or 2 drives • hex-dec-asc conv. • complete manual • create "bad" sectors • fix deleted or open files • fix dup filenames • safely use non-formattable disks • single and double density.

ALLEN MACROWARE

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diskwiz-II

by Jerry Allen

Allen Macroware
POB 2205
REDONDO BEACH, CA 90278

Backups are available for $10 ppd. when returning enclosed warranty form.

LIMITED WARRANTY

The disk medium shall be warranted for a period of ninety (90) days from the date of purchase to be free from defects. This warranty shall apply to the original purchaser only. If during this period the medium should fail the purchaser should return the disk along with proof of purchase to the address shown above. Proof of purchase shall not be necessary if the warranty registration card was filled out and returned at the time of purchase.
The manufacturer at his option will repair or replace the disk, providing that the disk has not been misused or abused in any way, and that the original internally serialized disk is the one returned.
After a period of ninety (90) days, or in the case of misuse or abuse of the disk, the disk will be repaired or replaced for a fee of ten dollars ($10.00). The original internally serialized disk along with proof of purchase must be returned to the manufacturer.
No other warranties, whether express or implied exist.
This program is not warranted as to application by the user. In no event shall the author, manufacturer, sellers or distributors of this program or documentation be liable or responsible for damages resulting from the application of this product. Damages to other disks hardware, and consequential damages resulting in loss of income are the responsibility of the user/purchaser. It is his sole responsibility to read the manual thoroughly and test or make any changes to disks of any value only after having thoroughly researched and tested his/her changes on a temporary work disk or other medium.

This program is intended only for legal repairs, alteration, and duplication (for archival purposes) of program materials stored on disk.

Please direct any comments, suggestions or questions along with a stamped self-addressed envelope to:
Jerry Allen
pob 2205
REDONDO BCH, CA 90278

THANK-YOU FOR BUYING THIS PRODUCT.

TABLE OF CONTENTS

change on the screen. Remember to RETURN if you are in the directory format. Type "A", RETURN. The first prompt asks which field, hex or char, you wish to edit. You may also choose to exit at this time by hitting RETURN.
Once you have chosen which side of the screen to work with, you will be limited to that side until you have edited a line and the initial prompt appears again. You may only edit one line at a time. After you respond to the question of which field to edit, the '?' and cursor will appear at the upper left corner of the field you have chosen. Use the CONTROL and ARROW keys to move the cursor to the location you wish to edit (all editing keys, and wraparound still work, so you can quickly jump from the top to bottom of the screen). Edit one or a whole line of bytes. You must press RETURN while on the line you intend to edit, or the change will be ignored. The program will recycle and you can change fields and continue or exit to the **W**>WRITE routine. No change to the sector on disk will actually occur until you deliberately write the screen changes to the disk. If things are not right or you are unsure of the correctness, exit, answer negatively to the write prompt, call the sector back up, and start over.
Exits may be accomplished in a number of ways: At the first prompt , hit RETURN; when the cursor is at the top line next to the ?, hit RETURN; a RETURN pressed on any blank horizontal row; or, at last resort, hit SRESET.
IMPORTANT!--Only one thing must be kept in mind when editing the CHARACTER field: An inverted escape character ($9B,155), or line return character, anywhere on the line you are editing will cause itself and all following characters to become spaces ($20,32). The cursor will go directly to the hex field edit mode in this situation. The first space on the line just edited is usually where the the return character was, and you can replace it at this time by putting "9B" in the hex field at the corresponding character location. If the characters following the 9B were not intended to be spaces ($20,32), there are two ways to avoid this problem:
The first, and most difficult, is to only edit lines with a return character ($9B) that needs to be retained using the hex field mode only. The second method is to use the character field mode and change the inverted escape return character to an asterisk or some other dummy byte you wish to use. Edit the rest of the line, and then return to the hex field and change the dummy byte back to "9B".
See the **H**>HEX-DEC-ASC CONV for aid in using the **A** function.
See the **R**>RENUMBER section, and RENUMBER first if you intend to move your altered sector and still retain the old one.

D>DUP SECTORS

This command is used to transfer sectors from one disk to another.

At the prompt, enter the consecutive first and last sectors you wish to dup. This may be of the range 1,1 to 720,720 or 1,720. Press RETURN.
The first prompt asks if you intend to write from drive#1 to drive#2. If so, both drives must be of the same density. If you have or intend to use one drive only, press RETURN. At the prompt for the destination disk, press RETURN to use drive#1, or enter "Y" to write to drive#2. If drive#2 is selected, the program will cycle to completion of the request. If drive#1 is used and your buffer size is exceeded, the prompts to insert source and destination disks will continue until the range of sectors you specified has been transferred.
"Bad" or scrambled sectors will be dupped as all zeros usually. Sometimes they will be readable, but your new sector will not generate the necessary error code required by the program before it will run. Use the **M**>MAP function or specified sector entry command to locate "bad sectors".

E>ENTRY:DIR. FILE

Use this command to alter the directory file entry code byte, $7D(125).
There are 64 possible codes used in this program. These correspond directly to the 64 possible directory entries. An "A" code is entry #0 or the first entry in the directory. A "B" would be the second or entry #1, and so forth. All DOS created files use this code to check the integrity of its files. If DOS encounters a sector with a different code or the filename you specified for a load does not match with the directory entry, an error #164 will be generated. This applies to all DOS files: BASIC, AUTORUN.SYS, and other object code files. Please note that the code used in DISKWIZ is not the same as DOS and is used for space requirements in mapping and entry ease. Also note that non-DOS files generally do not use link pointers and file name codes.
The **E** command will change all codes in the range you specify between one and 720. Check your directory before using this function. If you are entering a new name in the directory be sure to use a deleted or the first all zero entry space. If your new entry skips an all zero entry space, the file will be ignored by DOS. Then use the file code from the entry line you just used in the directory to enter at the prompt when the **E** command asks for your new code.
The formula to manually enter byte $7D(125) is the entry # in the directory (starting at zero) times four plus the high bits of the link pointer (0,1,2). This command as you can see greatly simplifies this procedure. It will cycle to completion for one or any number of consecutive sectors that you specify.
See the **F** and **V** commands and APPENDIX B,C,D.

F>FORMAT:DIRECTORY

The F command changes the normal sector display to a special format for reading your directory.
When a normal directory number is entered (361,368), enter F, RETURN to change the screen format. Hit RETURN to toggle back to the normal display mode. You may toggle back and forth between the two displays by alternately entering F, RETURN, and RETURN only. The F command to a non-directory sector will give unpredictable results. The directory location may be changed in DOS to hide it. If you find this to be true on a certain disk, the F command will again be useful.
When changing your directory entries, toggle back and forth as described above to read and change the sector.

