

# Construction Guide

# Horizon 4000 Ramdisk

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Toledo OH 43614  
USA**

## THE HORIZON 4000 RAMDISK

This version of the HORIZON RAMDISK is basically the same as the preceeding versions that use the 32k x 8 or 128k x 8 memory chips, (HRD+, HRD2000 and HRD3000). This card replaces the HRD3000 card and has been redesigned to allow the use of the 128k x 8 Memory chips OR the newer 512k x8 Memories. All previous changes have have been included to improve the ramdisk reliability. The first change is in the POWER-UP circuit to utilize the Console "RESET" line under control of the switch at the top back edge of the card to allow you to "TURN-OFF" or HIDE the RAMDISK. Very help-ful if a lock-up should occur or if you are experimenting with a program that can (or has) crashed the RAMDISK.

We have added 4 more Memory sockets (16 total) to increase the "single layer" capacity to 2 meg using 128k x 8 memory. Random Access Memory Block Operator (RAMBO by OPA) has been built into the 4000 Ramdisk and can be activated by formatting the Ramdisk smaller than the total size available. The remaining space is then available for RAMBO program use.

The TI 32k Memory card may be replaced by merely plugging in a 32kx8 memory in socket M32 AND a 74LS08 in U11. This memory is separate from the ramdisk and is not affected by the "HIDE" switch.

This feature may be de-activated by removing the two chips.

The PHOENIX modification that allows the Horizon to be used as TWO seperate Ramdisks on the same board is also "built in" (requires ROS chip change to a 32k x 8 and a simple jumper change. See FIGURE 7.

The HORIZON 4000 RAMDISK set up to accomodate the newer 128k x 8 Memory chips that require 32 pin sockets. We have even included the option for the 512k x 8 Memories.

The card is optioned by installing 12 jumper blocks when assembling the RAMDISK. The option for the 128k x 8 is Figure 7. The options for the 512k x 8 are Figure 7. The option for the PHOENIX are shown in Figure 7. NOTE: The card may be optioned for ONE size of memory chip. If you initially build the card using the 128k x 8 chips and later decide to change to the larger 512k x 8 chips, you can change the option jumpers and REPLACE the 128x8 with the 512k x 8 chips. We CAN NOT intermix the 128k x8 with the 512k x8 due to the addressing of the memory blocks. A smaller memory size 32k or 128k may be plugged into the next available socket and it will be counted and may be used BUT that use is not guaranteed.

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*
* The CONSUMER assumes full risk and liability for
* direct or consequential damages arising from
* attempted construction of the Horizon 4000.
*
* EXCLUSION OF WARRANTIES: The HORIZON RAMDISK circuit
* board is provided on an AS IS basis. No warranty of
* any kind is assumed by Horizon Computer, Limited.
* The user assumes full responsibility for quality of
* all parts associated with construction of the HORIZON
* 4000 RAMDISK. BUD MILLS SERVICES does not recommend
* or endorse the quality of parts sold by any other
* party. In any case, BUD MILLS SERVICES shall be
* liable only for the cost of the circuit board,
* associated manuals, disk based software, and, or parts,
* only if purchased from BUD MILLS SERVICES.
*
* Fully constructed HORIZON 4000 RAMDISKS are available
* with a 90 day limited warrenty for an additional cost
* covering parts and labor. Contact BUD MILLS
* SERVICES for current list of Dealers or Builders.
*
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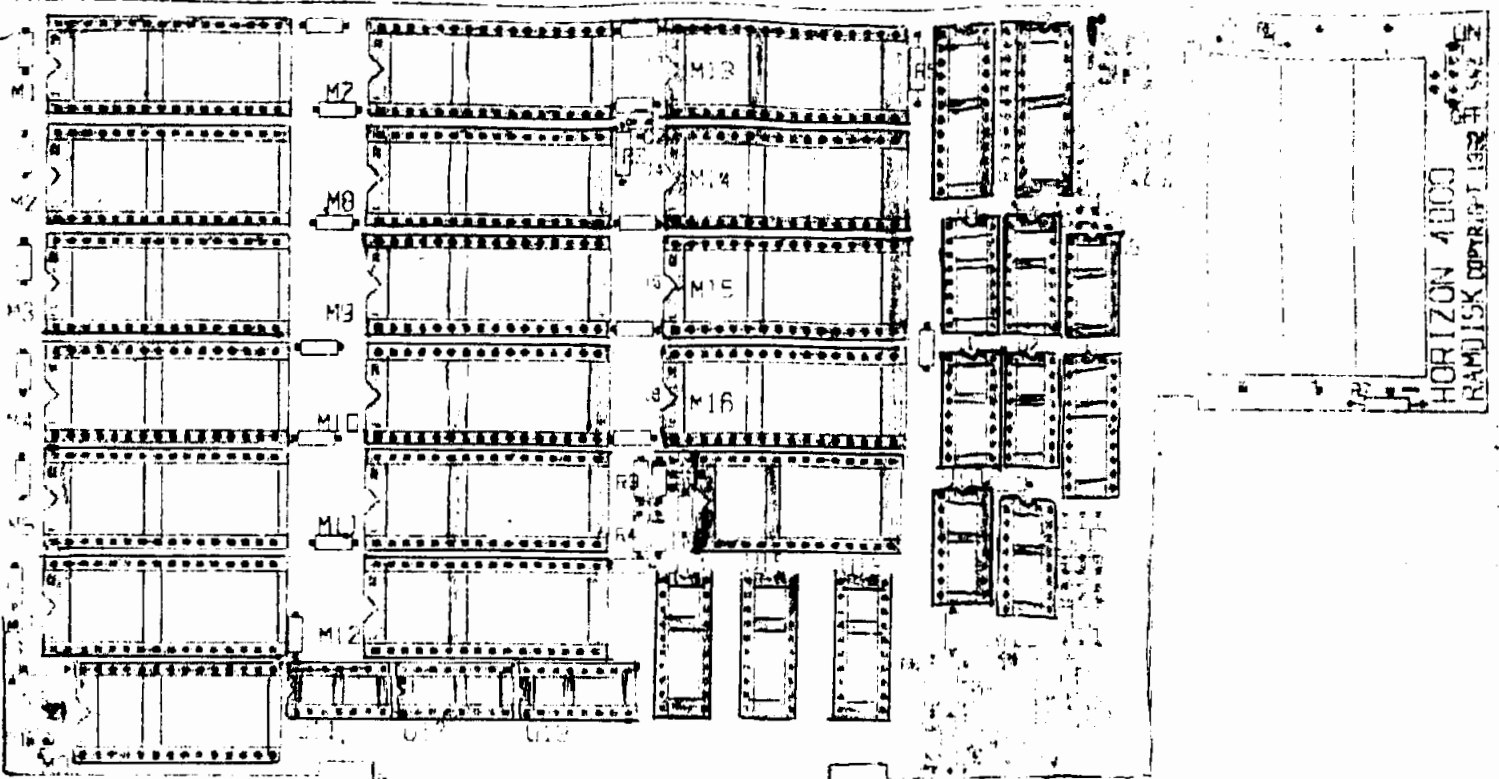
Prior familiarity with construction of digital circuits is assumed. Read all construction suggestions and notes provided with the eight figures before proceeding. The following eleven pages show progressive stages in completion of the HORIZON 4000 RAMDISK. If you encounter a problem or have a question at any step DO NOT PROCEED UNTIL THE PROBLEM IS RESOLVED. If you have any questions contact: Bud Mills at (419) 385-5946.

Although static can be a problem with CMOS devices (i.e. the 6264LP-15's) we have not seen a single case of IC damage under ordinary handling procedures; nor have we seen problems do to excessive heat. While you may decide to take precautions against excessive static and heat transfer, remember that it is equally important THAT ALL SOLDER CONNECTIONS ARE OF GOOD INTEGRITY.

