Construction Guide

Horizon 4000B Ramdisk

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THE HORIZON 4000B RAMDISK

This version of the Horizon Ramdisk is basically the same as the preceding versions that use the 32K x 8 or 128K x 8 memory chips (HRD+, HRD 2000, and HRD 3000). This card replaces the HRD 3000 card and has been redesigned to allow the use of 128K x 8 memory chips OR the newer 512K x 8 memory chips. All previous changes 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 helpful if a lockup should occur or if you are experimenting with a program that can (or has) crashed the Ramdisk.

We have added 4 more memory sockets (now there are 16 total) to increase the board’s “single layer” capacity to 2M using 128K x 8 memory chips. OPA’s Random Access Memory Block Operator (RAMBO) is built into the HRD 4000B Ramdisk and can be activated by using a Ramdisk formatting size smaller than the available memory size. All remaining space is then available for the RAMBO program to use.

The HRD 4000B can also replace the TI 32K memory card. Simply plug a 32K x 8 memory chip into socket M32 AND a 74LS08 into socket U11. This memory is separate from the Ramdisk and is not affected by the “HIDE” switch. Removing these two chips (M32 and U11) disables the feature and has no effect on the operation of other HRD 4000B functions.

The PHOENIX modification that allows the Horizon 4000B circuit board to be used as TWO separate Ramdisks is “built in.” The ROS chip (U9) was permanently changed to a 32K x 8 memory chip to support this capability.

The Horizon 4000B Ramdisk accommodates 128K x 8 memory chips using 32-pin sockets by default. Optionally, the user may install 512K x 8 memory chips.

The memory chip options are selected by installing 12 jumper blocks when assembling the Ramdisk. Figure 7 identifies their placement when using 128K x 8 chips, 512K x8 chips, and the PHOENIX option settings. NOTE: The card may only be optioned to support ONE size of memory chip. You can change from one size chip to the other by changing the jumper blocks to support the changed configuration and by placing the correct memory chips on the board (128K x 8 or 512K x 8). ***IT IS NOT POSSIBLE TO MIX MEMORY CHIP SIZES*** due to addressing restrictions of the memory blocks. Smaller sized chips may be plugged into the next available socket and may even be recognized within the memory map, but that use is NOT guaranteed.

The CONSUMER assumes full risk and liability for direct or consequential damages arising from attempted construction of the Horizon 4000B.

EXCLUSION OF WARRANTIES: The Horizon Ramdisk circuit board is provided on an AS IS basis. No warranty of any kind is assumed by Tekumel Software. The user assumes full responsibility for the quality of all parts associated with construction of the Horizon 4000B Ramdisk. Tekumel Software does not recommend or endorse the quality of parts sold by any other party. In any case, Tekumel Software shall be liable only for the cost of the circuit board, associated manuals, disk-based software, and/or parts, only if purchased from Tekumel Software.

Fully constructed Horizon 4000B Ramdisks are available with a 90-day limited warranty for an additional cost covering parts and labor. Contact Tekumel Software for a current list of Dealers or Builders.

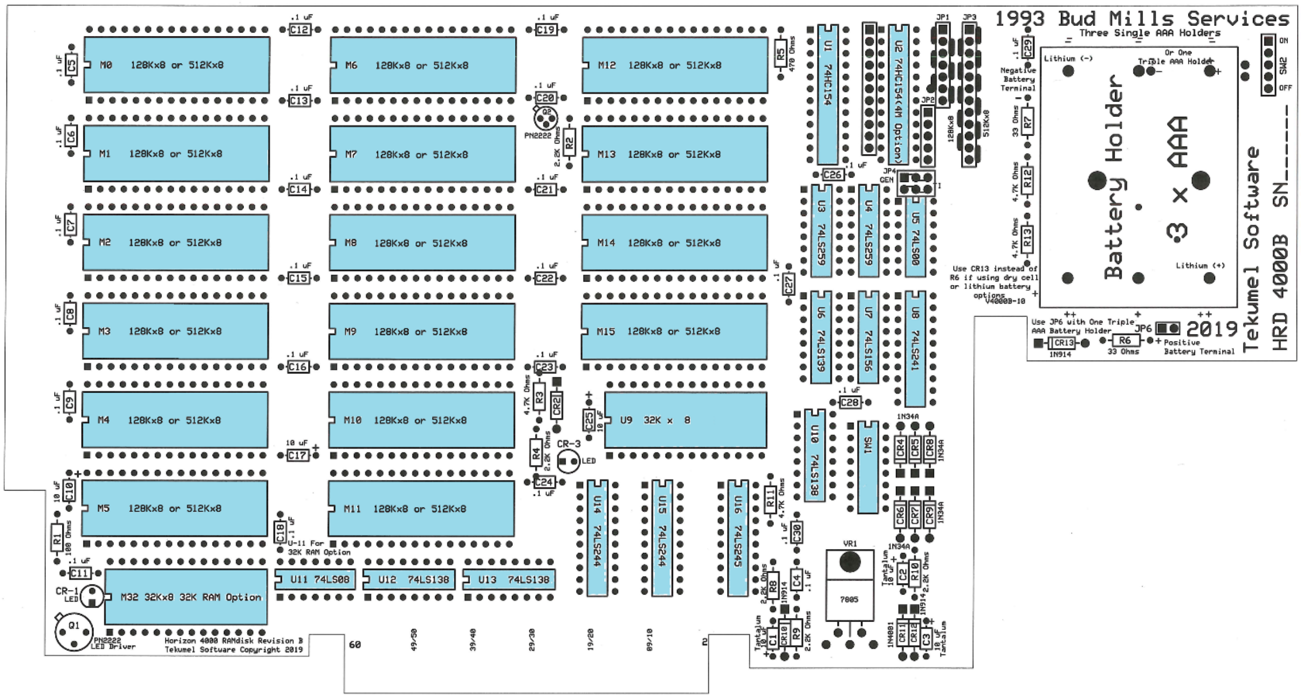
Prior familiarity with construction of digital circuits is assumed. Read all construction suggestions and notes provided with the eight figures before proceeding. The following eleven pages show progressive stages in completion of the Horizon 4000B Ramdisk. If you encounter a problem or have a question at any step, ***DO NOT PROCEED UNTIL THE PROBLEM IS RESOLVED***. If you have any questions, contact Ksarul at the TI Sub-forum on AtariAge.

Although static can be a problem with CMOS devices (i.e., the memory chips), we have not seen a single case of IC damage under ordinary handling conditions, nor have we seen problems due 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 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 (this works better).

When inserting ICs, 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 (.300) 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 then ***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. Solder ALL remaining pins once all sockets are properly adjusted. Remember, too much solder may fill the socket and render it useless or it may create a solder bridge under the socket on the top side of the board. This is tedious work and care must be taken not to bridge between adjacent pads or lines. Any bridges will cause the board to crash during testing.

NOTE: If you don't have access to 32-pin sockets locally, you can cut down 40-pin sockets to size or you can use a pair of single-row machine-pin sockets for each socket.

