

## Mimeo Filtering

The Apple 1 (and Mimeo) has some noise problems that can be improved with additional filtering. Adding more capacitors helps the noise problems significantly but the downside is the visual impact. A solution is to bury the capacitors in the socket above the board but under the chip where they are not visible. You can buy sockets with the Capacitors installed from TTL Vcc to GND which is what I did for a couple of my boards. I also added a few more Capacitors under the sockets to help filter other supply voltages. As can be seen from Figures a and 1b when the ICs are inserted in the sockets the capacitors are not visible. Figures 2 and 3 give more detail of the added Caps. From the last picture the capacitors are also not visible from the back side. The sockets with capacitors used are:

16 pin - Mil Max 110-93-316-41-801000 (001000 with no Capacitor)

14 pin - Mil Max 110-93-314-41-801000

Sockets with 0.1uF Cap are installed in all 14 and 16 pin locations except;

C1 - Empty

C3 - 2519

C11 - 2504 and DS0025 Combo

B4 - Keyboard

Capacitor Locations D4, D5, and D14 - 2504 will have Caps between -5V and +5V.

Locations B11, B12, B13, B14, B15, B16, B17, B18, A11, A12, A13, A14, A15, A16, A17, and A18 - MK4096 will have Caps between GND and +12V

All 34 other locations will have Caps between GND and +5V

Additional 0.1uF Caps are added as follows:

D2,3 2513, Cap between pins 1 (-12V) and 24 (+5V)

C3 - 2519, Cap between pins 5 (-12V) and 16 (+5V)

B11, B14, B18, A11, A15, A18-MK40906, Cap between pins 1 (-5V) and 16 (GND) and Cap between pins 8 (+12V) and 9 (+5V)

This adds 59 filter capacitors that are not visible but still does not completely eliminate noise problems. It is very hard to design good power and ground routing on large 2 sided TTL boards. The final fix would be a buried ground plane, that along with the capacitors should clean up the signals and would not have significant visual impact.

