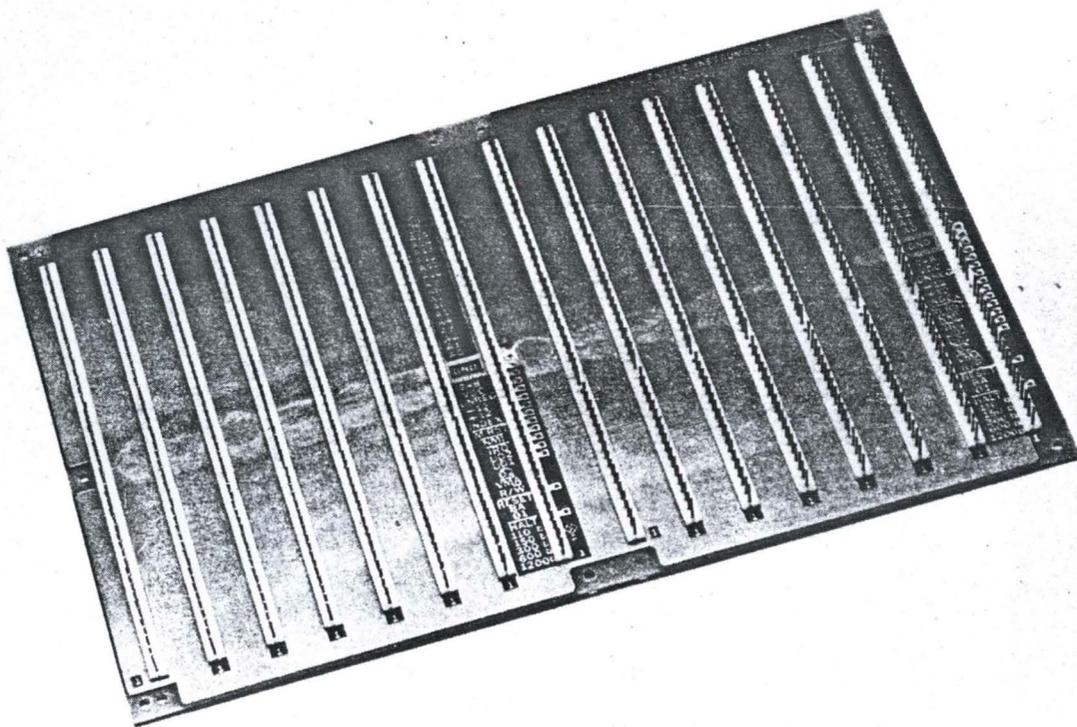# MOTHER BOARD

MODEL MB-1

Midwest Scientific Instruments, Inc.
Olathe, Kansas

MB-1 MOTHER BOARD

INTRODUCTION

The MB-1 Mother Board is a 9" by 14" double sided circuit board, having plated thru holes, which carries the 50 line bus to all circuit boards in the MSI 6800 Computer System. The MB-1 circuit board is constructed of 1/8 inch circuit board material to give it rigidity when installed in the computer system. The circuit board has been solder masked to provide the greatest ease of assembly.

ASSEMBLY INSTRUCTIONS

Before beginning assembly of the P.C. Board, perform the following steps. Referring to the parts list, carefully check the parts kit in order to properly identify each component and to make sure that all the necessary parts have been included.

Next carefully examine the P.C. Board itself for any flaws or defects. A magnifying glass is helpful in identifying the presence of any hairline shorts between foil, incomplete etching of the board, or breaks in a foil. Such defects are rare but a careful preliminary examination is very worthwhile. Any defects should be corrected before beginning assembly of the board.

Normally, a 25 or 30 watt soldering iron is recommended for assembly of MSI printed circuit boards. However, due to the large mass and the size of the foils on the MB-1 Mother Board, a higher wattage soldering iron is recommended for greater ease of assembly. Be sure to use a resin core solder, a 60/40 or 63/37 alloy is recommended. Never use an acid core solder.

MSI MOTHER BOARD, MODEL MB-1

PARTS LIST

QTY	MSI PART NO.	DESCRIPTION
1	970	PCB, MB-1, Mother Board
80	1042	CONNECTOR, 10 Pin, M, G, Molex
5	751	SPACER, Plastic, 1/4 inch

ASSEMBLY PROCEDURE

( ) Insert the 10 pin Molex male connectors into the P. C. board one row at a time. Connectors should be inserted from the top side of the board (the side containing etched bus identification) with the short end of the connector extending into the board. This leaves an approximately 1/2 inch length pin protruding upward from the mother board in order to receive individual circuit boards as they are plugged in. After insertion of the connectors, each must be soldered on the reverse side. Solder the two end pins of each connector while carefully holding the connector in place to insure that it is exactly vertical with the plastic body of the connector being flat on the surface of the mother board at the time of soldering. This procedure will insure correct alignment of the connectors and will avoid difficulties when plugging circuit boards on to the mother board.

( ) Using a pair of pliers, remove the INDEX PIN (18) from the plastic body of the appropriate Molex connector on each row. The mother board assembly may now be turned upside down and the remainder of the pins soldered. Be certain that the solder flows adequately and that the joint is properly heated in order to insure a good wetting action between the mother board foil and the pin of each connector.

( ) Following assembly, examine the bottom side of the circuit board carefully using a magnifying glass to insure that no foil or solder bridges exist. The most common problem observed with mother board assembly is the shorting of adjacent mother board lines thru a small solder bridge created during assembly. Ideally, the mother board should be tested with an ohmmeter when assembled to be certain that no adjacent shorts exist.

