

UNIVERSAL CHARACTER GENERATOR

Installation Instructions

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What you should know before starting the installation

Installing the universal character generator requires that you disassemble your computer. When you do this, the "warranty seal" will be broken. The strictest reading of the Radio Shack repair policy is that any remaining warranty (original or a repair warranty) will be void if the seal is broken, and if the machine is ever repaired again by Radio Shack, the technicians may remove or replace any "alien" components to restore the unit to its original state.

However, in 1982 Ed Juge (the Press Officer of Radio Shack/Tandy) clarified how "alien" modifications are handled by Radio Shack Service Centers. In "TRS-80 Microcomputer News", July/August 1982, and in "80-US", May 1982, Mr. Juge states that Radio Shack will service a machine with a modification and will ignore it if doesn't seem to be hurting anything. If the modification prevents the technician from properly testing the unit, they may ask you for permission to remove it.

It is also possible that some future repair may require the CPU board be exchanged and the technician may not notice that you have a different character generator in your machine and may fail to move it to the replacement board. To avoid this, be sure to tell the technician that you have the new character generator installed. Be sure this gets written down on the repair ticket in case a different person ends up working on your machine.

Installation

As discussed above, installing the character generator requires your computer to be disassembled. The entire job can be done in about 30 minutes. Two steps are much easier if you have a second person to help. Read through the following steps and if the procedure seems beyond your capabilities, seek help from a local computer shop, TV repair store or local college.

The installation instructions are written for the person who has never disassembled a Model 4 before, but is able to perform repairs on the car or the toaster. If you have installed a battery-powered clock in your computer or changed a disk drive, the instructions need only be skimmed. Otherwise, read each step entirely and then perform the action. It is suggested that you place a check mark next to each step as it is completed so that you won't skip anything.

Installing the character generator

1. You will need a medium-sized Phillips screwdriver, a small flat-blade screwdriver (1/4" wide tip or smaller), a large towel (or towels) that will cover a 5' x 3' area, and a table or workbench with at least 5' x 3' of space.
2. Place the cloth or towel over the area that is to be used. This will protect the surface of the table and the case of computer during disassembly.
3. Unplug the power cord and disconnect all other cables attached to the computer.
4. Place the Model 4 on the left hand side of the table and lay it on its left side, as one looks at the keyboard.
5. Remove the ten Phillips screws that hold the top and bottom of the case together. Keep track of where the screws come from as they may be of different types and sizes. In some cases, one or more screws may be missing or may be hidden under the warranty seal. Two recessed screws on either side of the case are sometimes hard to remove. If you don't have a magnetized screwdriver, simply unscrew them until they are loose. They should fall out in the next step.
6. Set the machine upright by tipping it from its side. It should now be on the right side of the table. While tilting the machine, keep in mind that the cover is loose, so hold the top and bottom sections together. If you had trouble with the two side screws, check to see that they have fallen out onto the table. If they did not, go back to Step 4.

7. Remove the Phillips screw from the back of the cabinet. If it is missing, don't worry; it is possible that this part was left out after some previous disassembly.
8. If you have floppy drives with "garage door" latches (these came standard on the Model 4 but not on the Model 4D), close them before proceeding.
9. READ STEP 9 ENTIRELY BEFORE DOING STEP 9.

Very carefully, lift the top half of the case STRAIGHT UP. Watch the neck of the CRT through the vent at the top of the computer, or through the top floppy drive opening. It is VERY IMPORTANT that you not lift the cover at an angle or push the cover towards the back because the CRT socket or cabling could catch on the lower half of the chassis and break the tube. If you have a second person to help, have them watch the CRT neck and give directions as you lift. Do not allow the top half of the computer to slip or drop, as the CRT could implode.

Once the cover is clear of the lower half of the computer, lay the cover on its side next to the bottom half. The cables from the bottom half to the cover are long enough to do this. The cover should be sitting on the left side of the computer now, as one looks at the keyboard.