Use a low wattage (about 25 watts) SOLDERING PENCIL and fine 60:40 tinlead solder. DO NOT USE a soldering gun or acid core solder! Make sure that sufficient solder is supplied to all connections with good wet-out, but that there are no solder bridges between connections. Upon completion of all soldering, remove flux from the solder side of the board with a commercial flux remover or you can use the old fashioned 91% rubbing alcohol and an old toothbrush (works better).

When inserting IC's bend the pins to fit the socket by placing the IC on its side on a flat surface. Bend the pins against the surface by moving the body of the IC. Make sure all pins are properly aligned with the socket holes and that all pins actually go into the socket holes upon insertion.

FIGURE 1



### THE IC SOCKETS

This requires 2 - 28 pin IC sockets, 16-32 pin sockets, 2-24 pin narrow sockets, 4-20 pin sockets, 8-16 pin sockets and 2-14 pin sockets. Put them in the board with the notch matching the notch on the painted socket lines and solder them in. It usually works best to place a piece of rigid cardboard over the top of the sockets and the CAREFULLY FLIP the board into position and begin soldering. I tack the opposite corner pins before removing the cardboard. I can then go back and adjust any socket that is not fully seated by reheating the appropriate pin. Proceed to solder ALL the remaining pins. Remember, TOO much solder may fill the socket and render it useless or may create a solder bridge on the top side of the board under the socket. This is tedious work and care must be taken not to bridge to adjacent pads or lines. If any bridges are created the board will crash in testing.

NOTE: The 32 pin sockets may not be available at your stores, however you can cut down 40 pin sockets to size.

A good solder connection will look like this



Too much solder can fill and/or short under the socket like this



A pear shape blob may not make contact with the board

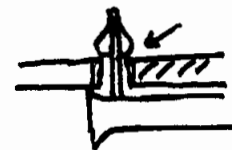
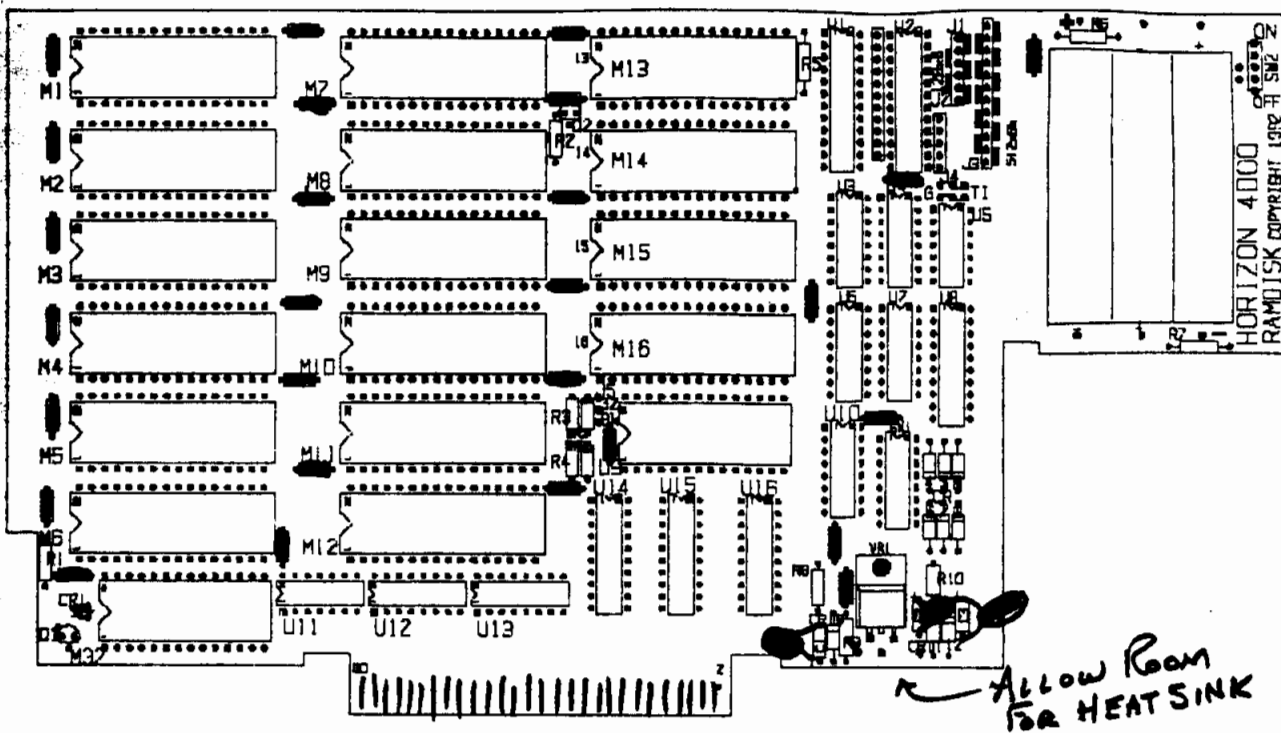


FIGURE 2



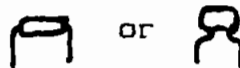
THE CAPACITORS

This requires 27 - .1 uf capacitors with .2 inch lead spacing. Insert them in C4, and C5 thru C30. Insert 3 - 10uf tantalums with + polarity facing the marked direction on the board in C1, C2 and C3. NOTE: Capacitors C5 thru C30 are not numbered.

10uf  
tantalum



.1 or .01uf  
ceramic



PARTS LIST FOR HRD+ RAMDISK

Quan. Part Description.

