MOSTEK®

F8/3870 PERIPHERAL SUPPORT

Operations Manual

PPG-8/16 PROM PROGRAMMER

OPERATIONS MANUAL
FOR
PPG-8/16
PROM PROGRAMMER
(MK79603)

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SECTION I

GENERAL INFORMATION

1-1. **INTRODUCTION.** The PPG-8/16 PROM PROGRAMMER, shown in figure 1-1, provides a low-cost means of programming and verifying MK2708, MK2758 or MK2716 UV PROMs. The PPG-8/16 is a peripheral which can be driven by most computers. It can be driven directly by the following Mostek Micro-computer products:

AID-80F - Software Development System
SDB-80 - Software Development Board Z80
SYS-80F- Software Development System(Z80)
SDB-50/70 - Software Development Board (F8)
MDX SERIES - Micro Designer Series (Z80)

Driver software is provided with the PPG-8/16 on floppy diskettes or paper tape. As shown in Table 1-1, an optional Texas Instruments Silent 700 compatible cassette tape of the software driver is also available.

1-2. **FUNCTIONAL.** The PPG-8/16 programmer writes data received from the host computer into the subject PROM as directed by the address/control outputs generated by the driver software. The data received from the computer may have been loaded directly into memory or developed interactively. Basically, the PPG-8/16 manipulates the data and the address/control inputs from the computer so that the subject PROM receives proper data, address and control inputs. As a p rt of delivering the control inputs to the PROM, the programmer generates the programming pulse from the output of a step-up voltage regulator within the programmer.

1-3. **PHYSICAL.** The PPG-8/16 programmer consists essentially of a small enclosure for the programming circuitry. A zero insertion pressure (ZIP) socket for the subject PROM and two LED indicators

are mounted on the top panel. One LED indicates that input power to the unit is present and the other indicates programming activity. The programmer is connected to the host computer by two connectors. J1 receives the data and address/control inputs. J2 is the power connector. J3 is a combination power & signal connector which is used in SYS-80F applications. For use with the MDX Series boards this connector is used as signal interface only, with power supplied through connector J2. (See Figure 1.1) Listed in Table 1-1, are cables for connecting the programmer to the MOSTEK products which can drive the PPG-8/16.

WARNING: Take steps to insure that the power connector (J2) is never wired up improperly or inserted backwards. This will result in destruction of the PPG-8/16. See Figure 1.1 for connector orientation.

1-4. SPECIFICATIONS.

1-5. Table 1-1 lists nomenclature and part numbers for the PPG-8/16 programmer and its accessories. Table 1-2 lists the PPG-8/16 programmer's overall specifications. Table 1-3 lists the pin usage of connectors J1, J2 and J3. J1 has 40 pins with .1" centers, and J2 has 12 pins with 1.56" centers. J3 is 25 pin 'D' type with pin contacts.

FIGURE 1-1. PPG-8/16 PROM PROGRAMMER

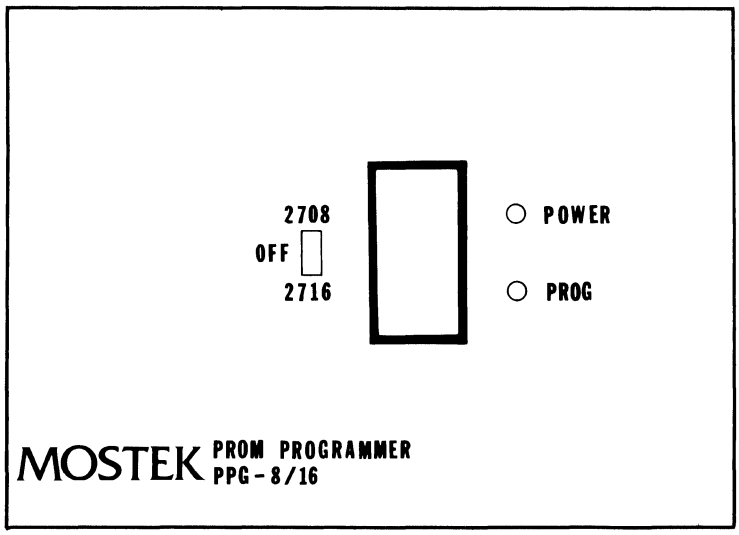
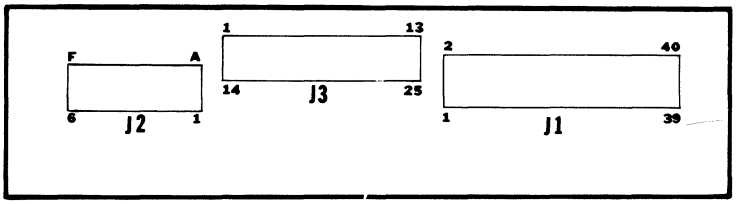


