
Micronix Upgrade Kit - Installation Instructions

This pamphlet explains how to install the Micronix upgrade kit. There are two parts to the upgrade, a hardware and a software part. The hardware part consists of adding more memory and a different PROM to your Decision. The software part involves the actual installation of Micronix on your hard disk. Depending on how old your Decision Computer is, you may also need to upgrade some of the boards in your system. You can perform the upgrade yourself, or have Morrow do it.

Your upgrade kit should contain:

- 1) These instructions
- 2) 4.47 PROM for the MPZ-80
- 3) MM256KD (256 DRAM memory board and manual)
- 4) Micronix Manual (a large binder)
- 5) Micronix distribution diskettes

Obviously, you will need to install the new hardware before you can install Micronix. Instructions for installing the additional memory and PROM are provided in the section that follows. You will also need to check the other boards in your system to ascertain that they will work with Micronix. Micronix is interrupt-driven, meaning, your hardware must be able to generate requests for service. CP/M generally waits for hardware to complete input/output before continuing. Micronix doesn't wait, but expects to be interrupted when the hardware is ready.

The version of Micronix included with the upgrade kit is capable of reading and writing 5 1/4" soft sector diskettes. But, before this will work, you must have the correct PROM's for your DJ/DMA floppy disk controller. We'll show you how to check this too.

Installing the Micronix software is a fairly simple process: you use three software commands and insert diskettes as required. The entire installation takes about an hour and a half, and less time if you ever do it again. The first step in installing Micronix is reformatting your hard disk. As you know, formatting a disk erases everything on it. If you want to save any of the files or programs on your hard disk, copy them to diskettes before installing the upgrade.

Micronix has a program, `far`, for copying CP/M diskettes to the Micronix file system, and a CP/M emulator, `upm`, for executing CP/M programs. All you must do is remember to salvage the files that you want from CP/M by copying them to diskette before installing the upgrade kit. Backup your treasured files NOW.

I. Installing the Hardware

This pamphlet was written with non-technically oriented users in mind. You don't need any special tools or skills to install the hardware. However, if working inside your computer intimidates you, ask your dealer (or a friend) to help you. But, unless your boards are very old, you will be able to do everything yourself.

You will need two screwdrivers, a phillips head and one with a small flat blade, and some masking tape (or other sticky tape that you can write on). The phillips head screwdriver is for taking off the cover of the Decision and the flat screwdriver will help you remove the old PROM on the MPZ-80 board. The tape is for labeling cables so everything will go back together easily.

Disconnect the Power

The first and most important step is to disconnect the power from your Decision to make it safe to work in. With the computer and all peripherals turned off, remove the power cord from the back of the Decision. Unplugging the power cord exposes a socket with three prongs in back of the cabinet. With the power cord disconnected, your system is safe to work in.

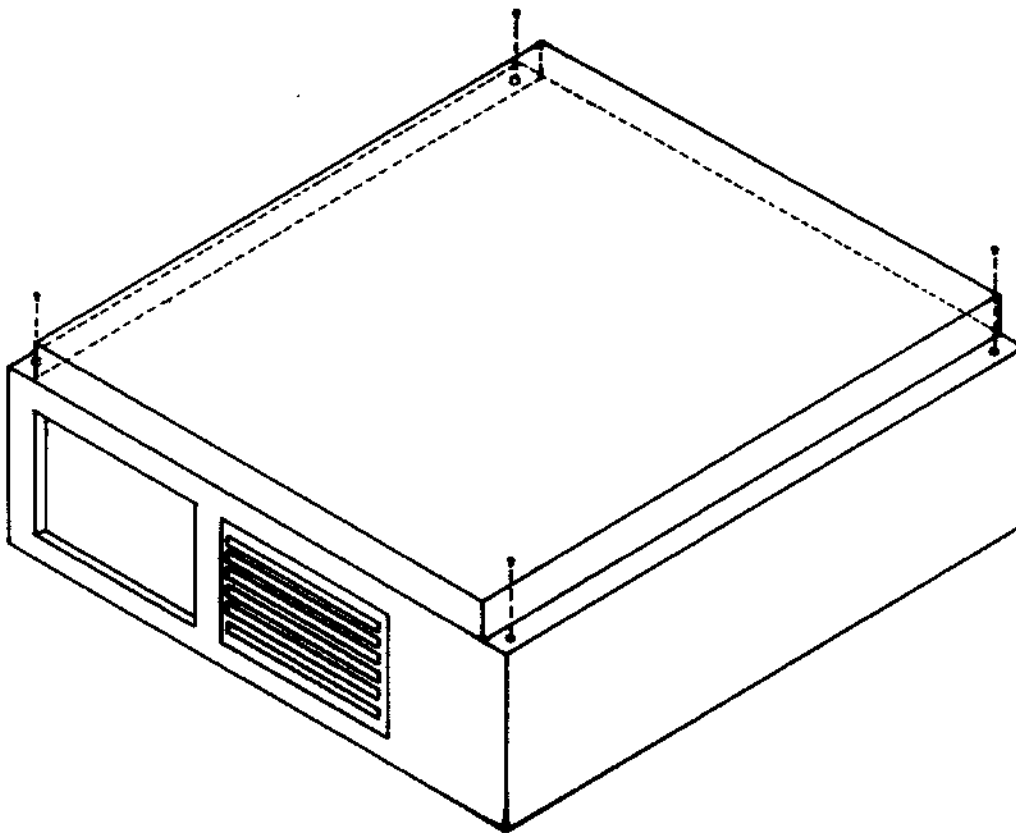
If you have a desktop Decision with a metal cabinet, you will need to turn it upside down to remove the cover. It may be easier to do this if you remove the other connections on the back of the cabinet. You can use the masking tape and a pen to label the various cables and connectors so they will be easy to put back together.

