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THE APPLE /// MEMORY DIAGNOSTIC DISPLAY

By Paul Barale

The Apple /// performs a memory check whenever it's turned on. Normally the display does stay on the screen long enough to be noticed as more than a feeting pattern in the upper left hand corner of the monitor. However, if a memory error occurs, you will get an array of periods with an inverse video "1" to indicate the faulty bit.

The memory diagnostic can also be invoked by <CONTROL> <OPEN APPLE> F6E6G (But there have been reports of problems with a Profile card installed, so you may want to take it out before running this test).

ROW	BITS
7	b7 b6 b5 b4 b3 b2 b1 b0
6	b7 b6 b5 b4 b3 b2 b1 b0
5	b7 b6 b5 b4 b3 b2 b1 b0
4	b7 b6 b5 b4 b3 b2 b1 b0
3	b7 b6 b5 b4 b3 b2 b1 b0
2	b7 b6 b5 b4 b3 b2 b1 b0
1	b7 b6 b5 b4 b3 b2 b1 b0
0	b7 b6 b5 b4 b3 b2 b1 b0

This information can be decoded with the following table to indicate which chip needs replacement:

MAP OF MEMORY BOARD

Board REF	ROW	CHIPS	ROW	CHIPS
D	1	b7 b6 b5 b4 b3 b2 b1 b0	2	b7 b6 b5 b4 b3 b2 b1 b0
C	3	b7 b6 b5 b4 b3 b2 b1 b0	0	b7 b6 b5 b4 b3 b2 b1 b0
B	4	b7 b6 b5 b4 b3 b2 b1 b0	5	b7 b6 b5 b4 b3 b2 b1 b0
B	6	b7 b6 b5 b4 b3 b2 b1 b0	7	b7 b6 b5 b4 b3 b2 b1 b0

