M100
5MHz Upgrade

April 2022

Version 1.0

S. Adolph

Modifications to your computer are done at your own risk!

Bitchin100 5MHz Upgrade hacks page

Overview

Goal:

Upgrade the circuitry of the M100 to run at 2x clock rate.

What you need:

(1) 9.8304 HC49 Crystal, 20pF load rated (others may work as well)

(1) clock divider PCB (Oshpark)

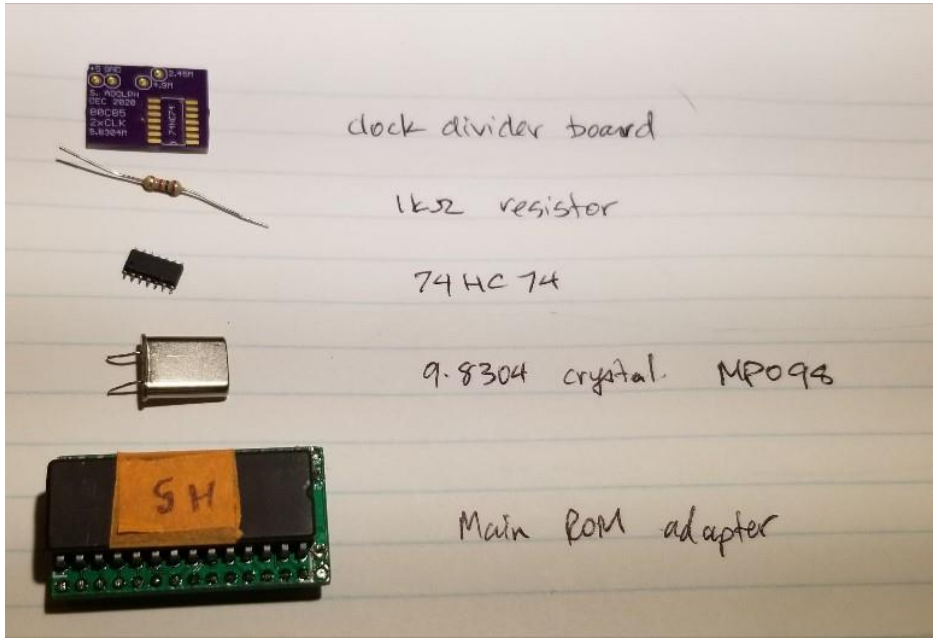
(1) 74HC74D flip flop IC

(1) Eprom adapter to upgrade the main ROM

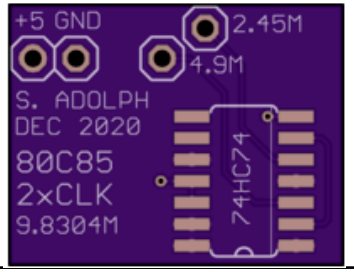
supplies, solder, tools, etc. for PCB rework

Note: The 80C85, 81C55 were not rated for 5MHz. While it appears to tolerate 5MHz operation, this is OVERCLOCKING beyond datasheet support.