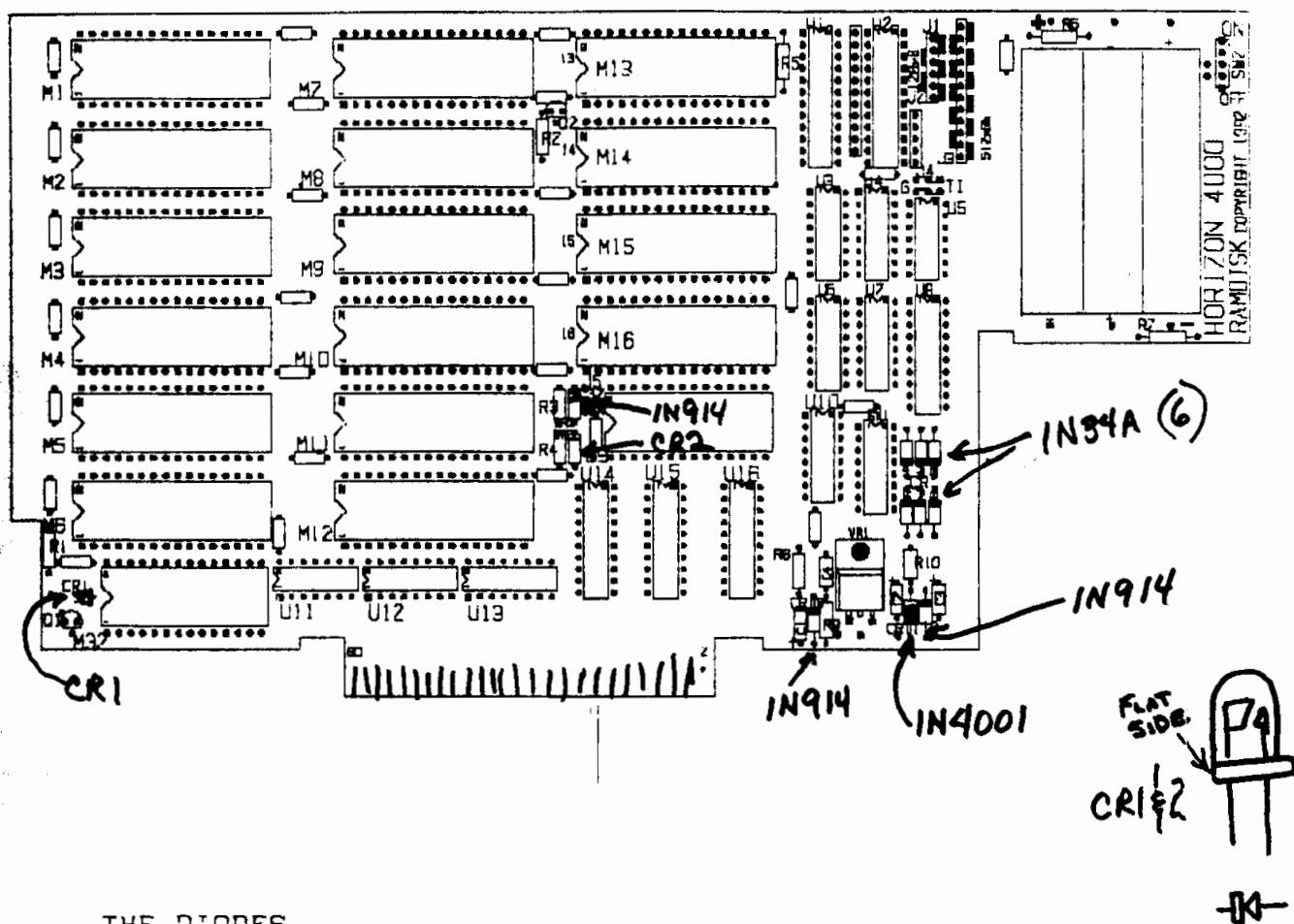
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1	7805 Voltage Regulator
1	74HC154 ( see note 1 below )
1	74LS00
1	74LS08 for the 32k memory card option.
3	74LS138
1	74LS139
1	74LS156
1	74LS241
2	74LS244
1	74LS245
2	74LS259
1	6264LP-12 for the ROS chip
1	HM62256LP-12 or D43256-12L for the 32K option if desired
->	HM628128LP/10 (see note 2) for 128x8K or 512x8k HM66205L12
2	14 pin socket
8	16 " "
4	20 " "
2	24 " " narrow .300
2	28 " "
16	32 " " (or cut down 40 pin)
2	PN2222 Transistor
6	1N34A Diode (radio shack)
3	1N914 Diode
1	1N4001 to 1N4004 Diode
1	LED ( Green ) <del>OR</del> RED
1	LED ( Red )
1	DIP Switch 8 position
3	NiCad AAA Battery
3	AAA Battery Holders
1	470 ohm Resistor
6	2.2k or 2.7k Resistor
1	100 or 150 ohm resistor
2	33 ohm Resistor
3	10uf Tantalum Capacitors
27	.1 or .01uf Capacitors ( these may be Ceramic or Glass )
1	Heat Sink for the Regulator
1	Single inline Header strip (36 pos or equiv)
19	.1 shorting blocks

Note 1: One 74HC154N will support 2meg of 128x8K Memory. A second 74HC154N will be needed for 2Meg to 4MEG. This chip must be the .300 "J" package.

Note 2: The Hitachi HM628128LP12 and the NEC 431000 12L are "equivalent". Each of these chips provide 128k of Memory in our circuit. The size that you want to build will determine the number of chips to obtain; 3x128=384k, 6x128=768k, 8x128=1MEG, 16x128=2MEG The Hitachi HM66205 LP12 is a 512Kx8 memory and requires the 32 pin socket. Equivalent and also more expensive is the Hitachi HM628512 LP12 (The 512x8K chips may be harder to locate at the present time.) FOR PHEONIX ONLY IF you are building a PHEONIX, the option jumper J3 should be placed horizontal to J1. The J4 jumper blocks should be set for the system you will be using ( T for TI or G for Geneve ). The ROS chip M17 must be a 32K x8 memory for PHOENIX operation. Set the J5 jumper to the 32 position to properly bias the memory.

FIGURE 3



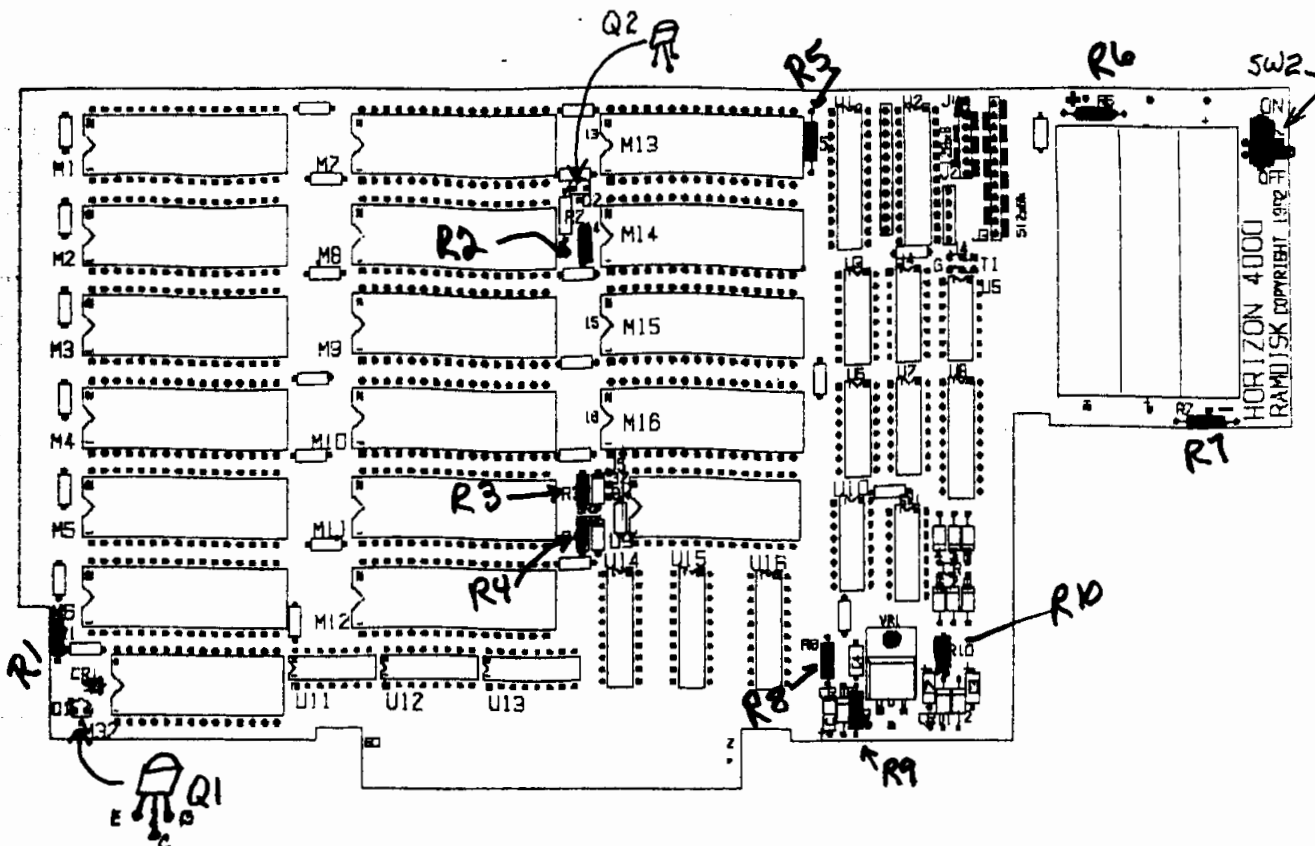
THE DIODES

Refer to Figure 3 for diode placement. Three diode types are shown: CR2, CR10, and CR12 are 1N914 silicon diodes; CR4, CR5, CR6, CR7, CR8, + CR9 are 1N34A germanium diodes; and CR11 is a 1N4001 rectifier diode. Although similar in appearance, the 1N914 silicon diodes are smaller than the 1N34A germanium diodes.