A good solder connection Will look like this	Too much solder can fill and/or short under the socket like this	A pear-shaped blob may not make contact with the board

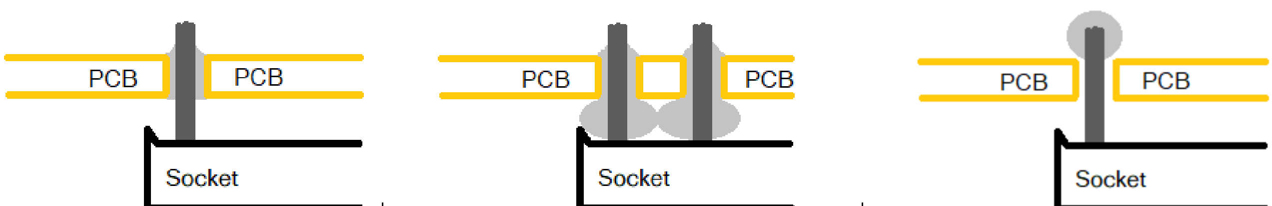
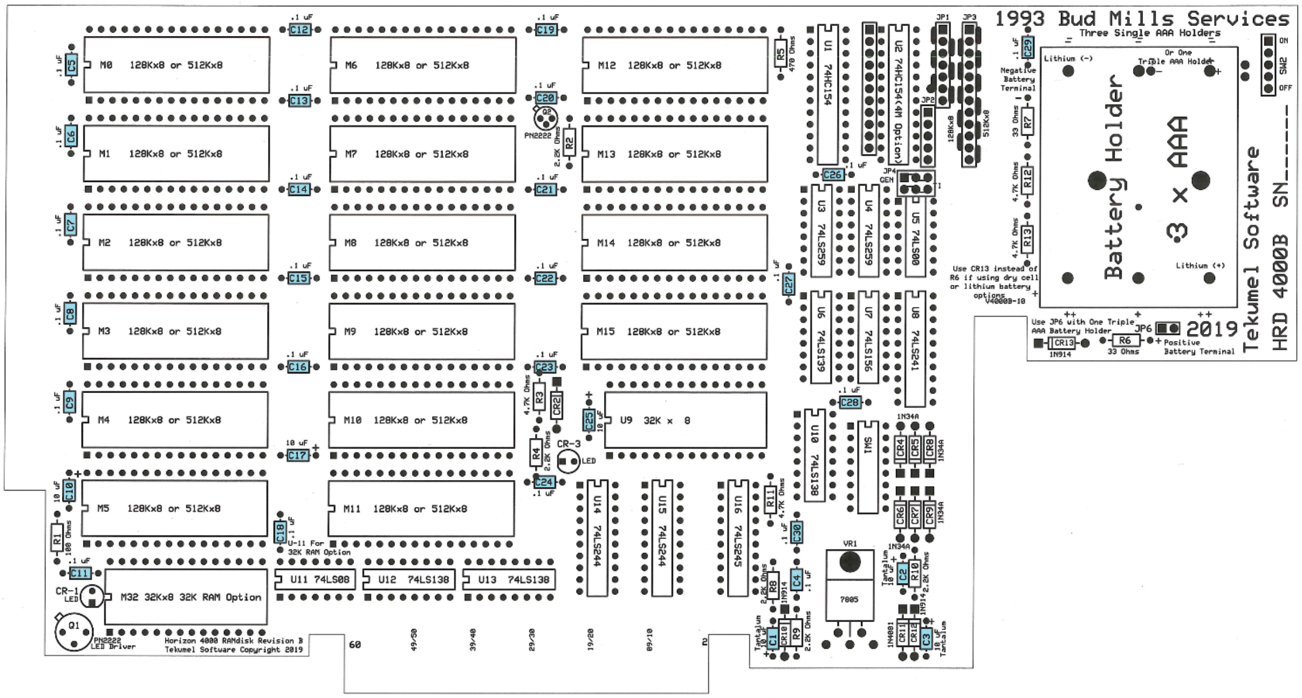
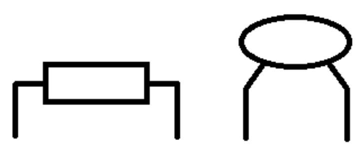


FIGURE 2



THE CAPACITORS

This requires 24 - .1µF capacitors with .2 inch lead spacing. Insert them into positions C4, and C5 through C9, C11 through C16, C18 through C24, and C26 through C30. Insert the three 10µF ceramic capacitors into positions C10, C17, and C25. Insert the three 10µF tantalum capacitors with the positive lead inserted through the marked pad on the board in positions C1, C2, and C3.

10µF tantalum	10µF, .1µF, or .01µF ceramic
	

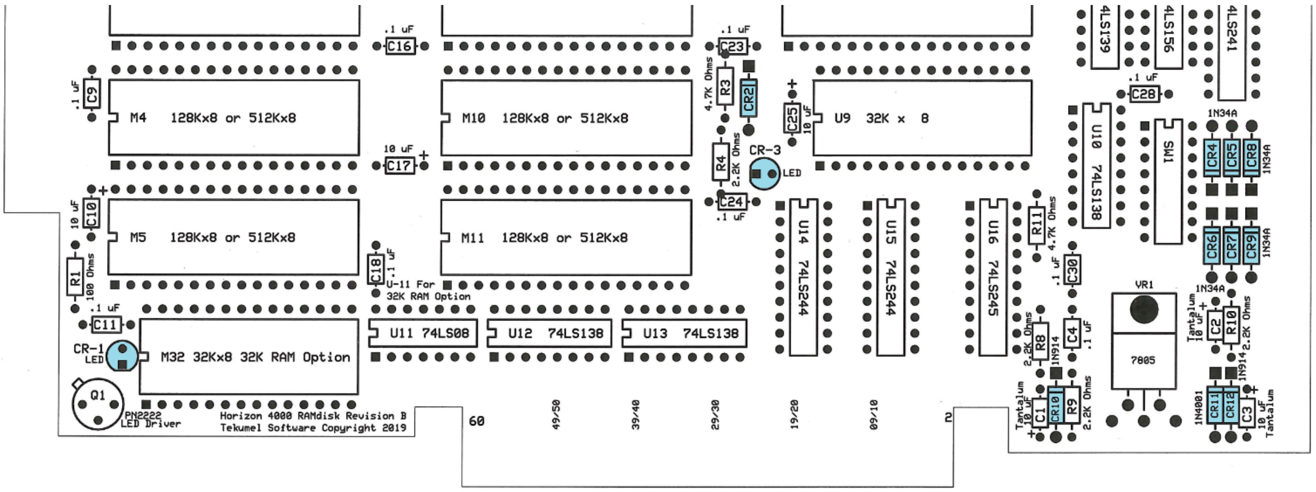
PARTS LIST FOR THE HORIZON 4000B RAMDISK

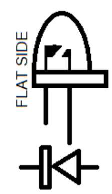
Quantity	Part Description
1	7805 Voltage Regulator
1	74HCT154 (see note 1 below), need 2 for dual memory layer board
1	74LS00
1	74LS08 (for the 32K memory option)
3	74LS138
1	74LS139
1	74LS156
1	74LS241
2	74LS244
1	74LS245
2	74LS259
1	HM62256LP-12 for ROS chip
1	HM62256LP-12 or D42256LP-12 (for the 32K memory option)
->	HM628128LP-12 or HM66205L-12 (128K x 8 or 512K x 8, see note 2)
2	14-pin sockets
8	16-pin sockets
4	20-pin sockets
2	24-pin sockets (.300 width skinny-DIP sockets)
2	28-pin sockets
16	32-pin sockets (or cut down 40-pin sockets/32 single-row sockets)
2	PN2222 transistors
6	1N34A diodes (or Soviet D9K diodes—usually much better quality part)
3	1N914 diodes
1	1N4001 to 1N4004 diode
1	LED (green, red, or yellow)
1	LED (red)
1	DIP switch, 8-position
3	NiCad batteries, AAA
3	AAA battery holders (or one triple holder for three batteries)
1	470Ω resistor
4	4.7KΩ resistors
5	2.2KΩ or 2.7KΩ resistors
1	100Ω or 150Ω resistor
2	33Ω resistors
3	10µF tantalum capacitors
3	10µF ceramic capacitors
24	.1µF or .01µF capacitors (ceramic or glass)
1	Heat sink for the voltage regulator
1	Single inline header strip (40-pin)
19	Shorting blocks

Note 1: One 74HCT154N will support 2M of 128K x 8 memory. Boards populated with between 2M and 4M require a second 74HCT154N (a space for this is provided on the board). These chips must be the .300 skinny-DIP "J" package.