G>GRAFIX OPT

This function allows you to copy all ATASCII as it appears on the screen, allowing you to leave your terminal with a written record. You must have an EPSON MX with GRAFTRAX (or EPSON compatable), or a NEC/PROWRITER printer for this function to work. If you don't meet this requirement for the printer, use the P>PRINTOUT command.
With the normal sector display, enter G, RETURN. In the map or trace modes, you may also copy the screen by pressing the G (or P) key while the display is still up. You do not need to hit RETURN also in this case; and the normal sector display mode will reappear after the printer finishes.
See U>UTILITY MENU to configure the program for EPSON/GEMINI type printers to NEC/PROWRITER type printers.

H>HEX-DEC-ASC CONV

This command gives you access to an on board conversion calculator.
The first time that you enter the H routine, the cursor will just sit and wait for your first input. Enter a range of numbers from $00-$FFFF or decimal 0-65535. Also, entering only a letter or other character will return the hex number for that ASCII. Entry input errors will return the ASCII in hex for the first character in the string entered. For hex values, you must preceed the entry with the traditional "$". Two ASCII characters corresponding to the numerical answer will also be displayed.
Entering RETURN only, exits this mode. Use normal editing keys to change or clear your input line.

L>LIST COMMANDS

This function re-displays the command menu and allows return to the previously viewed sector.

M>MAP DISK

This function reads and displays a code for all sectors, 1-720, simultaneously on the screen.
When the M, RETURN, command is given, a prompt will appear asking if you want to map just a part of the disk. RETURN only will default to sectors 1,720. The screen will start filling with sector codes which were defined at the last prompt.
Error and zero codes apply to all disk format types. File name codes and inverted character (in use) codes only apply to DOS files. Due to screen size limitations, you will only see sector numbers at the beginning and end of lines 30 increments appart.
Use the T>TRACE command to trace a single file by link pointer from beginning to end. This will apply to both deleted (non-inverted) and "in-use" files whether or not they can be found in the directory. Using the trace function will also help to know which sectors to ignore since they are not part of the DOS file, but still generate the same code in their last three bytes. Due to the fact that DOS reuses a file entry space of a previously deleted file there may be many deleted files with the same file code, but they are still not related. These files will all be non-inverted on the map. See the section on recovering a deleted file.

P>PRINTOUT

This command is the same as the G command except that all non-printable characters on the printer will be changed to periods or spaces. All inverted letters from the screen will be printed as non-inverted. The hex codes will tell you whether or not the character is really inverted or not and what the period really stands for when viewing the normal sector display.
This function is the same as The G command in respect to the map and trace functions' screens.
See the G command and APPENDIX: F

R>RENUMBER

This command is used to change the location of a sector or group of sectors on a disk.
The first prompt asks for a range of sector numbers. This may be one sector (i.e.,"134,134") or a group of sectors (i.e.,"220,550"). The second prompt requires only the first sector number of your destination. The program will

determine if your last destination number is out of range. You must determine if you will be overwriting necessary sectors or are out of range before you begin.
If you are going to overwrite something you'll later need, use another disk for your destination disk when prompted to do so.
A special message will appear telling you to definitely use a second disk if the first sector of the group of destination sectors is between the first and last sectors of the sectors you are coming from, AND, the amount of sectors you are moving exceeds your buffer size for one pass. If you don't comply, there will be an overlap ruining the beginning of the next pass. A second disk is not mandatory if this condition does not exist.
You may use drive#2 for writing to the destination disk when prompted.
After moving DOS created sectors remember to use the S>SECTOR LINK PTR and E>ENTRY:DIR. FILE functions to revise the link pointer and file bytes as necessary.
This command as most others, except the T>TRACE command, is consecutive in nature. Therefore, to change a file that is not consecutive on disk into a consecutively stored file, you must use the T>TRACE function to locate all the parts of the file, and move them as groups to one area. An example follows:
Move a file from 50-60,100-120,402 to sectors 250-282. First renumber 50-60 to 250. The last sector used at this time would be 260, which would now be on the screen. This sector plus one (261) is the next destination sector for 100-120. After this move the screen will be at 281 which is now the new last destination sector. So, you add one to that (282) for the next destination sector, and move the last group which is only a single sector in this case, to this destination. Now, the S command and E command, if necessary, will painlessly revise your link bytes. Also remember to change the two start bytes in the directory to point to 250 instead of 50. They are the two bytes immediately before the filename and are of the typical hex low byte first configuration. Toggle the F command and use the H command for help. Use the A command to do the job.

S>SECTOR LINK PTR

Use this command to refresh or revise a consecutive group of link pointers especially after a move (R>RENUMBER).
This command works in a sequential manner only.
Assuming the file to be changed is sequential (located in one group), merely enter the beginning and ending sector numbers at the prompt. DISKWIZ will automatically pull all the sectors you specify, change the pointer bytes as necessary, and rewrite them to disk. The last pointer must be specified in response to the second prompt. If the last sector is the last sector of the file, the last pointer will be zero.

In the case of jumps, use the trace command if you have not already determined the breaking points. Use the S command on each separate group. At the last sector of each group of the file the pointer must be to the first sector number of the next group or single sector which is next. The last sector of the last group should be zero. Adding sectors at the beginning or end of the file is handled similarly.
[The math of it all: The link pointer bytes are at bytes $7D(125) and $7E(126). Byte $7D(125) is a composite of the file entry code and the high bits of the link pointer. Since there are only 720 possible sectors, the high bits can only be 0, 1, or 2 ($256), and are stored in the two lower bits of byte $7D. To come up with the byte, divide the sector number to go to by 256. The integer portion (0,1,2) is inserted into byte $7D. (The upper five bits are the file entry code times four.) The sector number to go to, minus the number you just calculated times 256, equals the low byte of the pointer and is stored in byte $7E(126). Needless to say, this command saves you a lot of time and agony.]
Use the T command to find breaks in bad files and use this command to repair them. Sometimes a file can only be partially recovered, but that in itself may be of help.
There is no need to consider the file entry code bytes. They will be handled automatically.
See the R and E commands and the APPENDIX.
Many non-DOS created files are linked sequentially or by a table in the program and do not have link pointers, file entry code, and bytes used bytes. These include many commercial programs and all boot sectors. Also, the directory and VTOC do not have these bytes. Do not attempt to use this command on sectors of this type.