Take the Cover Off

There are several types of Decision cabinets: the metal and plastic desktop models, and the rackmount. We'll start with the desktop models.

If you have a plastic desktop cabinet, there are only two screws holding the top on. Both screws are at the back of the cabinet, at the top. Remove the two screws and put them in a safe place. Slide the cover up and back a little bit, then lift it off.

The metal cabinet of the desktop Decision is attached with four screws. To get at these screws, turn the cabinet upside down. The screws are located two on each side. This is where you'll need the phillips head screwdriver.



Remove the four screws completely and put them in a safe place away from the cabinet. Then, turn the cabinet right side up and slide the cover forward. When the cover is almost completely off, you will need to move it from side to side to get it off completely.

The metal cabinet Decisions have two rails that retain the printed circuit boards. The rails, which cover the ends of the PC boards, are held on with two screws each. Use your trusty screwdriver to remove the screws and rails. Be careful not to drop the screws inside of the cabinet. If you DO drop a screw, make sure that you get it out. If you can't find it, turn the cabinet up on the side opposite to the disk drives and shake it gently until the screw falls out.

Rackmount Decisions have a flat metal sheet attached with six screws on the top. Simply remove the six screws, put them aside, and lift off the cover.

On Removing Boards

Since you will be checking all the boards, you will also need to remove all the cables connecting the boards. It may be possible to remove the boards without removing the cables, but this is so difficult that only a contortionist would attempt the feat. Use the masking tape and pen to label each cable end and connector.

This will make the process of reassembly much easier because you won't need to worry about mis-connecting cables. You can leave the cables attached at the other ends (back of disk drives).

Cables are easiest to remove if you put your index fingers under the cable near the connectors, and lift gently. Try to lift the connectors straight up and off without bending any pins.

All the boards in your computer fit into black sockets in the motherboard, the large board on the bottom of the cabinet, and between pairs of white plastic rails on either side. To remove a board, grasp it near the center of the top and pull up. Unless you forget to remove the retaining rails, the boards should come right out.

HINT: The various pins and wires that stick out of the back of the boards may poke little holes in your fingers while you are pulling the boards out. You can protect your fingers by folding a single piece of paper over the top of the board. This way, the pins make holes in the paper instead of your fingers. This also makes gripping boards easier.

One more thing about removing boards. We are assuming that the only boards in your system are the ones installed in the Decision systems by Morrow: MM65K, MPZ-80, HDC/DMA, Wunderbuss I/O, HDCA, MULT I/O and DJ/DMA boards. If you have other boards in your system, you will need to check them also. Please read the section on Other Boards.

Memory Boards

Decisions have a single MM65K memory board when sold as CP/M systems. This board can be easily identified because it has no connectors along the top edge, and a row of eleven identical large chips across the top. This board is often near the front of the Decision (but doesn't have to be). Remove this board first.

Micronix requires a minimum of 256k of memory, which is supplied by the board that came with the conversion kit, the 256K DRAM. Insert this memory board in one of the slots in the motherboard. The board will only fit into the motherboard one way, the right way. Just be certain the board is plugged all the way into the slot on the motherboard. You can test this by lifting up gently on the board. If it is well seated in the socket, it will resist removal. If it comes out easily, try inserting it again.