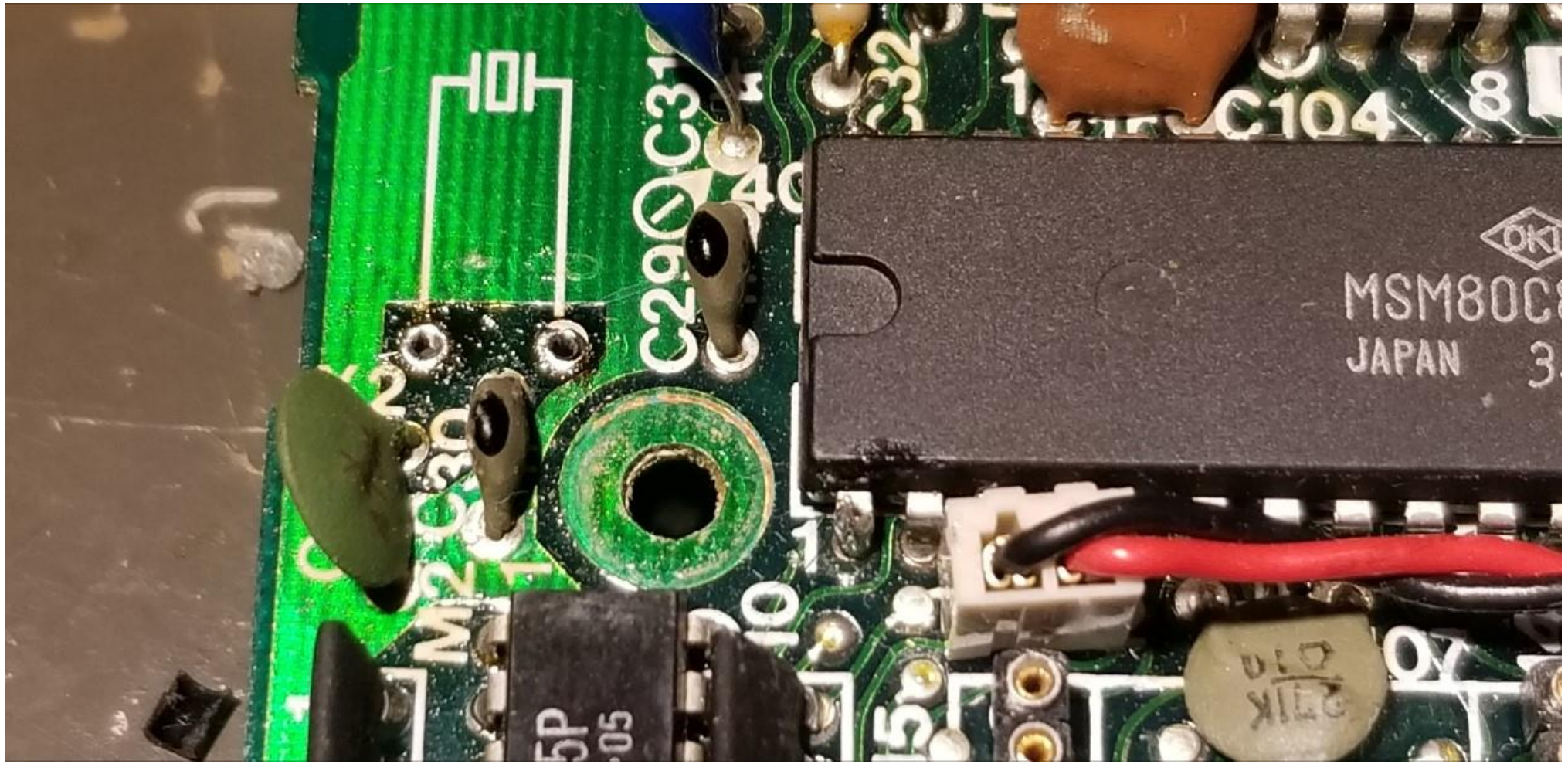
Parts:



Part	Source	Reference	Comment
Fast Main ROM	various		Need a fast Main ROM. Various solutions are available.
1 kohm			¼ or 1/8 watt should be fine. leaded
74HC74D	Digikey	74HC74D	3.9mm width, variety of parts can work
9.8304MHz	Digikey	CTX084-ND	HC-49/U 20pF, 30pF may work also. Lots of possibilities
/2 clock PCB	Oshpark	/2 PCB	2.35$ for 3 boards Non switchable. Switchable version available.