T>TRACE

This function will trace through a DOS linked file from the sector you specify to the end. The end will be a sector with a link pointer of zero or a link pointer of greater than 720.
This function is not necessarily sequential in nature as are many of the other commands; and, is almost mandatory to use prior to or in conjunction with some of the other functions. Although the display looks similar to the M>MAP DISK function, the VTOC in use designation is not implemented here. (See the V command for VTOC spot checking). The hearts mean nothing but are left to count with.
The last sector found will be shown when the normal screen returns upon pressing any key after the trace is through. A printout of the trace can be made if a printer and interface are on line and the P key (or G if appropriate) is pressed. The print will take place, and the normal display of the last sector will then appear.

U>UTILITY MENU

This command displays a submenu allowing you to change density, initialize a disk, change the grafix printer type, or turn write verify on or off when writing to a disk.
Enter the desired number of the function you wish and RETURN. The initialization command only writes track and sector information and erases a disk (you cannot write to a fresh un-initialized disk). It does not write sectors one thru three and 360-368 as DOS does. If you need those sectors, copy them later from a DOS formatted disk. The change from single to double density only reconfigures the program. You must manually reset the drive to double density by setting appropriate switches and/or turning the drive of then on as specified in the drive manual. RANA drives: refer to manual; PERCOM: set switch #4 on rear of drive to on, then turn drive off then on again. NCT TURBO 810: turn drive off then on again. Refer to drive manuals for assistance. In most cases the operation may be reversed to return to single density.
The write verify choice allows slower but slightly more reliable writes.

V>VTOC

This command allows the user to check, lock, or unlock the bits of the bit map sector, or Volume Table of Contents. DOS uses this map to determine which sectors it can or cannot use to write to.
The VTOC is located at DOS/OSA+ formatting time at sector 360, just before the directory sectors. There 90 bytes in this sector which DOS uses to keep track of the disk. This works out to one bit per sector, or eight times 90=720. The 90 bytes start at byte $0A(10) of the VTOC. The highest bit of byte $0A, bit 7 ($80,128), represents sector zero; the next bit, bit 6 ($40,64), represents sector one; and so on down to sector 719 in byte $63(99), bit 0 ($01,1). (Sector 720 was somehow ignored when DOS was written, while sector zero was acknowledged even though the disk drive controller cannot write to sector zero, but can to sector 720.) If a bit is on, or one, the sector is available for use; off, or zero, tells DOS that the sector is in use.
If you have added or deleted any sectors with this program to a DOS formatted disk that you intend to use again with DOS, you must use this command to alter the VTOC or DOS will overwrite your new sectors and/or will not be able to use sectors which you deleted. (DISKWIZ does not use DOS as you may already know).
The VTOC command takes care of all the tedious calculations and corrections automatically. The range specified at the prompt will be sequential. The check

function only works for the sector you are presently viewing. When you first enter the V function, sector 360 is automatically accessed. DISKWIZ is designed to check certain parameters of this sector and will stop to ask you to verify that sector 360 is indeed the VTOC or to enter a new VTOC sector number prior to proceeding if it appears that 360 is not the real VTOC. This is because it is possible to change the VTOC sector in DOS, or other parameters at 360 itself, which many commercial programs which use DOS do.
Because this command is sequential and does not check to see if you are trying to lock or unlock already used or unused sectors in the range specified, you can end up with the wrong numbers for the 'free sectors' message. To avoid this, map or otherwize check the disk to make sure the range you give is not overlapping already used or unused sectors. In case of accidental overlaps, map the disk, count the uninverted codes, convert to hex (low byte, high byte) and use the ALTER command on sector 360, bytes 4 and 5, to correct the free sectors message.

W>WRITE SECTOR

The W>WRITE command allows you to write the sector presently displayed to the disk. Enter "W", return. An extra security prompt must then be answered, and you may also choose to write to drive#2 at this time.
The A command when exited comes directly to this function. Of course, answer negatively with RETURN, if you are not yet ready to write to disk. If you intend to return to this command later with the alterations you have just made, do not make a call from the disk before you have returned to this command for a write. Otherwise, you will have to begin the changes from scratch.
After a write, the screen will refresh with what was just written and return an updated status code. If the code is not one, see your BASIC or other manuals for error code conversion.

X>DISASSEMBLE

This command will allow you to disassemble m/l code at the sector you are presently viewing.
Enter X, RETURN. The prompt will ask you for a hex or decimal starting address. You may or may not be able to determine the load address. Begin hex entries with a "$". The default address for input errors or by pressing RETURN only is $0000. You will then be asked for an offset in decimal or hex. If you want to start from the first byte of the sector, input a zero. If you want to skip over a binary header, enter a six. Or if the first few bytes appear to be throwing off the disassembly, enter whatever

number you like. The beginning row numbers in conjunction with the hex column numbers will allow you to quickly enter hex offsets. You will then be asked if you wish to ignore the last three bytes of the sector, which you should answer with a "Y" if you know that the sector is DOS/OSA+ format. DISKWIZ loads two sectors at a time for this function in order to continue into the next sector if a command near the end of the sector crosses into the next.
At the end of each screen of disassembly a prompt asks if you want to dump to a printer. Hit RETURN if not and the function will continue. Repeat to the end of the sector. You will then be asked if you want to continue into the next sector. RETURN if not. If a "Y" was entered at this time, the disassembly would continue into the next sector using the appropriate offset and address from where the previous sector ended.
You may also enter a plus or minus sign at the dump prompt to page the screen forward or back one byte at a time instead of a whole screen forward. This is extremely useful in correcting the first command byte of the disassembly.
Be aware that the next sector may not necessarily be the actual next sector if a load was actually taking place.

Y>SPEEDCHECK

Enter "Y", RETURN. A prompt will ask if you want to test drive#2. If not, hit RETURN. The test will begin at this time and will update every five seconds or so. If you inadvertently enter a "Y" when no drive#2 exists, hit any key or the SRESET key to abort. The speed in rpm should be 288 plus or minus 3 rpm; for PERCOM drives, 295 to 301 rpm. The test will discontinue when any key is pressed.
To adjust your 810 drive use a pen knife to remove the four half inch diameter cover circles of the top side of the drive. Then loosen the four phillips head screws in the holes which were under the covers. Remove the top half of the drive housing.
Looking down into the drive you will see a circular potentiometer at the left rear of older 810 drives or a small rectangular blue/green potentiometer will a very small adjustment screw near the center of the rear board on newer 810's. It's the only one there. Using a small screwdriver turn the adjustment wheel and simultaneously watch the screen display. Make minor adjustments and then wait for the display to update. Take care not to drop a metal screwdriver or accidently short any bare circuitry in the process. Replace the cover of the drive immediately when through to avoid troubles later. See the DUPLICATION segment following for more information.
For PERCOM drives, the adjuster is a long blue/green potentiometer on a narrow circuit board on the rear of the bare drive itself after removing the tan cover. Remove the glue drop before turning the adjustment screw.