FIGURE 1-2. PPG-8/16 I/O AND POWER CONNECTORS



(REAR VIEW)

Table 1-1. AVAILABLE ITEMS U.S. & JAPAN

NAME	DESCRIPTION	PART NO.
PPG-8/16	MK2708, MK2758, MK2716 PROM Programmer	MK79081
XAID-805	Cable for interface to SDB-80 or AID-80F	MK79041
XAID-705	Cable for interface to SDB-50/70	MK79046
MD-PPG	Cable for interface to MDX-PIO	MK77957
SWD-2	Driver software on TI Silent 700 compatible cassette tape for SDB-50/70 and SDB-80	MK79084
PPG-RETRO	Adapter Kit used to mount PPG to AID-80F	MK78154

EUROPEAN

PPG-8/16	MK2708, 2758, 2716 PROM Programmer with cable for ZDS-80, SYS-50/70, SYS-80E SYS-80F	MK79082
SWD-2	Driver software on TI Silent 700 compatible cassette tape for SYS-50/70 and SYS-80E	MK79084

Table 1-2. Specifications

Interface	All signals TTL compatible
Power Requirements	+12 VDC, 250mA (typical) +5 VDC, 100mA (typical) -12 VDC, 50mA (typical)
Operating Temperature	0°C to 50°C
Programming Time	2.5 minutes (maximum)
Physical Dimensions	7" x 5" x 2" (approx.)

Table 1-3. Connections

CONTROL CONNECTOR (JI) PIN-OUT

PIN#	Signal Name	Direction	Description
All Odd Pins (1-39)	GND	Logic Ground	
J1-2	/ASTB	Output	"LOW" when Port A (PA0-PA7) is in output mode
J1-6,8,10..20	PA0-PA7	Bidirectional	PORT A (PA0-PA7) is used to output the lower 8 bits of PROM address to latch, output PROM data during programming and input PROM data during read sequence.
J1-24	/BSTB	Output	"LOW" when Port A (PA0-PA7) is in input mode.
J1-26	PB0/ADDR8	Input	PROM address bit 8

Table 1-3 Connections(Cont'd)

J1-28	PB1/ADDR9	Input	PROM address bit 9
J1-30	PB2/PA IN	Input	"HIGH" when Port A PA0-PA7) is in input mode and PROM is in read mode.
J1-32	PB3/PROG MODE	Input	"HIGH" during program mode. ADDR10 for 2716
J1-34	PB4/PROG PULSE	Input	Program Pulse
J1-36	PB5/PA OUT	Input	"HIGH" when Port A (PA0-PA7) is in output mode.
J1-38	PB6/CLK LATCH	Input	Clock to strobe address bits 0-7 latch.
J1-40	PB7/PROGRAMMING LED	Input	Control line for programming indicator

POWER CONNECTOR (J2) PIN-OUT

J2-1,A	+5VDC	J2-4,5,D,E	+12VDC
J2-2,3,B,C	GND	J2-6,F	-12VDC

Table 1-3 Connections (Cont'd)

J3		J3	
1	PA0	13	PB4
2	PA1	14	PB5
3	PA2	15	PB6
4	PA3	16	PB7
5	PA4	17	/BSTB
6	PA5	18	+12V
7	PA6	19	+5V
8	PA7	20	PB
9	OPEN	21	PB1
10	/ASTB	22	GND
11	PB2	23	GND
12	PB3	24	GND
		25	GND

Table 1-4 Cable Pin-Out

Cable pin-out for connecting SDB-50/70 to PPG-8/16 in PSU mode operation.

PIN(PPG-8/16)	SIGNAL	PIN(SDB-50/70 P1)
J1-6	PA0	46
J1-8	PA1	48
J1-10	PA2	50
J1-12	PA3	52
J1-14	PA4	54
J1-16	PA5	56
J1-18	PA6	58
J1-20	PA7	60
J1-2	/ASTB	NC
J1-30	PB2	68
J1-32	PB3	70
J1-34	PB4	72
J1-36	PB5	74
J1-38	PB6	76
J1-40	PB7	78
J1-24	/BSTB	NC
J2-4,5,D,E	+12	
J2-1,A	+5	
J1-26	PB0	64
J1-28	PB1	66
J1-11	GND	
J2,2,3,B,C	GND	
J2-6,F	-12	
J1,All odd pins		GND

Note: Contact Mostek for information concerning this mode of operation.

Table 1-5

Cable pin-out for XAID-805E MK79060*

*NOTE: Contact Mostek GmBH for use of this cable with SYS-50/70, ZDS-80 and SYS-80.