Note 2: The Hitachi HM628128LF-12 and the NEC 431000-12L are equivalent. Each of these chips provide 128K of memory in our circuit. The build size determines the number of required chips: 3 x 128K = 384K, 6 x 128K = 768K, 8 x 128K = 1M, and 16 x 128K = 2M. The Hitachi HM66205LP-12 and HM628512LP-12 provide 512K x 8 memory and are equivalent. FOR PHOENIX ONLY: If you incorporate this option, place Jumper JP3 horizontal to JP1. The JP4 Jumper blocks must be set for the system you will use: TI for TI-99/4A or Gen for Geneve9640. U9 must be a 32K x 8 memory chip.

FIGURE 3





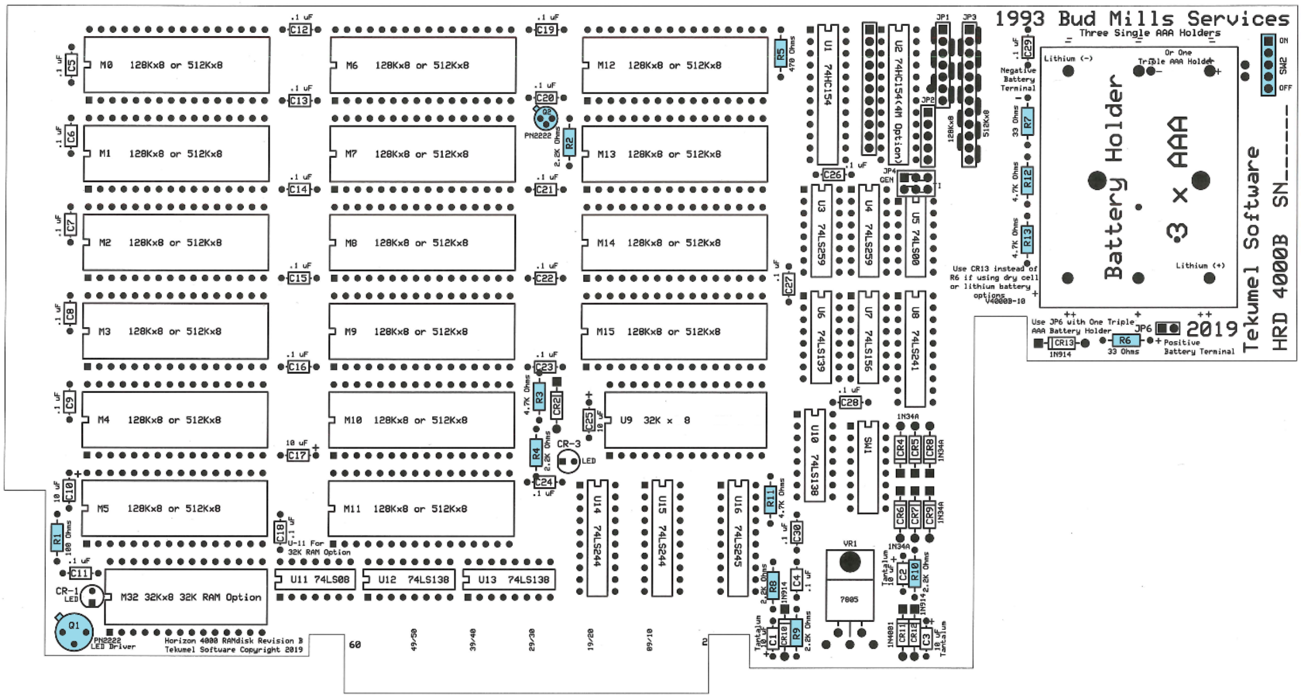
THE DIODES CR1 & CR3 LEDs

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, and 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 (or D7K) germanium diodes.

Diodes are polar. In the –▶| 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 two Light Emitting Diodes (LEDs). CR3 must be green, red, or yellow. CR1 may be any color of LED. LEDs have polarity, and the cathode (–) of those you are using will be indicated by a flat side on the LED body or by the shorter of the two leads. Orient the LEDs as shown in the inset. Install CR1 so that the lens points toward the front of the card but does not extend past the card edge. Position CR3 to make it visible from the top of the card.

FIGURE 4



THE RESISTORS

Mount resistors R1 – R10 as shown. Although resistors have no polarity, you may want to orient them so that the color codes can be read from left to right. Resistor values and corresponding color codes are as follows:

R1 = 100Ω or 150Ω	brown-black-brown or brown-green-brown
R3 = 4.7KΩ	yellow-violet-red
R2 and R4 = 2.2KΩ or 2.7KΩ	red-red-red or red-violet-red
R5 = 470Ω	yellow-violet-brown
R6 and R7 = 33Ω	orange-orange-black
R8, R9, and R10 = 2.2KΩ or 2.7KΩ	red-red-red or red-violet-red
R11, R12, and R13 = 4.7KΩ	yellow-violet-red

Install the PN2222 transistors Q1 and 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 ¼" above the surface of the board.

Take the Mini Switch and insert in SW2 at the top of the card.

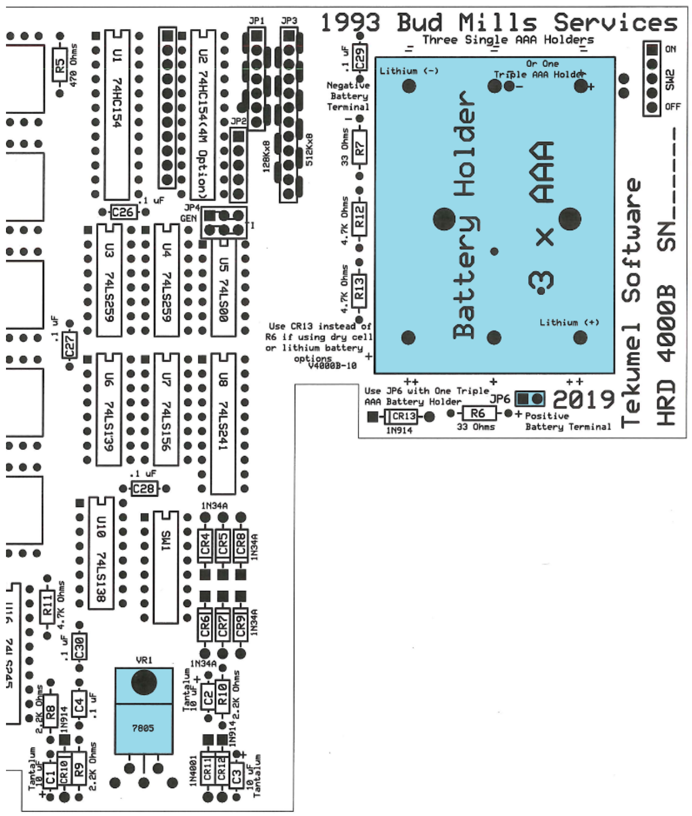
THE OPTION HEADERS

Take the strip of pins and separate them into 1 strip of 12, 1 strip of 7, 2 strips of 3, 1 strip of 2, and a single pin. These will be used to populate the option headers.

