ALPHA Technology, Inc.
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SUPERMEM

Model 1

INSTALLATION MANUAL

INTRODUCTION

Thank you for ordering the Supermem for the TRS-80 model 1. **The version you have received will work only on the model 1.** If you have received the wrong version, let your dealer know and they will exchange it for you. Alpha Technology, Inc. warrants this product to be free from defects in material and workmanship for a period of ninety (90) days from the date of purchase. During the warranty period, Alpha Technology will repair (or at its option, replace) at no charge for components that prove to be defective provided the product is returned, shipping prepaid, to the dealer from whom it was purchased. Your sales receipt is your warranty validation. The receipt, or a copy, must be provided when requesting warranty work to be performed.

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Please read the following instructions very carefully before proceeding with the installation. **Refer to figure 1 to determine the pin numbering for the IC's and figure 2 for component location.**

DO NOT OPEN THE 256K MEMORY CHIPS UNTIL TOLD TO DO SO.
USE EXTREME CAUTION WHEN HANDLING THE 256K MEMORY CHIPS

DISASSEMBLY

WARNING. Disassembly of your computer may void any warranty from Radio Shack. Verify that all functions (memory, disk, printer, RS-232, etc.) of your computer are working properly. After you are satisfied that all functions are working properly begin the disassembly process. Turn off the computer and disconnect the power cord. Remove all cables attached to the computer. Place some soft cloth material on your work area and perform the following steps.

1. Position the computer, keyboard down, on the soft material.

2. Remove six screws from the bottom of the case. Keep track of the different lengths so you are sure to replace them in the correct holes.

3. Turn the computer right side up and carefully separate the case halves.

4. Set the case top aside. Carefully lift the keyboard out of the case bottom. Take care that you don't put stain on the interconnect cable between the keyboard and CPU board.

5. Notice the rubber spacers that separate the two PCB's. Keep in mind where they are positioned so you can replace them over the same plastic studs.

6. Carefully lift both boards out of the case together. TAKE CARE YOU DON'T STRAIN THE INTERCONNECT CABLE.

7. Carefully lay out the two PCB's, side by side on your work area. **AGAIN, AVOID PUTTING STRAIN ON THE INTERCONNECT CABLE.**

Installation of the memory board will be in two parts. Part 1 will be the elimination of the -5 volts and the 12 volts from the CPU. Part 2 will be the installation of the memory board itself.

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PART I. The 16K memory chips now in your computer use -5, +5, and +12 volts. 64K and 256K memory use only +5 volts therefore we must eliminate the -5 & 12 volts and re-route the +5 to the proper pin. Once you make this modification it will not be easy to return to 16K chips.

1. Remove all 16K memory chips from the sockets. These memory chips will not be used and you may want to save them for one of your other projects. Z13 Thru Z20

Remove the following components from the CPU board...these may be de-soldered or clipped.

C3, C4, C16, C17, C18, C19, C29, C31, C33
CR2
R19

NOTE: Skip the next paragraph if you elect the ALTERNATE METHOD.

Isolate pin 9's of all the RAM sockets by cutting the trace that goes to pin 9 for each socket. The trace for Z20 is on the component side of the board. Now that all pin 9's are isolated we need to connect them together. Connect each pin 9 together and also connect them to Z51 pin 12 on the back side (solder side) of the CPU board.

ALTERNATE METHOD

Before installing the 256K memory chips, bend pin 9 out and back over the top. Do this for each memory chip. Insert the memory chips in the sockets. Using a length of small wire, connect all pin 9's together and also connect them to pin 12 of Z51. Z51 pin 12 must be common to all memory chips installed. We recommend you use the first method so that you don't destroy and RAM chips. The pin 9's will break off if you are not careful. If you use the alternate method it will be hard to upgrade to 512k.

Isolate Z19 pin 8 by cutting the large trace that runs to C15. Cut the trace close to pin 8. Verify that all pin 8's of the RAM sockets are connected to each other but isolated from the 12 volt buss. Once you are satisfied that they are, run a jumper from pin 8 of Z19 to the trace connecting to Z36 pin 14 .

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********** USE EXTREME CARE IN HANDLING THE 256K MEMORY CHIPS **********

Install 1 set (8 chips) of 256K memory in sockets Z13 thru Z20. Be sure pin 1 of the memory chips is in the upper left corner of each socket.

You are now ready to check out the memory circuits before installing the memory board. Do not connect the expansion interface at this time. Plug in the power and video cables and turn on the computer. Press <ENTER> for MEMORY SIZE?. Type PRINT MEM and you should have a 16K system. If you get MEMORY SIZE? and the computer locks up the system is still working ok. All we are checking here to to see if the computer will power and access the memory. Some 256K memory chips will not work at all without the 256 cycle refresh provided by our board. Some will work for a few minutes. If the computer won't power up or you get garbage, double check all your work. The computer must be working properly before beginning part II. Once you are sure that the computer is working you may proceed to the next step.