Z>SEARCH

The SEARCH command will scan the entire disk for a string that you define.
The string may be defined as a character string or hex/dec bytes entered one at a time. Follow the prompts. When a match is found, the normal screen display will reappear and an arrow will point to the first byte of the match in the hex field. You will then be asked if you wish to continue the search for the same match. If not , hit RETURN. If no match was found, the normal screen will display the last sector searched at. If a match was found and then no match after a continuation of the search, the last matched sector will be displayed until you press RETURN, at which time the screen will update to the last sector accessed in the search. (end of range)
As with most other commands you can enter a range to search. This function will also search across sector boundaries into the next sector if the end of a sector appears to be the beginning of your string. Also you may choose to ignore link pointers if you are searching though DOS type sectors by entering a "Y" when prompted.

+,-,SECTOR # ENTRY

Sector numbers can be entered in decimal, hex if preceded by a "$", or you may page forward or back by entering a plus or minus sign. This applies to calling up a sector# at the main prompt. See the other commands for specific hex or dec entry.

FIXING DUPLICATE FILENAMES

Use the A>ALTER command to change one of the filenames to deleted by making its flag an inverted heart temporarily or altering the name slightly in the directory entry. Then exit DISKWIZ and use a disk with DOS to delete or rename the files. You can also make your changes within DISKWIZ by changing names or moving all zero sectors to the sectors you want to delete and then using the VTOC function to free up the sectors in the bit map.

RECOVERING DELETED FILES

If you have just deleted a file and then realized that you should not have, you may be able to recover using DISKWIZ.
If the recovery attempt is made before DOS has written anything else to your disk, your job will be quite simple: Find the deleted file in the directory. Change the flag byte to in use or locked. Use the trace command to locate all of the sectors of the file and use the VTOC function to lock these sectors again in the bit map.

If you have written more to the disk since the deletion, you may or may not be able to recover. This depends on the number of free sectors prior to the deleted file being sufficient to have held all of the last write without getting into the area of your old file. Use the mapping, trace, and VTOC functions to inspect for the damage. Also, the filename of the deleted file you want may have been overwritten by the last file. In that case make a new entry for the recovered file over another deleted name or at the first all zero entry into the directory. If part of the file has destroyed you may be able to save part by changing links or adding dummy sectors at the beginning. Study basic and binary files to see how they are formed. If you have to make a new entry into the directory make sure to adjust file name codes in the sectors accordingly.

CHANGING BINARY HEADERS

DOS2/OSA+ binary headers can be altered to have the file load at a different address. (See a DOS 1 manual for DOS 1 files)
There six bytes associated with these files. The first two are "FF,FF" the next four designate the loading addresses in memory, from then to, in the typical low byte first order. Your DOS manual covers this subject fairly well.
You can also add or delete bytes to short sectors or whole sectors with different loading addresses if you wish. When adding bytes or new short sectors, remember to change the "used" byte, $7F(127), to reflect the new quantity. If sectors are added before the first, start with a new load address. If at the end, change the last sector of the old file to point to your new sector, and put in another new header to avoid changing a previous short sector. Study your DOS manual and other binary files using this program.

USING NON-FORMATTABLE DISKS

A non-formattable disk may have but one permanent physically bad sector in order for DOS to refuse to continue the entire formatting process. The disk will have zeros written to all the good sectors. All you need to do is locate the bad sectors using the map function. Jot down the bad sector numbers or use the printout functions. Duplicate sectors 1-3, and sectors 360 through 368 from a good blank formatted disk. Then use the VTOC function to lock out the bad sectors from use by DOS.
If the disk will be used for non-DOS purposes, just make sure that the unuseable sector or or sectors will not be written to.

USING THE BACKSIDE

You can now use the backside of all of your disks in full confidence, thereby doubling your storage capacity. All you need to do is cut a new write protect notch just opposite from the one that is already there. Use a second disk flipped over to mark the location for the new notch. Cut out this area with an Exacto type knife or use a single hole paper punch. Use care not to distort the disk itself. There is no disk material in the area of the cover that you will remove.
It has been stated that there may be up to a 10% error factor on the back side of disks. If it formats, no problem. If it does'nt, see the previous section on unformattable disks.
This will not work on PERCOM drives because they use the small timing hole near the center of the disk. It is not a good idea to make another one in the same fashion as above for the notch since disk damage is more likely.

DISK DUPLICATION

Unlike DOS, disks are copied on a sector by sector basis without regard to format, etc. Most disks are directly copyable. Some disks will contain deliberately made "bad" sectors (as opposed to physically bad disks). Some of these bad sectors are readable, some are not. When initially copying bad sectors, this program will copy all unreadable bad sectors as a good all zero sectors. It will copy readable bad sectors as good sectors with the data it read from them. Many copy-protected disks try to read a bad sector as part of their load routine. If they read a good sector when there should be a bad one, they won't run.
A simple bad sector may be made by drastically adjusting your drive speed out of whack. Experiment with speeds. 220 rpm is a good place to start. Sectors nearer 720 may require a little faster speed. Sectors nearer to 1, a little slower. Then use the **W**, **R**, or **D** commands to write to the sector or sectors that should be "bad". Re-adjust your speed to normal and check to make sure the damage has been done. The more sophisticated "bad sectoring" technique is done with special machinery. In order to duplicate these disks to run, you will have to disassemble and patch the code. This subject is beyond the realm of this manual. You are free to experiment. Do not overlook the value of duplicating a disk even if you can't get the dup to run. The vast majority of glitches showing up on your copy-protected disks will be on good sectors. You will be able to refresh the bombed good sectors with the backup.
Some newer ATARI 810 drives will require a 2000 ohm pot or

resistor placed temporarily across R105 on the rear board of the drive in order to slow the drive sufficiently. This may be accomplished with temporary clips and a resistor straddling R105. No speed adjustment is necessary in this case as the speed will change automatically to around 214, and will go back to its previous setting after the resistor is removed. PERCOM drives will not write bad sectors when slowed down but will when speeded up. The only problem is that the adjacent sector on the disk (not necessarily consecutive) will also be made bad. In some cases this will be ok; in others, not ok.
Remember that it is only legal to duplicate disks that you legally own for backup purposes only.