Insert two 3-pin in-line strips in the 6 holes above U5
Insert one 7-pin in-line strip in JP1
Insert one 12-pin in-line strip in JP3
Insert one single pin in the JP2 hole by U2
Insert one 2-pin in-line strip in JP6

Jumper blocks will be plugged into these pins later. Note, JP5 was removed from the HRD4000B, and this number was not reused.

FIGURE 5



THE POWER OPTIONS

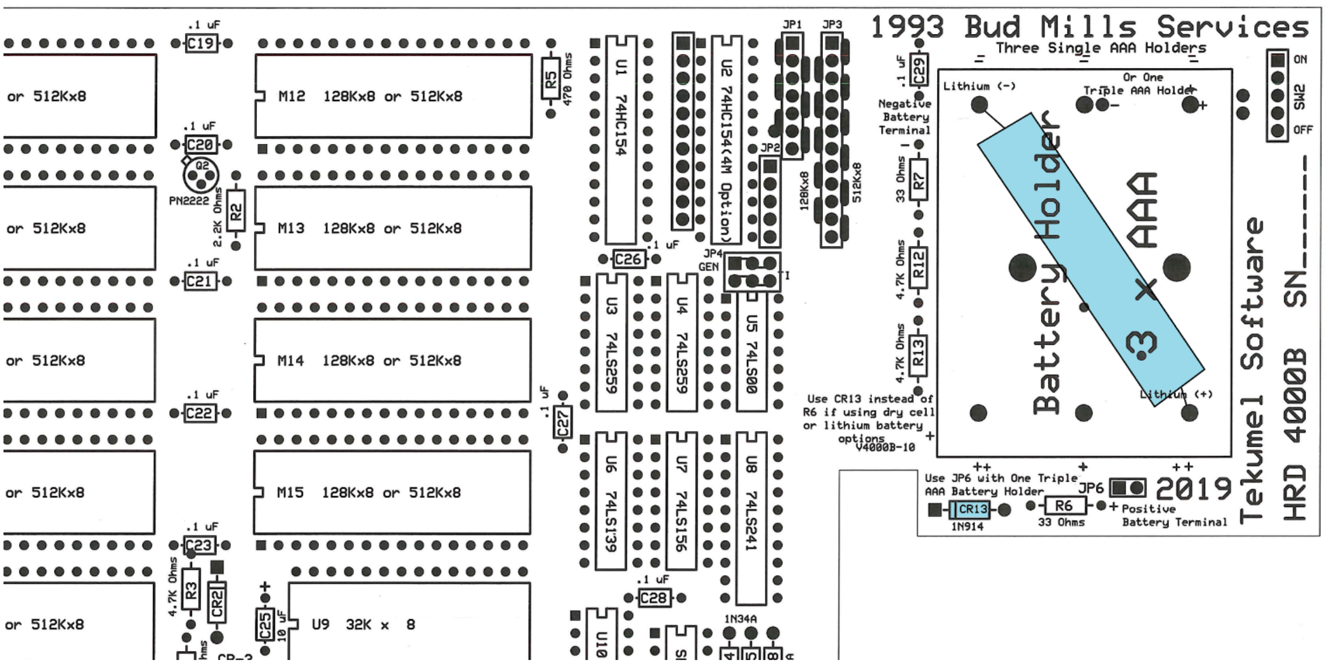
Use double-sided (foam) sticky tape or super glue gel to attach the three single battery AAA holders to the board and solder them into the provided pads. Make sure to observe correct polarity (positive at the bottom). If using a triple-battery holder, insert the power pins into the identified pads and solder them into place. Secure the battery holder with a pair of 6-32, ¼" machine screws secured with nuts using the holes provided for that purpose. Make sure the batteries are installed correctly, observing the correct polarity, especially as there will be differences based on the type of battery holder used. Solder the 2-pin header strip into position JP6. Insert a jumper block if using a LITHIUM BATTERY or the triple AAA battery holder.

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, ¼" machine screw and nut.

We normally supply and recommend AAA NiCad Rechargeable batteries (they are normally good for 5 – 10 years), however, you could use regular AAA dry batteries with a protective 1N914 diode instead of R6. The 4.5V Lithium Cell is also acceptable with a protective diode (should last 5 – 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, as it inhibits charging.

FIGURE 5A

OPTIONAL LITHIUM BATTERY INSTALLATION



SYSTEM SMOKE TEST

Your Ramdisk is almost ready to test in your P-Box, but before you plug it in, please go back to RECHECK ALL of steps completed do far and carefully examine ALL solder connections. Use a flux remover or rubbing alcohol to clean up all connections (an old toothbrush helps here). A magnifying glass is also recommended to help you check the connections. If it needs it, you may lightly “polish” the edge connector with a pencil eraser.

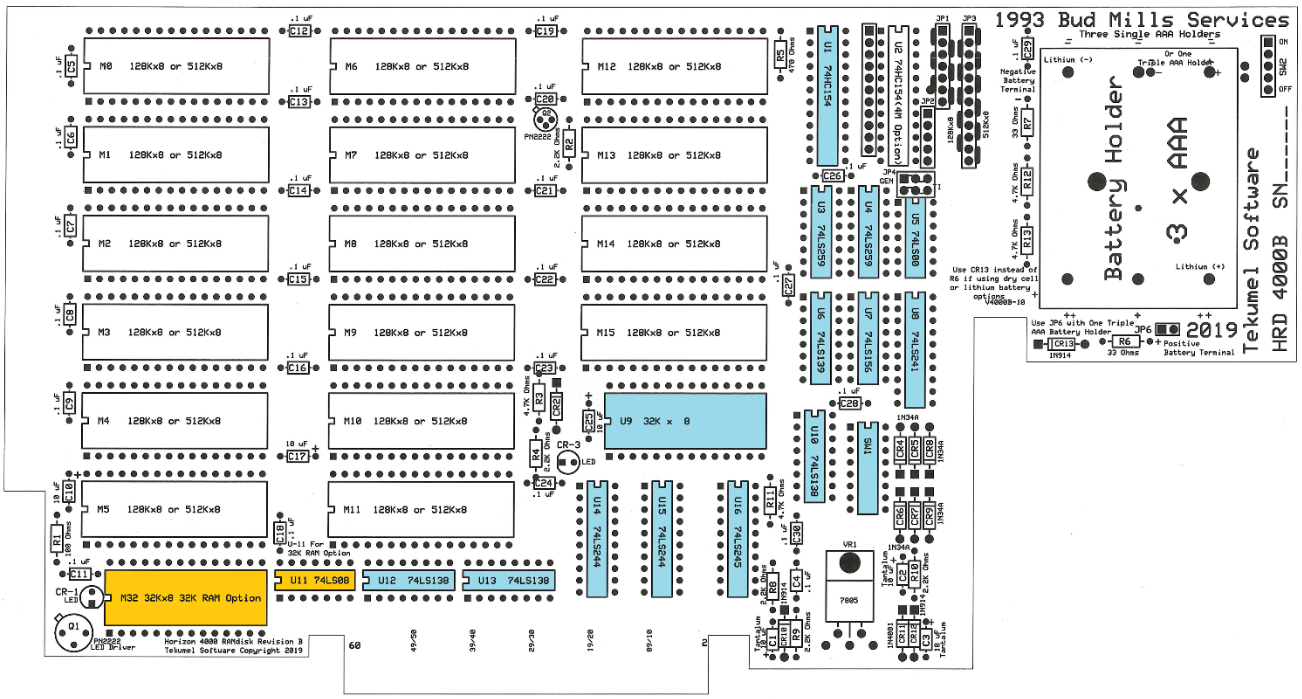
If the results at any step are not as described, ***STOP AND CORRECT THE PROBLEM BEFORE PROCEEDING***.