PART II. Remove the DIP shunt installed in Z71. Bend out pin 5 and re-insert the shunt back in the socket. Remove the Z80 (IC Z40). Install the memory board in the socket for the Z80. Press the header into the Z80 socket firmly. Insert the Z80 into the socket on the memory board (Z40). Pin 1 should be pointing in the opposite directtion as the other chips on the memory board. The wires from the memory board should be coming out towards the center of the CPU board.

You must now solder the wires to selected points in the next step. We have left the wires longer than needed but you must cut them to fit as short as possible. This is critical for the violet wire. If the color code is different on your board, go by the position of the wire, not the color. After you determine where each wire goes, we suggest you put a drop of solder at that point and then solder the wire to it. Use as little solder as possible. The more the better is not the case here.

Now solder on the following wires from the memory board to the CPU board.

Memory board pad 1 -GREEN--> Z51 pin 13.
Memory board pad 2 -BLUE---> Pin 1 of RAM sockets.
Best place to connect is at the left side of C19 or rather where C19 used to be.
Memory board pad 3 -VIOLET-> Z67 pin 13.
Memory board pad 4 -GRAY---> PIN 15 2nd set memory
Memory board pad 5 -WHITE--> Z72 pin 10.
Memory board pad 6 -BLACK--> Z72 pin 3.
Memory board pad 7 -BROWN--> Z74 pin 10.
Memory board pad 8 -RED----> Z21 pin 15.
Memory board pad 9 -ORANGE-> Z51 pin 14.

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You are now ready to test the system. However, do not connect the interface at this time .

Turn on the power. **ANSWER THE MEMORY SIZE PROMPT WITH 32000**. You will not see any difference yet. The system powers up in the normal model 1 mode. To switch in another bank, type **OUT 67,x**. **x** can be a value **0** to **7** for the 256K version, **0** to **15** for the 512K version .

If you do an **OUT 67,0** you will be switched back to the normal model 1 mode. When you switch a bank it defaults to the upper 32K bank of the normal 64K. If you want to switch into the lower 32K bank, just add 32 to the bank number i.e. **OUT 67,37** switches bank 5 into the lower 32K bank.

Type in the following program.

```
10 FOR N = 1 TO X:OUT 67,N:POKE -1,N:NEXT N
20 FOR N = 1 TO X:OUT 67,N:PRINT PEEK(-1);:NEXT N
```

X will 7 for 256K, or 15 for 512K.

The display should read:

1 2 3 4 5 6 7 for a 256K machine

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 for a 512K machine

Now for one more test to make sure we can read the port.

Type in the following program:

```
10 FOR N=1 TO X:OUT67,N:PRINT INP(67);:NEXT N
```

Use the same value for X as you did above and you should get the same results as you did above.

That means you can read the port to determine which bank you have switched in.

If your values match with those above, your system is switching properly.

If you don't get the indicated values, the system does not function properly. Please check all of your work to see if it is done correctly and try again. If you still can't get it to work call your dealer for technical assistance.

If you are installing only 1 set of memory for 256k, you will skip the next section and go to page 7 for reassembly instructions.

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In order to increase your memory from 256K to 512K, you must add one more set of 256K memory chips. The easiest way to do this is to 'piggyback' a set of memory onto an existing set. Note: This is extremely difficult to do if the first set of memory is installed using the ALTERNATE METHOD.

Make sure the system is working properly with 256K before expanding to 512K.

Open the second set of 256K memory chips.

1. Bend pin 15 out and back over the top of each chip. Be careful. The pins can break off if you use brute force. Do this to all 8 chips.

2. Remove the 256K chips now in the computer. Try not to bend the leads when removing the chips from the sockets.

3. Take one of the chips that you prepared in step 1 and stack it onto one of the chips you removed from the computer in step 2. Lay one chip on top another. Make sure the chips are lined up the same way. Press the top chip all the way onto the bottom chip. Make sure all the pins are aligned with the pins of the bottom chip. That is pin 1 of the top chip lined up with pin 1 of the bottom chip. Pin 2 with pin 2, etc. All pins except pin 15 should be lined up.

4. After you are satisfied that all pins line up, you are ready to solder the pins together. Some of our customers prefer to only solder pins 1 and 16 because the other pins will be making contact. We recommend soldering all pins to be sure. When soldering the pins try to keep the solder as high as possible on the pins. If you get too much solder on the pins it may interfere with the pins of the bottom chips going into the socket. You need only a small amount of resin core solder. **DO NOT USE ACID CORE SOLDER.**

5. Repeat steps 3 and 4 for each of the 8 chips in each set. After you have piggy backed all 8 chips, insert each double chip set into the memory sockets. Make sure they are lined up right, that is, all pointed the same way as when you removed them. You should now have 8 double chips on the CPU board. Pins 15 should be bent over the top of each double chip.