PIN (PPG-08 J1) PPG-8/16)	SIGNAL	PIN(25 PIN D-TYPE)*
J1-6	PA0	1
J1-8	PA1	2
J1-10	PA2	3
J1-12	PA3	4
J1-14	PA4	5
J1-16	PA5	6
J1-18	PA6	7
J1-20	PA7	8
		9
J1-2	/ASTB	10
J1-30	PB2	11
J1-32	PB3	12
J1-34	PB4	13
J1-36	PB5	14
J1-38	PB6	15
J1-40	PB7	16
J1-24	/BSTB	17
J2-4,5,D,E	+12V	18
J2-1,A	+5V	19
J1-26	PB0	20
J1-28	PB1	21
J1-11	GND	22
J2-2,3,B,C	GND	23
		24
J2-6,F	-12V	25

Table 1-6 Pin Out For PPG-8/16 to SDB-80 OR AID-80F

Cable pin-out for connecting the PPG-8/16 directly to the SDB-80, or AID-80F.

SDB-80 SIGNAL	SDB-80 CONNECTOR	PPG-08/16 PPG-08 CONNECTOR	PPG-08/16 PPG-08 SIGNAL
P(D4)0	J3-6	J1-6	PA0 (ADDRESS 0)
P(D4)1	J3-8	J1-8	PA1 (ADDRESS 1)
P(D4)2	J3-10	J1-10	PA2 (ADDRESS 2)
P(D4)3	J3-12	J1-12	PA3 (ADDRESS 3)
P(D4)4	J3-14	J1-14	PA4 (ADDRESS 4)
P(D4)5	J3-16	J1-16	PA5 (ADDRESS 5)
P(D4)6	J3-18	J1-18	PA6 (ADDRESS 6)
P(D4)7	J3-20	J1-20	PA7 (ADDRESS 7)
RDY(D4)	J3-4	N/C	
/STB (D4)	J3-2	J1-2	/ASTB
P(D6)0	J3-26	J1-26	PB0 (ADDRESS 8)
P(D6)1	J3-28	J1-28	PB1 (ADDRESS 9)
P(D6)2	J3-30	J1-30	PB2 (PROG MODE)
P(D6)3	J3-32	J1-32	PB3 (ENABLE)
P(D6)4	J3-34	J1-34	PB4 (PROG PULSE)
P(D6)5	J3-36	J1-36	PB5 (PA OUT)
P(D6)6	J3-38	J1-38	PB6 (CLK LATCH)
P(D6)7	J3-40	J1-40	PB7 (PGM/A10)
RDY (D6)	J3-22	N/C	
/STB (D6)	J3-24	J1-24	/BSTB
GROUND	ALL ODD PINS	ALL ODD PINS	GROUND

Table 1-6 Pin-Out For PPG-8/16 TO SDB-80 OR AID-80F (Cont.)