Remove the original 4.9152MHz crystal

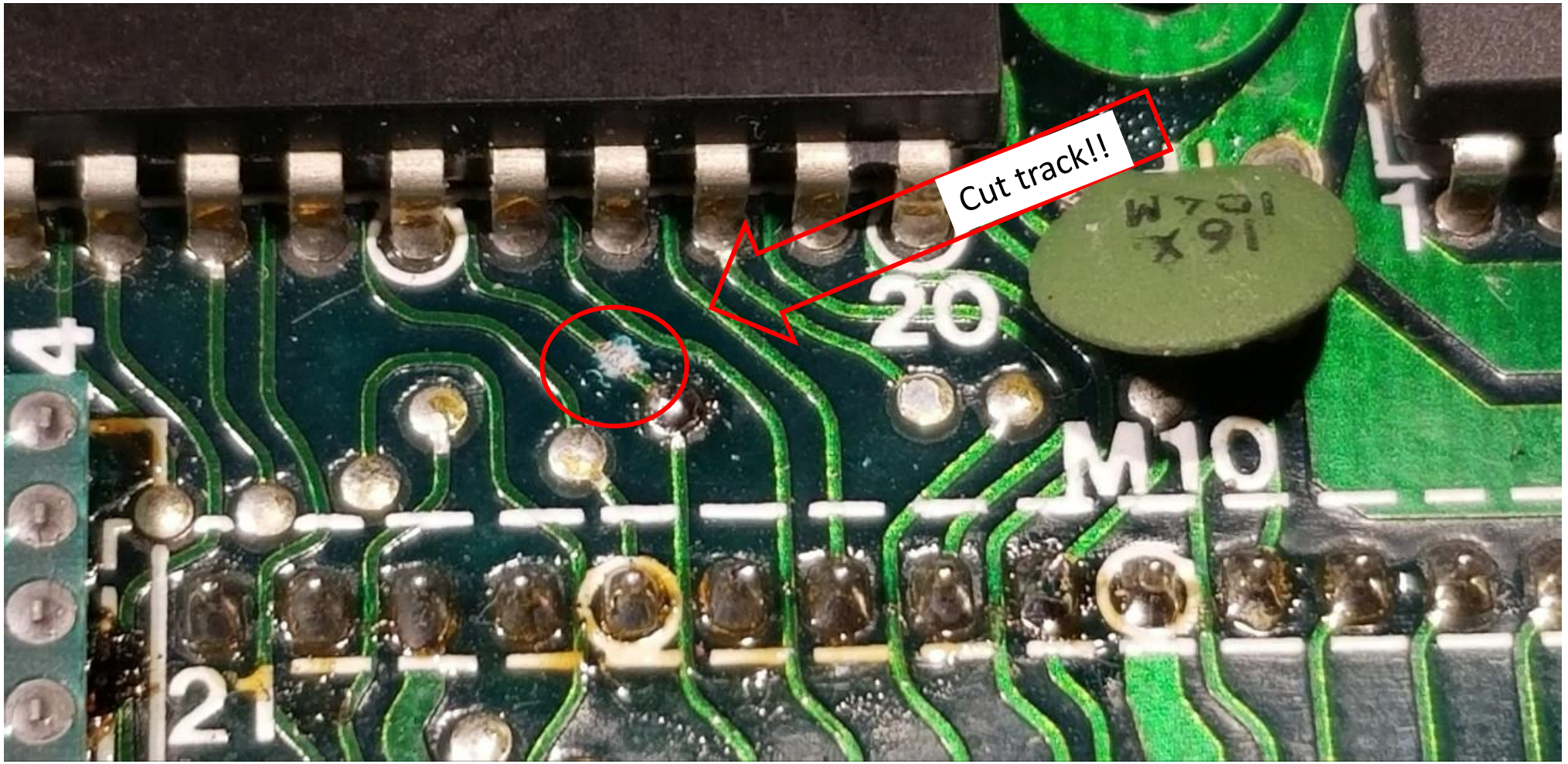


Remove the M100 PCB from the case. Using whatever means, remove the crystal and clean out the vias. Save crystal if you want to revert.