Now you are ready for a smoke test. We recommend that you remove ALL cards from the Peripheral Expansion Box before performing this test.

With NO ICs inserted, place the Horizon Ramdisk into the Peripheral Expansion Box and switch power on. LED CR3 should light and LED CR1 should remain off. You must look down from the top of the PEB to see LED CR3, as it is not visible from the front. It will be dimly lit and very hard to see. Leave the power on for 5 minutes and check the voltage regulator for excess heat. Turn power off and WAIT 4 MINUTES before removing the Ramdisk or reinserting any other card into the PEB. It takes longer for the voltage to drain off when no other cards are in the PEB. After the thorough cleaning and the initial smoke test, we can proceed to add the plug-in parts.

FIGURE 6

IC CHIPS AND OPTIONAL 32K MEMORY/74LS08



Do not install the Optional 32K memory (chips highlighted in yellow) until the HRD 4000B passes ALL operational tests.

THE INTEGRATED CIRCUITS

Insert all ICs except for the memory chips. Make sure the notch of each IC points toward the top of the card (for the chips mounted vertically) or to the left (for the chips mounted horizontally), as shown in Figure 6. Install U9, the 6264LP-15, near the center of the board. TO AVOID MEMORY DAMAGE, NEVER PLACE THE CARD IN THE PEB WITHOUT ITS BATTERIES! Run the MEGTEST program as described in the MEGTEST instructions. As the program runs, LED CR1 should blink on and off repeatedly. 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 (CR4-CR7). Experience shows that these can often be the problem. You can replace the diodes with Radio Shack Cat. No.

276-1123 (if available). More often, we find an “open” solder connection or a solder bridge. Try replacing U12 and/or U6 after rechecking the DIP SW1 setting.

Next, insert the 628128LP-12 or 66205-12L MEMORY chips per the following chart. Rerun the MEGTEST program, selecting the MEG CARD option. Note that the MEGTEST program will only test the first 1M of memory, equal to 32 of the 32K chips. The test should not find any bad chips. This test exercises the Ramdisk and reports most of the possible error conditions. Once MEGTEST finishes, run the TST program to exercise the entire Ramdisk memory thoroughly. Error locations will be displayed on the screen. Use the TST RESULTS table to translate them to a memory chip number.

IMPORTANT NOTE: If you are building your card with 128K memory chips, then you MUST insert them in the following order: M0=128K, M1=256K, M2=384K, M3=512K, etc., until you reach M15=2M. Solder additional 128K memory chips on top of the first layer in piggyback fashion to increase memory beyond 2M. Bend Pin 22 of each upper-layer chip out (do not solder this pin to the chip in the lower layer) to solder a wire between it and the appropriate pad by control chip U2 (M0 to pin 1 through M10 to pin 11 and M11 to pin 13 through M15 to pin 17). Insert a 74HCT154 into socket U2 to control this second layer of chips. You can increase the total board size to 6M or 8M by adding a third and fourth layer of 128K memory chips. You must piggyback one (or two for 8M) additional 74HCT154s on U2, following the above steps for adding memory. Wire Pin 18 of the upper 74HCT154s to U6 (Pin 10 for the third layer and Pin 9 for the fourth layer).

Using 512Kx8 memory chips, you can add 512K at a time without any additional soldering. Just plug the chips in using the M0, M1, . . .M15 order, to put up to 8M on a single layer.

NOTE: You MUST set all of the jumpers in Figure 7 and install the DIP Switch prior to running the MEGTEST program.

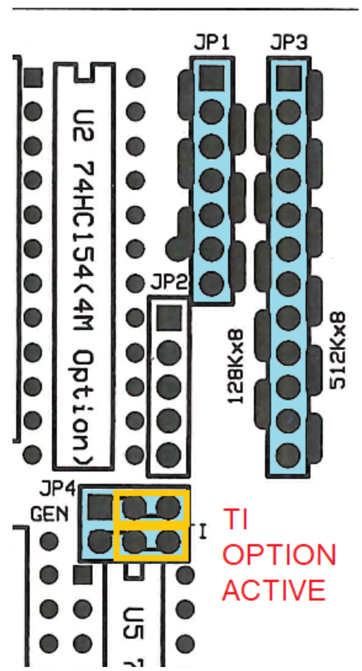
FIGURE 7

INTEGRATED CIRCUITS AND SETTING THE JUMPERS

The Horizon 4000B is designed to accommodate 128Kx8 or 512Kx8 memory chips. Due to differences in addressing requirements for each size, all chips on the board must be of the same size (128K OR 512K), mixing chip sizes is not possible. Complete the addressing setup options by placing jumper blocks on the appropriate pairs of pins of JP1, JP2, and JP3 (by U2).

NOTE: If you elect NOT to use jumper blocks on the pins, you CAN solder jumpers directly to the board—just be sure to pick the correct holes.

Place the shorting blocks on the JP1 and JP3 strips to match the white dashes on the board to the left of the strips, leaving the bottom pin uncovered to option the card for 128Kx8 memory chips.



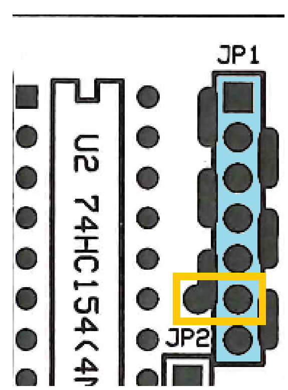
To option the board for 512Kx8 memory chips, start at the bottom pin and match the jumper blocks to the white dashes on the right side of the JP1 and JP3 strips.

J4 (The six-pin block above U5) is to:

Allow single or double Ramdisk operation on the TI-99/4A or to configure a Geneve to allow two 800K Ramdisk s (see the instructions for this in MDOS).

OR

Enable the Geneve PHOENIX for two Ramdisks on the same CRU address (256K/800K). DIP SW #2 or #4 control the PHOENIX assignment of CRU 1400 or 1600.



The dual Ramdisk option requires splitting memory socket assignments into two distinct memory blocks. The split is done by removing the Jumper Block beside the JP2 pin and reinstalling it horizontally so that it covers the JP2 pin AND the adjacent pin. This splits all of the 74HCT154s into the two sections. Each section is not contiguous with the previous 74HCT154. This limits the 128s as follows: Memory sockets M0 through M7 are locked to DIP SW #2 or #4 (CRU 1400 or CRU 1600). The remaining sockets can be assigned to DIP SW 1, 3, 6, or 8, as long as no other conflict exists. DIP SW 5 or 7 tie to 2 or 4. Install the 8-position DIP Switch into the 16-pin socket SW1. Select a setting from the following chart and set only one switch to the ON position. All other switches should be OFF or open.