POWER CABLE*

AID-80F POWER SUPPLY	PROM PROGRAMMER
+12V	J2-4,D,5,E
+5V	J2-1,A
GND	J2-2,B,3,C
-12V	J2-6,F

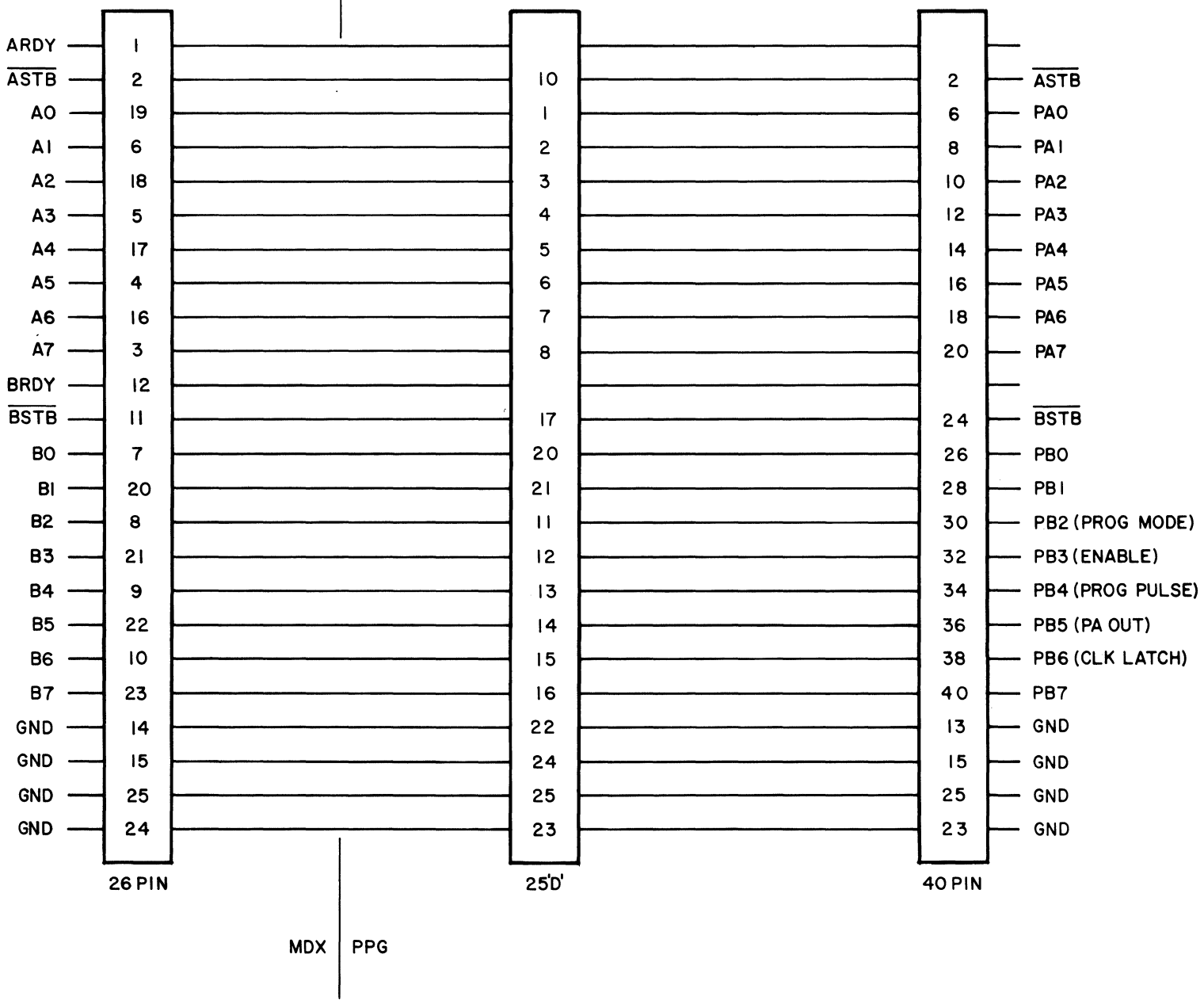
The first cable is supplied with the PROM PROGRAMMER RETROFIT Kit (PPG-RETRO MK78154) available from Mostek. Listed below are the parts required to build the cable and are not available from Mostek:

40 PIN CARD EDGE	ANSLEY # 609-4015M (2 required)
40 CONDUCTOR FLAT CABLE	ANSLEY # 171-40 (18" Max.)

*Power cable is shipped as part of AID-80F Assembly.

Table 1-7

Cable pin-out or connecting PPG-8/16 directly to MDX-PIO*



*Requires MDX-CPU1, MDX-DEBUG, MDX-DRAM8, 16, 32, and MDX-PIO complete system. This cable is available from MOSTEK (MD-PPG) MK77957).

SECTION 2

FUNCTIONAL DESCRIPTION

2-1. INTRODUCTION

2-1. Functionally, the PPG-8/16 programmer consists of two main parts: hardware and the software which drives it. The hardware allows the host computer maximum control of the read, program, and verify operations. The software must control mode selection, addressing, data transfer, and program pulse timing.

2-3. HARDWARE

2-4. The major functions of the programmer circuitry are shown in Figure 2-1, the block diagram of programmer. As shown in the diagram, the circuitry consists of a collection of circuit blocks which interface the data and address/control inputs from the host computer at J1 to the subject PROM at the PROM socket. Additional circuits consist of the power and step-up voltage regulators and LED indicators. Two elements of the programmer circuitry which are not truly circuit blocks, but which can be treated as such are the port A and B buses.

2-5. **PORT A BUS** The port A bus is used as a bidirectional path for three types of data transfer.

1. Loading the low order eight bits of PROM address (A0-A7) into the 8-bit latch.
2. Passing the contents of the PROM to the host computer during PROM read operations.
3. Passing the data to be written to the PROM during PROM programming operations.

2-6. **PORT B BUS** The port B bus is used as a unidirectional path for supplying eight bits of address/control to the PROM. The function of each bit is as follows:

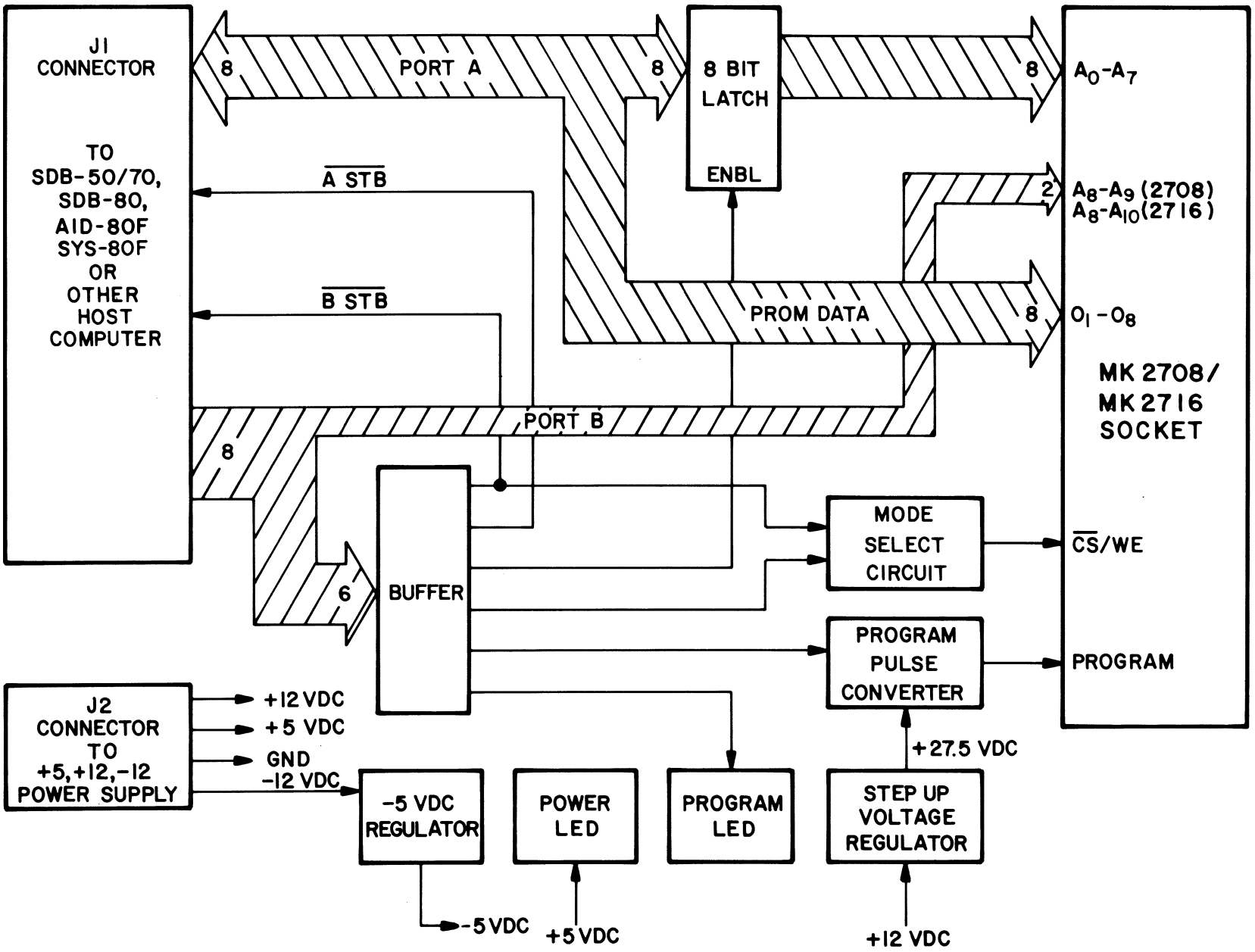


FIGURE 2-1 HARDWARE BLOCK DIAGRAM

1. Bits 0 and 1 are the two high order address bits (A8, A9) for the PROM.
2. Bit 2 is the PROM program mode bit for the 2708 mode and address bit A10 for the 2716 or 2758 mode.
3. Bit 3 is the PROM PA IN/ READ MODE bit. This bit selects the read operation and is buffered and sent back to the host computer /BSTB. If there are bidirectional buffers for Port A of the host computer, the /BSTB should cause them to direct transfer toward the computer.
4. Bit 4 is the PROM programming pulse bit for the 2708 mode and the +26V control for the 2716 mode.
5. Bit 5 is the PA OUT bit which is buffered and sent back to the host computer as /ASTB. If there are bidirectional buffers for Port A on the host computer, /ASTB should cause them to direct transfer toward toward the programmer.
6. Bit 6 strobes the low order eight bits of PROM address (A0-A7) into the 8-bit latch.
7. Bit 7 controls the programming LED which is used to indicate when PROM programming is in progress.

2-7. BUFFER The buffer conditions the bit 2 through bit 7 inputs on the port B bus.

2-8. LATCH The 8-bit latch holds the low order bits of PROM address (A0-A7) from the port A bus so that this data can be delivered to the PROM simultaneously with the high order bits of PROM address from the port B bus.

2-9. MODE SELECT LOGIC The mode select logic generates the signals for reading and programming the MK2708 and the MK2716 PROM's. Table 2-1 gives the truth table implemented by the mode select logic.

