

DISTO

SUPER PRODUCTS

1 MEG Upgrade Kit.

For the 512K COCO 3.

Manufactured and distributed by:

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DISTO 1-MEG MEMORY UPGRADE KIT

Congratulations on the purchase of your new DISTO 1-Meg Memory Upgrade Kit. The quality materials and workmanship used in this product insures years of trouble free use. This product will only work with a 512K COCO 3 computer. Please read this manual completely before opening your computer. It is very important that you understand what you are doing before you start. Good soldering experience is needed. **WARNING!** Opening your computer may void your warranty. Not knowing what you are doing may void your computer. After reading all the instructions, if you feel that you cannot do the installation, contact someone that can. We at DISTO & CRC are not responsible for any damage to your computer. We have made every effort possible that this manual is accurate.

FEATURES.

- * Transparent to all software that supports extra memory.
- * Can use any other 512K memory card.
- * Fits completely inside the COCO case.
- * Easy installation - installs in 1 evening.
- * Includes all necessary parts.
- * Drivers for OS9 included.

Theory of Operations.

The COCO 3 uses the MC68B09E CPU. This is an 8-bit CPU that can address 64K of memory. Before you bought this upgrade kit, the COCO 3 could access a maximum of 512K memory using a page switching method via the GIME chip. Now, with this kit, the page switching capabilities of the GIME chip has been extended to 1 Mega Byte of memory. This is done using two small internal boards. The first is 512K of memory on a special board that allows you to install your already existing 512K board on top for a total memory of 1 Meg. Also on this board are; a power supply, so that the COCO's power supply does not overheat and a switching circuit to access the memory on the top board. The second board is the page switching circuitry that adds the extra memory to the capability of the GIME. This method of page switching becomes transparent to software capable of using the extra memory. Note: before the software can make use of this extra memory, it must know of its existence. Check with the software's manual for its ability to use the complete 1 Meg.

Installation of the CPU Adapter.

Before you start this installation, make sure you have the following; SOLDERING EXPERIENCE, a fine-tip soldering iron, small wire cutters, solder, thin solid wire, star screw driver and a continuity checker. Make sure that you have a large, clean and static free working area.

1 - Unplug everything to your COCO and remove the top cover. Locate the CPU labelled IC1. It is next to the cartridge connector.

2 - Examine the 40 pin adapter included in this kit. Notice the

20 pins on each side. They have the same spacing as the CPU. Carefully place the long and wide end of the adapter on top of the CPU. Pry open one side of the adapter so that the pins of the adapter are against the pins of the CPU. Each pin of the adapter must sit in the each CPU pin. The points of each pin on the adapter must rest on the main board. Make sure that all pins are positioned properly and that there are no leftover pins on either end.

3 - Solder each adapter pin to the corresponding CPU pin one at a time. Make sure that you do not use too much solder. Make sure that the solder flows from the adapter pin to the CPU pin and that it does not short out to any adjacent pin. Solder all 40 pins.

4 - Locate R22 just above the keyboard adapter. Use a 1" piece of this wire and solder one end to one side of this resistor. Solder the other end of the wire to the other end of the resistor. This shorts out R22.

Testing the Adapter Installation.

This finishes the soldering part of the installation. But, before you go on, you must make a few tests. Note: Pin #1 of the Adapter is pin #1 of the CPU. Pin #2 of the Adapter is pin #2 of the CPU and so on. You now need to use your continuity checker. There are many kinds of continuity checkers. You must know how to use yours. What you are trying to determine in the following instructions are two things. First, no shorts between pins and second continuity between the Adapter and the CPU.

5 - Check that there is no short between pin #1 and pin #2 of the Adapter. Some continuity checkers may show some

resistance between these two pins, this is normal, what you are checking for are dead shorts or close to 0 ohms. If no shorts appear, check pin #2 and pin #3 and if no shorts appear, check pin #3 and pin #4 and so on until all pins are done. If there happens to be a short between pins, check your soldering where the adapter pins meet the CPU pins. Remove excess solder.

6 - Using the same procedure as above check for shorts between pin #1 and the pin directly across, pin #40. Then check pin #2 and the pin directly across it, pin #39. Before going on to pin #3, check the pin before the pin across (pin #40) and the pin after (pin #38) with pin #2. Continue in the same manor for all the pins. This will make sure that there are no cross shorts. If there are shorts, check again your soldering around the pins in question, it is the only reason for shorts.

7 - For this test, it is necessary to remove the COCO's Printed Circuit Board (PCB). Remove the power connection and all the screws that hold the board. Remove the shield by pressing on the pins. Now, position the PCB in such a way that you are able to see the Adapter pins and the pins of the CPU on the bottom of the PCB. (The side that has no components on it.) What you want to test in this part, is the continuity between the Adapter pins and the CPU pins. Yes, to see if your soldering is good. Touch one lead of your continuity checker on pin #1 of the Adapter. Touch the other lead to pin #1 of the CPU on the bottom side. There should be continuity between the two. If not, check your soldering for that pin. Next, do the same with pin #2 right through to pin #40. When all is well, replace the shield and reattach the PCB to the case. Do not forget the power wire. Make a visual test to see that nothing is touching.