Switch Position	CRU #	Notes
1	1000	
2	1400 (Phoenix #1)	Note: set SW POS 2 and 4 as shown
3	1200	
4	1600 (Phoenix #2)	to allow for simple setup
5	1400	
6	1500	
7	1600	
8	1700	

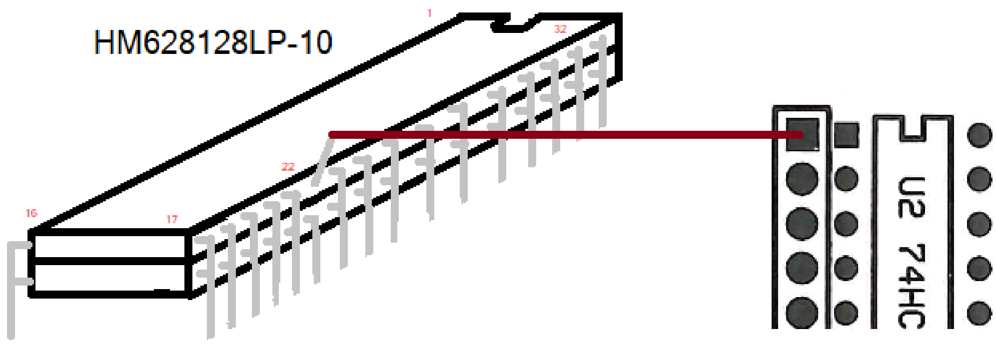
NOTE: The DIP Switch selection of the CRU base for the Horizon card is also dependent on the other devices you may have installed. Examples: the MYARC 512K card uses CRU 1000 and CRU 1700; the P-CODE card uses CRU 1200; an RS-232 card modified for Serial ports 3 and 4 uses CRU 1500; and the P-GRAM card 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 and versions of MDOS prior to 1.23, you will have to obtain the routines written by Mr. Jim Schroeder (LHDROS, HDROS, CFG, and RAMDOS) for the version of MDOS that you are using. Each MDOS release requires a different set of patches.

A set of Phoenix Install Disks can be found on the WHTech FTP site to automatically set up any Horizon for use with the Geneve.

All releases of MDOS from 1.23 through 6.7 have these routines built-in, allowing MDOS to boot from an 800K Ramdisk and allowing multiple 800K Ramdisks on any available CRU line. Special formatting routines are also included.

FIGURE 8



When using 128Kx8 Memory chips to build a HORIZON 4000B larger than 2M, you must stack and solder the memory chips as shown in Figure 8. Each upper chip will have a wire connected to pin 22 that connects 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, it is equally important that ALL SOLDER CONNECTIONS ARE OF GOOD INTEGRITY.

Use a low-wattage (no more than 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. Remove flux from the solder side of the board with a commercial flux remover or 91% rubbing alcohol and an old toothbrush (this works better) once you complete all soldering.

When stacking or inserting ICs, bend the pins to fit the socket by placing the IC on its side on a flat surface. Gently rotate the body of the IC to bend the pins into the desired position. Make sure all pins are properly aligned with the socket holes and that all pins actually go into their holes upon insertion.

APPENDIX 1

MEGTEST INSTRUCTIONS FOR USE ON TI OR GENEVE

MEGTEST will only test up to 1M of memory, however, it is an important tool to have available since the TST 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.

Memory chips can fail, and so can any of the other components of your Ramdisk. A TI BASIC program called MEGATEST has been included on the System Master diskette to facilitate a thorough test of your Ramdisk memory. 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. You must reload the operating system after running MEGTEST.

MEGTEST was set up to troubleshoot 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 chip or 16 32K blocks in each 512K memory chip.

Insert the System Disk into Drive 1 and let XB load the LOAD program.

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, chip U11 is the only chip tested. When "M" is selected, the program asks how many chips are installed. It expects the number of 32K memory chips, so enter the number of 32K memory BLOCKS (as identified above) installed on your board.

It then proceeds to fill the ENTIRE memory space on the card with a series of 18 special numbers and subsequently tests each of the 32K Blocks on your card to see if they retain the written values. If you have a single 128K Ramdisk, four blocks will be tested for each fill number; eight for two 128K chips (256K total); 12 for 384K; 16 for 512K; and 32 for 1M. If you have a single 512K Ramdisk, 16 blocks will be tested for each fill number; and 32 for two 512K chips (1M total).

The "L" LOOP test is only used to positively identify a bad chip using a digital voltmeter or a digital probe. The chip under test will be pulsed on and off to allow a test measurement (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 here to assist in identifying card access problems.

If you find that for certain numbers several chips appear bad, an even more rigorous test is the TST 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 ICs. If you find errors that you cannot correct, contact us regarding repair of your card.

As TST runs, a speedometer-like counter indicates the page under test. Errors are displayed on another line. If errors do occur, be prepared to write the error location down, as the next error overwrites it. You can disregard the last four columns on the right since they represent the 8K banks in each chip (note that these columns are important when troubleshooting older cards using 8K memory chips).

APPENDIX 2

IN CASE OF DIFFICULTY

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 updating the operating system. 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 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 your system down and waiting several minutes. Also try to get it to repeat immediately after reloading 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, does the problem occur when you try to duplicate the problem using a floppy drive in pace of the Ramdisk? 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 Option 1 of the TST program 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, reload the operating system as follows: Turn off the console and HOLD the SHIFT key DOWN while you turn the console back on. Place the ROS disk in the drive and load the XB LOAD program. Choose the CFG option and attempt to reload the ROS. If asked "DO YOU WANT TO RETAIN THE DATA?" type "Y" for yes. Check the drives [D] to see if any of the data has been scrambled after ROS loads. If so, you may have to REFORMAT the drives. Try to reload your SAVED copy of your tailored ROS before resorting to a drive REFORMAT. As the tailored copy loads, you will be asked "DO 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, 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 reenter 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 your computer on you get a blank screen and the computer is “locked-up.” If you find that this only happens when the Ramdisk is plugged into the PEB, it is likely that bad data has found its way into the Ramdisk operating system memory and the operating system must be reloaded. To determine that the Ramdisk is causing the “LOCKUP,” turn the card “off” by setting SW2 down to make the Ramdisk invisible to the system. Turn the PEB on, followed by the CONSOLE. Put your SYSTEM DISK into Drive 1, turn SW2 on (up), and reload the Ramdisk Operating System.

NOTE: A faulty copy of MENU can also case the system to lockup on Power-up.

You can also perform the following alternative procedure using an Editor Assembler cartridge:

1. Power down the Console and PEB;
2. Turn on the Console FIRST, followed by the PEB;
3. Enter the E/A;
4. Select Option 5;
5. Make sure the System Disk is in Drive 1, type DSK1.CFG, and
6. Reload 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. Reload the operating system as usual.

Should you need further assistance, you may write us or go to the TI Subforum on AtariAge and ask your questions there.