MISC

The OS (operating system) boot number is located at sector 1, the second byte ($01), of all disks whether DOS/OSA+ or not. This byte tells the OS how many consecutive, non-linked sectors to boot before turning control over to the loaded program. This can be of the range 1-256 (0=256). Usually on a DOS/OSA+ disk this number will be 3. After the program or DOS takes over from the OS, more sectors may be loaded as part of the boot process.
Tokenized BASIC (SAVED) files sometimes look the the same as m/l binary files. The difference can be determined on the first sector of the file. If the files first two bytes are 'FF FF' then the file is machine language. If the first bytes are '00 00 00 01' then the file is SAVED BASIC. If you can read it, the file is LISTED, or source code' or text data.

APPENDIX A: REFERENCES

DE RE ATARI
From APX (APX-90008)

OPERATING SYSTEM AND HARDWARE USERS MANUAL (TECHNICAL REF NOTES)
ATARI, INC., SUNNYVALE, CA. 94086
Part# C016555

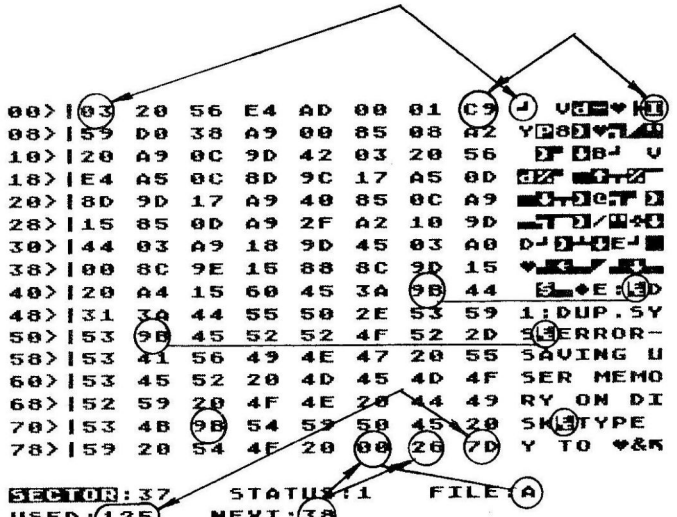
ATARI DISK OPERATING SYSTEM II REF MANUAL
Part# C016347

ASSEMBLER EDITOR USER'S MANUAL
ATARI Part# C014189-03

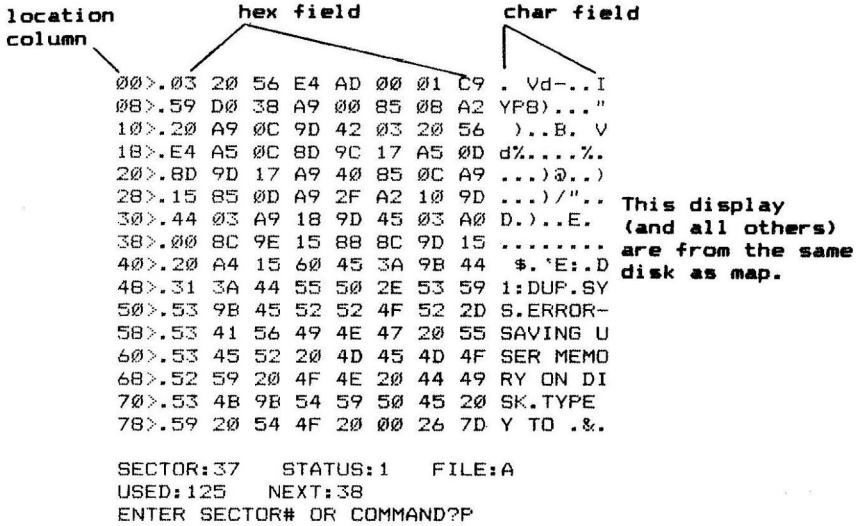
INSIDE ATARI DOS
by BILL WILKINSON
COMPUTE! BOOKS
POB 5406, GREENSBORO, N.C. 27403

"DISK DATA STRUCTURES: AN INTERACTIVE TUTORIAL"
by DAVID YOUNG
COMPUTE!
pp156-161, MARCH 1982

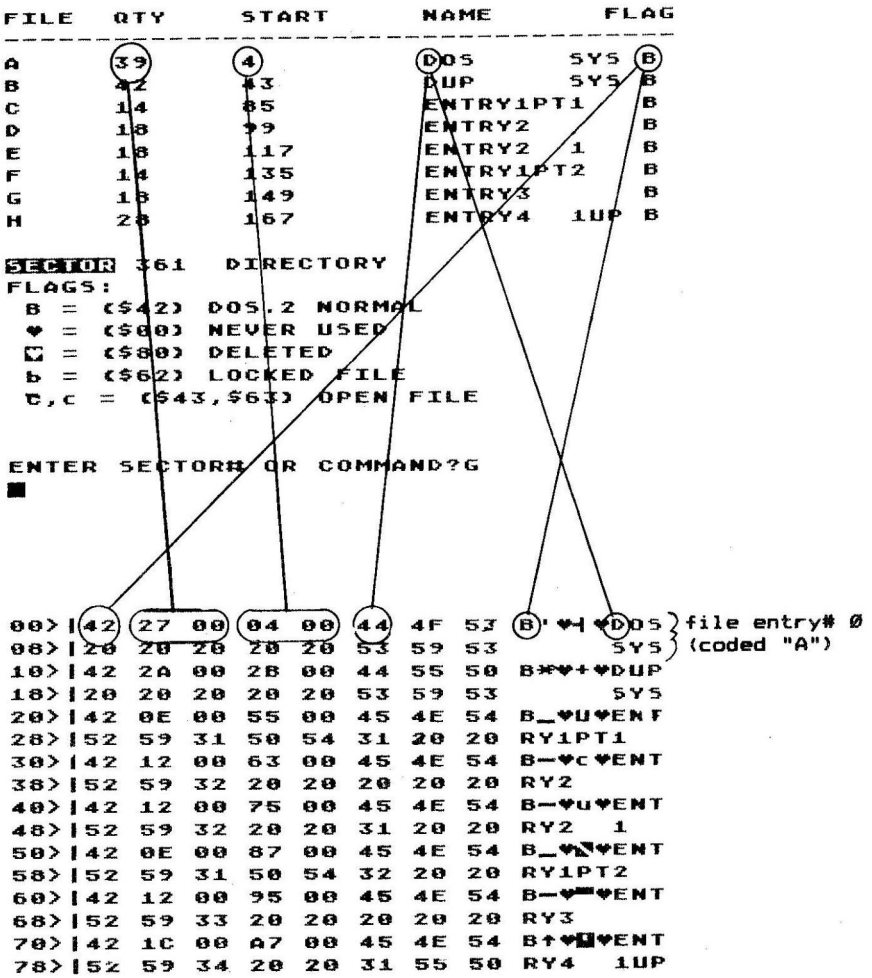
APPENDIX B: NORMAL DISPLAYS



```
00>|03 20 56 E4 AD 00 01 C9  . Vd-..I
08>|59 D0 38 A9 00 85 08 A2 YP8)...."
10>|20 A9 0C 9D 42 03 20 56  )..B. V
18>|E4 A5 0C 8D 9C 17 A5 0D d%....%.
20>|8D 9D 17 A9 40 85 0C A9 ...)@..)
28>|15 85 0D A9 2F A2 10 9D ...)/"..
30>|44 03 A9 18 9D 45 03 A0 D.)..E.
38>|00 8C 9E 15 88 8C 9D 15 ........
40>|20 A4 15 60 45 3A 9B 44  $.'E:.D
48>|31 3A 44 55 50 2E 53 59 1:DUP.SY
50>|53 9B 45 52 52 4F 52 2D S.ERROR-
58>|53 41 56 49 4E 47 20 55 SAVING U
60>|53 45 52 20 4D 45 4D 4F SER MEMO
68>|52 59 20 4F 4E 20 44 49 RY ON DI
70>|53 4B 9B 54 59 50 45 20 SK.TYPE
78>|59 20 54 4F 20 00 26 7D Y TO .&.

SECTOR:37    STATUS:1    FILE:A
USED:125    NEXT:38
ENTER SECTOR# OR COMMAND?G
```