Diodes are polar. In the  $\rightarrow$  notation the arrow points toward the cathode (-). Silicon and germanium diodes have a black or blue band on one end to indicate the cathode (-) lead. The rectifier diode will likely be black with a silver cathode band. Make sure the components you are working with are banded (glass bypass capacitors look similar but are not banded), and make sure you orient each diode with the cathode band in the direction shown in Figure 3.

Next install the 2 Light Emitting Diodes (LED's). CR3 must be green, **RED** or yellow. CR1 may be any color of LED. LED's have polarity, and the cathode (-) of those you are using will be indicated by a flat side on the LED body or the shorter of the two leads. Orient the LED's as shown in the inset. CR1 should be installed so that the lens points toward the front of the card but does not extend past the card edge. CR3 should be positioned so it may be seen from the top of the card.

FIGURE 4



THE RESISTORS

Mount resistors R1 - R7 as shown. Although resistors have no polarity, you may orient them so that the color codes can be read from left to right. Resistor values and corresponding color codes are as follows:

- R1 = 150 or 100                      brown-green-brown or brown-black-brown
- R2, R3, R4 = 2.2K or 2.7K        red-red-red or red-violet-red
- R5 = 470                                yellow-violet-brown
- R6, R7 = 33                            orange-orange-black
- R8, R9, R10 = 2.2K or 2.7K        red-red-red or red-violet-red

Install the PN2222 transistors Q1 Q2. From the top starting with the tab and going counter clockwise the three pins of Q1 are emitter, base, and collector (E B and C). Solder the leads so that the case stands about 1/4" above the surface of the board.

Take the Mini Switch and insert in SW 2 at the top of the card.

The "Option" headers

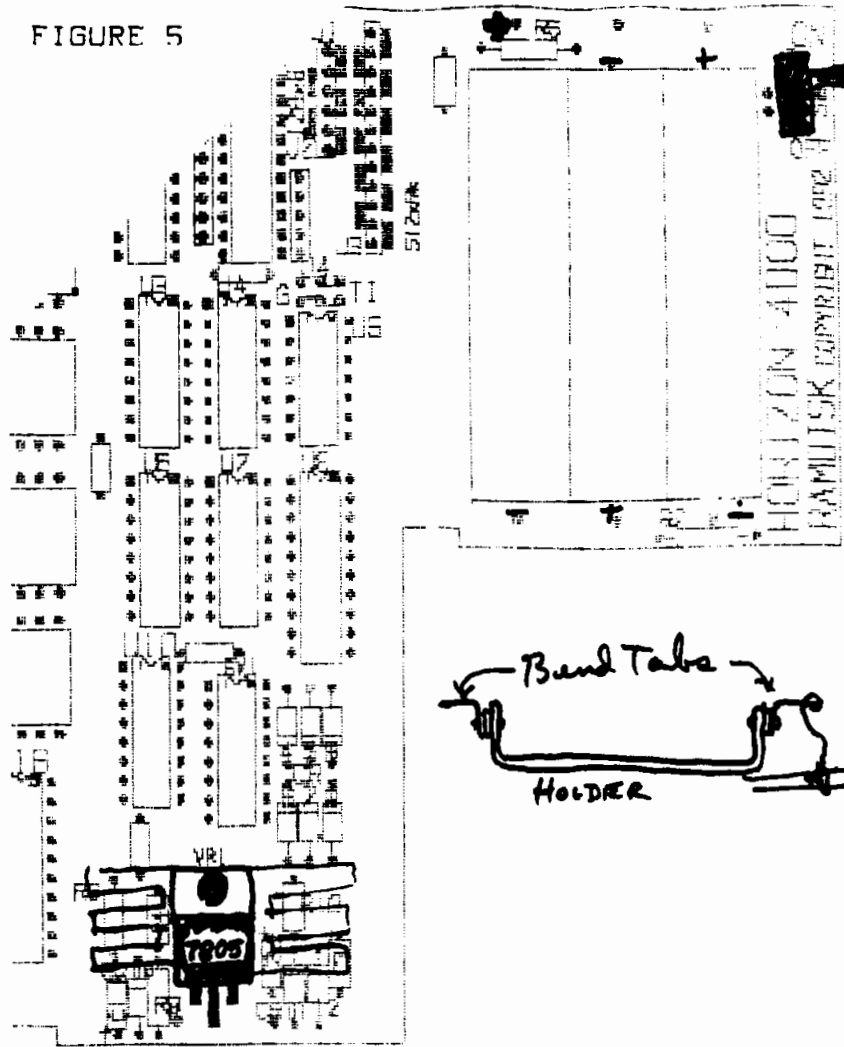
Take the strip of pins and separate them into; 1 strip of 12, 1 of 7, 3 of 3 and 1 single, pins to be used as Option headers.

- Insert and solder in a 3 pin in line strip in 3 holes by CR2
- Insert 2 3pin in line strips in the 6 holes above U5
- Insert 1 7 pin in line strip in the J1
- Insert 1 16 pin in line strip in the J3
- Insert 1 single pin in the J2 hole by U2

Jumper blocks will be plugged in later onto these pins.



FIGURE 5



### THE POWER OPTIONS

Lightly sand the underside of each battery holder to promote adhesion. Bend the solder tabs on each battery holder so they are parallel with the surface of the board. Observing correct polarity, with batteries in place, use double sided (foam core) sticky tape or use super glue gel or five minute epoxy to cement the holders to the board surface. Leave space between the holders as shown. When the cement has set, use short lengths of wire to connect the holders to the board. Make sure the batteries are installed correctly observing the correct polarity as marked on the board.

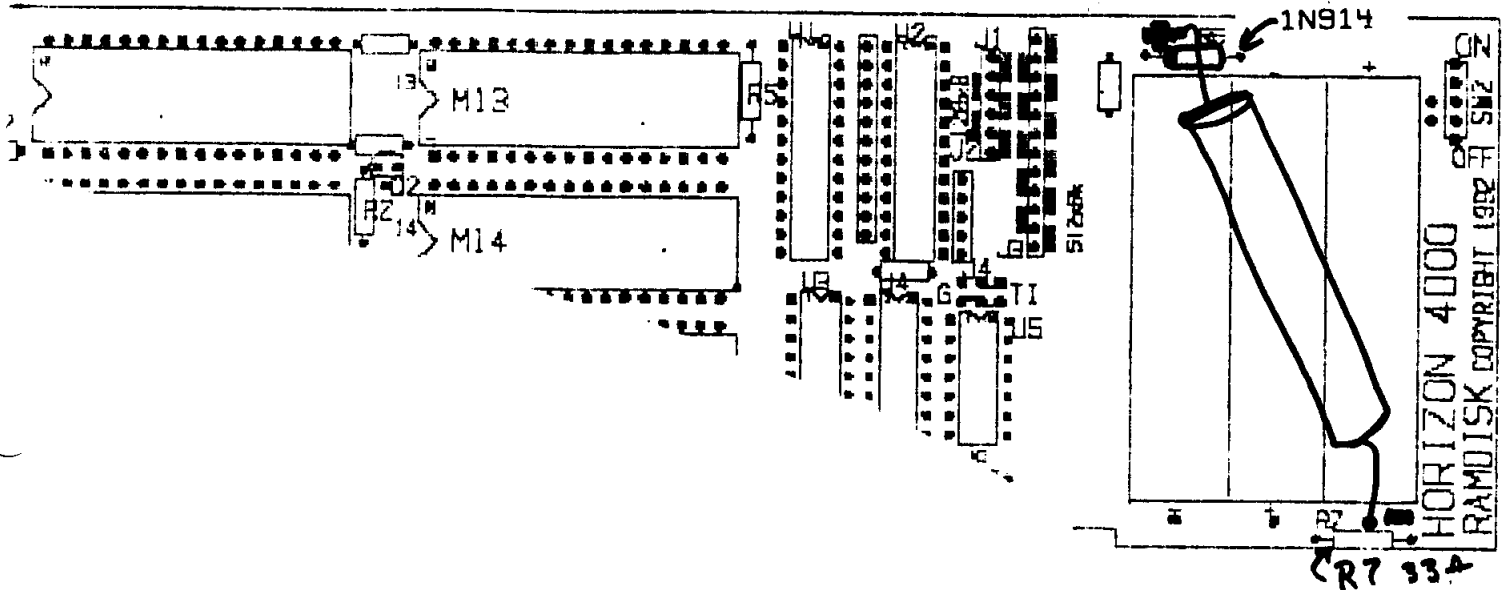
Solder a 33 ohm resistor, R6 (orange orange black) to the board.  
Solder a 33 ohm resistor, R7 (orange orange black) to the board.