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APPENDIX 3

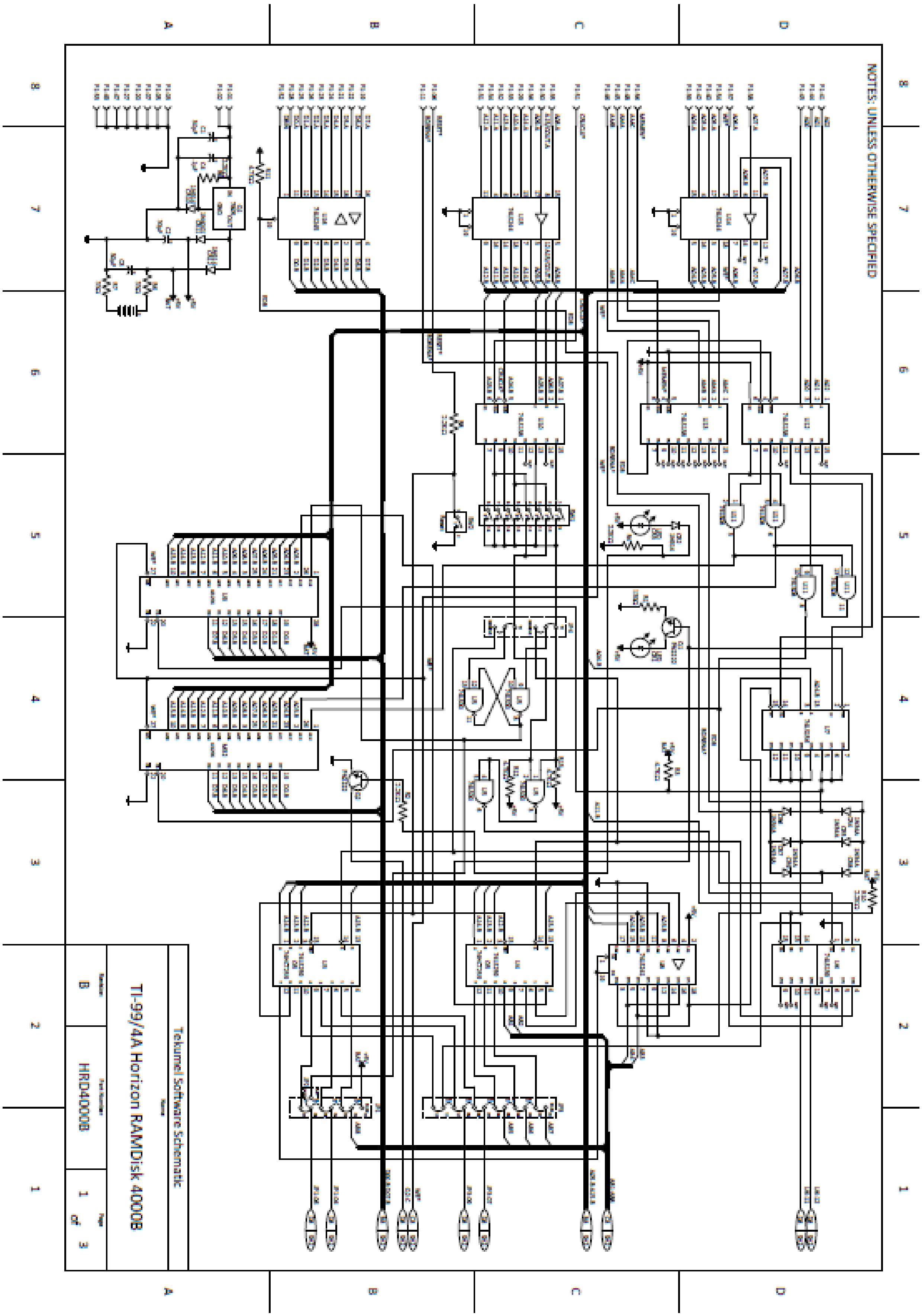
HORIZON TST PROGRAM, Copyright 1991, Bud Mills Services and OPA

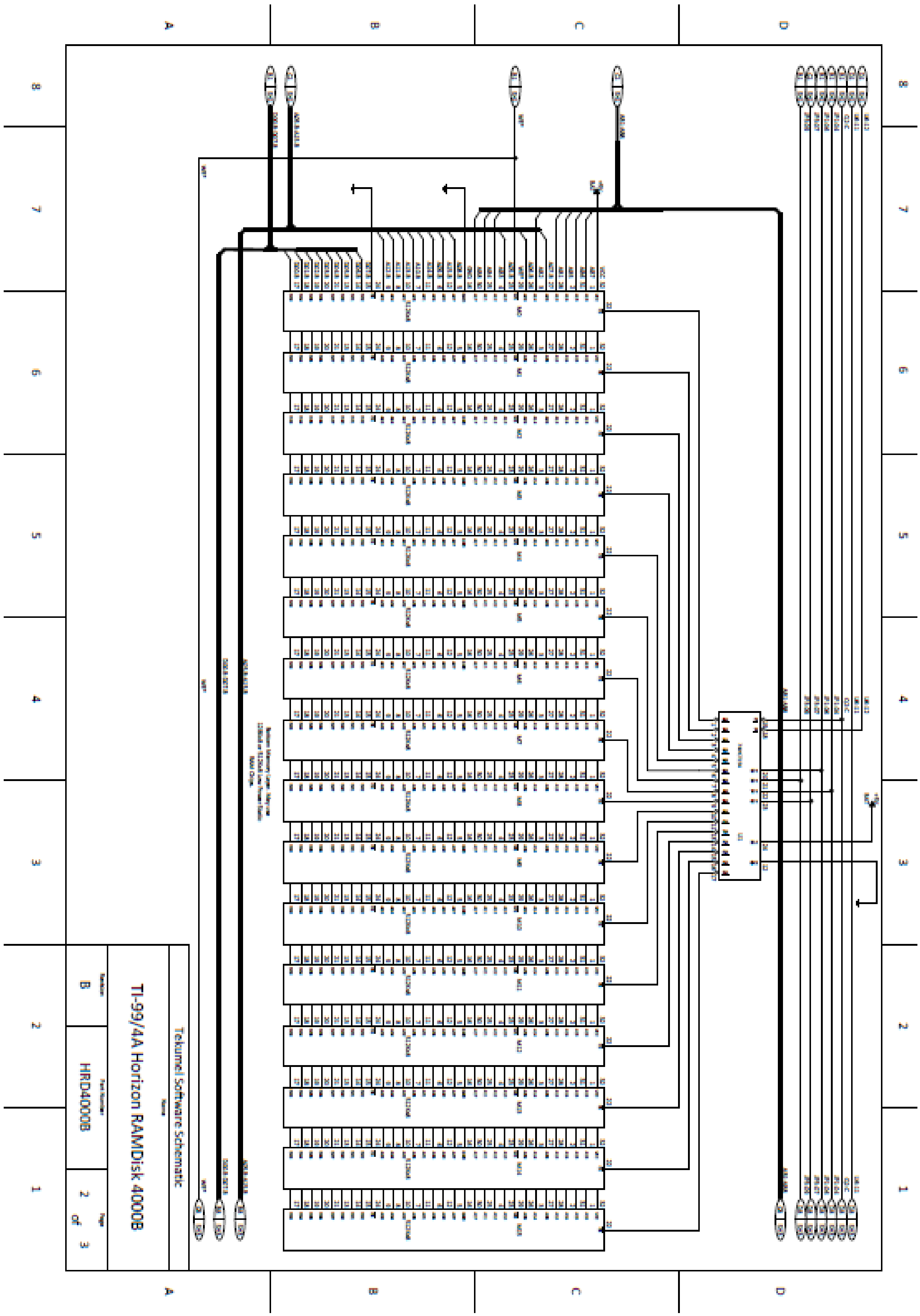
The TST program was written by Gary Bowser of OPA, Toronto Canada for use on ANY size Horizon Ramdisk. Each Chart is arranged to separate the memory chip sizes. When using the TST program you will see instruction screens that explain each test as it executes. If the program finds a valid ROS loaded onto the card under test, it will explicitly ask if you want to proceed.

