The Software Wizardry Eight Megahertz Modification For H/Z100 Computers

INTRODUCTION

One of the factors which determines the speed at which a computer will run is the processor clock speed. The processor portion of a typical microcomputer executes close to a million instructions a second. Each instruction carries out one small part of the task the computer is performing for the user. The timing of these instructions is controlled by a signal called the processor clock. In the H/Z100 series computers, this signal is generated by a circuit based on a crystal which electrically vibrates at a known frequency.

Replacing this crystal will change the processor clock speed and therefore the operating speed of the computer. A standard H/Z100 computer has a processor clock speed of five megahertz (five million cycles per second). The Software Wizardry Eight Megahertz Modification will change the clock speed to eight megahertz (8 MHz) resulting in a 60% improvement in processor speed.

This change in processor clock speed does not change the speed with which the computer reads or writes information to disks. The data-handling performance of peripherals, such as printers, is not speeded up either. For example, a database program which reads and writes large quantities of information to disk will show only a small improvement. A spreadsheet program which is recalculating a large number of formulas will run considerably faster.

Since the H/Z100 computers were designed to operate at 5 MHz, many of the components used in the computer were selected to operate at that speed. Simply increasing the clock speed has the undesirable side effect of forcing these components to operate beyond their rated capacity. Therefore, a simple crystal change may result in a system which operates unreliably--or not at all.

Software Wizardry, Inc. pioneered the RamPal memory upgrade to H/Z100 computers. We have used our experience with upgrading the H/Z100 to design a kit which will increase your computer's processor speed to 8MHz. The Software Wizardry Eight Megahertz Modification replaces all potential problem components with components which are properly rated to operate at 8MHz.

You may find some software packages which assume the processor clock is running at 5MHz. This usually indicates poor programming practice, but that is little consolation if you need software which doesn't work properly on your new "improved" machine. To avoid this situation, the 8MHz modification includes a switch which will return the clock speed to 5MHz. This switch gives you all of the advantages of the higher speed, coupled with absolute compatability when you need it.

We cannot guarantee that switching "on-the-fly" will always work. You may need to re-boot your computer when you change speeds. However, as long as the computer is idle (at a point when you would be safe turning it off), switching clock speeds will not damage anything. Please do NOT switch clock speeds when the LED's on the disk drives are on, indicating that disk activity is taking place.

The 8MHz modification is designed to be added to systems which already have the RamPal-100 memory modification installed. While it is possible to install the 8MHz modification on systems which do not have RamPal-100 installed, this leaves a few components from the original computer design which are not rated to run at 8MHz. There is no way to guarantee how these chip components will perform at 8MHz, so we highly recommend that they be replaced.

One type of component which is NOT included in this upgrade is memory chips. If your system presently has 200 nanosecond memory chips you may need to replace them with 150 nanosecond or 120 nanosecond chips. Two hundred nanosecond chips are usually identified by a "-20" or "-200" suffix on the part number.

TOOLS NEEDED

In order to install the Software Wizardry Eight Megahertz Modification, you will need a phillips-head screwdriver, a small flat blade screwdriver (or an IC puller tool), and a 1/4 inch nut driver.

WORKING ENVIRONMENT

You should work in a clean, well-lighted area which is at least twice the size of your computer. Be sure that you will not lose any small items (screws, etc.), if you drop them.

Please study these instructions carefully before you attempt to install this modification in your computer. We have provided a box in front of each step of these instructions. You may wish to check each box as you complete each step.

Be careful handling the integrated circuits in this package, since they can be damaged by static electricity.

To remove an integrated circuit from a socket, use a small flat blade screwdriver (or IC puller tool) to pry the chip gently from its socket. Chips should be stored in static protection packaging such as is used to package the chips in this kit.

To install an integrated circuit, be sure the leads on the chip match the socket holes (bend them gently if necessary) then press the chip firmly into place. Pay particular attention to the orientation of the chips. A 'U' shaped cutout or a small dot marks one end of the chip. This end should go toward the left side of the circuit board. All of the chips on the H/Z100 motherboard will have the 'U' shaped cutout or small dot in the same direction.

INSTALLATION STEPS

(1) Preparing Your Computer

[] Turn the power off. Remove the top of your computer.

[] Remove the disk drive assembly according to the following instructions.

