

WATSON™

by Bill Sefton
and Mark Pump

APPLE DISK & MEMORY UTILITY

All the features of THE INSPECTOR™ plus:

- Reconstruct VTOC
- Kill DOS
- HEX/ASCII Disassembly
- Continuous Dump To Printer
- Disk Free Space
- Disk Compare
- Display Track Sector Lists
- Lockin / Lockout Sectors
- File Follower
- Display Control Characters
- Allows User Functions
- Individual Page Dump

WATSON™ requires THE INSPECTOR™ in memory.



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GENERAL DESCRIPTION

WATSON is a powerful assistant to THE INSPECTOR disk and memory utility. Like THE INSPECTOR, WATSON is permanent — either on an EPROM to be simply plugged into socket D \emptyset , or on disk ready to be merged with Integer Basic for loading on boot. WATSON augments many of THE INSPECTOR commands — making them handier, more automatic, more complete. For instance, you can now INCREMENT or DECREMENT buffer locations with a single key-stroke. The disk map now also displays free space remaining on the disk. You can even reconstruct a VTOC automatically.

But WATSON brings along a whole new bag of tricks his very own. A Disassembler that displays ASCII, an instant hex/decimal/signed decimal converter, the ability to exclusive-or the buffer with any value, lock-out or free-up specific sectors on a disk, follow a file sector-by-sector automatically, and much more. Browse through all the new commands in this manual. You can now call for a jump to any of **nine** of your own subroutines. If you enjoyed working with THE INSPECTOR, you'll **love** WATSON.

When you quit WATSON, you can take a single-stroke Screenshot along with you back into Basic. Or an automatic inverse display of all control characters. Together, WATSON and THE INSPECTOR give you by far the most complete disk and memory utility for your Apple.

SYSTEM REQUIREMENTS

WATSON requires THE INSPECTOR in order to work. Both are compatible with any Apple II STANDARD computer with at least one Disk Drive. If you have an Apple II+ (with Applesoft in ROM), you will need an Integer Card, an Apple Language Card, or a 16K RAM Card.

WATSON is compatible with any APPLE II STANDARD computer. You will need an INTEGER CARD, APPLE LANGUAGE CARD or a 16K RAM CARD if you have an APPLE II+. You will also require at least one APPLE DISK DRIVE for the disk routines. WATSON supports lower case adapters and will operate with as little as 16K of RAM memory. WATSON also requires that the INSPECTOR be installed in the APPLE.

IMPORTANT NOTE: WATSON and THE INSPECTOR will examine either 13- or 16-sector disks, but you must first BOOT whichever DOS you will be working under.

INSTALLATION

WARNING: BEFORE ATTEMPTING TO INSTALL THE WATSON EPROM, TURN OFF THE POWER TO THE APPLE TO PREVENT DAMAGING YOUR SYSTEM.

INSTALLATION OF WATSON (EPROM VERSION)

(If you have the WATSON disk version, skip to the following section titled Installation of WATSON (disk version))

The WATSON EPROM is designed to be inserted in the D0 socket on the motherboard of an APPLE II or in the D0 socket on the INTEGER CARD on an APPLE II+.

INSTALLING WATSON IN THE APPLE.

1. Double check that power is off.
2. Remove the cover from the computer.
3. Touch the case of the power supply to discharge static electricity that may have accumulated on your body.