( ) Refer to the Chassis Wiring Diagram, Drawing No. 100029, and attach the 5 spacers to the bottom side of the mother board at positions A,B,C,D,E, as shown in the drawing. Use a drop of glue to attach each spacer. This provides additional support for the center portion of the mother board.

MOTHER BOARD BUS SIGNAL IDENTIFICATION

The Mother Board carries 50 parallel bus lines for information exchange between the various cards of the MSI 6800 Computer System. The following is a brief description of each of these lines and the signals which are associated with them.

DATA LINES D0-D7 (43-50)

The data lines carry inverted data bits 0 thru 7 respectively which in parallel form an 8 bit data byte. D0 carries the least significant data bit (0) while D7 carries the most significant data bit (7). The data lines are inverted (active low) while on the mother board and are inverted again by the interface adapter board so as to provide true data signals to the interface cards.

ADDRESS LINES A0-A15 (27-42)

Sixteen address lines are available in the MSI 6800 computer which are labeled A0 thru A15. A0 is the least significant address bit while A15 is the most significant bit. This allows a 16 bit address to be used to select a desired memory location or a desired interface address. The address signals are true logic (non-inverted or active high) while on the mother board.

UNREGULATED +8 VOLTS (21, 22, 23)

The unregulated +8 V.D.C. bus carries supply voltage to the 7805 voltage regulators which are contained on each of the circuit boards in the MSI 6800 Computer System. The regulators then furnish a regulated +5 V.D.C. to the boards. The bus voltage should be a minimum of +8 V.D.C. in order to insure adequate on board regulation. If bus voltage drops below this level, as a result of line voltage fluctuation or heavy load in the computer, then the tap on the transformer primary should be changed in order to achieve the desired +8 volt level.

+12 and -12 V.D.C. (19, 20)

The +12 and -12 volt bus lines actually carry unregulated plus and minus 15 volts to various circuit boards in the MSI 6800 Computer System. The negative supply serves as source voltage to supply EPROM chips, which require -12 V.D.C., or other PROM chips which may require -9 V.D.C. RS-232 interfaces require plus and minus 12 V.D.C. Onboard regulators, or zener diodes, are used to drop the plus and minus 15 volt levels from the bus to the desired voltage levels which are used on the circuit boards.

GROUND (24, 25, 26)

The ground bus connects the ground plane of all circuit boards with the common point or ground of the system power supppply.

INDEX (18)

The index keying pin is provided only to insure correct orientation of circuit boards which are plugged into the mother board. The index pin should be removed from each row of connectors and the corresponding index pin on each card should contain a small keying pin. This prevents circuit boards from being plugged in backwards or with the pins offset.

M RESET (17)

The master reset line is connected to the reset switch on the front panel of the computer. Pressing this switch grounds the reset line momentarily which resets the 6800 CPU chip and other logic within the system.

RESET (9)

The reset line goes low in response to a master reset signal and is used to reset various cards or peripheral devices attached to the system. This line is activated by the reset function of the 6875 clock driver and will go low when the system is first powered up or when the master reset line has been momentarily grounded.

NMI (16)

The NMI is the non-maskable interrupt line which communicates with the CPU board. When this line is pulled to ground momentarily, the CPU enters a non-maskable interrupt routine. Since this interrupt is non-maskable it cannot be inhibited by software.

IRQ (15)

IRQ is the software maskable interrupt line for the CPU. If the interrupt mask has not been set in software, then grounding this line momentarily will cause the CPU to enter an IRQ interrupt routine.

UD1, UD2 (13, 14)

The UD1, UD2 lines are provided on the mother board as user defined lines and are presently not used.

O2 (12)

This line carries the phase 2 clock signal from the CPU board. The phase 2 clock signal is used to enable memory chips during a read or write cycle as well as to provide a timing signal for information exchange between interface cards and the CPU.

VMA (11)

The VMA signal is an indication of valid memory address from the CPU card. This signal is active low on the mother board which indicates that the data contained during that time on address lines A0 thru A15 is valid.

R/W (10)

The R/W line establishes the direction of data flow

on the 8 line data bus D0 thru D7. The read/write line is
high during a memory read cycle or low when data is being
written into memory or to an I/O device.

BA (8)
     The BA signal goes high when the address and data bus
is available for external use. This normally occurs during
the time that the CPU has been halted. It is used as a
signal for external devices such as in direct memory access
applications, that the bus may then be taken over
momentarily by another device.

HALT (6)
     The halt line is normally high on the mother board
during normal CPU operation. If this line is brought low by
an external device the processor will be halted. This
results in the bus available signal going high indicating
that the system data and address buses are available for use
by an external device. The halt line may not be held low
for more than three milliseconds or data within the internal
CPU registers will be lost.

O1 (7)
     The phase 1 clock signal is the non-overlapping
compliment of phase 2, the two phase clock system which is
used by the 6800 computer system. Memory read and write
operations are normally carried out during phase 2 of the
system clock and therefore phase 1 may be used by the system
to perform other functions, such as Dynamic Memory Refresh
or others.

110, 150, 300, 600, 1200 (1, 2, 3, 4, 5)
     These five lines carry the baud rate clock signals
which are generated by the baud rate generator on the CPU
card. On the MSI 6800 system, the 600B clock line actually
carries a 9600 baud clock signal since this one is more
commonly used than the 600 baud.