Solder the 7805 voltage regulator in place making sure that the hole in the tab lines up with the hole in the board. Install a heat sink on top of the tab with a 6-32 1/4" machine screw and nut.

We normally supply and recommend AAA NiCad Rechargeable batteries, (they are good for 5 - 10 years) however, you could use regular AAA DRY batteries with a protective 1N914 diode instead of R5. The 4.5v Lithium Cell is also acceptable with a protective diode (should last 5 to 10 years). the REGULAR batteries may last up to a year before they have to be replaced. CAUTION you MUST use a protective diode with the REGULAR or LITHIUM BATTERIES...

Do not use the diode on the NiCad Batteries ( inhibits charging ).

LITHIUM BATTERY  
INSTALLATION  
FIGURE



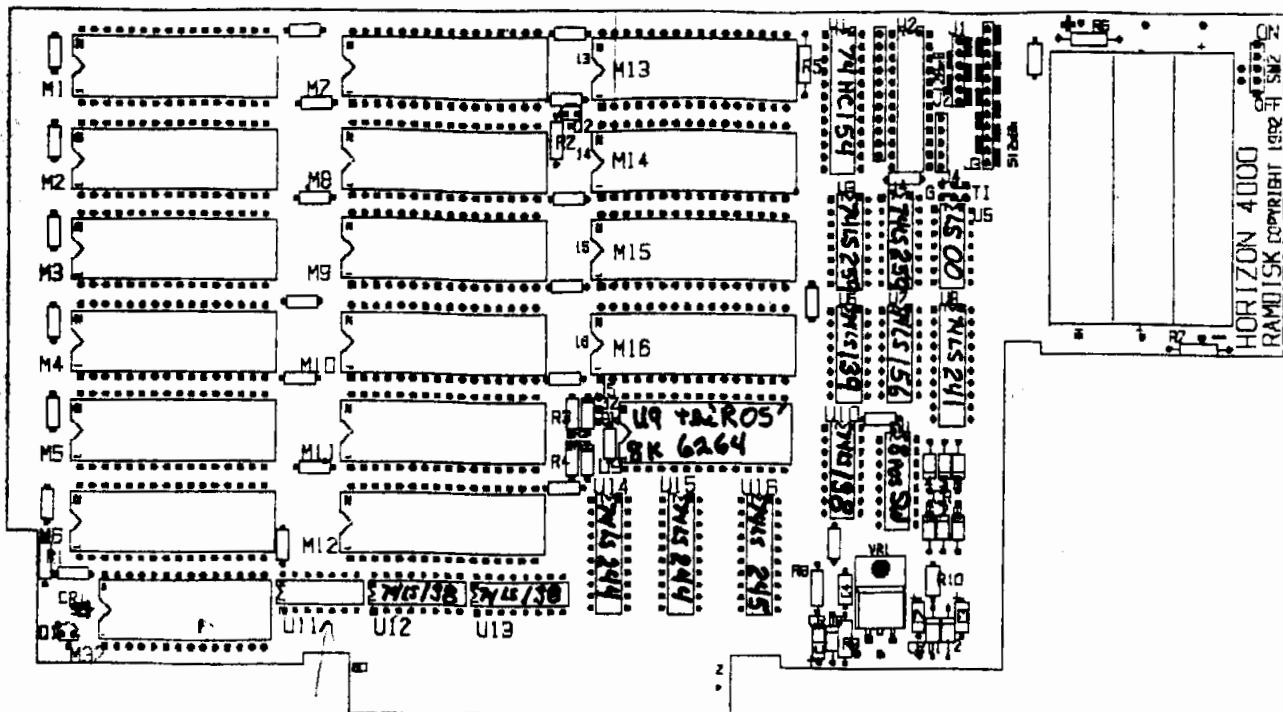
Your RAMDISK is almost ready to test in your P-EOX. But before we PLUG it in, Lets go back and RECHECK ALL of the steps and carefully examine ALL solder connections. Use a flux remover or rubbing alcohol to clean up all connections ( an old toothbrush helps). A magnifying glass is also recommended to help you check the connections. Use a pencil eraser to lightly "polish" the edge connector.

If the results at any step are not as described, STOP AND CORRECT THE PROBLEM BEFORE PROCEEDING.

BEFORE proceeding with the following test, we recommend you remove ALL of the cards from the Phriperal Expansion Box. ( Smoke Test )

With NO IC's inserted, place the card in the Peripheral Expansion Box and switch on the power. The CR3 LED should light and the CR1 LED should not light. CR3 LED cannot be seen from the front of the PEB, you must look down from the top. CR3 will be dim and very hard to see. Leave the power on for 5 minutes and check the voltage regulator for excess heat. Turn off the power and WAIT FOUR minutes before removing the ramdisk or reinserting any other card....(it takes longer for the VOLTAGE to drain off when there are not any other cards in the box.) After the through cleaning and the initial test we can proceed to add the plug in parts.

FIGURE 6



Optional  
32k Memory € 74LS08

*Do Not Install The  
Optional 32k Until  
After All Test Are OK*

### THE INTEGRATED CIRCUITS

Insert all IC's except the MEMORY CHIPS. Make sure the notch of each IC points toward the front of the card or to the left and the 3 vertical U14, 15, 16 IC's are toward the top of the card, and that the labels on the horizontal IC backs are oriented as shown in Figure 6. Install M17, the 6264LP-15 near the center of the board. ALSO install a jumper block on the 8K pins by CR2 at M17. TO AVOID MEMORY DAMAGE, NEVER PLACE THE CARD IN THE PE-BOX WITHOUT ITS BATTERIES! Run the MEGTEST program as described in the MEGTEST Instructions. As the program runs, the CR1 LED should turn on and off. If the program stops or has errors check that the DIP switch setting and the CRU address MEGTEST is testing match. If the DIP switch setting is correct check the germanium diodes. We have found that the germanium diodes CR4-CR7 can be the problem. The diodes can be replaced with Radio Shack Cat. No. 276-1123. More often we find an "open" solder connection or a solder bridge. Another cause may be a defective chip, try replacing U12, U6, after rechecking the DIP SW1 setting.