IF YOU HAVE A STANDARD APPLE II

4. Locate socket D0 on the motherboard.
5. Orient the EPROM so the notch is facing towards the key board. See diagram 1.

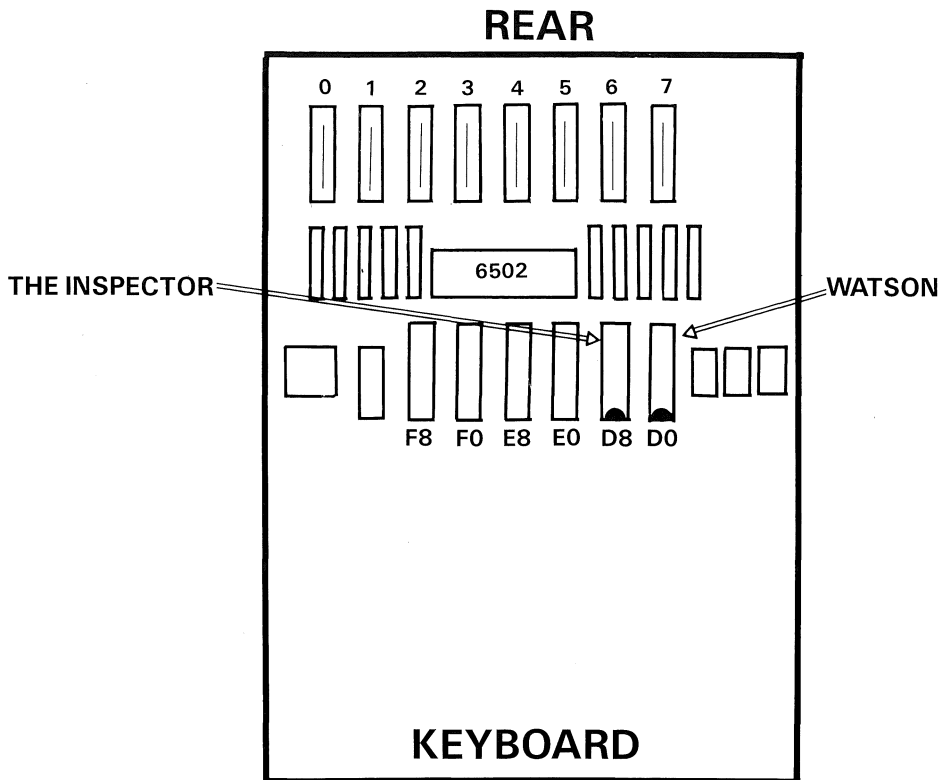


Diagram 1

6. Now carefully align the pins with the socket and gently but firmly insert the EPROM into the D0 socket until it is seated. You may find that the pins on the EPROM need slight bending to get them properly aligned. They can be bent quite easily by carefully pressing them against a flat surface.

Note: Owners of Apple II Standard systems with Apple Language cards may experience some difficulties due to the possible incompatibility of the 2716 EPROM and SOME Apple Language cards. A fix is available free of charge. Call the Personal Service Department for information if you suspect a problem.

IF YOU HAVE AN APPLE II+ (with Integer firmware card)

4. Remove the INTEGER FIRMWARE CARD from slot #0.
5. Locate socket D0 on the INTEGER FIRMWARE CARD.
6. Orient the EPROM with its notch towards the top of the INTEGER FIRMWARE CARD. See Diagram 2.

TOP

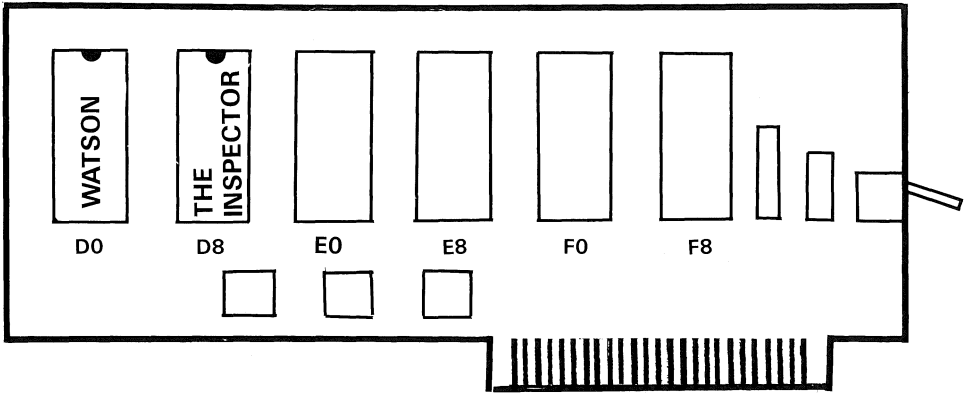


Diagram 2

7. Now carefully align the pins with the socket and gently but firmly insert the EPROM into the D0 socket until it is seated. You may find that the pins on the EPROM need slight bending to get them properly aligned. They can be bent quite easily by carefully pressing them against a flat surface.
8. Insert the INTEGER FIRMWARE CARD back into slot #0.