Install the 9.8304 MHz crystal

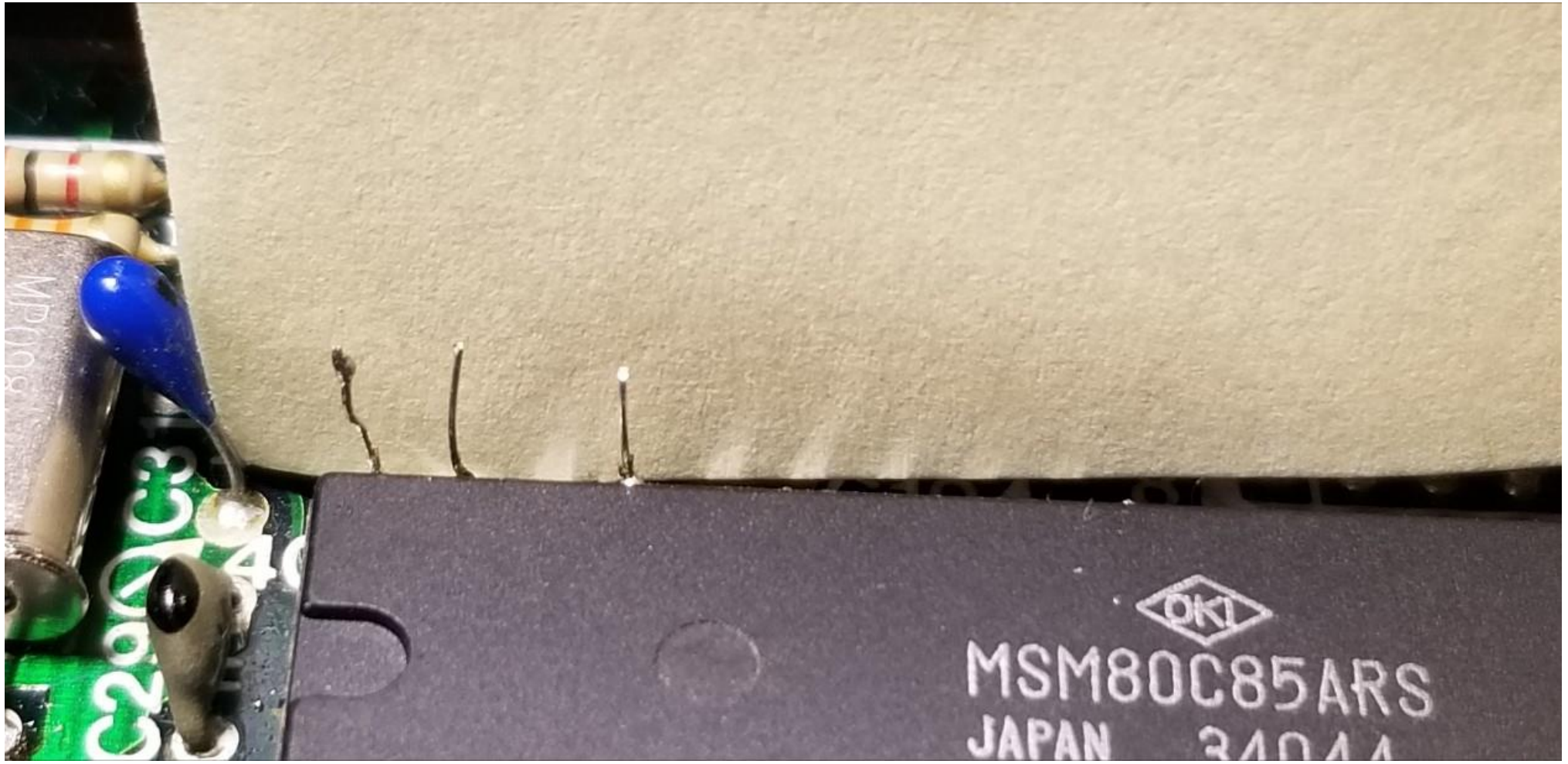
Insert, solder, trim the leads

Cut the clock track at location



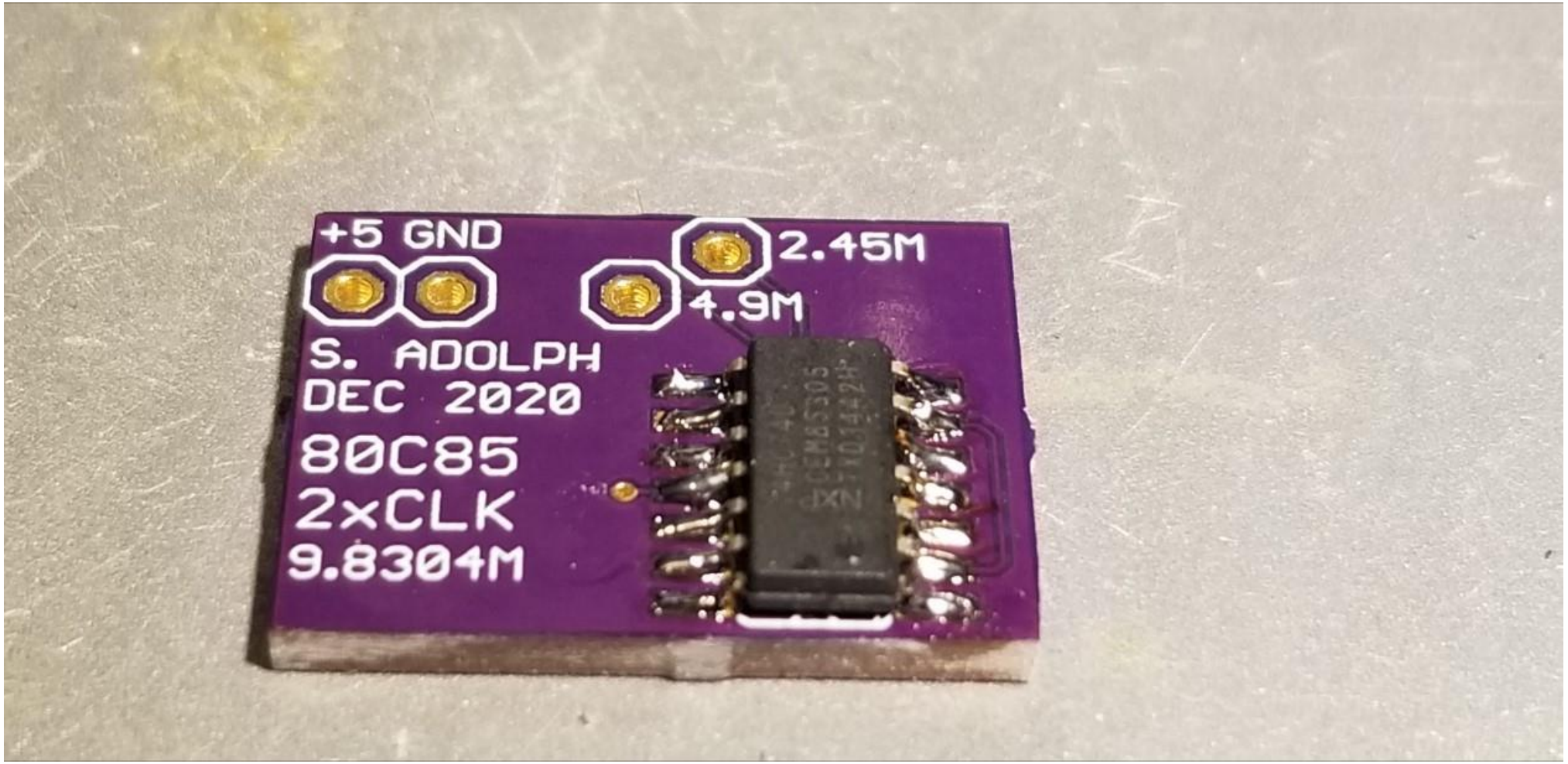
Cut track carefully as indicated, to isolate the clock fed from pin 37 of the CPU.
This is easily reversed with a single strap wire if needed.