Next, you want to change your old memory board so that it fits in as the fifth 64k of memory, that is, have a different address than the 256k memory board. The switches that control the memory's address are located near the left edge of the board and are labeled "SW1". All the switches should be in the ON position, depressed to the right. Turn switch 3 OFF, and leave all the others on. This makes this board respond to addresses in the fifth 64k, right after the 256K DRAM board.

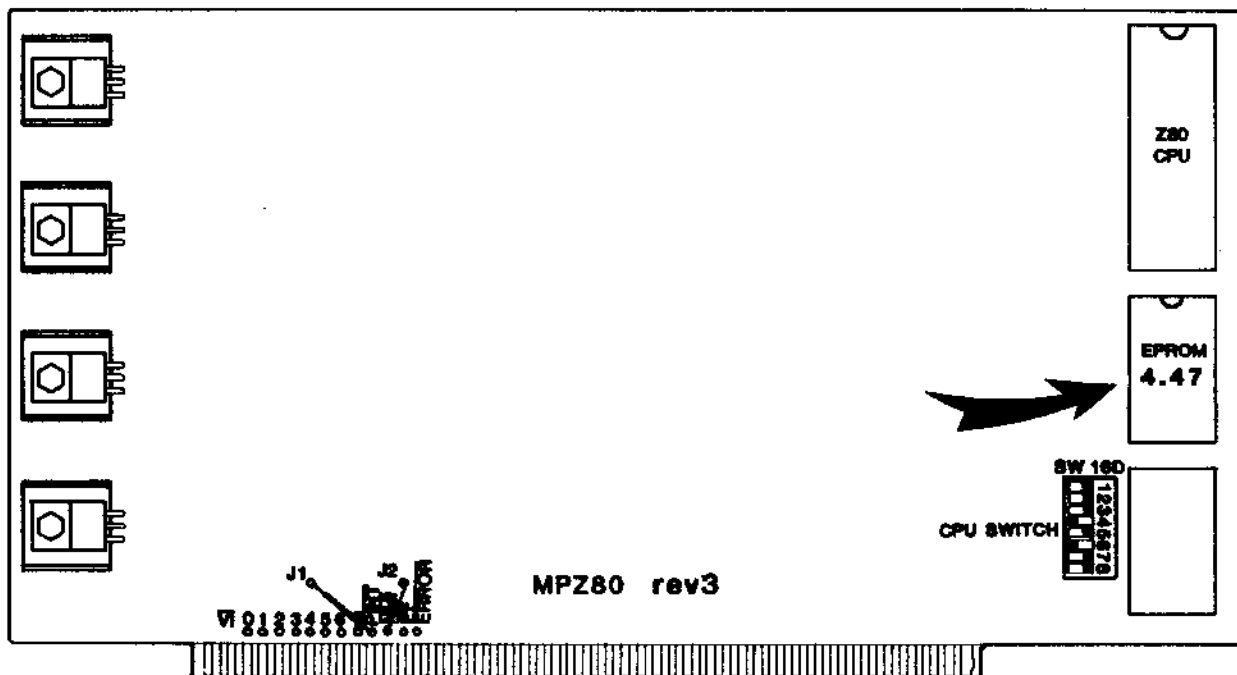
Technical Note: Switches 1 to 8 represent address lines 16 through 23. Turning the switch OFF sets a match for a one on the address line; ON matches a zero. Switch 3 off, and the rest on, is equivalent to 100, or 4 binary, for the fifth 64k of ram (counting from 0 to 4). If you wanted to set the board to be the ninth 64k, you would turn OFF switch 4, and leave the rest ON, for 1000.

MPZ-80 CPU Board

The MPZ-80 board can be distinguished by the large chip in the upper right hand corner. This chip is labeled D780C, and is the Z-80 processor chip. Just below this chip is the PROM chip that you need to change. This chip is about half the size of the Z-80 chip, and has a paper label on it. If you have a recent D120 system, this chip is labeled 3.75, and it is designed for running CP/M. The PROM chip labeled 4.47, that came with your upgrade kit, will replace the old PROM chip.

Removing and replacing chips requires a gentle touch. The pins, the little silver legs, of the chip can be bent and broken off if you are not careful. To remove the old PROM chip, use a flat tipped screwdriver, or the small blade of a knife, to pry the old chip up and out. Slide the screwdriver under one of the narrow ends of the chip, and pry it out halfway. Then, working from the other end, pry the chip out the rest of the way.