The power to the APPLE can now be turned on and WATSON is always available for use.

INSTALLATION OF WATSON (Disk Version)

WATSON is also supplied on disk for users who have an Apple II+ with either the Apple Language system or a 16K RAM memory expansion board. The disk version is installed as follows:

1. Boot DOS into the Apple using a BACKUP COPY of your DOS 3.3 System Master Diskette. You must use a copy of your system master that contains the program INTBASIC that has THE INSPECTOR installed, or, you may use your BASICS disk if it has been modified to contain THE INSPECTOR.
2. Insert the WATSON disk into the disk drive. Type 'RUN WATSON', (RETURN).

3. You will see the following:

DO YOU WISH TO MODIFY

1. DOS 3.3 BASICS
- OR
2. DOS 3.3 SYSTEM MASTER

NOTE: You will be modifying these disks so we suggest that you use BACKUP COPIES.

Press (RETURN) after inserting the correct disk.

Your disk will be modified and the screen will say:

YOUR DISK HAS BEEN MODIFIED AND CONTAINS WATSON.

4. WATSON may be accessed and used in the same fashion as the EPROM version.

WATSON is loaded into the Apple every time you boot the BACKUP COPY of your DOS System Master disk or BASICS disk.

ACCESSING WATSON

WATSON is always in memory and available for use. WATSON can be used in a number of different APPLE configurations. Since each is slightly different there are a number of distinct procedures to be used depending on the computer configuration you are using. To access WATSON proceed as specified for the Apple configuration which you are using.

- A. APPLE II STANDARD (Integer on mother board).

FROM	TO	TYPE
Integer	WATSON	CALL—12288, (RETURN)
Monitor	WATSON	C081, (RETURN), D000G, (RETURN),
Applesoft	WATSON	CALL—151, (RETURN), C081, (RETURN), D000G, (RETURN)

- B. APPLE II+ (Applesoft on mother board) (Integer on Firmware Card or in RAM of Language Card)

FROM	TO	TYPE
Integer	WATSON	CALL—12288, (RETURN)
Monitor	WATSON	C080, (RETURN), D000G, (RETURN)
Applesoft	WATSON	CALL—151, (RETURN), C080, (RETURN), D000G (RETURN)

WATSON COMMANDS

+ = CONTINUOUS SCAN FORWARD

Causes WATSON to start scanning forward sector by sector. When any key is pressed, scanning will stop.

= = CONTINUOUS SCAN BACKWARD

Causes WATSON to start scanning backward sector by sector. When any key is pressed, scanning will stop.

. = INCREMENT BUFFER

Increments the Buffer Location by 1 page in memory. For example, if the buffer is currently set to \$0800, pressing this key will change the Buffer Location to \$0900.

, = DECREMENT BUFFER

Decrements the Buffer Location by 1 page in memory. This command is similar to the INCREMENT BUFFER command.

CTRL-E = EXCLUSIVE-OR BUFFER

This command will EOR the entire buffer with any entered value. Certain programs encode information by using this method, causing the information to be unreadable. By using this command, these may be decoded.

To use this command proceed as follows:

1. Press CTRL-E. The cursor will move to the upper left-hand corner of the display.
2. Enter the value that you wish to EOR the buffer with and press (RETURN)

NOTE: THIS COMMAND WORKS WHILE THE DISPLAY IS IN EITHER HEXADECIMAL OR ASCII MODE.

CTRL-D = DISASSEMBLE WITH ASCII

Disassembles instructions starting at the Buffer Location. The ASCII values of memory will be displayed in the right-most column. This is very convenient for looking at data areas in machine language programs. Figure 2 is an example of a partial disassembly of DOS, containing machine language code, as well as data.

To use this function:

1. Press "B" to select the Buffer Location mode.
2. Select the Buffer Location where you wish to begin disassembly.



Figure 2

3. Press "CTRL-D" to start disassembly.
4. Press any key to stop scrolling.
5. Press any key to restart scrolling.
6. Press "Q" while scrolling to toggle between slow and fast scrolling.
7. Press (RETURN) to exit from this mode.

