Upgrade Your SWTPC System to 60K!

By Earle Hilton

It can be done, and it's possible with or without an expansion chassis.

Your highly reliable M6800 computer is a work horse and can do a lot more than the designers expected, as evidenced by the 32K limit designed into the motherboard and CPU board, although address C000 through DFFF is open for 8K of PROM.

This is memory totaling 40 kilobytes which is a little short of the 65K of addressing available by the M6800 chip. The subject of this article is how to expand your system to a possible 20K, increase the I/O port number to 16, and change the map to 60 kilobytes.

The best solution to the problem would be to install 8K or 16K memory cards. Two 16K RAM boards would fill out the 32K leaving four slots to expand. Another 16K board can be added. A small modification to the CPU module will make address A000 through BFFF available for an 8K, or you can use 16K to extend through addresses C000 and DFFF.

The Smoke Signal Broadcasting people will furnish with their 16K RAM board the details for the MP-A CPU card that will address the first block to A000.

With this, the new total memory is (RAM) 48 kilobytes and fills all addresses 0000 to 7FFF and A000 to DFFF. This is a good size system for SWTPC 6800.

If you wish, you can add an 8K PROM board with a switch in or out PROM monitor. You may also choose to use a different monitor. An example would be the new SWTBUG# or RT68MX from Microware Systems Corporation. The options are unlimited with the P38 series PROM module made by Smoke Signal Broadcasting. They do furnish information to assist you in the necessary change to upgrade your SWTPC 6800.

All this leads up to getting the most from an already excellent and reliable system. If you would believe this is the most we can expect to get from the SWTPC, I have a surprise for you. We can add another 4K of RAM or EPROM to the present total of 56K (kilobytes).

Those who own the Southwest 6800 computer already know that I/O addresses are coded to wrap around all the way to H9FFF. The normal address of the eight ports are H8000 through H801F 32 bytes. These 32 bytes wipe out 8K of possible address space and put a large gap in the memory map. The I/O is interleaved all the way to H9FFF. By this I mean the 32 bytes is alternated every other 32 bytes.

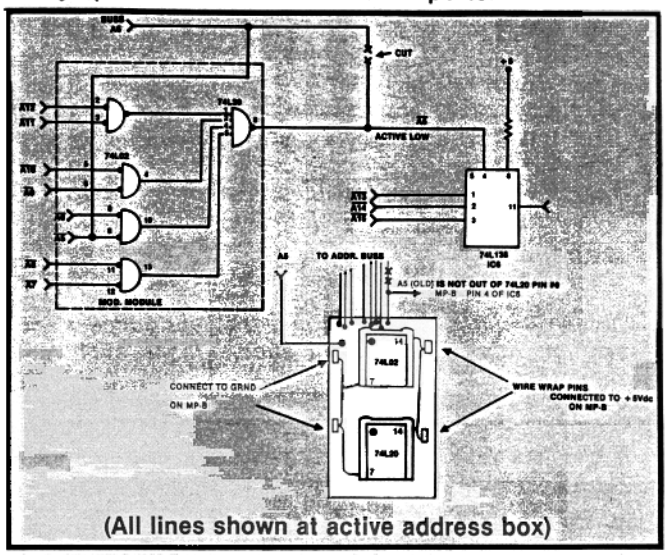
In order to cure the lost memory problem, a number of things must be done. First, we define the address, and determining its boundaries will be a starting point. The SWTPC system defines the I/O area with address lines A15, A14, A13 decoded by IC6 74L138. Also A5 is used as enable LOW at pin 4 of IC6. All this is fine except A12, A11, A10, A9, A8 are not defined. If you wish to do as I did with my SWTPC, you will want to define address lines A12 through A6 low and connect the logic result to pin 4 of IC6 74L138 of I/O decoder on the motherboard. Otherwise you will have wrap around for any bit not defined.

This will allocate 32 bytes only of I/O and free memory from H801F to H9FFF. This is about 8 kilobytes minus 32.

The last total was 56 kilobytes. It's not hard to see that we are over 60 kilobytes and ready to add a 6820 I/O chip and code it for out boarded memory and a Megobyte unit, but that's in the future.

ADVANTAGE GAINED

The advantage is that you may add additional I/O by defining consecutive addresses above 801F. Example: 8020 through 83FF is used by Smoke Signal (SSB) for a ROM bootstrap and interleaved to H83FF very effectively. I set my second I/O port area to H8420 with top port at H843F and in this way I am out of SSB memory allocations, ready for a mini-floppy. For the mod installed, you may option to H8040 to 805F for 8 ports.



(All lines shown at active address box)

HOW TO DO IT

IC6 74L138 pin 4 must be active low to enable the I/O data latch and device decoder IC3 74L138. This makes an easy modification because only one line needs to cut on the foil. The A5 address line coming from the main bus should be cut, then a hole should be drilled next to each side of the line A5. Use a 65# .035 drill bit.

Solder one end of a 6-inch piece of wire to the A5 going to pin 4 of IC6, and do the same to the other side leading to the bus. These wires are fed through to the top of the board and connected to the modification module to be attached to the motherboard.

The two integrated circuits, 74L02 and 74L30 (or 74L20) are mounted on a p.c. board about 1.5 inches wide and made just long enough to accommodate the IC's and 9 off board connection. You may use wire wrap pins for the +5 volts and return connections when mounting the module on the MP-B bd#. Solder the pins to the respective power supply foil (top only).

There are two ways to connect the wire to address bus lines. One which may be more popular is to use a 65# drill bit and make a hole next to or through the proper address line, feed the wire end from the module in the hole and solder.

The other option is, if you are lucky to have an 8 or 16K board in your system and have an empty slot at the rear, use a female board connector and match pins to the correct lines. Solder the wire from module to the terminals, check wiring, and clean up all solder points. Now you are ready for power up check.

Use your memory change function 'M' to test your new address boundaries.□