Now, take a look at the new (4.47) PROM. Notice that there is a notch in one of the narrow ends of the PROM. This notch is used to orient the PROM correctly when you install it. Look at the other chips on the processor board, and you can see that they all have notches oriented to the top of the board. You want to insert the PROM so that its notch is also pointed toward the top of the board.



To insert the new PROM, with the notch oriented toward the top of the board, line up the pins on one side of the PROM with the row of pin sockets and insert the pins partway. Then, lineup the other row of pins with their sockets and insert them partway. The rows of pins usually tend to be bent away from each other slightly, so inserting the second row of pins will require you to push the chip against the first row of pins until the second row can be inserted in the socket.

When you are certain that the pins are all started in their sockets, press on the top of the chip until it is firmly seated. After the chip is in place, examine it carefully to be sure all the pins are in sockets, and that no pins have been bent over or have missed their sockets. If you bend a pin, you can remove the chip, straighten the pin and try to reinsert the chip. Pins are fragile and can only stand a little bit of bending before you break them off, so be careful, please.

There is another thing to check while you are working with the MPZ-80 board. If you have set the board to boot from the hard disk automatically, you must change switches on the MPZ-80 board (and the DJ/DMA) to enable a floppy disk boot (for initialization of the hard disk with Micronix). The switch to check is located just to the left of the PROM. All of the switches should be on, except for switches 4 and 6, which should be off.

One last thing to check. Your MPZ-80 board should have a revision level of 2A or 3. The revision level may be printed on the board near the lower edge, and is sometimes covered by a paper sticker used by the inspecting technician. Look in the middle of the bottom of the board for words saying:

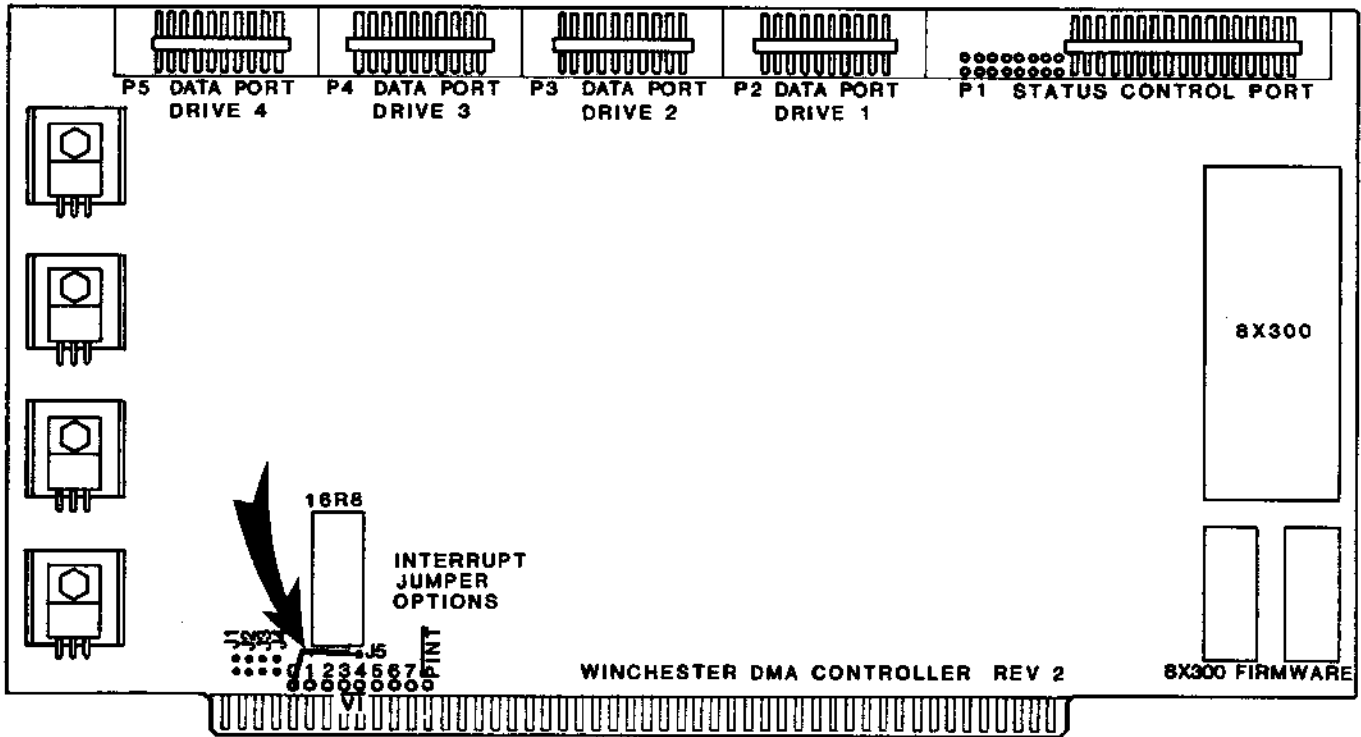
MPZ80 rev3

If you have an older revision of the board, it may need to be upgraded before it can operate with Micronix. (Some revision 2 boards have been upgraded without changing the revision level label). Wait until after trying to install Micronix before calling Morrow Customer Service about your upgrade problems.

HDC/DMA Hard Disk Controller Board

The HDC/DMA board probably doesn't need any changes. However, we would like you to check it to make certain that it is set up for interrupts. (If you have a HDCA controller board, please read the section on HDCA Boards.) The HDC/DMA board can be identified by the five connectors across its top. Four of the connectors are groups of twenty brass pins each. The fifth, and rightmost, is 34 brass pins. Please remove the board so you can see its lower edge.

The HDC/DMA is setup for interrupts by having a little wire soldered onto the board in the lower left hand corner. With the board out of the computer, examine the region near the gold fingers on the left hand side. There is a "J5" printed here, and the numbers from 0 to 7 printed right below this.

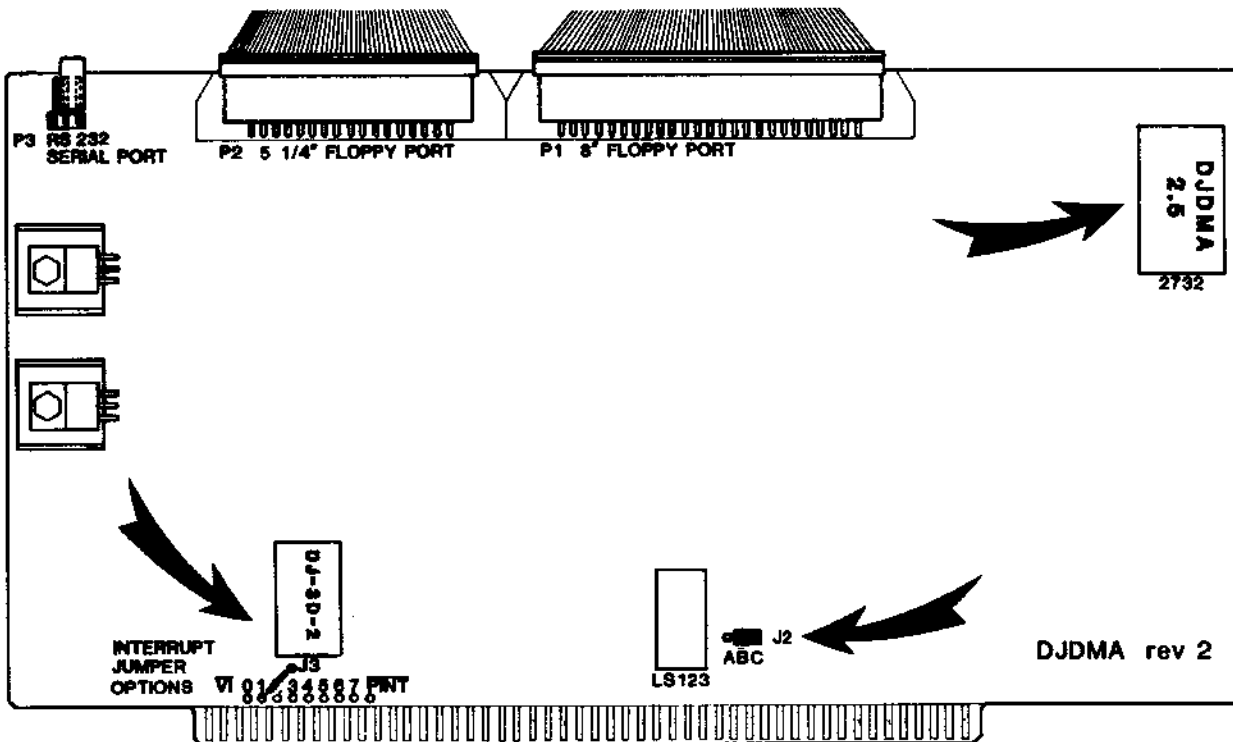


There should be a wire connecting the point labeled J5 and the point labeled 0. This wire connects interrupt requests from the HDC/DMA controller to vectored interrupt line 0. If this wire isn't here, you will need to install it. The wire must be soldered in place, and be insulated except at the ends. If you aren't an expert solderer, have a skilled friend (or technician) do it for you.