This chart is only needed when a memory error is detected during a test run of a Horizon 4000B with 128Kx8 or 512Kx8 memory chips. You can ignore the values reported in columns 765432 and 1 when using 128K chips, and columns 98765432 and 1 for 512K chips. The remaining columns correctly identify the memory chip with the error.

16-bit CRU bits bus reported 1111111 column # 6543210987654321 BAD VALUE AT:	Chip number by chip type 128K	512K
0000000000001011	U9	___U9
0000000001111111	M0	\
0000000011111111	M1	\M0
0000000101111111	M2	/
0000000111111111	M3	_/
0000001001111111	M4	\
0000001011111111	M5	\M1
0000001101111111	M6	/
0000001111111111	M7	_/ 1 Meg
0000010001111111	M8	\
0000010011111111	M9	\M2
0000010101111111	M10	/
0000010111111111	M11	_/
0000011001111111	M12	\
0000011011111111	M13	\M3
0000011101111111	M14	/
0000011111111111	M15	_/ 2 Meg
0000100001111111	M0 TOP	\
0000100011111111	M1 TOP	\M4
0000100101111111	M2 TOP	/
0000100111111111	M3 TOP	_/
0000101001111111	M4 TOP	\
0000101011111111	M5 TOP	\M5
0000101101111111	M6 TOP	/
0000101111111111	M7 TOP	_/ 3 Meg
0000111001111111	M8 TOP	\
0000111011111111	M9 TOP	\M6
0000111101111111	M10 TOP	/
0000111111111111	M11 TOP	_/
0001000001111111	M12 TOP	\
0001000011111111	M13 TOP	\M7
0001000101111111	M14 TOP	/
0001000111111111	M15 TOP	_/ 4 Meg

16-bit CRU bits bus reported 1111111 column # 6543210987654321 BAD VALUE AT:	Chip number by chip type 128K		512K
			_
0001001001111111	M0	T	\
0001001011111111	M1	H	\M8
0001001101111111	M2	I	/
0001001111111111	M3	R	_/
0001010001111111	M4	D	\
0001010011111111	M5		\M9
0001010101111111	M6	L	/
0001010111111111	M7	A	_/ 5 Meg
0001011001111111	M8	Y	\
0001011011111111	M9	E	\M10
0001011101111111	M10	R	/
0001011111111111	M11		_/
0001100001111111	M12		\
0001100011111111	M13		\M11
0001100101111111	M14		/
0001100111111111	M15		_/ 6 Meg
0001101001111111	M0	F	\
0001101011111111	M1	O	\M12
0001101101111111	M2	U	/
0001101111111111	M3	R	_/
0001110001111111	M4	T	\
0001110011111111	M5	H	\M13
0001110101111111	M6		/
0001110111111111	M7	L	_/ 7 Meg
0001111001111111	M8	A	\
0001111011111111	M9	Y	\M14
0001111101111111	M10	E	/
0001111111111111	M11	R	_/
0010000001111111	M12		\
0010000011111111	M13		\M15
0010000101111111	M14		/
0010000111111111	M15		_/ 8 Meg


NOTES: UNLESS OTHERWISE SPECIFIED
Tekumel Software Schematic
TI-99/4A Horizon RAMDisk 4000B
B
HRD4000B
1 of 3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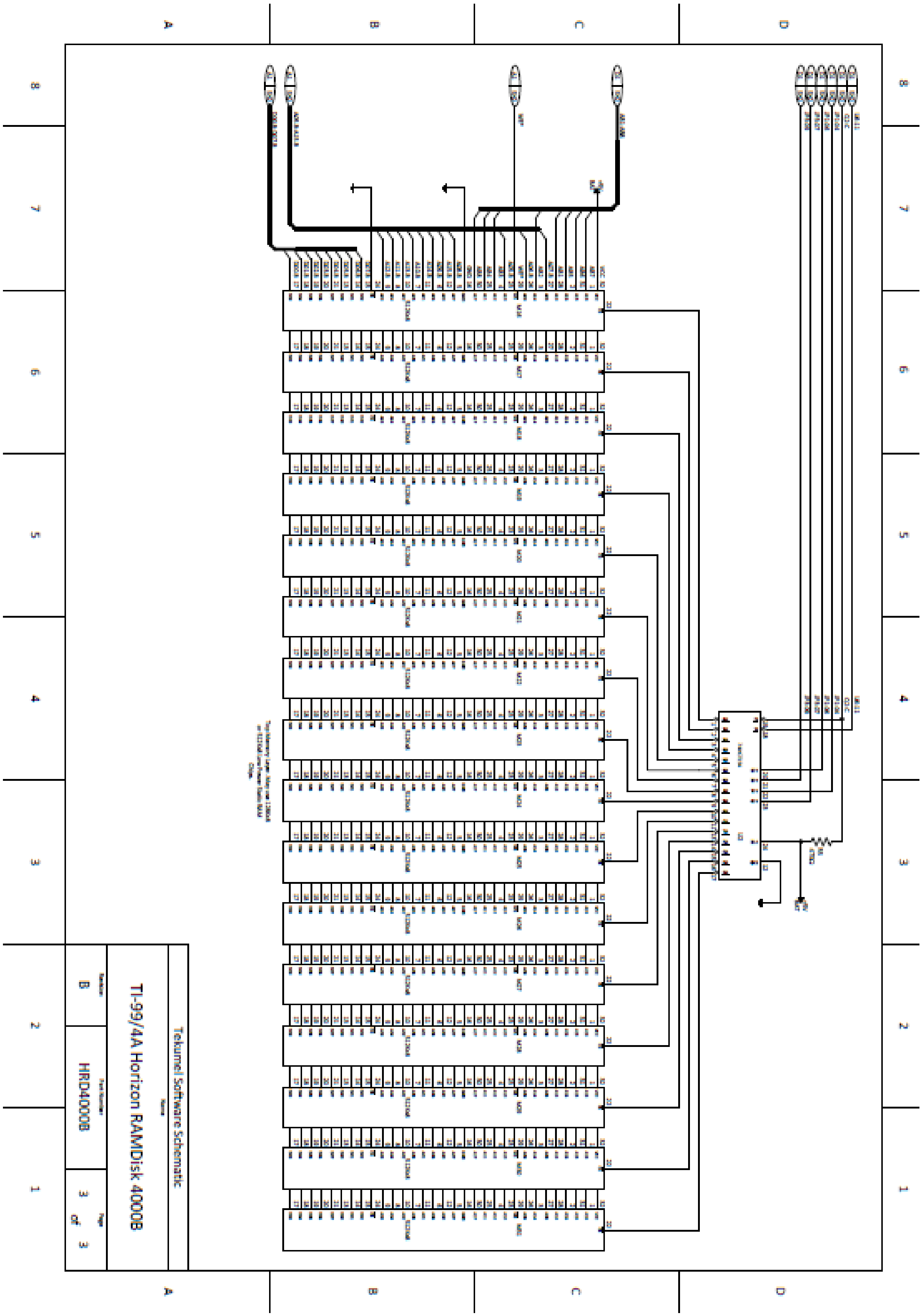
TI-99/4A Horizon RAMDisk 4000B
B
HRD4000B
2 of 3


Tekumel Software Schematic
TI-99/4A Horizon RAMDisk 4000B
B
HRD4000B
3 of 3