

## P-38 OPERATING INSTRUCTIONS

### INTRODUCTION

The P-38 is a memory system that is plug compatible with the SWTPC 6800 motherboard. It can hold up to 8K of ROM (Read-Only Memory) or EPROM (Eraseable and Programmable Read-Only Memory). Most people will probably want to use the type 2708 EPROM since the programming on the chip can be changed from time to time as needed; however, any ROM or non-eraseable PROM that is pin compatible with the 2708 may be used. Also, provision has been made to accomodate the Motorola 6830 ROM in either the Mikbug or Minibug II versions. Mikbug and Minibug are Motorola Trademarks. The P-38 may occupy any 8K of memory beginning at 0000 or any 8K multiple.

### POWER REQUIREMENTS

Plus 8 volts at 0.6 amps typical, 1.0 amps P-38-I and P-38-FF  
Plus 15 to 20 volts at 0.4 amps typical  
Minus 8 to minus 20 volts at 0.25 amps typical

The plus 8 volts is supplied by the power supply contained in the SWTPC 6800. The supply included in the 6800 is not, however, adequate to supply the other voltages required. The PS-1 Power Supply Kit offered by Smoke Signal Broadcasting is designed to provide plus and minus 16 volts to the plus and minus 12 volt lines on the SWTPC 6800 motherboard and is capable of supplying power to up to 5 P-38 systems. Additionally, installation of the PS-1 allows a wiring change to be made to the plus 8 volt supply to increase its output by approximately one volt.

You may, if you wish, build your own power supply, however, you must be sure its voltage output falls within the ranges specified above and that its current handling capability is adequate for the number of P-38's that you intend to use in your system. It is absolutely essential to install a separate supply (either the PS-1 or your own). The plus and minus 12 volt supply included with the SWTPC 6800 will not reliably operate the P-38 and could possibly damage it.

### Installation

Before installing the board, you must decide where in memory you want your non-volatile memory (the P-38) to be located. We suggest that the first P-38 be located at E000 through FFFF, however, this requires a wiring modification to the CPU board. If you do not want to modify your CPU board, then the P-38 can be located at C000 through DFFF without any modifications to the SWTPC 6800 and you still have the entire lower 32K (0000-7FFF) available for RAM.

The advantage of locating the P-38 at E000 through FFFF is that you have access to the interrupt and reset vector locations. Thus, when you first turn the power on to your system, you can have the 6800 immediately enter your operating system without having to enter the starting locations in A048 and A049 and then typing "G". Indeed, in a process control application, it may be desirable not to have a CRT or teleprinter in your final system.

If you have decided to locate the P-38 in an area of memory that requires no modification to the 6800 system, place switch S-1 in the up position. Refer to the memory assignment table and put the other switches in the appropriate positions. Install your previously programmed 2708's in the sockets that correspond to the memory locations in which they were programmed to operate.

TURN OFF THE POWER TO THE SWTPC 6800 AND INSTALL THE P-38 IN ONE OF THE MOTHERBOARD LOCATIONS. INSTALLING THE P-38 WITH THE POWER ON MAY SEVERELY DAMAGE THE COMPONENTS ON THE P-38 INCLUDING THE 2708's.

Turn the power on and begin checking out your new operating system.

If you have decided to locate the P-38 at E000 through FFFF, first read the sections on "MIKBUG AND SWITCH S-1" and make the modifications outlined in the section titled "USE OF THE P-38 AT E000 THROUGH FFFF".

#### MIKBUG AND SWITCH S-1

If you have decided to locate the P-38 at E000 through FFFF, provision has been made for you to use either the MIKBUG or MINIBUG II in place of a 2708 in the PROM 0 location. NOTE: YOU MUST NOT HAVE A 2708 IN THE PROM 0 LOCATION AND A MIKBUG OR MINIBUG II IN THE MIKBUG SOCKET. To use the MIKBUG, install a wire jumper from "A" to "K" and another jumper from "C" to "P" in the locations just below the MIKBUG socket. To use the MINIBUG II, install jumpers from "A" to "M" and "C" to "2".