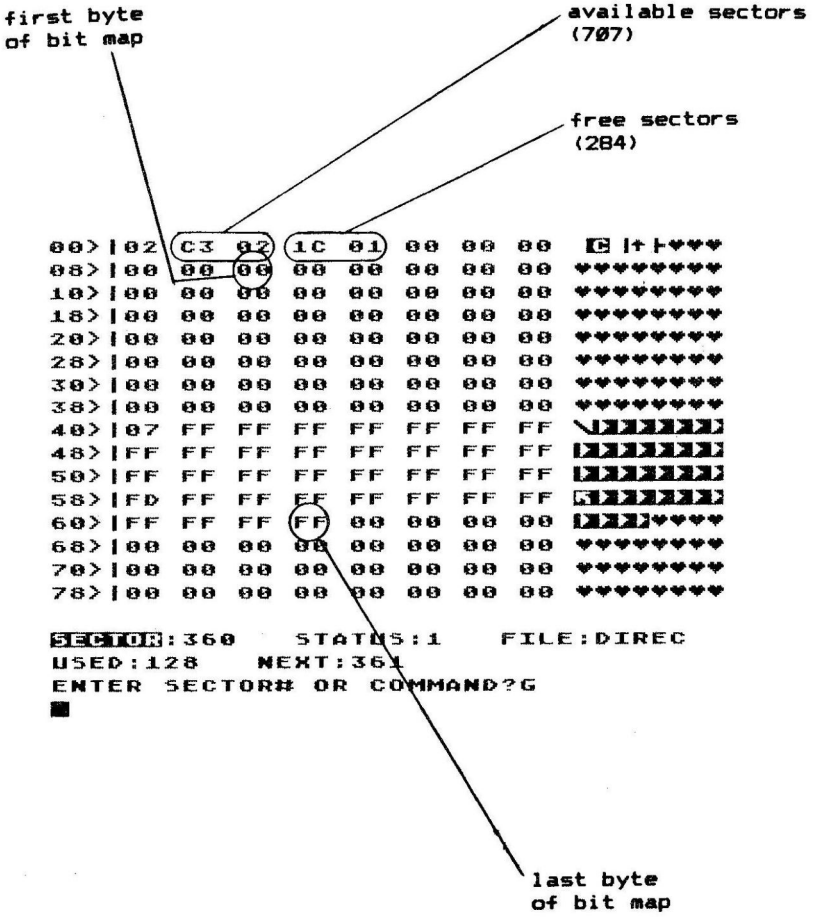
APPENDIX C: THE DIRECTORY



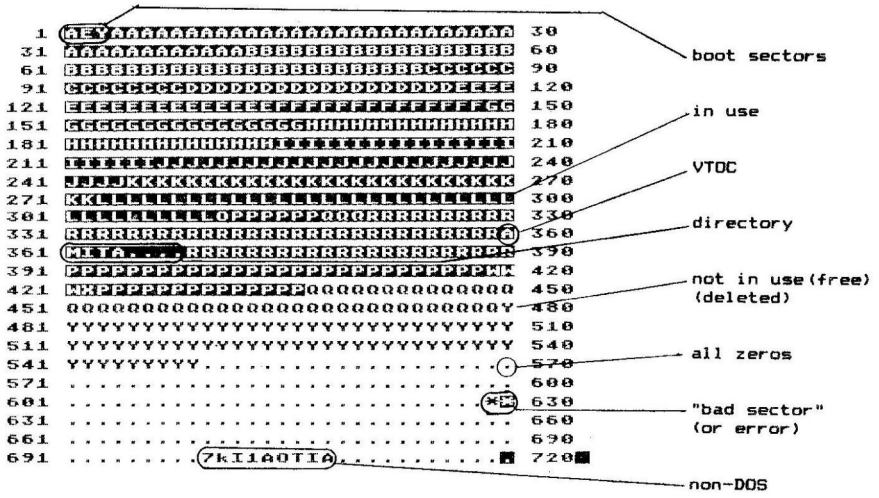
```
FILE  QTY     START     NAME        FLAG
-----------------------------------------
A       39        4     DOS     SYS  B
B       42       43     DUP     SYS  B
C       14       85     ENTRY1PT1    B
D       18       99     ENTRY2       B
E       18      117     ENTRY2   1   B
F       14      135     ENTRY1PT2    B
G       18      149     ENTRY3       B
H       28      167     ENTRY4   1UP B

SECTOR 361   DIRECTORY
FLAGS:
  B = ($42) DOS.2 NORMAL
  ♥ = ($00) NEVER USED
  ◘ = ($80) DELETED
  b = ($62) LOCKED FILE
  c,c = ($43,$63) OPEN FILE

ENTER SECTOR# OR COMMAND?G
```