DJ/DMA Floppy Disk Controller Board

The DJ/DMA board has two connectors on its top edge. The left hand connector has 34 pins (for 5 1/4" floppy drives) and the connector on the right has 50 pins. Like the HDC/DMA board, the DJ/DMA must be capable of signaling interrupts. You may also need to change this board so that your system will boot from floppies. And finally, you want to check to see if you have PROMs that enable the board to read and write soft-sectored 5 1/4" floppies.

The wire for signaling interrupts is in the same region as it was for the HDC/DMA boards. Look in the lower left corner of the board, near the gold fingers, and you will see a point labeled J3 and the row of numbers from 0 - 7.



There should be a wire connecting the point labeled J3 with the point labeled 1. If there isn't a wire there, you will need to solder an insulated wire between these two points. This wire connects the interrupt signal from the DJ/DMA to vectored interrupt 1.

To change the DJ/DMA board so that it will boot, you may need change the jumper connection at J2. J2 is located in the middle of the lower edge of the board. There are three pins here, labeled A, B and C. A black plastic slider should be pushed on pins B and C. If the slider is on pins A and B, take it off and slide it over pins B and C.

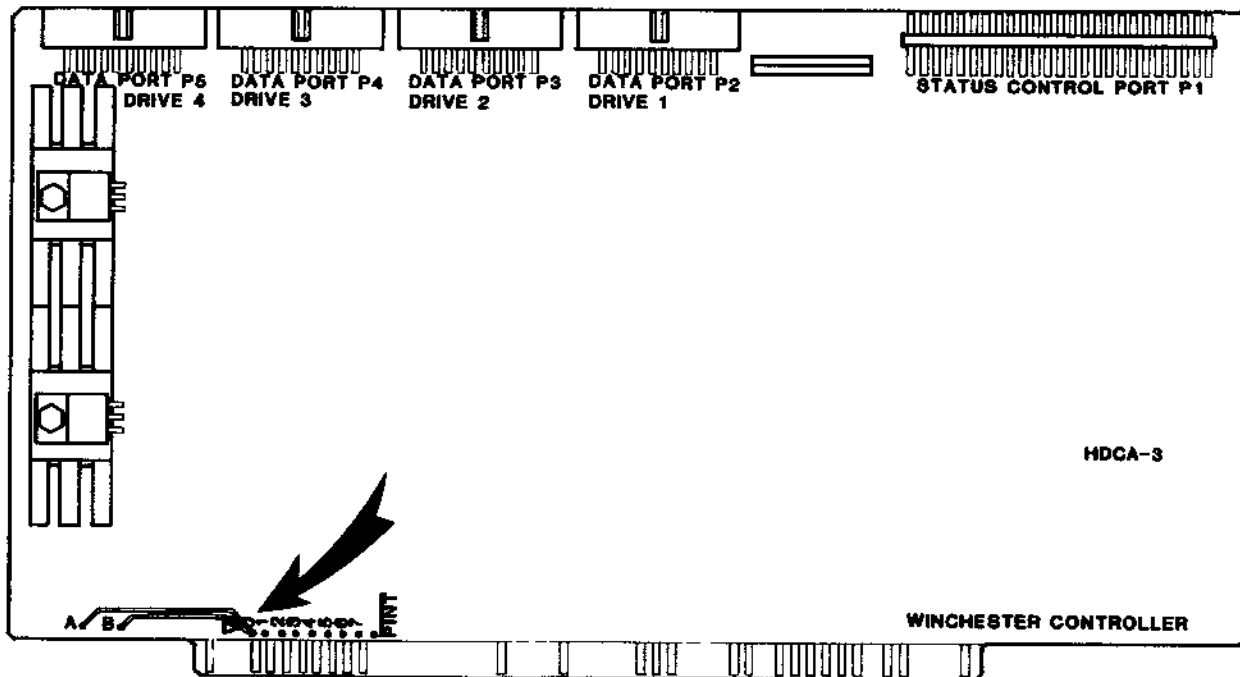
The final point to check is the PROMs on the controller. In the upper right hand corner of the board is a large chip with a paper label attached to it. This label should be labeled DJ/DMA 2.5 (or greater). If this chip is labeled 2.0, or something less than 2.5, you will want to order 2.5 Update PROMs for the DJ/DMA.