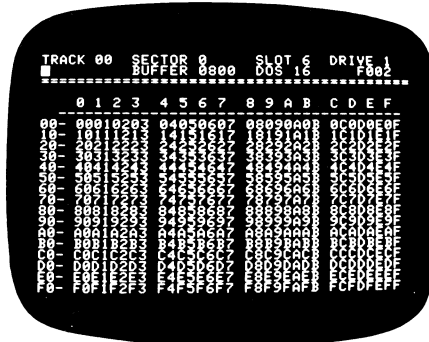


Figure 3

CTRL-B = BUFFER TEST PATTERN

Pressing CTRL-B will fill the Buffer Location with the values \$00 — \$FF. This is useful for performing tests, displaying the ASCII character set, etc. Figure 3 is an example of a Hexadecimal display of the buffer after pressing "CTRL-B".

C = CONVERT HEX/DEC & DEC/HEX

This command will take HEX and DECIMAL numbers and display them as HEX, DECIMAL and SIGNED DECIMAL numbers. It will also allow addition and subtraction of any of the three forms of numbers. See Figure 4.

This command was included in THE INSPECTOR, but has been modified slightly. After pressing "M", a map will be displayed, an "M" will appear in the upper left-hand corner of the map, and the free space on the disk will be displayed at the bottom of the map, in the form of F=XXX. Figure 5 is the display of a typical Map.

CTRL-L = LOCKOUT/LOCKIN SECTOR

Toggles the status of a specific sector on a disk. A free sector will be locked out, and a locked out sector will be freed.

To use this function:

1. Set the number of the track and sector, (using the "T" and "S" commands) to the specific sector that you wish to lock in or lock out.
2. Press "CTRL-L". The status of the specified sector will be toggled, and a new map of the disk will be displayed.

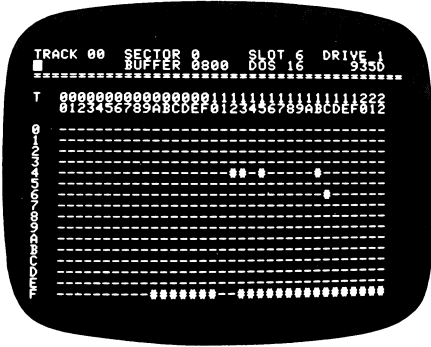


Figure 6

CTRL-T = DISPLAY ALL TRACK/SECTOR LISTS

Causes the disk to be scanned, and all sectors which could possibly be Track/Sector Lists will be displayed on a map. This is very convenient when trying to reconstruct a blown CATALOG. An example of a typical display is shown in Figure 6.

The procedure is as follows:

1. Set the number of the track and sector (using the "T" and "S" commands) you wish to begin scanning from (normally this is track 0, sector 0).
2. Press "CTRL-T". The screen will clear below line 3, and a blank map will be displayed, containing a "T" in the upper left-hand corner. As WATSON scans the disk, sectors which may possibly be Track Sector Lists will be displayed on the map.
3. Pressing any key will halt the scan.
4. After the last sector is read on the disk, the scan will stop.

CTRL-R = RECONSTRUCT VTOC

Reads in the VTOC from a disk, then rebuilds the Track Bit Map from the Catalog Track. This is especially useful when a catalog is reconstructed from a blown disk, or a file is undeleted.

This may be done as follows:

1. Insert the disk that you wish to be reconstructed in the drive.
2. Press "CTRL-R". A blank map will be displayed, with a "R" in the upper left-hand corner. The Catalog Track will be read in, and files will be displayed on the map, as they are reallocated.
3. After the disk has stopped, the new VTOC may be saved to the disk by pressing "CTRL-W".

NOTE: THE DISK BEING RECONSTRUCTED MUST HAVE A READABLE VTOC. IF THERE IS NOT ONE ON THE DISK, THEN ONE SHOULD BE COPIED FROM A GOOD DISK FIRST.