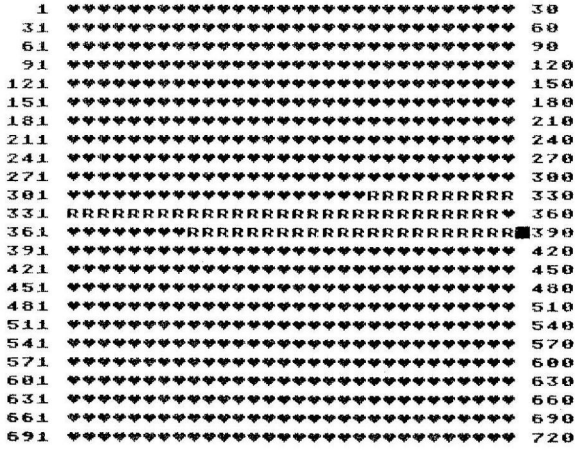
```
00>|42 27 00 04 00 44 4F 53  B'♥♦♥DOS  } file entry# 0
08>|20 20 20 20 20 53 59 53         SYS  } (coded "A")
10>|42 2A 00 2B 00 44 55 50 B*♥+♥DUP
18>|20 20 20 20 20 53 59 53         SYS
20>|42 0E 00 55 00 45 4E 54 B♫♥U♥ENT
28>|52 59 31 50 54 31 20 20 RY1PT1
30>|42 12 00 63 00 45 4E 54 B↕♥c♥ENT
38>|52 59 32 20 20 20 20 20 RY2
40>|42 12 00 75 00 45 4E 54 B↕♥u♥ENT
48>|52 59 32 20 20 31 20 20 RY2  1
50>|42 0E 00 87 00 45 4E 54 B♫♥ç♥ENT
58>|52 59 31 50 54 32 20 20 RY1PT2
60>|42 12 00 95 00 45 4E 54 B↕♥ò♥ENT
68>|52 59 33 20 20 20 20 20 RY3
70>|42 1C 00 A7 00 45 4E 54 B∟♥§♥ENT
78>|52 59 34 20 20 31 55 50 RY4  1UP

SECTOR:361    STATUS:1    FILE:DIREC
USED:40    NEXT:362
ENTER SECTOR# OR COMMAND?G
```

APPENDIX D: THE VTOC (bit map sector)



APPENDIX E: DISK MAP AND FILE TRACE





Trace of file "R" on same disk as shown above.

APPENDIX F: SPECIAL MESSAGE PRINTER

```
THIS IS AN EXAMPLE OF INSERTING AN
ADDITIONAL MESSAGE ON THE SCREEN■♥H
PRIOR TO USING EITHER PRINTOUT D♥┐◢
COMMAND, P> OR G>. WRITE IN WHAT YOU
WANT AND THEN ENTER A "P" OR "G" AND
RETURN ON THE FIRST AVAILABLE BLANK
LINE PAST THE PROMPT→↓10 9D ▄T┐/╚☆
30>|44 03 A9 18 9D 45↓03 A0 D┘┐╚E┘■
38>|00 8C 9E 15 88 8C↓9D 15 ♥▄▀▄▄▄
40>|20 A4 15 60 45 3A↓9B 44  $▄◆E:D
48>|31 3A 44 55 50 2E↓53 59 1:DUP.SY
50>|53 9B 45 52 52 4F↓52 2D S.ERROR-
58>|53 41 56 49 4E 47↓20 55 SAVING U
60>|53 45 52 20 4D 45↓4D 4F SER MEMO
68>|52 59 20 4F 4E 20↓44 49 RY ON DI
70>|53 4B 9B 54 59 50↓45 20 SK.TYPE
78>|59 20 54 4F 20 00↓26 7D Y TO ♥&}
                          ↓
SECTOR:37    STATUS:1 ↓ FILE:A
USED:125    NEXT:38    →→→→→↓
ENTER SECTOR# OR COMMAND? ↓
↓←←←←←←←←←←←←←←←←←←←←←←←←←
G
■
```

```
THIS IS AN EXAMPLE OF INSERTING AN
ADDITIONAL MESSAGE ON THE SCREEN-..I
PRIOR TO USING EITHER PRINTOUT )..."
COMMAND, P> OR G>. WRITE IN WHAT YOU
WANT AND THEN ENTER A "P" OR "G" AND
RETURN ON THE FIRST AVAILABLE BLANK)
LINE PAST THE PROMPT..10 9D ...)/"..
30>.44 03 A9 18 9D 45.03 A0 D.)..E.
38>.00 8C 9E 15 88 8C.9D 15 ........
40>.20 A4 15 60 45 3A.9B 44  $.`E:.D
48>.31 3A 44 55 50 2E.53 59 1:DUP.SY
50>.53 9B 45 52 52 4F.52 2D S.ERROR-
58>.53 41 56 49 4E 47.20 55 SAVING U
60>.53 45 52 20 4D 45.4D 4F SER MEMO
68>.52 59 20 4F 4E 20.44 49 RY ON DI
70>.53 4B 9B 54 59 50.45 20 SK.TYPE
78>.59 20 54 4F 20 00.26 7D Y TO .&.
                          .
SECTOR:37    STATUS:1 . FILE:A
USED:125    NEXT:38    ......
ENTER SECTOR# OR COMMAND? .
.........................
P
```


NOTES:

HEX	DEC	CHR	KEY
00	000	♥	c,
01	001	├	cA
02	002	▕	cB
03	003	┘	cC
04	004	┤	cD
05	005	┐	cE
06	006	╱	cF
07	007	╲	cG
08	008	◢	cH
09	009	▗	cI
0A	010	◣	cJ
0B	011	▝	cK
0C	012	▘	cL
0D	013	▔	cM
0E	014	▁	cN
0F	015	▖	cO

HEX	DEC	CHR	KEY
10	016	♣	cP
11	017	┌	cQ
12	018	─	cR
13	019	┼	cS
14	020	●	cT
15	021	▄	cU
16	022	▎	cV
17	023	┬	cW
18	024	┴	cX
19	025	▌	cY
1A	026	└	cZ
1B	027	␛	esc
1C	028	↑	ec↑
1D	029	↓	ec↓
1E	030	←	ec←
1F	031	→	ec→

HEX	DEC	CHR	KEY
20	032		spc
21	033	!	!
22	034	"	"
23	035	#	#
24	036	$	$
25	037	%	%
26	038	&	&
27	039	'	'
28	040	(	(
29	041	)	)
2A	042	*	*
2B	043	+	+
2C	044	,	,
2D	045	-	-
2E	046	.	.
2F	047	/	/

HEX	DEC	CHR	KEY
30	048	0	0
31	049	1	1
32	050	2	2
33	051	3	3
34	052	4	4
35	053	5	5
36	054	6	6
37	055	7	7
38	056	8	8
39	057	9	9
3A	058	:	:
3B	059	;	;
3C	060	<	<
3D	061	=	=
3E	062	>	>
3F	063	?	?