10. Move around to the back of the computer. If a metal plate covers the circuit boards (across the back), remove the brass-colored screws that hold the cover in place. These are located across the top and sides of the CPU enclosure. Do not remove the screws that hold the CPU to the plastic base. If there is no shield, skip to step 13.
11. Some machines are equipped with Network 4 or a Model III graphics hardware. These boards (only one can be present in a machine) are mounted on the shield. If these boards are present, one or more multi-wire cables will plug into connectors that stick out of a slot in the shield. Make a note of where each connector goes (label them if necessary) and unplug them from the connector(s) on the shield.
12. Once the screws are removed, gently fold the shield (metal surface that faces the back of the machine) down. In some machines, small metal hooks were installed to hold the cover in place while the screws are being inserted. By bending the cover back in one area at a time, the cover should fold down so that the CPU board is revealed.

Some units also have a metal foil across the bottom of the shield. If this prevents the shield from folding down, peel it off the shield but leave it attached to the base of the machine. You will have to re-apply the foil later, so don't destroy it.

13. Near the top of the circuit board, just to the right of center is the character generator. This is a 24 pin part. Near each socket (usually just above it) is written a number like U23. U23 is the part we want to replace.

If you cannot find U23, or the socket with that number is the wrong size, don't panic. There were several different circuit boards built for the Model 4, and the one you have may have the socket in a slightly different place or it may have a different socket number.

Search the CPU board for the following items and you should be able to identify the character generator:

1. The chip must have 24 pins.
2. There should be one other 24 pin chip adjacent (in the same row or column) to the chip you located.
3. The part number on other chip should have the number 6116 written on it.

Once you locate a chip that meets these requirements, you have found the correct part.

14. On one end of the chip (character generator) there will be a notch, indentation or small "divot". This indicates which end of the chip has pin 1. It is extremely important to remember which way the chip goes in so that the new character generator can be installed correctly. Although the CPU board may also have a "1" marked on it indicating where pin 1 is, CPU boards have been known to be incorrectly marked.

15. Remove the old character generator from the socket. If you know how to remove the part, do so and skip to 16.

If you don't know how to remove the chip, here is one way to do it with the tools you have. Using the blade of the flat-blade screwdriver, slip the end between the chip and the socket on either end of the chip. DO NOT try to do this between the pins. Insert the screwdriver only a quarter of an inch, or less. Now rotate the screwdriver VERY GENTLY so that the chip lifts away from the socket. If you can't do this, then use the screwdriver as a lever and pry the chip up NO MORE than 1/8 of an inch. DO NOT try to pry the chip out of its socket with a single motion or you could bend or break the pins, or even crack the chip.

Now that you have one end of the chip lifted slightly, insert the screwdriver further under the chip (about 3/4 of an inch, or as far as it will go without forcing), and repeat the process. This will lift the chip out of its socket without bending the pins. You may have to insert the screwdriver one more time to completely lift the chip.

If the chip has not fallen out, you should be able to grasp it on each end with a finger and pull it straight out. If it is too tight to be removed using two fingers, repeat the screwdriver maneuver.

16. Remove the new character generator from the foam or tube. If the chip was packaged in foam, check between the pins for any small pieces of the foam that may have stuck to the pins or to the chip. Remove these particles.
17. Insert the old character generator into the foam or the tube. This will protect the part from static electricity.
18. Insert the new character generator into the socket that the old part came from. Make sure the notch, indentation or "divot" on the chip is facing the same way as the part you removed. This is most important, as improper insertion will ruin the character generator.

Line the chip up so that its legs are sitting in the sockets. You may have to bend one or more pins ever so slightly to get them all started into the socket. When everything appears to be lined up, press the chip into the socket part-way by pressing it with your thumb. Confirm that all the pins are still going into the socket and that none are going outside the socket or are bending under the chip. (The top of the pin usually bows out if the bottom of the pin is bending under the chip.) If one or more pins are out of line, remove chip using the screwdriver method, and straighten the pins out that are not inserting properly. Then try again. It may take a few tries to get all the pins going into the socket.