Table 2-1. Truth Table for Mode Select Logic

2708 MODE

PORT B BIT 3	PORT B BIT 2	COMMENTS
0	0	PROM UNSELECTED
0	1	PROM PROGRAM MODE
1	0	PROM READ MODE

2716, 2758 MODE

PORT B BIT 7	PORT B BIT 4	PORT B BIT 3	COMMENTS
1	0	0	PROM UNSELECTED
0	1	0	PROM PROGRAM MODE
1	1	1	PROM READ MODE

2-10. **PROGRAM PULSE CONVERTER.** The program pulse converter converts the buffered bit 4 input from the port B bus into the 26-volt programming pulse required by the PROGRAM pin of the PROM. The converter also controls the rise and fall times of the PROGRAM signal.

2-11. **STEP-UP VOLTAGE REGULATOR.** The step-up voltage regulator converts the +12vdc input to the programmer to 27.5 vdc used by the program pulse converter.

2-12. **-5VDC REGULATOR.** The -5vdc regulator produces -5vdc power from the -12vdc input to the programmer.

2-13. **LED INDICATORS.** The POWER ON LED illuminates when power is supplied to the programmer. The PROGRAMMING LED indicates when programming is in progress.

2-14. SOFTWARE

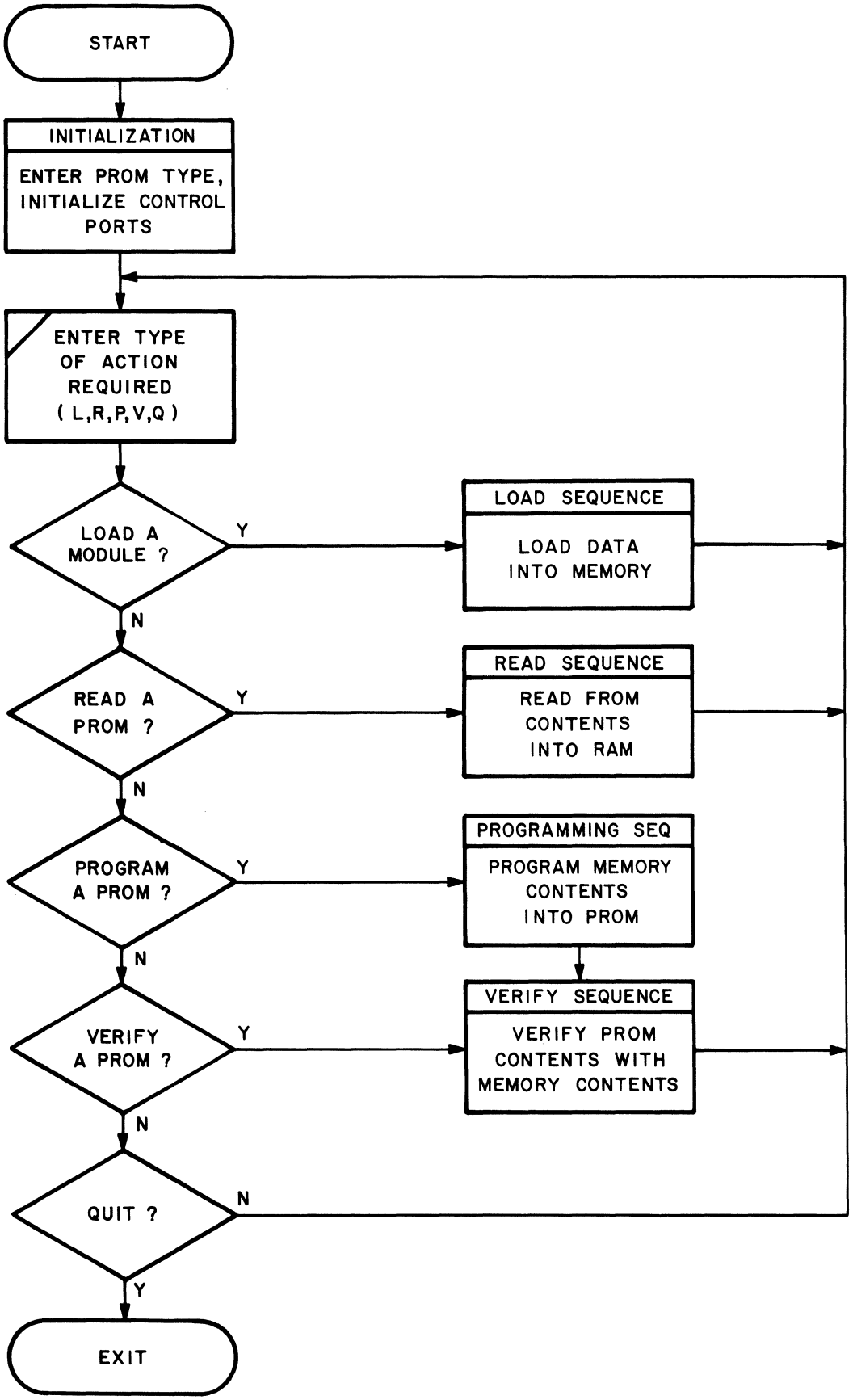
2-15. INTRODUCTION

2-16 The PPG-8/16 driver software is supplied for the following MOSTEK Development Systems: SDB-80, AID-80F, SDB-50/70 or SYS-80F.

