

## Assembly Instructions MP-B3 Mother Board

### Introduction

The MP-B3 Mother Board is a 9.1" x 15.1" doubled sided plated thru hole board onto which all of the various computer processor and interface boards are plugged. The mother board also provides the line buffering and address decoding for up to eight interface boards. Although one of the eight must be the MP-S2 console interface (serial), the other seven may be any combination of serial (MP-S2) and parallel (MP-L2) interfaces the user may choose to have.

When the SWTPC 6809 Computer is being assembled, work on only one board at a time. Each of the computer's boards and their associated parts must not be intermixed to avoid confusion during assembly.

### PC Board Assembly

NOTE: Since all of the holes on the PC board have been plated thru, it is only necessary to solder the components from the bottom side of the board. The plating provides the electrical connection from the "BOTTOM" to the "TOP" foil of each hole. Unless otherwise noted it is important that none of the connections be soldered until all of the components of each group have been installed on the board. This makes it much easier to interchange components if a mistake is made during assembly. Be sure to use a low wattage iron (not a gun) with a small tip. Do not use acid core solder or any type of paste flux. We will not guarantee or repair any kit on which either product has been used. Use only the solder supplied with the kit or a 60/40 alloy resin core equivalent. Remember all of the connections are soldered on the bottom side of the board only. The plated-thru holes provide the electrical connection to the top foil.

- ( ) Before installing any parts on the circuit board, check both sides of the board over carefully for incomplete etching and foil "bridges" or "breaks". It is unlikely that you will find any but should there be one, especially on the "TOP" side of the board, it will be very hard to locate and correct after all of the components have been installed on the board.
- ( ) Attach all of the resistors to the board. Be sure to orient all of the terminating resistor packages so the dot or "1" on the end of the package matches with the dot on the circuit board. As with all other components unless noted, use the parts list and component layout drawing to locate each part and install from the "TOP" side of the board bending the leads along the "BOTTOM" side of the board and trimming so that 1/16" to 1/8" of wire remains. Solder.
- ( ) Install all of the capacitors on the board. Be sure to orient the electrolytic capacitor properly. Solder.

Scanned and edited by Michael Holley Oct 9, 2001 Revised May 31 2002 Southwest Technical Products Corporation Document Circa 1979
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- ( ) Install each of the 64, 10-pin Molex male connectors, oriented so the shorter pinned side fits into the holes provided on the mother board. The connectors must be inserted from the "TOP" side of the board and must be pressed down firmly against the board. Make sure the body of the connector seats firmly against the circuit board and that each pin extends completely into the holes on the circuit board. Not being careful here will cause the plug-on boards to be crooked. It is suggested that you solder only the two end pins of each of the 64 connectors until all have been installed at which time, if everything looks straight and rigid, you should solder the as yet unsoldered pins.
- ( ) Using a pair of wire cutters, cut off the "INDEX" pin on each of the eight main board (50-pin) and eight interface board (30-pin) male connector strips. Each row is pointed out by the word "INDEX" or "IND" printed right on the "TOP" side of the mother board. Be very careful when doing this. Do not cut off anything other than the "INDEX" pins. You cannot afford to make a mistake here. These "INDEX" locations prevent the various plug-on boards from being plugged on incorrectly later during assembly.
- ( ) Install each of the integrated circuits excluding IC4. As each one is installed make sure it is down firmly against the board and solder only two of the leads to hold the IC in place while the other IC's are being inserted. Be very careful to install each in its correct position. Do not bend the leads on the back side of the board. Doing so makes it very difficult to remove the integrated circuits should replacement ever be necessary. The semicircle notch or dot on the end of the package is used for orientation purposes and must match with the outlines shown on the component layout drawing for each of the IC's. After inserting all of the integrated circuits go back and solder each of the as yet unsoldered pins.
- ( ) Cut off the center lead on integrated circuit IC4. Now install integrated circuit IC4 on the circuit board. This component must be oriented so its metal face is facing the circuit board with the small metal heatsink sandwiched between the two. The heatsink and IC are secured to the circuit board with a #4-40 x 3/8" screw, lockwasher and nut. The two leads of the integrated circuit must be bent down into each of their respective holes and the heatsink must be orientated as shown in the component layout drawing. Solder.
- ( ) Install transistor Q1 on the circuit board. Orient the transistor as shown in the component layout drawing. Solder.
- ( ) Install the 16-pin header in the set of holes just above IC6 on the component layout drawing Also install the two three-pin headers. The headers should be installed so the shorter pinned side goes into the board from the TOP side. Solder.