HEX	DEC	CHR	KEY
40	064	@	@
41	065	A	A
42	066	B	B
43	067	C	C
44	068	D	D
45	069	E	E
46	070	F	F
47	071	G	G
48	072	H	H
49	073	I	I
4A	074	J	J
4B	075	K	K
4C	076	L	L
4D	077	M	M
4E	078	N	N
4F	079	O	O

HEX	DEC	CHR	KEY
50	080	P	P
51	081	Q	Q
52	082	R	R
53	083	S	S
54	084	T	T
55	085	U	U
56	086	V	V
57	087	W	W
58	088	X	X
59	089	Y	Y
5A	090	Z	Z
5B	091	[	[
5C	092	\	\
5D	093	]	]
5E	094	^	^
5F	095	_	_

HEX	DEC	CHR	KEY
60	096	◆	c.
61	097	a	a
62	098	b	b
63	099	c	c
64	100	d	d
65	101	e	e
66	102	f	f
67	103	g	g
68	104	h	h
69	105	i	i
6A	106	j	j
6B	107	k	k
6C	108	l	l
6D	109	m	m
6E	110	n	n
6F	111	o	o

HEX	DEC	CHR	KEY
70	112	p	p
71	113	q	q
72	114	r	r
73	115	s	s
74	116	t	t
75	117	u	u
76	118	v	v
77	119	w	w
78	120	x	x
79	121	y	y
7A	122	z	z
7B	123	♠	c;
7C	124	|	s|
7D	125	↰	esCLR
7E	126	◀	eDEL
7F	127	▶	eTAB

HEX	DEC	CHR	KEY
80	128	[illegible]	c,
81	129	[illegible]	cA
82	130	[illegible]	cB
83	131	[illegible]	cC
84	132	[illegible]	cD
85	133	[illegible]	cE
86	134	[illegible]	cF
87	135	[illegible]	cG
88	136	[illegible]	cH
89	137	[illegible]	cI
8A	138	[illegible]	cJ
8B	139	[illegible]	cK
8C	140	[illegible]	cL
8D	141	[illegible]	cM
8E	142	[illegible]	cN
8F	143	[illegible]	cO

HEX	DEC	CHR	KEY
90	144	[illegible]	cP
91	145	[illegible]	cQ
92	146	[illegible]	cR
93	147	[illegible]	cS
94	148	[illegible]	cT
95	149	[illegible]	cU
96	150	[illegible]	cV
97	151	[illegible]	cW
98	152	[illegible]	cX
99	153	[illegible]	cY
9A	154	[illegible]	cZ
9B	155	inv⏎	RET
9C	156	[illegible]	esDEL
9D	157	[illegible]	esINS
9E	158	[illegible]	ecTAB
9F	159	[illegible]	esTAB

HEX	DEC	CHR	KEY
A0	160	█	spc
A1	161	[illegible]	!
A2	162	[illegible]	"
A3	163	[illegible]	#
A4	164	[illegible]	$
A5	165	[illegible]	%
A6	166	[illegible]	&
A7	167	[illegible]	'
A8	168	[illegible]	(
A9	169	[illegible]	)
AA	170	[illegible]	*
AB	171	[illegible]	+
AC	172	[illegible]	,
AD	173	[illegible]	-
AE	174	[illegible]	.
AF	175	[illegible]	/

HEX	DEC	CHR	KEY
B0	176	[illegible]	0
B1	177	[illegible]	1
B2	178	[illegible]	2
B3	179	[illegible]	3
B4	180	[illegible]	4
B5	181	[illegible]	5
B6	182	[illegible]	6
B7	183	[illegible]	7
B8	184	[illegible]	8
B9	185	[illegible]	9
BA	186	[illegible]	:
BB	187	[illegible]	;
BC	188	[illegible]	<
BD	189	[illegible]	=
BE	190	[illegible]	>
BF	191	[illegible]	?

HEX	DEC	CHR	KEY
C0	192	[illegible]	@
C1	193	[illegible]	A
C2	194	[illegible]	B
C3	195	[illegible]	C
C4	196	[illegible]	D
C5	197	[illegible]	E
C6	198	[illegible]	F
C7	199	[illegible]	G
C8	200	[illegible]	H
C9	201	[illegible]	I
CA	202	[illegible]	J
CB	203	[illegible]	K
CC	204	[illegible]	L
CD	205	[illegible]	M
CE	206	[illegible]	N
CF	207	[illegible]	O

HEX	DEC	CHR	KEY
D0	208	[illegible]	P
D1	209	[illegible]	Q
D2	210	[illegible]	R
D3	211	[illegible]	S
D4	212	[illegible]	T
D5	213	[illegible]	U
D6	214	[illegible]	V
D7	215	[illegible]	W
D8	216	[illegible]	X
D9	217	[illegible]	Y
DA	218	[illegible]	Z
DB	219	[illegible]	[
DC	220	[illegible]	\
DD	221	[illegible]	]
DE	222	[illegible]	^
DF	223	[illegible]	

HEX	DEC	CHR	KEY
E0	224	[illegible]	c.
E1	225	[illegible]	a
E2	226	[illegible]	b
E3	227	[illegible]	c
E4	228	[illegible]	d
E5	229	[illegible]	e
E6	230	[illegible]	f
E7	231	[illegible]	g
E8	232	[illegible]	h
E9	233	[illegible]	i
EA	234	[illegible]	j
EB	235	[illegible]	k
EC	236	[illegible]	l
ED	237	[illegible]	m
EE	238	[illegible]	n
EF	239	[illegible]	o

HEX	DEC	CHR	KEY
F0	240	[illegible]	p
F1	241	[illegible]	q
F2	242	[illegible]	r
F3	243	[illegible]	s
F4	244	[illegible]	t
F5	245	[illegible]	u
F6	246	[illegible]	v
F7	247	[illegible]	w
F8	248	[illegible]	x
F9	249	[illegible]	y
FA	250	[illegible]	z
FB	251	[illegible]	c;
FC	252	[illegible]	s|
FD	253	[illegible]	ecCLR
FE	254	[illegible]	ecDEL
FF	255	[illegible]	ecINS