6. Connect pins 15 of all 8 double chip set together with some small wire and, also, that wire to the gray wire that goes to pad 4 of our memory board.

You should now have all pins **15** connected together and connected to pad **4** of our memory board.

You now have **524,288** bytes of memory in your model **1**.

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Turn on the power and run the same test as you did before on page 5 and you should get the same results except for the additional memory. If you do not get the correct results, recheck your 'piggyback' and the solder connections. If it is still bad you may have a bad memory chip.

REASSEMBLY

Reassemble your computer by reversing the steps you used to disassemble it. However you will notice that you will need to trim off one of the standoffs to get the CPU back into the case. Do this carefully so that you do not damage the rest of the case. Complete reassembly insuring proper placement of rubber spacers. Do not connect your computer to the interface, yet. You must now disassemble the interface and disable the memory circuits in the interface. If you remove the memory from the interface without disabling the buffer the system will not work properly. Remove the screws from the bottom of the interface. Separate the two halves of the case and remove the circuit board from the case by removing the three screws holding it to the case. If you have an RS232 installed you must also disconnect it before removing the circuit board. Remove the circuit board and perform the following steps depending on whether you have the **old** interface or the **new** interface. The **new** interface will have 2 sets of memory sockets near the center rear of the circuit board. The **old** circuit board will have the memory sockets on the side near the power supplies.

OLD CIRCUIT BOARD: Cut the trace going to Z19 pin 1 and cut the trace going to Z21 pin 1. The trace to Z19 pin 1 comes out between pins 15 and 16 of Z19.

NEW CIRCUIT BOARD: Locate Z28 which is a 74LS00. Cut the trace that runs from pin 6 of Z28 to pin 19 of Z29 and to pin 19 of Z31. The trace you need to cut runs between pin 8 and pin 9 of Z28. Cut the trace right above the number "2" in "Z28".

You have now disabled the interface memory. Remove the 16K memory chips, if installed. Reinstall the circuit board and reinstall the RS232 if it was installed prior to disassembly of the interface and reassemble the case.

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You may now connect the CPU to the interface and install the RAMDRIVE software or write your own drivers to use the extra memory now available to your system. We have supplied all the required technical information we think you will need to write your own software; however, if there is any more information you need, just ask us.

If you don't get the indicated values or the system does not function properly. Please, check all of your work to see if it is done correctly and try again. If you still can't get it to work call your dealer for technical assistance.

If you return your registration card, you will be notified when the system is upgraded to 768k or higher.

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Warranty Registration

In order for us to keep you updated with changes to hardware and software, please return this registration to:

Alpha Technology, Inc
1127 S. Patrick Dr, Suite 24
Satellite Beach FL 32937-3939

NAME: _____

ADDRESS: _____

CITY STATE ZIP: _____

TELEPHONE NUMBER: _____

DATE OF PURCHASE: _____ SERIAL NO. _____

PURCHASED FROM: _____

Any comments you would like to make on our products, our manual, or our service. We would also like to find out from you what products you would like us to produce for the Radio Shack or other computers.

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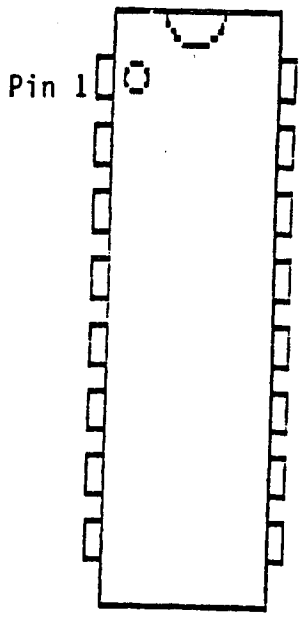
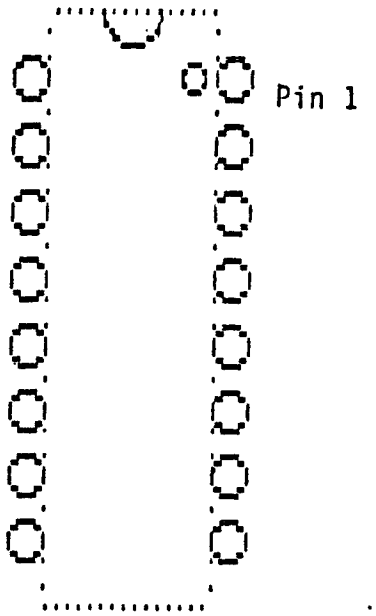
IC PIN NUMBERING

The pin numbering system used on the IC's is as follows: When viewing the IC from the front, or component side, the numbering goes counter-clockwise. When viewing the IC from the back, or solder side, the pin numbering goes clockwise. Pin 1 will be indicated by a small dot or dimple on the front of the IC. If there is no dot or dimple, the IC will have a notch at one end. When holding the IC with the notch at the top, pin 1 will be the pin at the top left when looking at the front of the IC. This holds true for 14, 16, 20, 24, and 40 pin IC's.