NOTE: TO CHECK IF A VTOC IS CURRENTLY BAD, A MAP MAY FIRST BE READ FROM THE DISK. BY COMPARING THE MAP TO THE RECONSTRUCTED VTOC, IT IS EASY TO DETERMINE IF A PROBLEM EXISTS.

CTRL-K = KILL DOS ON DISK

Frees the DOS tracks from the Track Bit Map. DOS normally uses tracks 0-2 and track 11. These are locked out on the Track Bit Map. On disks where DOS is not required, tracks 1 and 2 may be freed, allowing up to 32 additional useable sectors.

This command works exactly like the Reconstruct VTOC command, only tracks 1 and 2 will not be allocated. The new VTOC may be saved to the disk with the "CTRL-W" command.

CTRL-V = VERIFY THAT DISKS ARE ALIKE

This command may be used to compare two or more disks, and display a map of any sectors which are not the same.

The first disk that is read will set up a table in memory of sector checksums. As further disks are compared, their checksums will be compared to the previous disk, and any differences will be displayed on a map.

To use this feature, proceed as follows:

1. Insert the disk to be verified in the drive.
2. Set the track and sector (using the "T" and "S" commands) to the sector where you wish to begin verifying (this is normally track 0 and sector 0).

3. Press "CTRL-V". The display will clear, and a blank map will be displayed with a "V" in the upper left-hand corner. If this is the first disk read, then the map will remain blank. If there has been a disk previously read, any sectors which do not compare correctly will be displayed on the map.
4. This function may be halted by pressing any key during scanning.
5. After the last sector on the disk is read, scanning will stop.

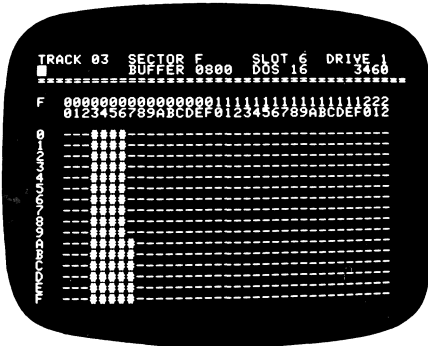


Figure 7

CTRL-F = FILE FOLLOWER

Allows a file to be scanned sector by sector automatically, both forward and backward. This is accomplished by reading in the Track/Sector List for a file, which is then used by WATSON to read in each sector of the file. This command is very useful when a file needs to be inspected or changed.

This command sets up the Track/Sector List for a file. After "CTRL-F" has been pressed, it is then possible to scan the sectors using the left and right arrow keys. Figure 7 shows a typical display after pressing "CTRL-F".

This command may be used as follows:

1. Set the track and sector (using the "T" and "S" commands) to the location of the Track/Sector List of the file that you wish to work with.
2. Press "CTRL-F". The Track/Sector List will be read, and a map showing all sectors in the file will be displayed.

-->= READ NEXT SECTOR IN FILE

Works in conjunction with the File Follower command. After a file has been set up by pressing "CTRL-F", pressing the right arrow key will stop forward through the Track/Sector List and read the next sector. If the Track/Sector List is more than one sector long, subsequent Track/Sector Lists will be read in after reaching the end of the current one. After the last sector in a file is read, the apple will "beep", signifying the end of the file.

<-- = READ PREVIOUS SECTOR IN FILE

This command works like the right arrow, only the previous sector in the Track/Sector List will be read. Also, since Track/Sector Lists will only link forward, and not in reverse, if the Track/Sector List is more than one sector long, it is possible to read only to the beginning of the current sector, and no further back. This will only be a problem when working in the second or further sectors of a Track/Sector List. After reaching the first sector in the Track/Sector List, the Apple will "beep". This only occurs if a file is 123 sectors or greater.

CTRL/SHIFT-N = TEST OVERRIDE

Pressing "CTRL/SHIFT-N" will put WATSON in Override mode. Normally for the File Follower, WATSON checks to ensure that the Track/Sector List read in is valid. This mode ignores that test, in case the Track/Sector List is partially bad. Using this command, it is still possible to partially use the File Follower command.