Both MIKBUG and MINIBUG II use the program locations normally occupied by the PROM 0 chip beginning at E000.

Switch S1, when in the "DOWN" position also allows whatever chip is in either the MIKBUG socket or PROM 0 socket to occupy the locations of the PROM 7 chip. You may still have a 2708 installed in the PROM 7 socket, however, it will not be selected when S-1 is DOWN. This allows the vectors at the high end of MIKBUG or MINIBUG II to be located up at FFF8 through FFFF so that the interrupt and reset vectors will point to MIKBUG locations and MIKBUG will operate normally.

By placing S-1 in the "UP" position, the interrupt and reset vectors are determined by the programming of PROM 7. Thus, you may use S-1 as a hardware switch between your own operating system and the MIKBUG or MINIBUG II operating system. This could be used in a business system where your customer would normally see only your operating system but you could switch to MIKBUG for debugging purposes and thus avoid having to program these debugging features into your operating system.

#### USE OF THE P-38 AT E000 THROUGH FFFF

When you do not have a M-16 memory board located at A000 through DFFF in your system, the 6800 CPU board must be modified as outlined below in order to use the P-38 at E000 through FFFF.

- (✓) Unsolder IC-10 on the 6800 CPU Board.
- (✓) On the top side of the circuit board, cut the foil leading from pin 9 of IC-10 and connecting to the ground lead running down the middle of the socket.
- (✓) Re-install IC-10.
- (✓) Cut the foil connecting pins 10 and 13 on IC-16.
- (✓) Connect a jumper from pin 14 of IC-3 to pin 9 of IC-10.
- (✓) Connect a jumper from pin 8 of IC-10 to pin 13 of IC-16.

This completes the modification to the 6800 CPU board. Refer to the parts layout and schematic furnished with the SWTPC 6800 to locate the specified parts.

When you do have M-16 memory board at A000 through DFFF and you intend to install a P-38 at E000 through FFFF, proceed as follows.

- ( ) If you have previously modified the CPU to accept the M-16 at A000 through DFFF but without a P-38 at E000 through FFFF, then remove the wire jumper from pin 13 of IC-16 to pin 3 of IC-7.
- ( ) If you have an unmodified CPU board, cut the foil connecting pins 10 and 13 of IC-16.
- ( ) Connect a jumper from pin 13 of IC-16 to pin 7 of IC-16.

It is not necessary to remove IC-2 or IC-3 from the CPU board. This completes the modification to the 6800 CPU board.

MEMORY ASSIGNMENT TABLE

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MEMORY LOCATIONS OCCUPIED BY P-38	SWITCH POSITIONS			PROM 0 OR MIKBUG	PROM 1	PROM 2	PROM 3
	S2	S3	S4				
0000 THRU 1FFF	UP	UP	UP	0000-03FF	0400-07FF	0800-0BFF	0C00-0FFF
2000 THRU 3FFF	DOWN	UP	UP	2000-23FF	2400-27FF	2800-2BFF	2C00-2FFF
4000 THRU 5FFF	UP	DOWN	UP	4000-43FF	4400-47FF	4800-4BFF	4C00-4FFF
6000 THRU 7FFF	DOWN	DOWN	UP	6000-63FF	6400-67FF	6800-6BFF	6C00-6FFF
8000 THRU 9FFF *	UP	UP	DOWN	8000-83FF	8400-87FF	8800-8BFF	8C00-8FFF
A000 THRU BFFF *	DOWN	UP	DOWN	A000-A3FF	A400-A7FF	A800-ABFF	AC00-AFFF
C000 THRU DFFF	UP	DOWN	DOWN	C000-C3FF	C400-C7FF	C800-CBFF	CC00-CFFF
E000 THRU FFFF *	DOWN	DOWN	DOWN	E000-E3FF	E400-E7FF	E800-EBFF	EC00-EFFF