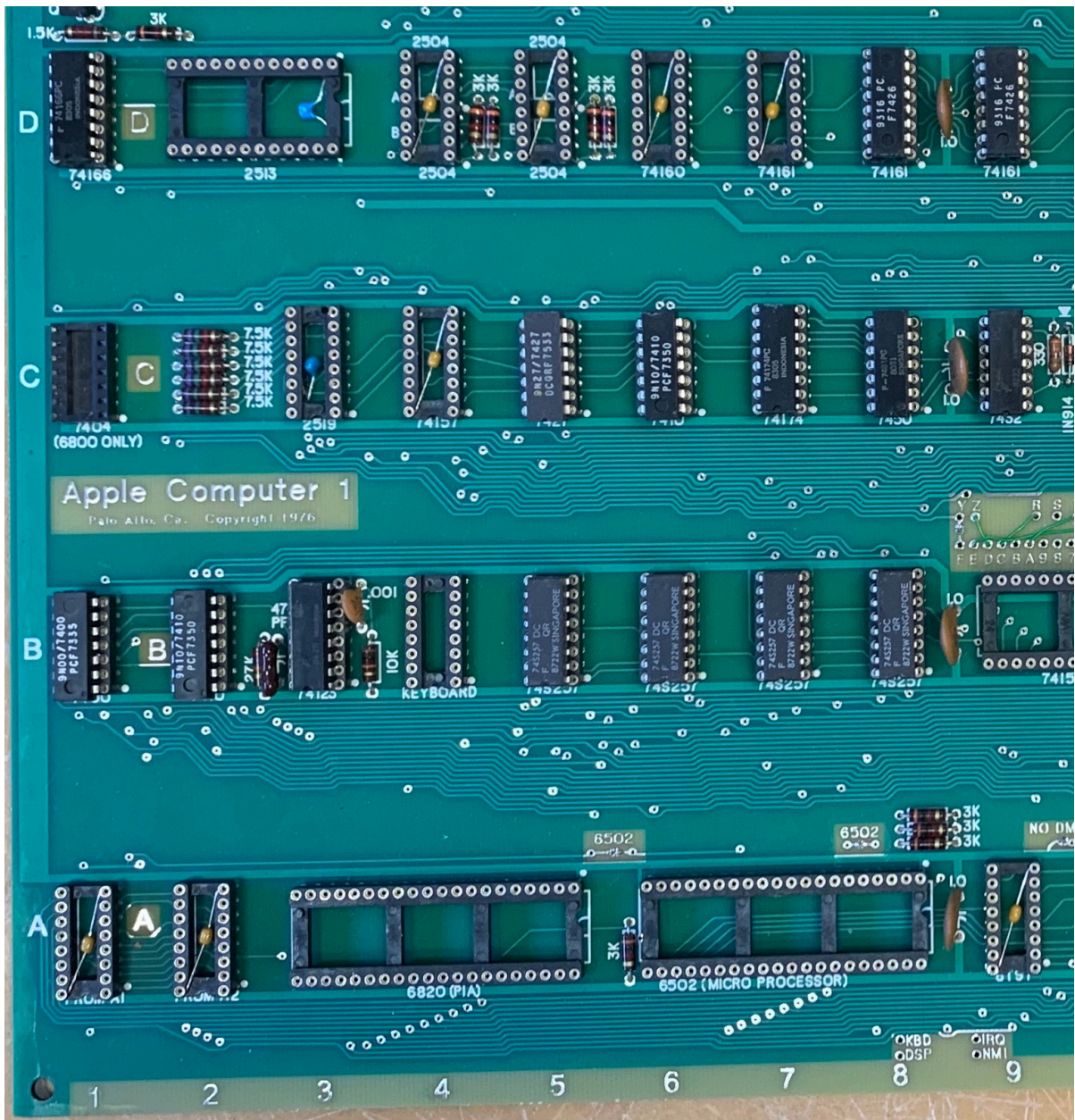


Figure 1a

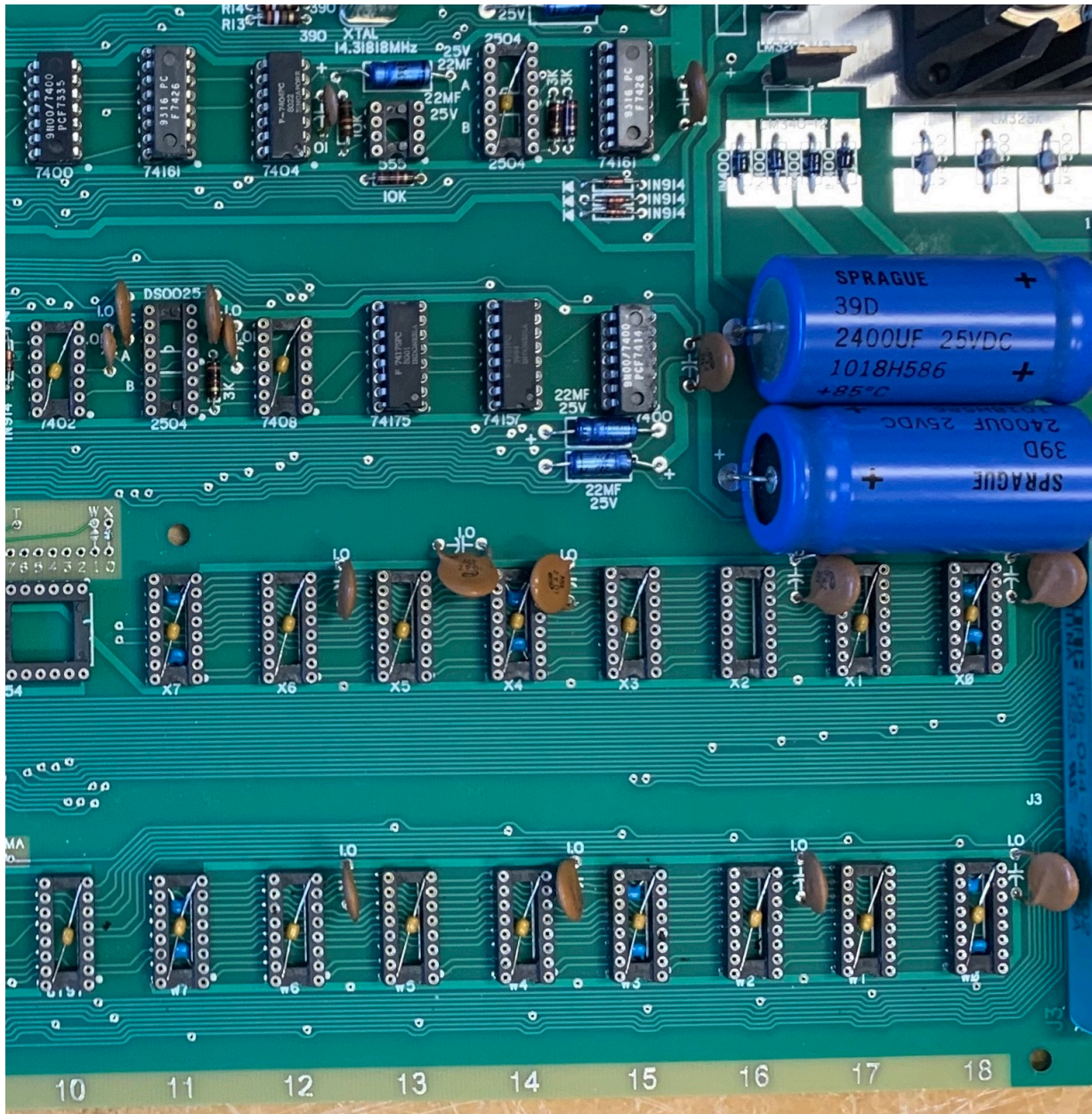