## INTEGRATED CIRCUITS Continued.

Next insert the 628128LP12 or 66205-12L MEMORY chips per the following chart. Re-run the MEGTEST program. This time selecting the MEG CARD option. NOTE The MEGTEST program will only test the first one MEG of memory or equal to 32 of the 32k chips. No bad chips should be found. This test forces the ramdisk to be tested and will report most errors that can occur. Once the MEGTEST is satisfactorily completed, then run the IST program to more thoroughly test the entire ramdisk memory. If there are any errors a location number will be displayed on the screen that must translated to a memory chip number using the IST RESULTS table.

IMPORTANT: If you are building your card with 128k memory then you MUST insert the Memory Chips in the following sockets. First 128K: M1 the second 128k will go in M2 to = 256k. add a chip to the next M# to increase the ramdisk size. Repeat adding chips till the 16 sockets are full at 2 meg. Additional 128k memory chips may be added by piggyback soldering on top of the first layer of memories. Pin 22 of the upper chip M1 should be bent out for a wire to be connected to the solder pad by pin 1 of the U2 control chip. A second 74LS154 will be required in U2 to control the second 2 meg of memory. The wire from the upper M2 chip will go to U2 pin 2. Repeat thru M11. M12 will be wired to U2 pin 13, M13 to 14, M14 to 15, M15 to 16, M16 to 17. A third and fourth layer of 128's can be added by piggy backing up to two more 74LS154 on U2 and following the above steps for adding memory. Pin 18 of the upper 74LS154's will be wired to U6 pin 10 and ( U6 pin 9 for the 4th layer of memory). This will allow up to 8 meg using 128k x 8 memory chips.

If you start out using the 512k x 8 memory chips then you can add 512k at a time without any additional soldering by plugging the chips in. Follow the M1, M2,----> M16 or up to 8 meg on one layer..

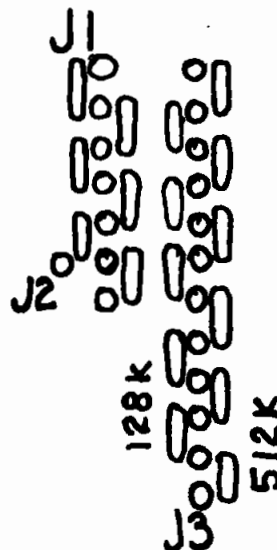
← BEFORE Running Megtest you need to set all jumpers in Figure 7 and install the DIP Switch

FIGURE 7  
INTEGRATED CIRCUITS and SETTING the JUMPERS

The HORIZON 4000 is designed to accommodate the 128Kx8 or the 512Kx8 memory chips. Due to a difference in addressing requirements for each size, only one size, 128Kx8 OR 512Kx8 may be used. This means we CANNOT MIX the chip sizes. The addressing setup options are completed by placing jumper blocks on pairs of pins of the J1, J2 and J3 strips (by U2)

NOTE: If you elect to NOT use jumper blocks on pins you CAN solder jumpers in the board - Be sure to pick the right holes.

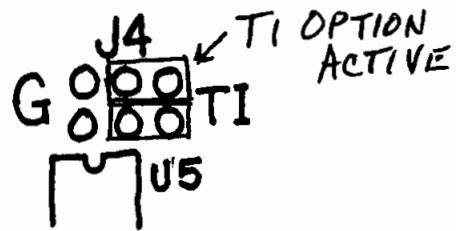
Placing the shorting blocks on the J1 and J3 strip to match the white dashes on the board to the left of the strips, leaving the bottom pin uncovered and rest of the pairs covered you will option the card for 128k x 8 memory chips.



Starting with and covering the bottom pin and matching the white dashes on the right side of J1 and J3 strips will set the card for 512k x 8 memory chips.

J4 ( 6 pins above U5 ) is for:

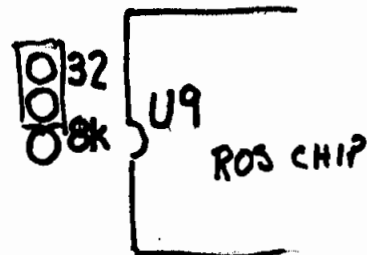
1. Allowing single or double ram disk operation on the TI99/4A  
The TI option may also be used with the Geneve to allow two 800k ramdisks (see instructions in MDOS 1.23)



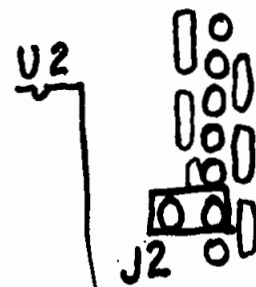
OR

2. Enabling the Geneve PHOENIX for two ramdisks on same CRU address (256/800k)  
The DIP SW #2 or 4 control the PHOENIX assignment of CRU 1400 or 1600.

Dual ramdisk operation will require a 32k x 8 memory in the ~~U9~~ memory socket and the 32-8k jumper block moved to the 32 pair of pins.



The dual ramdisk will also require splitting memory socket assignments into two distinct memory blocks. The split is done by removing the jumper block beside the J2 pin and reinstall it horizontally to cover the J2 pin AND the adjacent pin. This splits all of the 74LS154's into the two sections. Each section is not contiguous with the previous 74LS154. This limits the 128's to NOTE the memory sockets M1 thru M8 are locked to DIP SW #2 or #4 (CRU1400 or CRU1600). The remaining sockets can be assigned DIP SW 1,3,6,8 as long as no other conflict exists. SW 5 or 7 tie to 2 or 4.



Install the 8-position DIP switch in the 16 pin socket SW1. Select a setting from the following chart and close only one switch to the ON position. All other switches should be OFF or open.

Switch Position	CRU#		
1	1000		
2	1400	Phoenix #1	Note the SW POS 2 and 4 as shown
3	1200		
4	1600	Phoenix #2	to allow for simple set-up
5	1400		
6	1500		
7	1600		
8	1700		

NOTE: The DIP Switch selection of the CRU base for the HORIZON card is also dependant on the other devices you may have installed.

EXAMPLES The MYARC 512k card uses CRU 1000 and CRU 1700  
The P-CODE card uses CRU 1200  
A RS232 card modified for 2/4 uses CRU 1500  
The P-GRAM card should use the highest available CRU

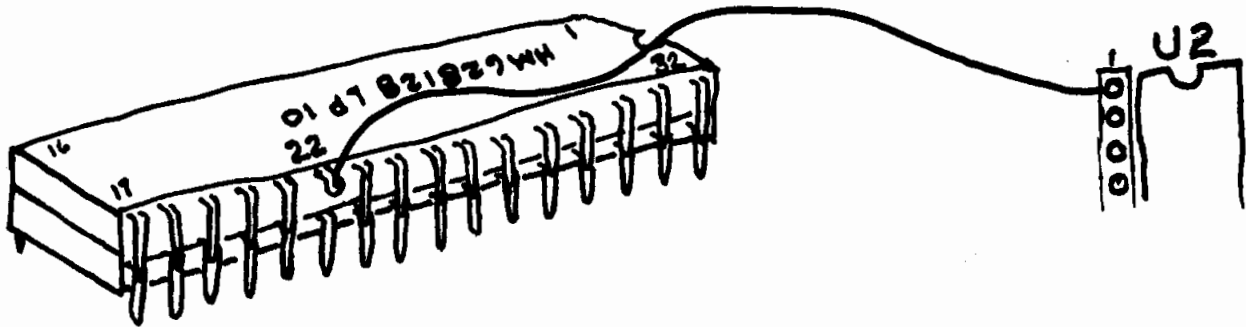
If you are using the HORIZON card with a GENEVE 9640 then set the First card at CRU 1400 and a second card may be installed at CRU 1600. To use the HORIZON with the GENEVE you will have to obtain the Routines written by Mr. Jim Schroeder. You will need LHDROS, HDROS, CFG, and RAMDOS for the Version of MDOS that you want to use. Due to changes in MDOS with every issue, there are different patches required.