MEMORY LOCATIONS OCCUPIED BY P-38	SWITCH POSITIONS			PROM 4	PROM 5	PROM 6	PROM 7 OR PROM 0 OR MIKBUG
	S2	S3	S4				
0000 THRU 1FFF	UP	UP	UP	1000-13FF	1400-17FF	1800-1BFF	1C00-1FFF
2000 THRU 3FFF	DOWN	UP	UP	3000-33FF	3400-37FF	3800-3BFF	3C00-3FFF
4000 THRU 5FFF	UP	DOWN	UP	5000-53FF	5400-57FF	5800-5BFF	5C00-5FFF
6000 THRU 7FFF	DOWN	DOWN	UP	7000-73FF	7400-77FF	7800-7BFF	7C00-7FFF
8000 THRU 9FFF *	UP	UP	DOWN	9000-93FF	9400-97FF	9800-9BFF	9C00-9FFF
A000 THRU BFFF *	DOWN	UP	DOWN	B000-B3FF	B400-B7FF	B800-BBFF	BC00-BFFF
C000 THRU DFFF	UP	DOWN	DOWN	D000-D3FF	D400-D7FF	D800-DBFF	DC00-DFFF
E000 THRU FFFF *	DOWN	DOWN	DOWN	F000-F3FF	F400-F7FF	F800-FBFF	FC00-FFFF

\* NOTE: TO USE THE P-38 AT THESE LOCATIONS, IT IS NECESSARY TO MODIFY THE SWTPC 6800. WE DO NOT RECOMMEND USING THE P-38 BETWEEN 8000 AND BFFF. THERE ARE SEVERAL ADVANTAGES TO USING THE P-38 AT E000 THRU FFFF AND WE HAVE PROVIDED INSTRUCTIONS ON THE MODIFICATIONS TO THE 6800 CPU BOARD TO ALLOW THE USE OF THE P-38 AT THESE LOCATIONS.

## LIMITED WARRANTY

Smoke Signal Broadcasting will repair or replace any P-38, P-38-I or P-38-FF that malfunctions within 90 days of purchase provided that the malfunction, in our opinion, was not caused by a defect in the computer in which it was used or any device connected to that computer. Smoke Signal Broadcasting makes no warranty as to the suitability or serviceability of the P-38 in any particular application other than those advertised. Our liability will be limited to repair of the P-38 or replacement and we will not assume responsibility for damage to a customers system (software or hardware) or any other consequential damage caused by the P-38 series systems.

## REPAIRS

Repairs under the terms of our limited warranty will be made provided the P-38 is mailed postpaid to:

Smoke Signal Broadcasting  
P.O. Box 2017  
Hollywood, California 90028

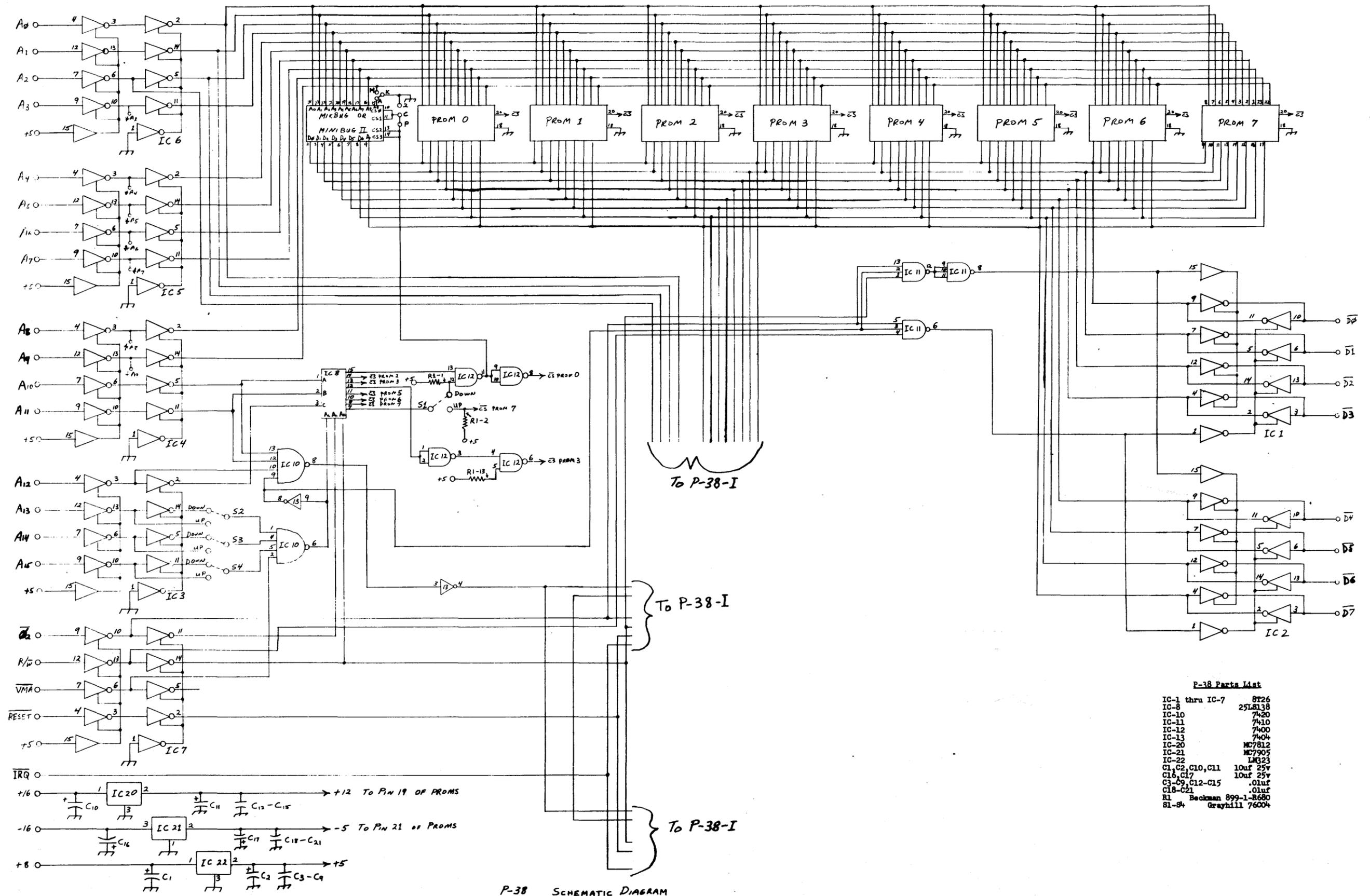
Normal turnaround time for repairs is one week and the P-38 will be returned postpaid. Please give as many written particulars concerning the nature of the malfunction as possible. Repairs outside of the warranty period will be made for a flat fee of \$35 provided that no more than three components need to be replaced and that the circuit board has not been physically damaged. (In the case of the P-38-FF, the 2708 provided will not be replaced for the basic flat fee). In the event more than three parts need to be replaced, a free written estimate will be given prior to repairing the unit.

For repairs outside the warranty period, send the P-38 postpaid with a check for \$35 to the address above.



PARTS LAYOUT DIAGRAM P-38-I





**P-38 Parts List**

- IC-1 thru IC-7 8T26
- IC-8 25L8138
- IC-10 7420
- IC-11 7410
- IC-12 7400
- IC-13 7404
- IC-20 MC7812
- IC-21 MC7905
- IC-22 LM323
- C1, C2, C10, C11 10uf 25v
- C16, C17 10uf 25v
- C3-C9, C12-C15 .01uf
- C18-C21 .01uf
- R1 Beckman 899-1-R680
- R1-R4 Grayhill 76004

P-38 SCHEMATIC DIAGRAM