2-17. Driver software for the PPG-8/16 must meet four functional requirements. These are loading modules (object tapes for the SDB-80 and SDB-50/70 or binary files for the AID-80F or SYS-80F) into host computer memory, reading the contents of the PROM into the host computer memory, programming the PROM with the contents of the host computer memory and verifying the PROM against the contents of the host computer memory. Within the software, the executive system coordinates all four operations, while each operation sequence is run by its respective routine.

2-18 EXECUTIVE SYSTEM. As shown in Figure 2-2, the executive allows the operator to select from among the four modes of operation: load, read, program and verify. Depending on the system being used, additional input may be requested by the host computer. The four modes of operation are described in detail for each system used in Section 3 of this manual.

Figure 2-2 EXECUTIVE SYSTEM FOR PPG 8/16



Section 3

INSTALLATION PROCEDURES

3-1. INTRODUCTION

3-2. This section is intended to serve as guide to insure proper setup of the PPG-8/16 when used with the SDB-50/70, SDB-80 or MDX series boards.

The AID-80F is shipped with the proper configuration for PPG-8/16 operation. Follow the installation instruction sheet supplied with the PPG-8/16 Retro-fit Kit.

3-3. OPERATION WITH SDB-80

CAUTION: In order to prevent possible destruction of PROMs, PROMs must never be inserted into the ZIP DIP socket on the PPG-8/16 until the driver software is running. If the PROM is inserted prior to starting the driver software, the PROM may be subjected to a continuous program pulse which will destroy the PROM. For the same reason, the restart switch on the SDB-80 must not be depressed while the PROM is in the socket.

3-4. SETUP

1. Connect SDB-80 to peripherals and power supply (See Figure 1-1)

2. Connect SDB-80 J3 to PPG-8/16 J1 using XAID-805 40-pin flat cable.

NOTE: SDB-80E (Double Eurocard) uses XAID-805E and XAID-806E, or wire the connections shown in Table 1-5. SYS-80F uses cable XAID-805E. Power is automatically supplied. Insert 25-pin plug into the PROM PROG socket. The line printer and the PPG-8/16 may not be used simultaneously. (Contact Mostek GmBH for details concerning SYS-80F and SDB-80E).

3. The PIO on the SDB-80 to which J3 connects must be configured as shown on page 8-9 (Figure 4) of the SDB-80 operations manual. This is the configuration as shipped from the factory. Resister pack U9 must be removed from the SDB-80.

4. Connect PPG-8/16 J2 to power supply as listed on Table 1-3.

3-5. POWERING UP WITH THE SDB-80

1. Energize power supply.
2. Position restart select switch (S2) on SDB-80 to left. (facing component side)
3. Momentarily depress restart switch (S1) on SDB-80.
4. Depress RETURN key on console, and observe that console prints a period (.) indicating that the operating system (DDT-80) of the SDB-80 is operative.

3-6. OPERATION WITH SDB-50/70

CAUTION: In order to prevent possible destruction of PROMs, PROMs must never be inserted into the

ZIP DIP socket on the PPG-8/16 until the driver software is running. If the PROM is inserted prior to starting the driver software, the PROM may be subjected to a continuous program pulse which will destroy the PROM. For the same reason, the reset switch on the SDB-50/70 must not be depressed while the PROM is in the socket.

3-7. SET UP

1. Connect SDB-50/70 to peripherals and power supply using cable XAID-705(See Figure 1-1).
2. There are two types of software drivers for the PPG-8/16. Type PIA uses the reader/punch conncection of the SDB-50/70 as the interface. This is most useful if data is loaded over the serial channel, e.g., Silent 700 operation. In this mode, connect J1 of the PPG-8/16 to J1 of the SDB-50/70 using XAID-705, MK79401. If the PROM data is to be loaded over the PIA ports (tape reader), then it is more convenient to use the PSU ports on the P1 connector of the SDB-50/70 to drive the PPG-8/16. If the PPG-8/16 is to be used with SYS-50/70, then use cable (MK79060) to connect the PPG-8/16 to the PROM PROG connection. Note that power is automatically supplied. In stand alone or other system environments, the ports should be wired as shown in Table 1-4. The wiring for the SYS-50/70 is shown in Table 1-5. In the PSU mode, the AIM-51 and AIM-70

cards may be left in the system during programming but do not insert PROMs into the PPG-8/16 when using the AIM cards. Programming PROMs will not alter data in the AIM. Port 14 is used for output control (port B), and port 15 is used for data (port A).