There is a second PROM involved, down near the interrupt connection region of the board. This much smaller PROM should be labeled DJDMA 2X or DJ-3D-2. If you are missing this PROM, you will be unable to read or write soft-sectored 5 1/4" floppy diskettes with Micronix (or CP/M for that matter).

HDCA Hard Disk Controller Board

The top edge of the HDCA hard disk controller board resembles the top of the HDC/DMA board: there are four groups of 20 brass pins, and 1 group of 50 pins. The HDCA hard disk controller works with 8 and 14 inch hard disks, whereas the HDC/DMA controls 5 1/4" hard disks. If you have an HDCA controller, it must be capable of generating interrupts.

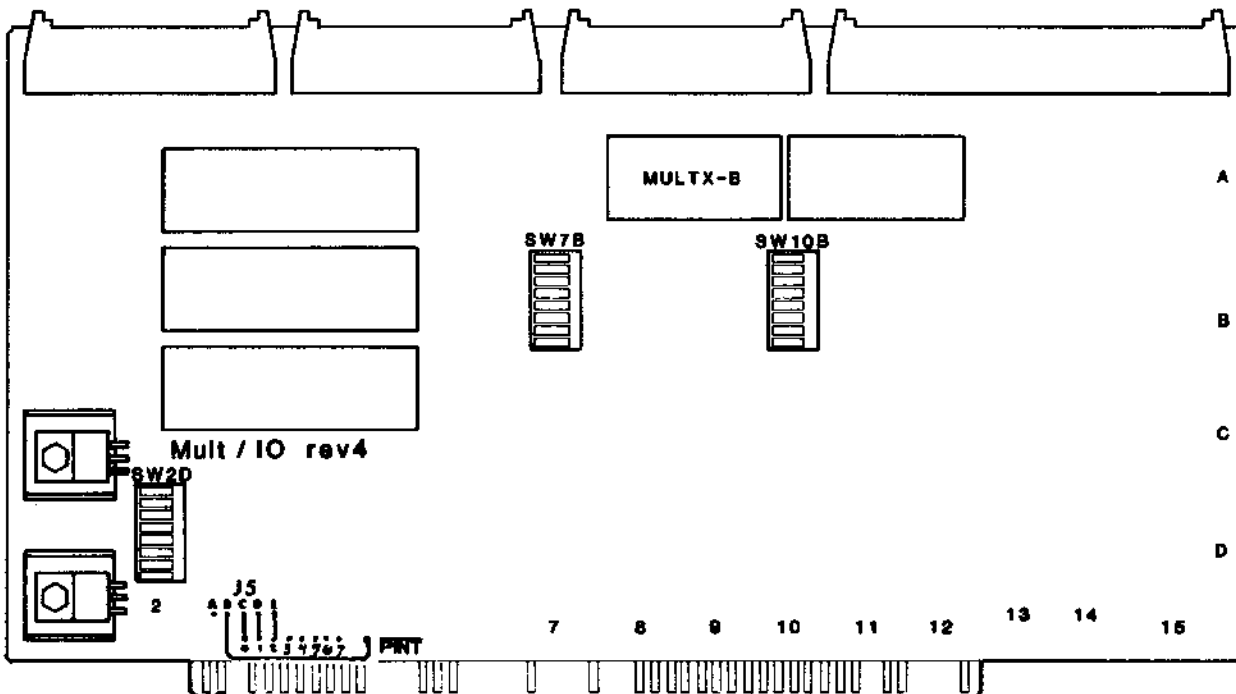
The HDCA is setup to signal interrupts in the lower left hand corner of the board. There are two points, labeled A and B, near the left edge of the board and a row of points labeled /VI 0 through 7 and /PINT. The points A and B should be connected together by a wire, and an insulated wire should run from point B to the point labeled 0.



MULT I/O Boards

Rackmounted systems probably use the MULT I/O board for serial communications and interrupt handling. (Desktop Decisions use the Wunderbuss I/O, which has permanent connections for interrupts. If you have a desktop Decision, you can skip this section.) We'd like you to check your MULT I/O board for the proper connections for signaling interrupts.

The MULT I/O collects interrupt requests from the bus and from the serial ports and generates interrupt requests for the Z-80. These requests are transmitted to the bus line /PINT by a wire down in the lower left hand corner of the board that connects a point labeled B and the point labeled /PINT.