Figure 1b

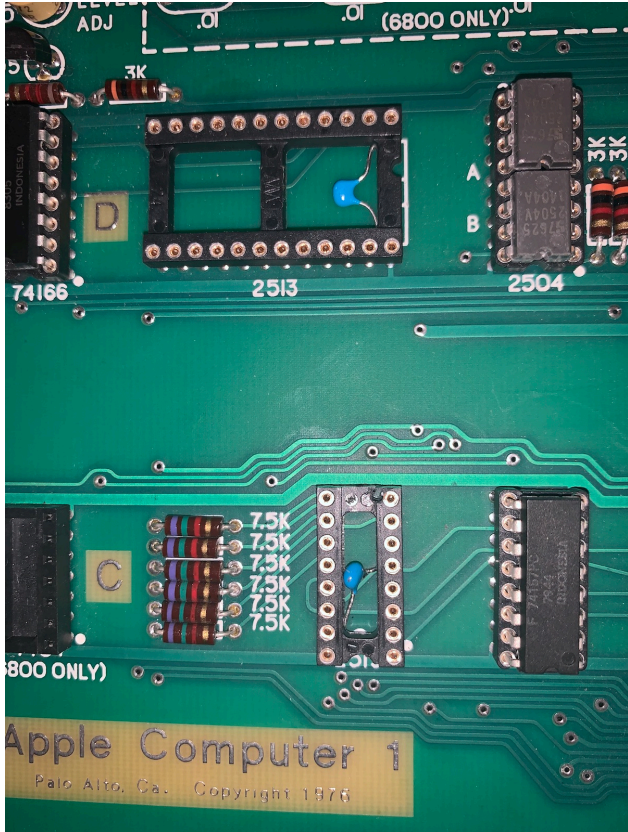


Figure 2

