

**DISTO**

**2-MEG MEMORY**

**UPGRADE KIT**

Congratulations on the purchase of your new DISTO 2 Meg Memory Upgrade Kit. The quality materials and workmanship used in this product insure years of trouble free use. This product will only work with a COCO III 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 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.
- Needs no other memory upgrades or cards.
- Fits completely inside the COCO III case.
- Easy installation - installs in an evening.
- Includes all necessary parts except memory chips.
- Drivers for OS9 included.

## Theory of Operations.

The COCO III uses the MC68B09E CPU. This is an 8-bit CPU that can address 64K of memory. Before you bought this upgrade kit, the COCO III 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 2 Mega bytes of memory. This is done using two small internal boards. The first is the "Memory" board which is a special board that use two 1 meg SIMMs and plugs into the memory expansion socket of your COCO. The second is the "DAT" (Dynamic Allocation Translation) board which is a 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 2 Meg.

## Installation of the DAT Socket.

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. All references to, position, are taken when the computer is in the normal typing position.

**1** - Unplug everything to your COCO and remove the top cover. Remove the keyboard by carefully unplugging the connector. Use slow even pressure on both sides.

**2** - 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.

**3** - Locate the CPU labelled IC1. It is next to the cartridge connector. If your CPU is not in a socket go to step #4. Carefully remove the CPU chip from its socket and insert it into the socket of the DAT board. Remember that pin #1 of the CPU chip must go into pin #1 of the socket. Pin #1 of the DAT board is just left of the J1 label. Insert the supplied 40 pin socket into the now vacant IC1 socket making sure that pin #1 of the socket goes into pin #1 of the IC1 socket. This serves two purposes: it protects the original socket from getting damaged and raises the socket so to clear the surrounding components. Now, go to step #9.

**4** - Examine the supplied 40 pin socket included in this kit. Notice the 20 pins on each side. They have the same spacing as the CPU. Carefully place the socket on top of the CPU. Make sure that pin #1 of the socket aligns with pin #1 of the CPU. If necessary, slightly pry open one side of the socket so that the pins of the socket lean against the pins of the CPU. Each pin of the socket must press on each CPU pin. The socket must rest flat on top of the CPU. Make sure that all pins are positioned properly and that there are no leftover pins on either end.

**5** - Carefully solder each socket 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 socket pin to the CPU pin and that it does not short out to any adjacent pin. Solder all 40 pins being careful not to melt the socket or any other part with the hot soldering tip.

#### Testing the Socket Installation.

Pin #1 of the socket is now pin #1 of the CPU. Pin #2 of the socket is pin #2 of the CPU and so on. You now need to use your continuity checker to check your work. There are many brands 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.

**6** - Make a visual test to see that each pin of the socket is properly soldered to the CPU. 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.

**7** - Starting with pin #1, put one probe of your checker to the top part of the socket. With the other probe, touch pin #1 of the CPU. This is tricky because you must make sure that you do not touch the socket pin. Use a safety pin for a probe if your probe is too thick. This test must show that there is continuity. Check all pins in this way. If you come across a pin that does not show continuity, reheat it with your iron.

**8** - The final test for this 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 #6. 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.

**9** - Insert the long pins of the DAT board into the socket making sure that pin #1 of the DAT board enters pin #1 of the socket. Pin #1 of the DAT board is just left of the J1 label. Rock the board slowly and lightly, back and forth until all the pins are secure in the socket. Never press too hard on the DAT board to get it in! This

may damage the socket, the COCO III PC board and/or CPU.

10 - Soldered to the DAT board is a multi-conductor cable. Four of these wires are soldered to the DAT board and two are loose. These two must be soldered to different points on the COCO III board. The first point is the left-hand leg of the capacitor C60. The side that connects to the crystal X1. Solder the end wire to this point. The other point is pin #40 of IC5. Solder the second to end wire to this point. For now, place the 6 pin connector in such a way as to not touch anything.

11 - Plug in the computer and turn it on. If you do not get your regular screen, turn it off right away and check over all your work.

### Installing the Memory Board.

You are now well on your way to a 2 Meg COCO III. The next few steps involves installing and testing the Memory board. Be patient, it's almost done.

12 - If your computer has a 512K memory board, remove it and go to step #13. Remove the memory chips in sockets labelled IC16, IC17, IC18 and IC19. Using a pair of cutters, remove capacitors C65 and C66.

13 - If your 2 Meg memory board came with 0K, you must acquire and install two 1 Meg x 8-Bit DRAM SIMMs. This must be the CMOS 2 chip type of 100ns or less. The CMOS 3 chip (1 Meg x 9-Bit DRAM) SIMM will also work. Make sure that pin #1 of the SIMM goes into pin #1 of the SIMM sockets U101 and U102 of the Memory board.

14 - Now, insert the Memory board into the white sockets of the COCO III labelled CN4, CN5 and CN6. There is only one orientation that will fit all three connectors. Make sure that all pins align and that there are no socket holes without pins. Do not insert the Memory board too deep into the connectors. This may cause shorts.

15 - Insert the 6 pin connector from the DAT board into the 6 pin header on the Memory board led JP103. Again, make sure that pin #1 of the connector goes into pin #1 of the header. Pin #1 of this connector is the end that goes to the DAT board, opposite to the loose ends that you have soldered in step #10.

16 - Connect the monitor and keyboard and turn the computer on. If a normal screen does not come on, turn the computer off right away and check your work from the beginning. LOAD and RUN the MEMTEST program. After a few minutes, you should see that you now have 2 meg of memory.

### 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 2 more bits to the Ram Block. The value that can be entered into the DAT Registers is now 0 to 255. 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 and most other RS DOS programs do 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 the 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 area of the GIME chip. This location is at \$FF9B. On power-up or reset, bit #0 and #1 of this location is set to 0. Writing a 1 to that location will force the video to come from the second 512K bank. Writing a 2 to that location will force the video to come from the third 512K bank and a 3 will be the fourth bank. Again, this is a write only location. 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 2 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 2 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 2 Meg Upgrade Kit and all its documentation are conceived and designed by Tony DiStefano. The DISTO 2 Meg Upgrade Kit is manufactured and distributed by,

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