For example, if your display looked like this:

```
. . . . . . .
. . . 1 . . .
. . . . . . .
. . . . . . .
. . . . . . .
. . . . . . .
. . . . . . .
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you would need to replace the fourth chip from the left end of row "B". This row appears double width because it has 32K RAM chips.

MOTHERBOARD IDENTIFICATION AND HINTS

There are two types of Apple /// main logic and memory board combinations. They are

typically referred to as either being "5 volt" or "12 volt".

Since there are two types of boards in the field, the first step in servicing an Apple /// is to identify whether the system contains 5 or 12 volt boards.

Apple /// systems about serial number 100,000 are 5 volt systems. When the Apple /// was first introduced, 64K random access memory (RAM) chips were too expensive to incorporate into the Apple /// design. Approximately a year later, the use of 64K chips became economically feasible; replacing the mixture of 16K and 32K RAM chips used up until that time. An additional advantage was that a 256K system would actually draw less power than the original "mixed" 128K system, resulting in less heat and therefore longer chip life.

The first and best way to determine which motherboard you have in your /// is to look at the part numbers of the ROM chips at locations C11 and C13.

Here is what to look for:

12 Volt		5 Volt	
Location	Part	Location	Part
C11	341-0044	C11	341-0061
C13	341-0042	C13	341-0062 (128K)
C13	341-0063 (256K)		

The 342-0063 part number works for either 128K or 256K configurations.

The second method of verifying which main logic board youare working with is to look at R58, which is located just above locatin C13. On a 12 volt logic board, a 27 ohm, 1/4 watt resistor will be present. ON a 5 volt logic board, R58 will be missing and a solder bridge will connect the small solder pads on the logic board under R58's mounting postion on the board.

There are also two different types of Apple /// memory boards: The 12 volt board has three rows of RAM on it. Two rows are filled with 16K RAM (Apple part 334-0002) and one row with 32K RAM (part 333-0002).

A 256K 5 volt board as two rows of 64K RAM (part 334-0003) mounted on it. A 128K 5 volt board has one row filled with RAM and one row empty. Five volt boards are also marked "5 Volt Memory Board" on the top center of the card. The two memory boards and the two logic boards are not totally interchangeable.

Always remember that logic and memory boards of the same voltage must be used together. Main logic boards can be modified to work with either type of memory board, but memory boards cannot. 256K Upgrade Kits are available from Sun Remarketing (and a 512K Upgrade Kit is available from On Three).

REPLACE A KEYBOARD YOURSELF
(Edited)
By Clyde Kirlin

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If you're handy with a soldering iron (this may be a repair you can do yourself).

I found I could buy new switches from the local Apple dealer for $5.00 a copy, though their shaft dimensions varied from what I was currently using - not a problem as you will see (alternatives: Sun Remarketing or pull a key from a dead keyboard/Apple ///)

If you are going to get into this operation feet first, remove all power from the machine! Five screws under the keyboard cover release the cover. Four more, those holding the keyboard, will then be obvious from above. First remove the four screws, then gently ease the connecting keyboard-to-machine cable from it's socket. The whole keyboard now lifts out. Take it to the bench and heat up the 30 watt (NO HOTTER!) soldering iron, the one with a long-pointed tip. Keep a wet plastic sponge handy to clean the iron.

Using a SolderWick, remove all solder from the switch terminas where they mounton the PCB. Do not remove solder from any jumper wires, or the ribbon connector from the cursor controls to the PCB, or the RESET button. After all solder is removed, take a knife blade or probe and see if each switch terminal can be wiggled slightly

in its socket. If not, it's back to the SolderWick. Soon the board may be pried free from the switches by the gentle, gentle persuasion of a flat bladed screwdriver. Time involved? Took me about 1/2
hour so far. Set the PCB aside.

Carefully remove the defective switch by using long-nosed pliers to close the latches holding the switch in place to the bottom side of the mounting plate. The switch will now merely pop out, ready for you to remove the switch cap. Using General Cements Contact Cleaner, drip a reasonalbe quantity down the side of the swithc shft, press the plunger shaft several times and let it sit for a few hours. If you go into this a little deeper, as suggested later, you will see why more than a few drops of cleaner is needed.

Testing - that's easy! Calibrate a digital ohmmeter by shorting its
probes to indicate "zero" resistance. Note the reading. These keyboard switches are no more than single contact closures that must read pretty darn close to "zero" ohms if they are to work. Test the remaining switches mounted
in place the same way. Replace any that are not right.

Want to go deeper? It's fascinating! Looking at the switch, it can be seen that only side latches hold the bottom to the top and keep the mechanism closed. GENTLY pry open the latches and drop the bottom case half, begin carefully not to loose any parts. OBSERVE how all components are assembled. You will be doing this job shortly! Now you can see inside to note the closure action. Spray more contact cleaner in here if you wish to assure your success.

Should you wish to replace the switch, the new swithc will probably have a differnt shaft length and sytle. Having observed the assembly of the unit, you can now easily replace a new shaft with one from your old and defective switch.

Assembling PCB once again is the reverse procedure. However, be sure that any replacement switches are correctly oriented. Look at those already mounted. Now, if you have not bent any switch pins in removing the PCB, again GENTLE persuasion should reset it in palce on top of the switch pins. Carefully review the PCB to see that all of the holes are filled with switch pins. I use a fluorescent-lighted magnifier for this purpose, being the myopic
that I am.

If all pins are correctly seated, take some multi-core RESIN solder, 60/40, and 21 guage in diameter, and begin resoldering the contacts in place. Use just enough solder to make a good connection - NO MORE. Check final results with the magnifier to be sure that no shorted tracks have unwittingly occured. Now, once again, go through the PCB with the digital ohmmeter to measure all switch closures for "zero" ohms.

Looks like you're ready to put the keyboard back on the Apple /// once again. Set it in place. Plug in the keyboard-m chine connection cable. Wiggle the board to be sure of its setting on its mounts and re-fasten it in place. If all went well, you've wasted no more than one and a half hours, saved perhaps $100.00 (cost of a new keyboard today), and the good ole Apple /// should light off immediately to do all those good things its been doing right along.

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DO YOU KNOW WHERE YOUR CLOCK IS?

It is a new year and you need to reset your lock. Specifically, the
year. The day and time roll over correctly, but the year does not change.

With System Utilities, go from Devises to Time and use the arrow key to go over to the year and make the change. It is automatically saved.

You can also make the change using Timeset.Inv from within Business Basic or if you use Word Juggler V. 2.6 there's also a timechange option.