[] On an all-in-one computer, remove the screws holding the CRT and disk drive assembly down. Disconnect the cables to the disk drive(s) and disconnect the cable attached to the video driver board (the circuit board mounted vertically on the left side of the machine.) Lift the assembly off and set it aside.

[] On a low profile computer, remove the screws which hold the disk drive assembly down. Disconnect the cables from the disk drive(s), and lift the assembly off. Set it aside.

[] Remove the floppy disk controller board from the S-100 card cage. The floppy disk controller is the circuit board to which the floppy disk cable was attached.

[] Remove the screws holding the middle shell of the computer; lift the shell off and set it aside.

[] Lift the keyboard toward the front of the computer so that you can access the circuit boards mounted in the bottom of the computer.

[] The video board is the board mounted upside down over the motherboard. Unscrew the three phillips-head screws which hold down the video board. Tilt this board toward the back of the computer to gain access to the motherboard.

(2) Installing the Eight Megahertz Modification

Replace the following components, one at a time, keeping in mind the precautions mentioned above about handling integrated circuits. In addition to the identifying numbers shown below, there will usually be several numbers on a component which provide such information as when and where the part was manufactured. These components are all mounted in sockets.

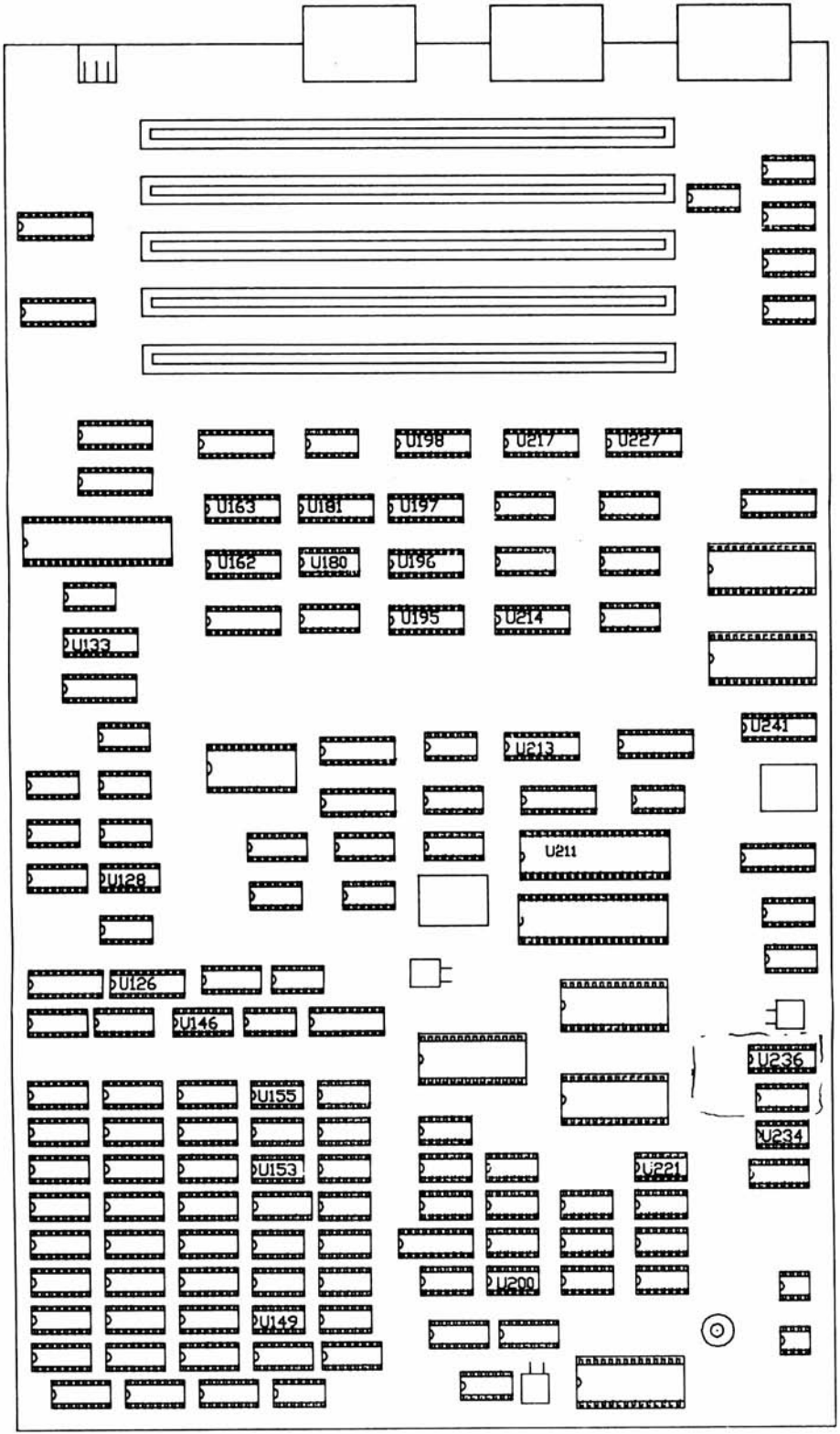
In some cases there are equivalent chips from different manufacturers who use different part numbering schemes. The following list will show both possible part numbers. One or the other will be in your package:

On the motherboard: (See Illustration "A")

- [x] U211 8088-2
- [x] U126 74F244 or 74ALS244
- [x] U128 74F257 or 74ALS257
- [x] U146 74F257 or 74ALS257
- [x] U153 74S280
- [x] U241 74ALS244
- [x] U181 74ALS244
- [x] U162 74ALS244
- [x] U163 74ALS244
- [x] U214 74ALS244
- [x] U217 74ALS244
- [x] U195 74ALS240
- [x] U133 74ALS373
- [x] U213 74ALS373
- [x] U196 74ALS373
- [x] U197 74ALS373
- [x] U198 74ALS373
- [x] U227 74ALS373
- [x] U221 74ALS1032 or 74S32
- [x] U200 74F368
- [x] U180 74F367
- [x] U234 74S74
- [ ] U155 74AS00 or 74ALS37 — FROM RAMPAL100
- [x] U149 Part # may vary--150 nsec. delay line

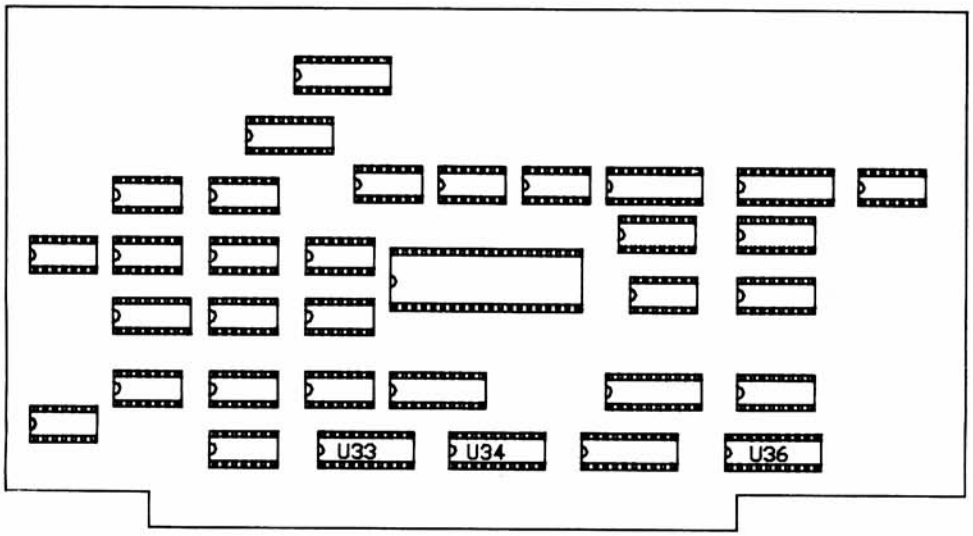
On the floppy disk controller: (See Illustration "B")

- [x] U33 74ALS244 ← POSSIBLY NO SEATED PROPERLY - FAILED FLOPPY DIAG CONTROLLER TEST
- [x] U34 74ALS244
- [x] U36 74ALS244