8 - The final test for the Adapter section is to plug in the computer and turn it on. If you do not get your regular screen, turn it off right away and go back to step #5. Check your computer with several pieces of software and all your peripherals plugged in. When you are satisfied that all is working well, continue the installation.

Plugging in the Boards.

You have now successfully installed the Adapter and are ready to continue. At this point, you will be unplugging and plugging the power to your computer many times. Please do this every time you are told, because if you plug or unplug a board while the power is on, you may damage the board, your computer or both. Unplug everything to your computer.

9 - Locate pin #1 of the small board. Insert the small board into the CPU Adapter making sure that pin #1 of the small board enters pin #1 of the Adapter. Rock the board slowly and lightly, back and forth until the connector of the board reaches the bottom of the Adapter. Never press hard onto the board to get it in! This may break the solder connections of the Adapter.

10 - Plug in the computer and turn it on. If you do not get your regular screen, turn it off right away, remove the small board and go back to step #5.

Installing the Special Memory Board.

You are now well on your way to a 1 Meg COCO. The next few steps involves installing and testing the Special Memory board. Be patient, its almost done.

11 - Unplug the computer and remove your regular 512K memory board. If you bought a 0K Special Memory board insert 16 - 41256 memory chips into the board. Make sure that pin #1 of the chips are inserted into pin #1 of the sockets. Insert the Special Memory board into the memory connectors of the COCO. Make sure that all the pins are inserted correctly. Insert the 1 pin wire of the Special Memory board into pin #3 of J2 of the small board. Pin #1 of J2 is next to the number '2'. Insert the power adapter (9 Volts DC @ 1 Amp) connector into J5 of the Special Memory board.

12 - Plug in the computer and turn it on. If you do not see your regular screen, turn it off right away, unplug everything and remove the Special Memory board. Replace your regular memory board and go to step #10. Run the memory 'MEMTEST' program supplied with this kit. At this point, you should get 512K of memory.

13 - Unplug the computer and insert your regular 512K memory board on top of the Special Memory board. Make sure that all the pins are connected properly. Plug in the computer and turn it on. If you do not get your regular screen, turn it off right away, remove your regular memory board and go to step #12. Turn the computer off and change the wire of the Special Memory board from pin #3 to pin #1 of J2. Run the memory test program again. This will test the regular memory board only. Again you will only get 512K of memory.

14 - Turn the computer off and change the wire of the Special Memory board from pin #1 to pin #2 of J2. Again, run the memory test program. If all is well, you now have 1 Meg of memory! Congratulations!

15 - Run the power adapter wire where it will not be in the

way. You may want to cut a notch in the case to pass the wire. Depending on which regular memory board you have, you may have to trim the long pins in order to properly close the cover. After the pins are cut, run the memory test again. Close up the computer.

Technical Information.

The COCO III uses a chip called the GIME. The following discussion presumes that you have a good knowledge of the GIME chip, its functions and its memory map. As you know, the GIME has 16 DAT (Dynamic Address Translation) registers. Any of these 16 registers can contain a number from 0 to 63. This number, 0 to 63, is known as a Ram Block. Each of these blocks consists of 8K of Ram giving you a total of 512K of memory. In a HEX value, 0 to 63 is represented by 6 bits.

What the DISTO Memory Upgrade does, is add 1 more bit to the Ram Block. The value that can be entered into the DAT Registers is now 0 to 127. The locations are exactly the same as the GIME DAT registers, from \$FFA0 to \$FFAF. But, unlike the GIME's DAT registers, you cannot read back the extra bits. This is no problem, since OS9 Level II does not need to read them. It is up to the software using the DAT registers to keep track of what is in each register.

Since there is no way for the GIME chip to know that extra memory exists, it can not put any video in that area. It also can not cross any 512K boundary with video. But, there is a circuit that allows you to move the video completely into other 512K banks. This is done by adding a register into an unused memory of the GIME chip. This location is at \$FF9B. On power-up or reset, bit #0 of this location is set to 0. Writing a 1 to that location will force the video to come from

the second 512K bank. Again, this is a write only bit. It is up to the software to keep track of which bank the video is in.

If the Screen Start Address Register is set close enough to the end of a 512K boundary, the video will scan the beginning of the same 512K boundary and not cross over into the next 512K block. To avoid this, make sure that the start of video is in the proper location.

OS9 Operation

Complete OS9 drivers are included with this. When properly installed, the OS9 operating system will recognize a full 1 - MEG of memory. There are no restrictions on how to use this memory. All programs should be able to make use of full memory. Complete instructions on how to install these drivers are included in a README file on the OS9 portion of the included disk. There may be more than one README file, if so, read all of them before starting. The instructions will require that you to make a new Boot disk. When making a new Boot disk, remember to start with only original Tandy modules. Then, when you get the 1 - MEG working properly, you can start adding and modifying modules to customize your system to your needs. All OS9 drivers and patches are written and copyrighted by Kevin Darling unless other wise noted.

Credits:

The DISTO 1 Meg Upgrade Kit and all its documentation are conceived and designed by Tony DiStefano. The DISTO 1 MEG Upgrade Kit is manufactured and distributed by,

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