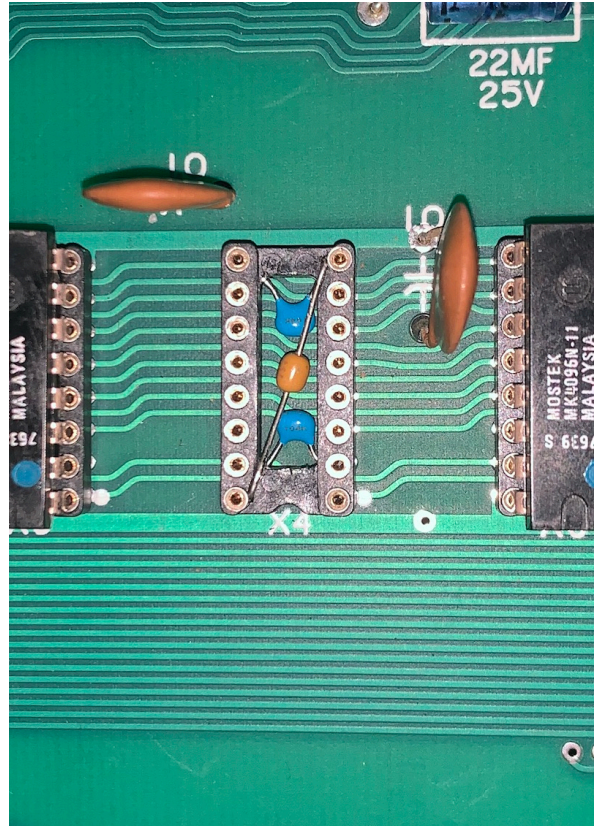


Figure 3

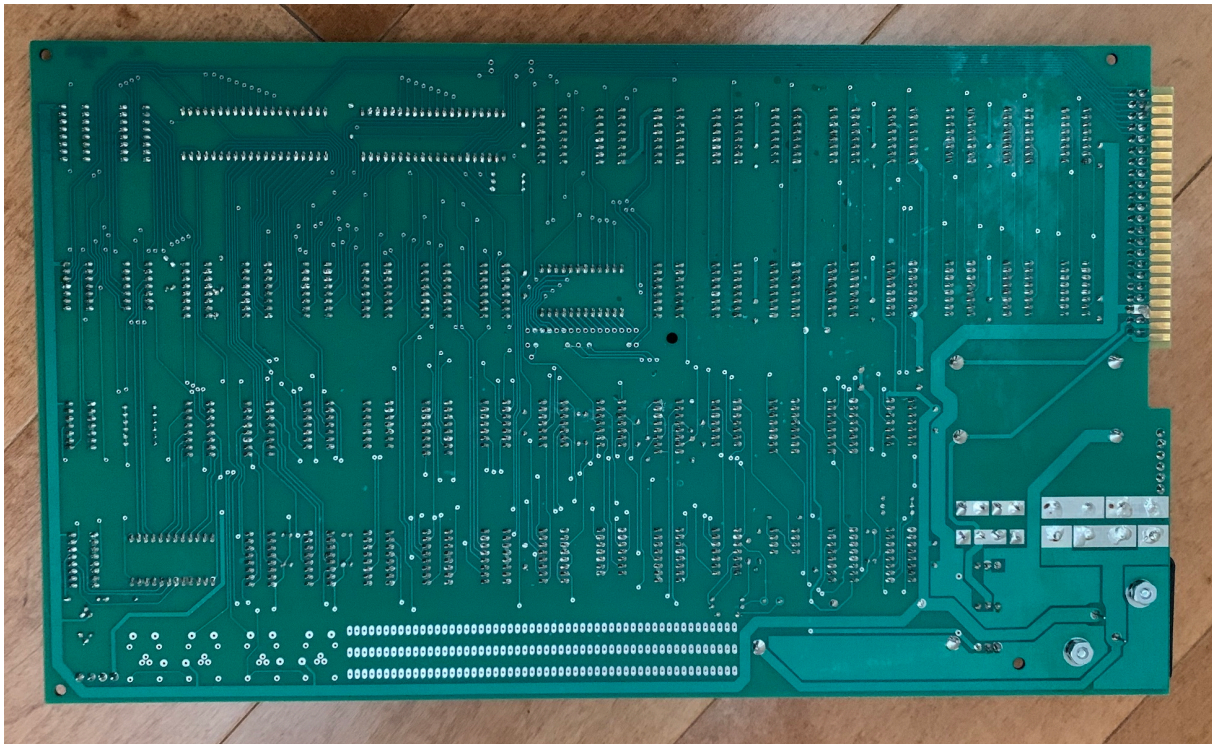


Figure 4