MOTHER BOAR

Figure A



FLOPPY DISK CONTROLER Figure B

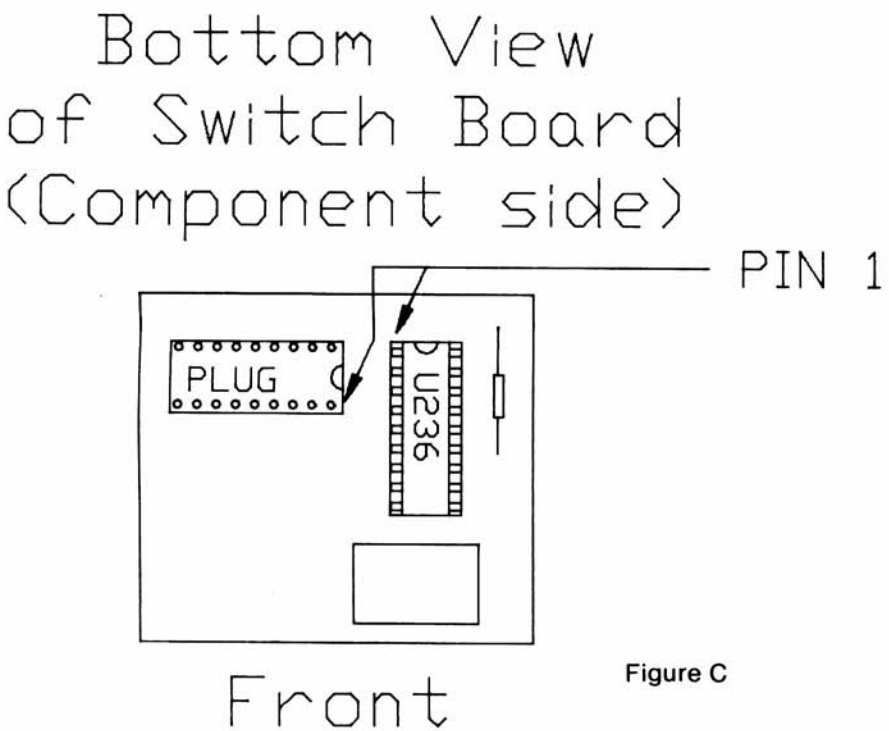


Figure C

(3) Preliminary Test

☑ After making these changes, test to be sure that everything is still working. First, do one last visual inspection to be sure that all of the leads of the chips you have installed are in the proper holes in their sockets -- not bent out or under. Also check to be sure that the "U" shaped cutout or small dot is oriented properly.

☑ Replace the floppy controller board in the card cage.

☑ Place the video board back in position and secure it with the proper screws, and set the keyboard back in position.

☑ On an all-in-one computer, set the disk drive/CRT assembly in place and connect the cable to the video driver board.

☑ On a low profile computer, attach the cable to your monitor.

If anything goes wrong with the following test, turn the power off IMMEDIATELY, then resolve the problem before trying it again. Turn the power on, then hit the DELETE key to cancel the automatic boot (remember you don't have any drives attached.) When you get the hand prompt, type "T" for test then run the memory test for one pass. When you are satisfied the system is operating correctly, turn it off and proceed with the installation.

☑ Lift the keyboard and the video board up to gain access to the motherboard again.

☑ If you need to replace your memory chips with faster (150 nanosecond or better) chips, do so at this time, then repeat the preliminary test before proceeding.

(4) Completing the Installation

☑ Locate the small circuit board included in the upgrade. There is an empty IC socket on this board which will hold the chip you will remove from the motherboard in the next step. There is also a set of wires attached to this circuit board which lead to a switch panel which will be mounted in the back of your computer.

The following step is the most difficult in the upgrade. You should be very careful to read and follow the instructions exactly.

[✓] Find U236 near the right side of the mother board. Carefully remove this chip and install it in the socket on the small circuit board. The "U" shaped cutout or small dot marking pin one goes toward the edge of the board. (See Illustration "C")

[✓] Turn the board over so the components are down and insert the pins from the adapter on the board into the empty IC socket from which you removed U236. Once you are sure the pins are lined up correctly with the holes in the socket, press the board firmly into place.

— 5 mhz toward RIGHT

[✓] Route the wires from this board along the right edge of the computer to the rear of the machine. Remove one of the plastic plugs blocking the holes in the back panel of the computer and install the switch panel in the open hole using the screws and nuts supplied. — SEE ERRATA SHEET

(5) Final Testing

[✓] Once again test to be sure that everything working properly. First examine the board you installed to be sure it is seated firmly.