Jim's address is; Mr. J. Schroeder  
4153 S Regal Manor Ct.  
New Berlin Wi. 53151

A set of Phoenix Install Disks is available from Bud Mills Services to automatically set up any Horizon for use with the Geneve.

Note the LATEST releases of MDOS from Beery Miller DO have the Shroeder routines built-in like MDOS 1.23 dec 92 allows MDOS to be booted from an 800k Ramdisk and multiple 800k ramdisks may be installed on any available CRU line. Special formatting is included.

FIGURE 8



To build the HORIZON 4000 larger than 2 Meg, using the 128k x 8 Memory chips you will have to STACK and solder the chips as shown in the drawing.

Each upper chip will have a wire connected to pin 22 that will connect to a pad on the circuit board as described on the next page under CONTROL LEAD ASSIGNMENTS.

To piggyback the chips, the top chip should "GRIP" the lower chip to allow a good solder connection. It is important to take care and avoid excessive static and heat transfer, remember that it is equally important THAT ALL SOLDER CONNECTIONS ARE OF GOOD INTEGRITY.

Use a low wattage (about 25 watts) SOLDERING PENCIL and fine 60:40 tin/lead solder. DO NOT USE a soldering gun or acid core solder! Make sure that sufficient solder is supplied to all connections with good wet-out, but that there are no solder bridges between connections. Upon completion of all soldering, remove flux from the solder side of the board with a commercial flux remover or you can use the old fashioned 91% rubbing alcohol and an old toothbrush (works better).

When stacking or inserting IC's bend the pins to fit the socket by placing the IC on it's side on a flat surface. Bend the pins against the surface by moving the body of the IC. Make sure all pins are properly aligned with the socket holes and that all pins actually go into the socket holes upon insertion.

## APPENDIX 1

### MEGTEST INSTRUCTIONS For Use on TI OR GENEVE....

MEGTEST will only test up to 1 MEG of memory... However it is an important tool to have available, since the IST program will not work if it cannot find memory ... The MEGTEST program will access a failed card and give us an indication of the real problem...

Insert the System Disk into Drive one, and let XB load the LOAD program.

Memory chips can fail, and so can any of the other components of your RAMDISK. In order to facilitate a test of your RAMDISK memory, a TI BASIC program called MEGTEST has been included on the System Master diskette. MEGTEST wipes out the ENTIRE contents of the RAMDISK including the operating system, so make sure you copy important files to a floppy diskette before running MEGTEST. After running MEGTEST, the operating system must be reloaded.

Troubleshooting with MEGTEST was set up for the OLDER HRD+ ramdisks and reports the old chip numbers as the trouble locations. Remember that there are four 32k blocks in each 128k memory OR 16 32k blocks in each 512k memory

The Extended Basic "Load" program DSK1.LOAD provides a menu selection to load MEGTEST. The MEGTEST program rolls up a SWITCH assignment MENU and asks for the number of your DIP SWITCH setting. The test Menu will then appear;

```
[U] for U11 TEST
[M] MEMORY TEST
[L] LOOP TEST
```

When "U" is Selected the U11 chip is Tested. When "M" is Selected the program asks how many chips are installed. Enter the number of 32K memory chips. Enter the NUMBER of 32k BLOCKS (see above)

It then proceeds to fill the ENTIRE memory on the card with a series of eighteen special numbers and subsequently test each of the 32K chips on your card to see if they retain the values written. If you have a single 128k RAMDISK, 4 blocks will be tested for each fill number -- 8 for two 128k (256k); 12 for 384k; 16 for 512K; 32 for One MEG.

The [L] loop test is only used to positively identify a bad chip using a Digital Voltmeter or Digital Probe. The chip under test will be pulsed on and off to allow a test measurment (HI LO) to verify the physical location of the chip under test. MEGTEST does identify chip locations of the older cards. We only suggest use of MEGTEST to assist in identifying card access problems....

find that for certain numbers several chips appear bad. An even more rigorous test is the IST program. Test 3 of the series has been able to locate problems on cards that no other test detects. All such problems have been due to poor solder connections on piggy-backed IC's. If you find errors, that you cannot correct, contact us regarding repair of your card.

As IST runs, a speedometer like counter indicates the page under test. And errors are displayed on another line. If errors do occur then be prepared to write down the error location, since the the next error overwrites the first. You can disregard the last four columns on the right since they represent the 8k banks in each chip.



Problems and "bugs" of various kinds have been found with many computer products, and the HORIZON RAMDISK will probably be no different in this regard. However, because the operating system for the card is in RAM, we can correct software problems by sending you a new disk. You can help us to improve your RAMDISK by letting us know about the kinds of problems you experience in a way that will help us identify and correct the problem.

Whenever you experience a problem in using your RAMDISK, there are several questions you should try to answer. The first is:

#### Is the Problem Repeatable?

Using the same piece of software or the same disk, can you make the problem happen consistently. (While random problems are difficult to diagnose, we would still like to know about them.) If the problem is repeatable, try making it happen after powering-down your system and waiting several minutes. Also try it immediately after re-loading the operating system (this will not affect the contents of your disk). Any information you can provide to pin down the factors which cause the problem will be of help.

#### Is the Problem Specific to the RAMDISK?

If you make a sector copy of the RAMDISK contents to a floppy, set the RAMDISK number at 6, and try the problem situation again using a floppy drive in place of the RAMDISK, does the problem occur? If so, it may not be related to the RAMDISK. In the process of RAMDISK software development there have been many times we thought there were problems with the RAMDISK only to discover the true source of the problem was elsewhere in the system.

#### Is the Problem Hardware Related?

Use the TST program option 1 to check the HORIZON RAMDISK. If you do not find errors, the problem is likely to be in the software which controls the RAMDISK. When you have verified that the problem is repeatable, that it is specific to the RAMDISK, and that your hardware tests OK, please notify us of your problem so that it can be corrected.

#### No Access to Floppy Drives

If your system appears normal on power-up, but locks up when you try to access your floppy drives, re-load the operating system as follows: Turn off the console and HOLD the SHIFT key DOWN while you turn the console back ON. Place the ROS814 disk in drive and load the XB LOAD program. Choose the CFG option and attempt to reload the ROS. If the question "DO YOU WANT TO RETAIN THE DATA ?" type a Y for yes. After the ROS loaded, Check the Drives (D) to see if any of the data there has been scrambled. If so then you may have to REFORMAT the Drives, BUT before you do that, try reloading your SAVED copy of your tailored ROS.

## APPENDIX 2 (Continued)

As the tailored copy loads you will be asked if you want to save data?, This time you answer N for no because you want to load in a fresh copy of your data MAP. It is the MAP of how the memory is formatted that we need to restore. Once the MAP is redrawn then the location of the various drive directories will be correct and your file data should be intact and usable. Note that drive names are not preserved when you SAVE your tailored ROS so you may have to re-enter them on the Drives screen.

### System Lock-Up on Power-Up

Occasionally (especially if you choose to experiment with writing your own routines for the card) you may find that when you turn on your computer, you get a blank screen and that the computer is "locked-up". If you find that this happens only when the RAMDISK is plugged into the PE-Box, bad data has found its way into the RAMDISK operating system memory, and the operating system must be re-loaded. To test if the RAMDISK is causing the "LOCKUP", turn the Card "off" by setting SW2 down to make the RAMDISK invisible to the system. Turn ON the P-BOX, then the CONSOLE, put your SYSTEM DISK in Drive 1, turn ON SW2 (UP) and reload the RAMDISK Operating System.

NOTE A faulted copy of MENU can also cause a Lockup on Power-up.

Alternatively, you can follow this procedure with Editor/Assembler.