With this wire in place, your MULT I/O can transmit interrupt requests to the MPZ-80 board. When the MPZ-80 acknowledges the interrupt, the MULT I/O provides the address of the service routine. This is enabled by having a slide jumper connecting the pins B and C at J4. If your board has these jumpers, you are ready for Micronix.

Other Boards

You may possibly have other S-100 boards in your Decision besides the boards that we have listed here. Some boards, for example, memory boards, will require changes in configuration. Other boards, in particular, those that are I/O or memory mapped, will require changes in the drivers that control these boards.

If you have have other memory boards in your Decision, you must reconfigure them so that they won't interfere with the 256K DRAM board that you are adding. If your non-Morrow memory board cannot handle extended addressing, you won't be able to use it with Micronix.

Memory and I/O mapped boards present a different problem. Micronix is a multi-user environment and must carefully control all direct access to memory or I/O. Without this control, more than one user could access the same printer or device simultaneously, mixing output (or input) in a random fashion. Micronix prevents this by having the MPZ-80 board trap non-system attempts to access I/O or memory. What this means is that your old software for your video board or your intelligent modem won't run under Micronix.

There is a way to modify the old software so that it is Micronix compatible. You will need to make system calls to the /dev/io and /dev/mem devices. Please read the sections in the Reference Manual about System Calls and Devices.

II. Putting it all Back Together

By now you have checked and/or modified all the boards in your Decision. All that is left to do is to reconnect the cables and put the cover back on. If you followed our suggestion and labeled all your cables, putting them back on should be a simple matter.

Here are some more points that will aid you in reinstalling cables (including information about all Decision models):

The red stripe on the cables will always be on the right when looking at the front (component side) of the disk controller boards (HDC/DMA, DJ/DMA and HDCA).

The cables will extend out across the back of the disk controller boards, without being folded across the tops of the connectors. If you have oriented the red stripe to the right, this will be true anyway.

The cable that connects the DJ/DMA to the floppy disk drive connector will extend across and down the back of the drive (as opposed to extending up and away from the drive). The red stripe on the cable will be on the right hand side, when looking from the front of the drive, across its top.

The cables that connect the 5 1/4" hard disk extend up and across the back of the drive. The red stripes are on the LEFT side when viewed from the front of the drive.

The cables that connect 8 and 14 inch hard disks will extend down across the back of the drive cabinet, and the red stripe will be on the right when viewed from the front of the cabinet.

The cables between serial ports on the MULT I/O and back panel connectors will have the red stripe on the left when viewed from the front (component side) of the PC board.

Once you are certain your cables are connected properly, and all boards are snugly fitted in place (the tops of the boards extend the same distance above the card cage), you should reinstall the cover. For desktop Decisions with metal cabinets, you should also install the rails that retain the PC boards.

You should never operate the Decision without the cover on. Leaving the cover off prevents the fan from cooling the boards properly, and exposes electrical hazards within the cabinet. After you have installed the cover, you may reconnect the power cord, and any other cables you have disconnected from the back of the cabinet.

III. Installing the Software: Micronix

The Micronix User's Guide goes into much detail explaining how to install Micronix on your system, so we won't be repeating the explanations here. Instructions for Installing Micronix on the Hard Disk make up chapter 3 of the section labeled INSTALLATION in the big binder. Basicly, you will be

1. Reformatting your hard disk (remember to backup first!),
2. Using Standalone Micronix to build a skeletal system, and
3. Adding the rest of Micronix to the hard disk.

When you are finished, you should acquaint yourself with Micronix, using the First Time section of the Users Guide, and start reading the Maintenance and Administration Section of the manual. You will find out how to copy your CP/M diskettes to Micronix in the Maintenance Section.

If your system doesn't seem to work with Micronix, you may need to upgrade some boards. Contact Morrow Customer Service.

IV. Upgrade Installation Checklist

- [] Remove power supply cord; remove cover; label cables and remove from boards.
- [] Remove MM65K memory board; change SW1, switch 3 to OFF; replace board.
- [] Insert 256k DRAM memory board.
- [] Remove MPZ-80 board; remove 2732 EPROM and replace with EPROM labeled 4.47; make sure that CPU switch 5 is on and switch 4 is off.
- [] Check for proper interrupt jumper connections on HDC/DMA or HDCA boards (/VI 0), DJ/DMA board (/VI 1) and MULT I/O (/PINT).
- [] Check EPROM on DJ/DMA for revision 2.5.
- [] Reinstall cables, cover and power cord.
- [] Install Micronix software (Chapter 3 of Installation section).