Add 3 wires to the CPU



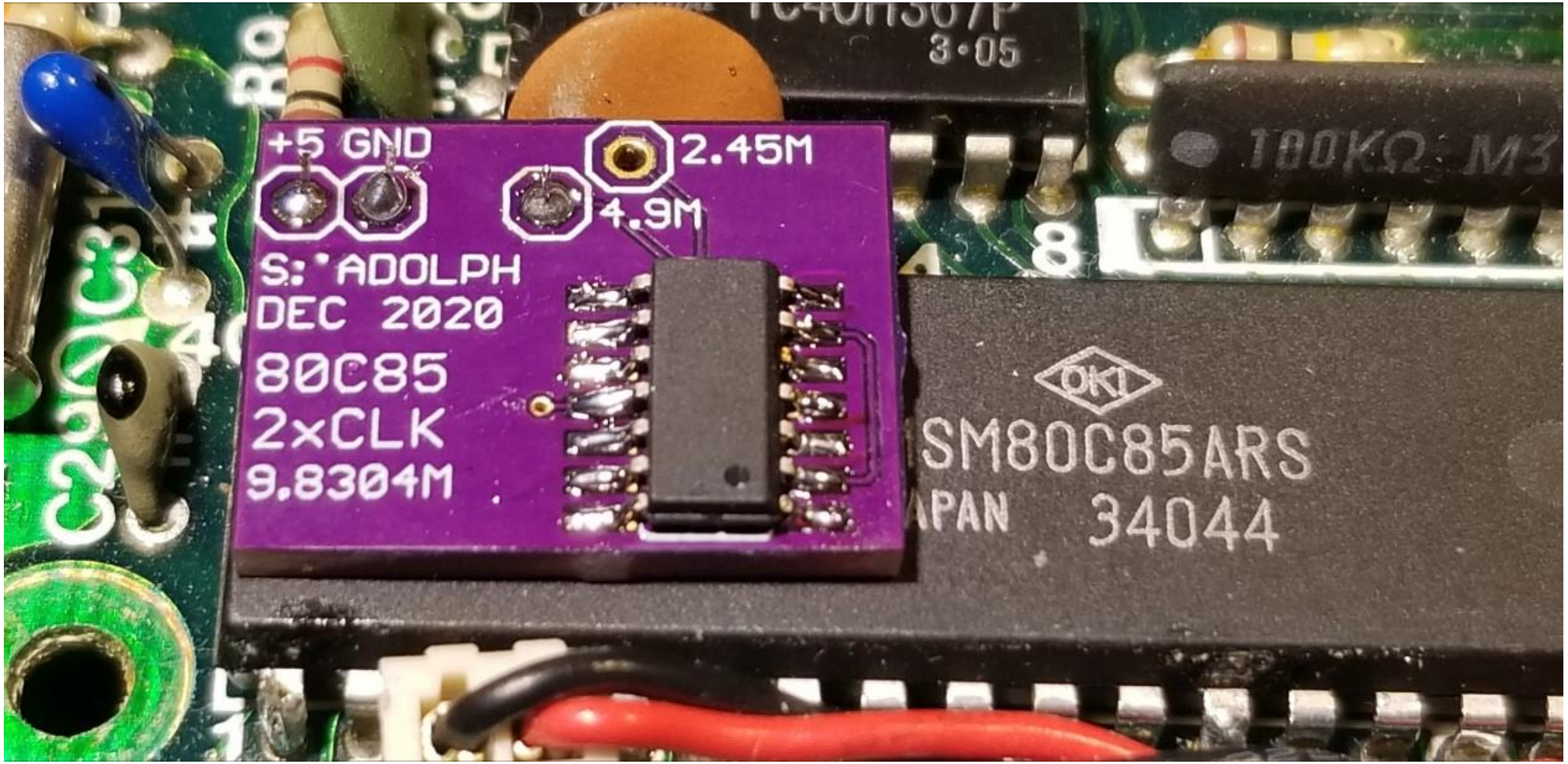
Solder 3 short wires vertically to pins 40, 39 and 37 on the CPU, as shown.

Assemble clock divider PCB



Solder the 74HC74D IC to the divider PCB.