If the pins are still going into the socket after you have pushed it halfway into place, push it down until it feels firmly seated. There is usually about 1/8 to 1/16 of an inch between the bottom of the chip and the socket when it is inserted properly.

Do not try to force the chip flush with the socket. Some sockets are designed to prevent you from doing this and the excessive force could crack the CPU board.

Now run your finger along the pins on either side. If a pin feels like it is out of line, examine it carefully, as it may have folded under the chip despite your efforts. If you have a flashlight, examine the pins by looking under the chip from one end. If a leg is bent, carefully remove the chip and straighten the leg by bending it very slowly and try again. A chip leg can usually be straightened twice without breaking, but that is all.

19. In the upper half of the case, check the connector that attaches to the video board (mounted on the side of the cover). Sometimes this comes loose when the machine is disassembled. Make sure the connector is pushed all the way onto the circuit board.
20. Re-install the shield over the CPU board if your machine had one. If there was a piece of foil-covered tape along the bottom of the shield, be sure the foil is on the outside of the shield when you put it back in place. Press the tape into place and if the adhesive is not holding the tape in place, use non-fiber packing tape or electricians tape to hold it in position.

Once the shield is back in position, insert and tighten the brass screws that hold the shield in place.

If your machine has the Network 4 or Model III graphics boards, reconnect the cables that you removed earlier. If you have the Model III graphics board and fail to reconnect these cables correctly, the screen will not display anything when you test the installation.

21. At this point, you can either completely reassemble the machine, or test the character generator first. If you want to go ahead and reassemble the machine, Skip to step 29.

Testing the character generator installation with the machine disassembled

CAUTION! HIGH VOLTAGE EXISTS WITHIN THE CABINET WHEN POWER IS APPLIED, EVEN WHEN THE POWER SWITCH IS OFF. AVOID TOUCHING ALL METAL SURFACES. NEVER TOUCH ANY OF THE CIRCUITS WHILE POWER IS APPLIED TO THE COMPUTER.

24. Reach under the right edge of the machine and turn the power switch on. Because the 120 volt connections to that switch are exposed while the cover is removed, that area should be avoided during this test. For this test, the computer will be turned on and off by plugging it into the outlet or an extension cord.
25. Plug the power cable into the outlet. The floppy drive should light and the floppy drive motor should run for a few seconds and then it may stop.
26. Press RESET and hold down the **BREAK** key. You should see the Cass ? prompt. (This message may be displayed more than once. This is normal.) If you see the message, go to step 28.
27. Wait one minute. You should see the message Cass? on the display. If there is no text on the screen, adjust the brightness and contrast controls on the left side of the base, but **AVOID TOUCHING ANY WIRES**. Turn both controls to maximum so that you can see the screen raster (fine lines running horizontally across the screen.)

If you do not see the message Cass?, try Steps 26 and 27 again. If that does not work, unplug the power cord and wait one minute. Then check the installation and make sure the part was installed correctly and all cables were reconnected. If the problem is not found, remove the new character generator. If the pins are not bent, install the old character generator and see if it works. If neither part works, then a cable is probably loose somewhere.

28. If the above checks worked correctly, the character generator installation is correct. Now unplug the power cord and wait one minute. Now reassemble the computer by following the instructions below.

Reassemble the Computer

29. Make sure the power cord is unplugged. From the front of the machine, lift the cover and place it over the computer base. Watch the neck of CRT through the top vents or through the top floppy drive opening in the cover. The cover should be guided so that the CRT neck does not strike the CPU enclosure and does not hang on any of the wires that are routed near the CRT. If the CRT socket won't clear the wires, remove the cover and adjust the wiring so that the CRT and its socket have more room. If you have a second person to help, they should assist in guiding the cover into position.
30. Unplug the computer and replace the screw in the back of the cover. Then set the machine on its side and install the 10 screws that came from the bottom. Be sure you get them back in the right holes. Tighten but do not force as these bolts are going into plastic and can be easily stripped.

This completes the installation of the character generator.

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