Z = SETUP \$3000 TO TURN ON PRINTER

In THE INSPECTOR documentation, it was explained how to install a routine at \$3000 to turn on the printer when "CTRL-Z" is pressed. This is used for the HEX/ASCII and Nibble Dump commands. By pressing "Z", a routine will be setup automatically to perform this function.

NOTE: THIS COMMAND DEFAULTS TO SLOT 1 FOR THE PRINTER LOCATION. LOCATION \$2BA IN MEMORY MAY BE CHANGED, USING THE EDIT COMMAND, TO ANY OTHER SLOT REQUIRED, AND THE NEW SLOT WILL THEN BE USED.

CTRL-S = SCREENDUMP

Performs a screendump when pressed. Anytime a printout of the WATSON screen is desired, pressing "CTRL-S" will perform a screendump.

NOTE: AS IN OTHER PRINTER COMMANDS, SLOT 1 IS THE DEFAULT PRINTER SLOT. THIS MAY BE CHANGED TO ANY OTHER SLOT BY CHANGING LOCATION \$2BA IN MEMORY.

CTRL/SHIFT-M = PRINTER ECHO STATUS

This command is used to enable the Screendump routine to either supply or suppress carriage returns at the end of a line. Different printer interface cards either require a carriage return to be supplied to it, or they supply their own. The default is to have the routine supply carriage returns. If your printer output is double spaced, pressing "CTRL/SHIFT-M" will clear up the problem.

CTRL-P = EXIT AND SETUP SCREENDUMP

This command works much like the normal Screendump command, only it may be used from outside WATSON. After pressing "CTRL-P", WATSON will return to DOS. Normal commands and programs may be run at this time, and a Screendump will be performed whenever a "CTRL-Z" is pressed. This command is very handy when checking disk catalogs, listing programs, etc.

NOTE: THE PRINTER SLOT (LOCATION \$2BA) AND ECHO STATUS SHOULD BE SETUP BEFORE USING THIS COMMAND.

CTRL-O = EXIT AND OUTPUT CONTROL CHARACTERS

Pressing "CTRL-O" will exit WATSON, and cause all control characters displayed on the screen to appear in inverse. This will work with DOS and normal programs. This is convenient to use when trying to find hidden control characters, etc.

ESC 1-9 = USER FUNCTIONS

Just as the "CTRL-Z" command will perform a jump to a subroutine located at \$300, ESC 1 through ESC 9 will perform jumps to user subroutines. These jumps are specified by the bytes located at \$3BE through \$3CF. These locations are setup in normal 6502 location, that is, with the low byte first, and high byte second.

The locations are as follows:

ESC 1 — \$3BE & \$3BF
ESC 2 — \$3C0 & \$3C1
ESC 3 — \$3C2 & \$3C3
ESC 4 — \$3C4 & \$3C5
ESC 5 — \$3C6 & \$3C7
ESC 6 — \$3C8 & \$3C9
ESC 7 — \$3CA & \$3CB
ESC 8 — \$3CC & \$3CD
ESC 9 — \$3CE & \$3CF

For example, if you wished to have ESC 7 do a jump to memory location \$2000, you would place a \$00 at location \$3CA, and a \$20 at location \$3CB. This routine is convenient when testing machine language programs, using subroutines, etc.

ACCESSING WATSON™

A. APPLE II STANDARD (Integer on Mother Board)

FROM	TO	TYPE
Integer	WATSON	CALL — 12288, (RETURN)
Monitor	WATSON	CØ81, (RETURN), DØØØG, (RETURN)
Applesoft	WATSON	Call — 151 (RETURN), CØ81, (RETURN), DØØØG, (RETURN)

B. APPLE II + (Applesoft on Mother Board) (Integer on Firmware Card) (Integer in Ram of Language Card)

FROM	TO	TYPE
Integer	WATSON	Call — 12288, (RETURN)
Applesoft	WATSON	Call — 151, (RETURN)
Monitor	WATSON	CØ8Ø, (RETURN), DØØØG, (RETURN)

with WATSON initialized

FROM	TO	TYPE
Integer	WATSON	Call — 12288 (RETURN)
Applesoft	WATSON	& (RETURN)
Monitor	WATSON	CTRL — Y (RETURN)

