6800 CPU Board

Introduction

Thank you for buying our 6800 CPU board!

Is this board vintage? Well, it was designed in 2014, so technically it is not. However, it uses a design very similar to the original SWTPC MP-2A using parts available at that time. The large RAM and EPROMs are not vintage, nor are some of the TTL chips.

Using older parts has been a problem because some of them have not been made in a long time, so prices are high, conditions of pulled chips are unknown, and we have to test a lot more components to verify they actually work as expected. Fortunately all the chips on this board are available from surplus inventories, but eventually they will be unavailable.

Features

- 6800 typically running at 1 MHz, but can be adjusted.
- Baud rate generator provides all standard SS-50/SS-30 clocks.
- One baud rate line can be jumpered for higher speed options.
- Three 8K sockets. One dedicated to ROM, one to RAM, the other can be either.
- 8K of RAM from A000 to BFFF.
- 8K of ROM from E000 to FFFF.
- 8K or either RAM or ROM from 0000 to 1FFF, 2000 to 3FFF, 4000 to 5FFF, 6000 to 7FFF, C000 to DFFF or disabled.

Summary of Jumpers

There are a number of jumpers on the board that change the behavior. While many of them are discussed in other sections of the manual, here is a summary:

Label	Use
CLK_TST CLK_GND	These are used for adjustment of the CPU clock frequency. A frequency counter can be connected to these pins while the CLOCK ADJUST potentiometer is adjusted to get the desired clock speed. Typically it should be 1 MHz.
JP1	Used to enable or disable the RAM in socket IC5 which is located from A000 to BFFF. This should normally be enabled.
JP2	Used to select if socket IC4 is RAM or ROM.
JP3	Used to select which bank IC4 responds to, or to disable it.
JP4	Access to UD 1 pin on SS-50 bus.
JP5	Access to UD 2 pin on SS-50 bus.
JP6	Selects which baud rate clock is present on the SS-50 and SS-30 pins for 150 baud.

Baud Rate Selection

The original SWTPC CPU boards provided baud rates up to 1200 baud, even though the 14411 baud rate generator produced faster speeds. To get around this, people would cut traces on their boards or use the unused motherboard pins for these alternate baud rates.

To make this easier, we decided to take a seemingly useless baud rate line, 150 baud, and allow the baud rate generator to put different clocks onto it.

Remember that SWTBUG is 8 bits, no parity and two stop bits: 8N2.

xSWTBUG

We include a version of our extended SWTBUG (xSWTBUG) in EPROM by default. It is fully software compatible with SWTBUG, having all the internal subroutines exactly as they were in the original.

One area of difference is the "C" (clear screen) command has been removed and replaced with the "X" command for extended command set. Using the X command will change the prompt from the normal '$' to '$$' indicating the extended command set. Once in xSWTBUG, there is help available with the '?' command. Exactly which additional features are available in a given version of xSWTBUG depends on the version:

Version 1.1 (initial release)
- M = Memory checker
- O = Othello
- N = Number guess

¡Viva Fiesta!

All of our circuit boards have something unusual on them, and since SWTPC was in San Antonio, it seemed the city would make for some interesting additions. Fortunately, I have a friend who is a native of San Antonio, so I asked her for some ideas or else I'd resort to Googling for something appropriate. She said that ¡Viva Fiesta! is a big festival held in San Antonio each year, so that seemed like a good choice. I was also excited about this board, so the exclamation points fit into my enthusiasm for this project.

Why This?

Back when SWTPC was around, I was a teenager without much money to spare. I got their catalogs and was intrigued by their inexpensive kits and simple designs that could be assembled by average people. The entry point for a working system was a bit beyond my means, so I ended up with a KIM-1 instead.

Years later, I have my own company that has been making Apple/Franklin and KIM-1 expansion boards and one night I decided it was within my abilities to make a clone of the original SWTPC machine. By using some parts available now, the design can be simplified.

Bob Applegate
May 2014

Revision History

Version	Changes
A	Initial Beta.
1	First official release.
2	Very minor PC board clean-up.

Errata

Parts List

Part	Number	Description
PCB	1	Printed Circuit Board (Corsham Tech)
J1	5	Molex 09-52-3101
JP1, JP2	2	1x3 jumper block
JP3	1	2x6 jumper block
JP6	1	2x4 jumper block
C1	1	220uf, 25v electrolytic capacitor
C2-C6, C8-C11	1	.1 uf disc capacitor
C7	1	60 pf
C12, C13	2	1.5uf, 10v electrolytic capacitor
R1	1	1K 10 turn trim pot
R2	1	1M ¼ watt
R3, R4	2	1K
R5, R6	2	6.8K
R7	1	10K
X1	1	1.8432 MHz crystal
IC1	1	MC6800 CPU
IC2	1	2764 EPROM
IC3	1	7805 +5 VDC regulator, TO-220 case
IC4, IC5	2	6264 RAM
IC6	1	74LS138
IC7, IC8	2	74LS244
IC9	1	74LS386
IC10	1	74LS04
IC11	1	74LS10
IC12	1	74LS32

IC13	1	74LS74
IC14	1	74LS640
IC15	1	MC6875
IC16	1	MC14411
	5	14 pin IC sockets for IC9, IC10, IC11, IC12, IC13
	2	16 pin IC sockets for IC6, IC15
	3	20 pin IC sockets for IC7, IC8, IC14
	1	24 pin wide IC socket for IC16
	3	28 pin IC sockets for IC2, IC4, IC5
	1	40 pin socket for IC1