- ( ) Working from the "TOP" side of the circuit board, fill in all of the feed-thru's with molten solder. The feed-thru's are those unused holes on the board whose internal plating connects the "TOP" and "BOTTOM" circuit connections. Filling these feed-thru's with molten solder guarantees the integrity of the connections and increases the current handling capability. Do not fill in the holes on the edge of the board that are to be used for wiring connections.
- ( ) Now that all of the components have been installed on the board, double check to make sure all have been installed correctly in their proper location.
- ( ) Check very carefully to make sure that all connections have been soldered. It is very easy to miss some connections when soldering which can really cause some hard to find problems later during checkout. Also look for solder "bridges" and "cold" solder joints which are another common problem.

This completes the assembly phase for the MP-B3 board. Program the jumper blocks as outlined in the section below. Checkout instructions for the board are provided with the System Checkout Instructions supplied with this kit. The System Checkout Instructions are used after having assembled the MP-09 Processor Board, MP-B3 Mother Board, MP-S2 Serial Interface, and MP-P2 Power Supply.

#### Programming the Jumper Blocks

Programmable jumper blocks allow the interface boards to be decoded in the lower 512 bytes of any 1K segment in memory from 48K thru 64K. The 48K/56K jumper determines into which of the two 8K segments is to be decoded. The 0-7 jumper determines which 1K segment above the 48/56K base is to be decoded. For proper operation with the SBUG-E monitor ROM on the MP-09 processor board, program the jumper blocks for 56K - 64K and 0. This will locate the decoding at E000 or 56K. Unless otherwise noted in the instructions, program the SLOW PER./NORM jumper for NORM. Refer to the Documentation Notebook for detailed programming information.

#### How It Works

Attached to the 50-line system information bus are the interface decode and driver circuits. A considerable cost savings is made by providing the address decoding and information bus buffering for all of the interfaces right on the mother board instead of providing it on each of the interface boards individually. Since each parallel interface integrated circuit requires four address locations and each serial two, sixteen addresses are provided for each of the interface positions. The signals carried on the interface information bus are almost identical to those on the system bus. RSO, RS1, RS2 and RS3 are register select lines which are identical to address lines A0, A1, A2 and A3 respectively.

Parts List -- MP-B3 Motherboard

Integrated Circuits

___ *IC1	74121 one shot	___ *IC5	74LS138 1 of 8 decoder
___ *IC2	74LS32 OR gate	___ *IC6	74LS138 1 of 8 decoder
___ *IC3	74LS244 octal buffer	___ *IC7	74LS00 NAND gate
___ *IC4	7805 regulator	___ *IC8	74LS640 octal transceiver

Resistors

___ R1	4.7K ohm 1/4 watt resistor	___ *TR1	680 ohm terminating resistor package
___ R2	1K ohm 1/4 watt resistor	___ *TR2	680 ohm terminating resistor package
___ R3	4.7K ohm 1/4 watt resistor	___ *TR3	680 ohm terminating resistor package
___ R4	6.8K ohm 1/4 watt resistor	___ *TR4	680 ohm terminating resistor package
___ R5	6.8K ohm 1/4 watt resistor	___ *TR5	680 ohm terminating resistor package
		___ *TR6	680 ohm terminating resistor package

Capacitors

___ C1	220 pfd capacitor	___ C6	C6 0.1 mfd capacitor
___ C2	20 pfd capacitor	___ C7	C7 0.1 mfd capacitor
___ *C3	220 mfd @ 10VDC electrolytic capacitor	___ C8	C8 0.1 mfd capacitor
___ C4	0.1 mfd capacitor	___ C9	C9 0.1 mfd capacitor
___ C5	0.1 mfd capacitor	___ C10	C10 0.1 mfd capacitor

Miscellaneous

\_\_\_ \*Q1 2N5210 transistor

\*All components flagged with a \* must be oriented as shown on the component layout drawing.