- 1) Power-down the console and PE-Box;
- 2) Turn on the console FIRST, then the PE-Box;
- 3) Enter E/A
- 4) Select Option 5
- 5) Make sure system disk is in Drive 1 and type in DSK1.CFG
- 6) Re-load the RAMDISK operating system.

If this program fails to work then run the MEGTEST program and select the U11 test to clean out the ROS chip.

Your system should now power-up normally. Re-load the operating system as usual.

Should you need further assistance, you may write to or call Bud Mills (419) 385-5946 (sorry, but our extremely low margins will not allow us to accept collect calls.)

BUD MILLS SERVICES  
166 Dartmouth Dr.  
Toledo, Oh. 43614

HORIZON TST PROGRAM  
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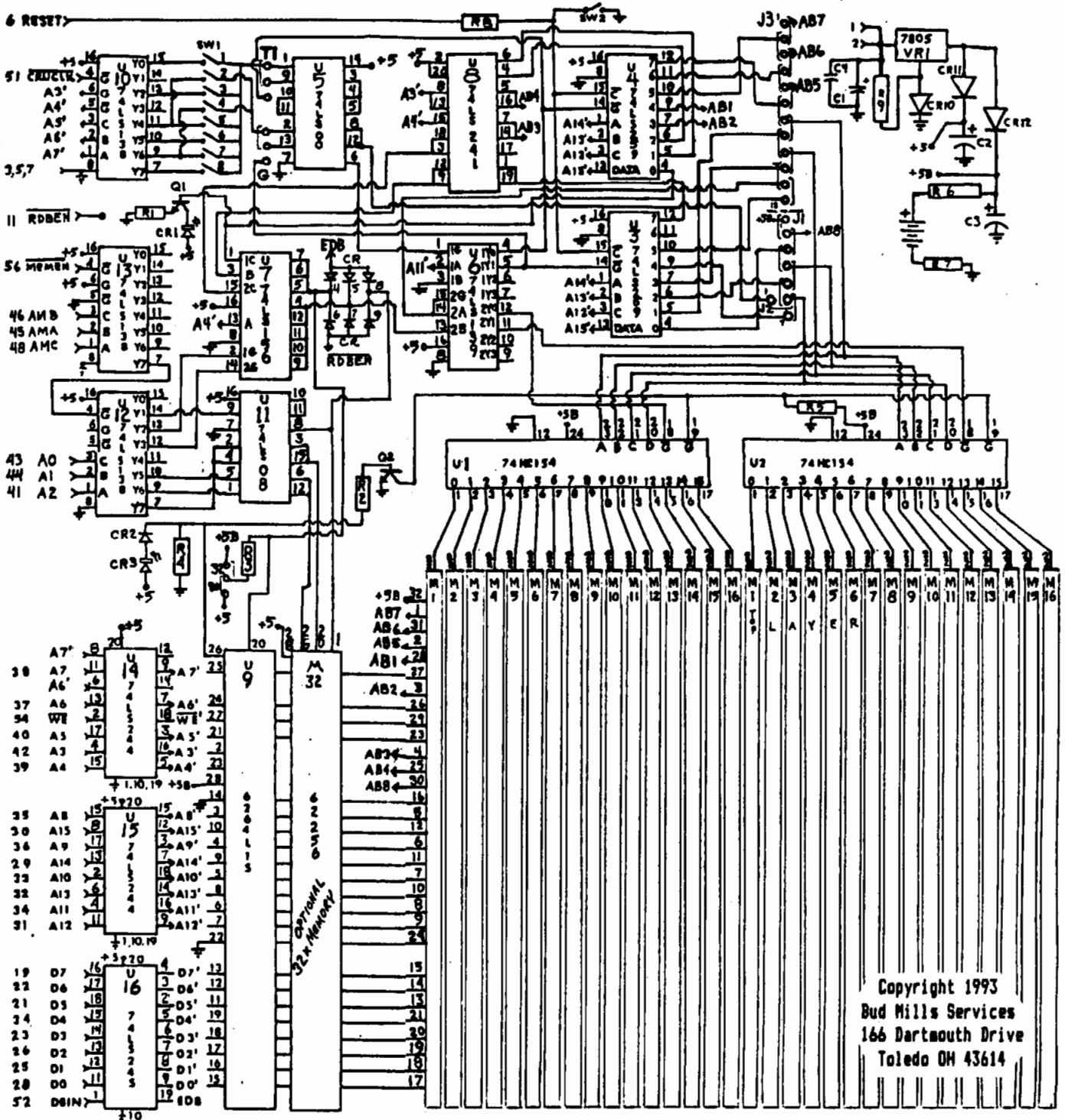
The TST program has been written by Gary Bowser of OPA Tronto Canada for use on ANY size Horizon. Each CHART is arranged separate the memory chip sizes. When using the TST program you will see instruction screens that will explain each test as you proceed into the test. If a Valid ROS is loaded you will be challenged if you want to proceed.

THIS CHART WILL ONLY BE NEEDED IF A MEMORY ERROR IS DETECTED DURING A TEST OF A HORIZON 4000 with 128k x 8 or 512k x8 memory chips. You can ignore the value reported in columns 765432&1 for the 128k chips or columns 98765432&1 for 512k chips. *The remaining columns will correctly identify the memory chip with the Error.*

16 bit CRUbits bus reported	Chip number by chip type	16 bit CRUbits bus reported	Chip number by chip type
1111111 column #		1111111 column #	
6543210987654321	128k	6543210987654321	128k
BAD VALUE AT:		BAD VALUE AT:	
0000000000001011	U9	0001001001111111	M1 T
0000000001111111	M1	0001001011111111	M2 H \ M9
0000000011111111	M2	0001001101111111	M3 I /
0000000101111111	M3	0001001111111111	M4 R - /
0000000111111111	M4	0001010001111111	M5 D \
0000001001111111	M5	0001010011111111	M6 \ M10
0000001011111111	M6	0001010101111111	M7 L /
0000001101111111	M7	0001010111111111	M8 A - / 5 MEG
0000001111111111	M8	0001011001111111	M9 Y \
0000010001111111	M9	0001011011111111	M10 E \ M11
0000010011111111	M10	0001011101111111	M11 R /
0000010101111111	M11	0001011111111111	M12 - /
0000010111111111	M12	0001100001111111	M13 \
0000011001111111	M13	0001100011111111	M14 \ M12
0000011011111111	M14	0001100101111111	M15 /
0000011101111111	M15	0001100111111111	M16 - / 6 MEG
0000011111111111	M16	0001101001111111	M1 F \
0000100001111111	M1 TOP	0001101011111111	M2 O \ M13
0000100011111111	M2 TOP	0001101101111111	M3 R /
0000100101111111	M3 TOP	0001101111111111	M4 T - /
0000100111111111	M4 TOP	0001110001111111	M5 H \
0000101001111111	M5 TOP	0001110011111111	M6 \ M14
0000101011111111	M6 TOP	0001110101111111	M7 L /
0000101011111111	M7 TOP	0001110111111111	M8 A - / 7 MEG
0000101111111111	M8 TOP	0001111001111111	M9 Y \
0000111001111111	M9 TOP	0001111011111111	M10 E \ M15
0000111011111111	M10 TOP	0001111101111111	M11 R /
0000111101111111	M11 TOP	0001111111111111	U12 - /
0000111111111111	U12 TOP	0010000001111111	U13 \
0001000001111111	U13 TOP	0010000011111111	U14 \ M16
0001000011111111	U14 TOP	0010000101111111	U15 /
0001000101111111	U15 TOP	0010000111111111	U16 - / 8 MEG
0001000111111111	U16 TOP		

# HORIZON 4000 RAM DISK

Built In RAMBO & PHOENIX



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