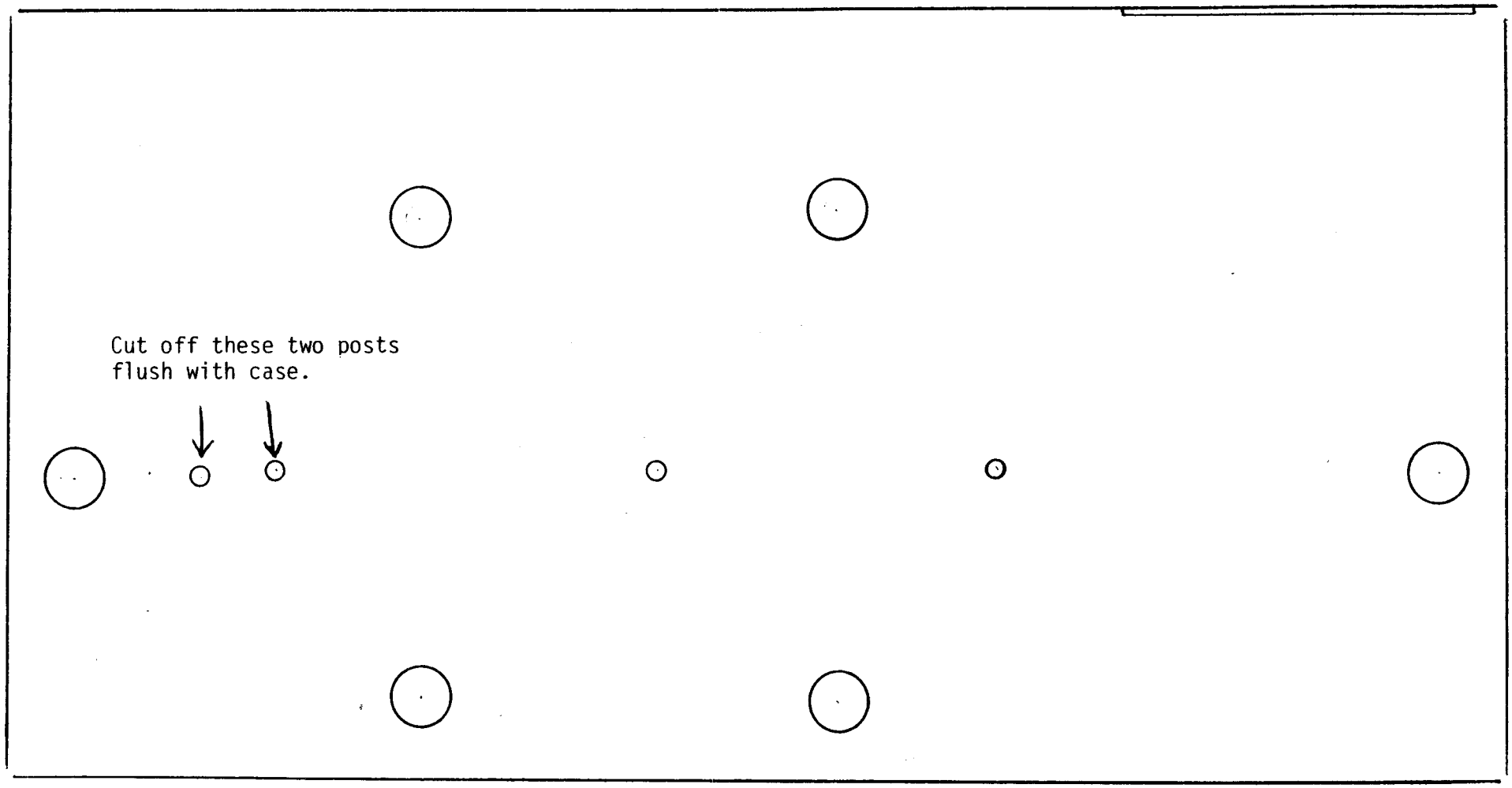
IC viewed from
component side



IC viewed from
solder side

Figure 1

Rear



Front

TRS-80 Case Lower Half