[✓] Place the video board back in position and secure it with the proper screws, and set the keyboard back in position.

[ ] Replace the middle shell of the computer, but do not fasten it down yet.

[ ] On an all-in-one computer, set the disk drive/CRT assembly in place and connect the cable to the video driver board.

[✓] On a low profile computer, attach the cable to your monitor, and set the disk drive assembly back in place, but do not fasten it down.

[✓] Remove any diskettes which may be in the disk drives. Reattach the data and power cables to the floppy disk drive(s).If anything goes wrong with the following test, turn the power off IMMEDIATELY, then resolve the problem before trying it again.

[✓] Turn the power on, then hit the DELETE key to cancel the automatic boot. When you get the hand prompt, type "T" for test then run the memory test for one pass.

[✓] Insert a write-protected bootable disk in floppy disk drive "A". At the hand prompt, type "B" then "F1" to boot from the disk.

[✓] To check whether the drive is operating correctly, use the "DIR" command to get a directory listing.

RAN DIAGNOSTICS - FAILED FLOPPY DISK CONTROLLER TEST
(U33 BAD?)

(6) Final Reassembly

When your computer passes these tests, you are ready to finish reassembly.

[✓] For an all-in-one use the proper screws to fasten down the middle shell of the case and the disk drive assembly.

[✓] For a low-profile, use the proper screws to fasten down the video/disk drive assembly.

[✓] Reinstall the the top cover. Your computer is now ready to use.

LIMITED WARRANTY AND DISCLAIMER

If the Software Wizardry Eight Megahertz Modification is correctly installed according to the instructions in this manual, on systems which already have the Software Wizardry RamPal-100 memory upgrade installed, it will operate as documented in this manual.

If the Software Wizardry Eight Megahertz Modification fails to operate correctly when properly installed due to manufacturing defect, the user should return the defective product to his dealer for repair or replacement (at our option). Providing this return is accomplished within 90 days of the original purchase date, and the fault is verified to be a manufacturing defect, this repair or replacement will be at no charge.

If, in the opinion of Software Wizardry, Inc., the failure was caused by abuse or faulty installation, a small repair fee may be charged.

Under any circumstances, Software Wizardry's liability shall be limited to repair or replacement of the Eight Megahertz Modification or refund of the amount paid to Software Wizardry, Inc. for the Eight Megahertz Modification. In no event will Software Wizardry, Inc. be liable for incidental or consequential damages deemed to be the result of the installation or use of the Eight Megahertz Modification.

This limited warranty gives you specific legal rights and you may also have other rights which vary from state to state.

If you need more information concerning the installation and use of the Eight Megahertz Modification or information about making a warranty claim, please call our technical support line, (314) 946-1968, during business hours (Central Time Zone).

ABOUT THE COMPANY

Software Wizardry, Inc. has been serving the Heath/Zenith community since 1981, and has gained an enviable reputation for producing unique, high quality products. Software Wizardry was awarded a special award for "Outstanding End User Support" by the national Heath User's Group, the only such award ever conferred.

Well-known Software Wizardry products include Palette, the most widely used graphics editor for the Z-100, Zlynk/II, the classic modem communications utility, the P-SST multifunction card for the Z-100, and the RamPal series of memory upgrade kits for the Z-100 and Z-150 series computers.

Software Wizardry is continuing to support the Zenith line of computers, as well as the IBM PC and PC compatible market. Watch for future products continuing our tradition of innovation and high value.

ABOUT YOUR REGISTRATION CARD

Information about our users is valuable to us. It is a Software Wizardry policy to reward our customers who become registered owners. When you send your registration card in, you become eligible for discount coupons on new products. It is to your advantage to send your registration card to us immediately.

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Software Wizardry Eight Megahertz Modification

Errata

Add the following information to the the paragraph on page 9 which begins "Route the wires..."

There are two wires connected to the switch--one to the center lug and one to one side. Mount the switch so that the wire connected to the side lug is toward the left side of the computer as seen from the rear of the machine.

Viewing the system from the rear, when the switch is to the left (the switch is closed) the system will be operating in low speed. With the switch to the right (open) the system operates at high speed.

A convenient way to compare the high speed operation to the low speed is to use the memory test command in the monitor ROM. You will hear a significant difference in the rate of beeping during the test when you run it at the different speeds.