Attach clock divider to CPU

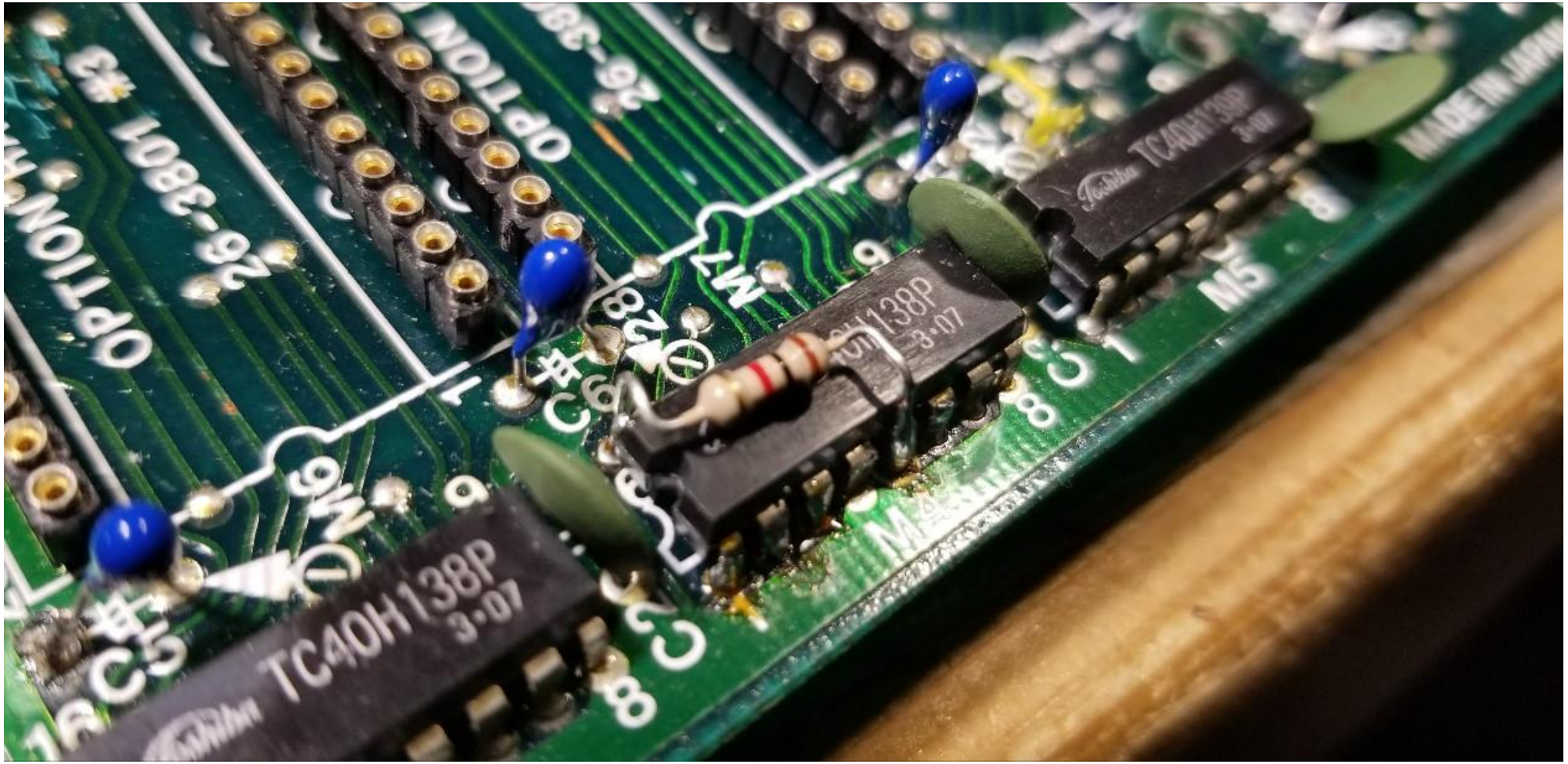


Slide the divider PCB onto the three pins as indicated. Solder lightly as to not dislodge the wires from the CPU.

Connect new clock signal

Run a wire from the via right next to the clock track cut, to the 2.45M pin on the clock divider PCB.

Pull A* signal high with 1kohm



Bend leads and trim to fit 1kohm resistor on top of M7. Connect 1K from pin 16 (+5V) to pin 6 (A*). This should pull A* to 3.5V or higher.

Install faster Main ROM

Install new Main ROM using adapter. Use an EPROM that is 150nsec or faster.

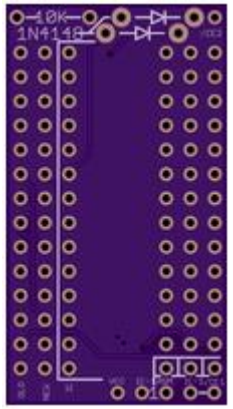
Image can be stock, or modified to suit. I'm using the hardware scroll patch.

Faster Main ROM

The stock M100 main ROM is too slow to run at 5MHz. It is rated at 600 nsec.

There are several ways to get a PCB and ship solution for upgrading the main ROM.

- This link has one PCB that works
- https://oshpark.com/shared_projects/Kil9S1ya



Finishing comments

This modification permanently changes the clock rate. Switchable solutions are also available and tested.

The changes are reversible, to the extent that you can repair the cut trace.

I have modified 2 M100 to date with no issues observed. I also have 2 T102s similarly modified to run at 5 MHz.

If you have any questions, don’t hesitate to ask!

Steve Adolph

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