3. Connect PPG-8/16 J2 to power supply as listed in Table 1-3. (Not required on SYS-50/70).

3-8. POWERING UP THE SDB-50/70.

1. Energize power supply.
2. Momentarily depress reset switch on the SDB-50/70 and observe that the console prints a period (.) indicating that the operating system (DDT-2) of the SDB-50/70 is operative.

3-9. OPERATION WITH MDX SERIES BOARDS

CAUTION: In order to prevent possible destruction of PROMs, the devices must never be inserted into the ZIP DIP socket on the PPG-8/16 until the driver software is running. If the PROM is inserted prior to starting the driver software, the PROM may be subjected to a continuous program pulse which will destroy the PROM. For the same reason, the reset switch on the MDX System must not be depressed while the PROM is in the socket.

3-10. In order to use the PPG-8/16 with the MDX-PIO board the following minimum system is required:

MDX-CPU
MDX-DRAM 8,16, or 32
MDX-DEBUG
MDX-PIO

The CPU, DRAM and DEBUG cards are available as part of the MDX-PROTO prototyping package which also contains a wire-wrap card, card cage, extender card and terminal I/O cables. The MDX-PIO must be ordered as a separate item.

The discussion here applies to specific operation of the PPG-8/16 and MDX-PIO. For detailed operating procedures for the MDX-PROTO systems, refer to the manuals suplied with package.

3-11. HARDWARE CONFIGURATION - MDX-PIO

3-12. Refer to operations manual supplied with MDX-PIO board for detailed operating instructions and option set-up.

3-13. Perform the following changes to the MDX-PIO strapping and change devices as noted. The MDX-PIO is shipped from the factory to decode the following port addresses:

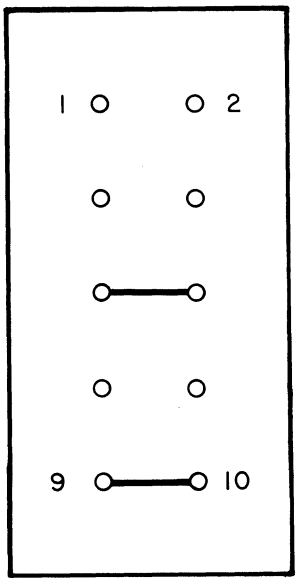
	PIO #1		PIO #2	
	PORT A	PORT B	PORT A	PORT B
DATA	F8H	FAH	FCH	FEH
CONTROL	F9H	FBH	FDH	FFH

For PPG-8/16 operation, the strap option at J4 must be changed to decode:

	PIO #2	
	PORT A	PORT B
DATA	D4H	D6H
CONTROL	D5H	D7H

Wire option block J4 as shown below:

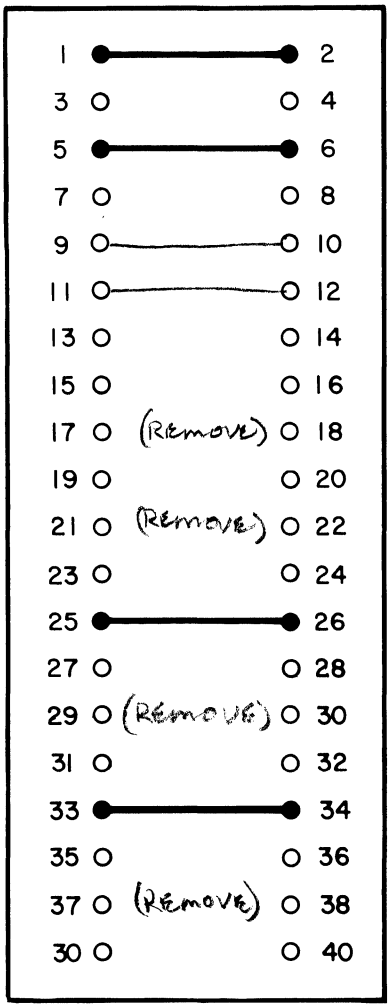
FIGURE 3-1 J4 STRAPPING FOR MDX-PIO TO OPERATE WITH PPG-8/16



3-14. Next the PIO data path must be configured for direction and polarity. This is determined by the strapping of option block J3.

1. Configure Port A as bidirectional path
2. Configure Port B as unidirection path (output from PIO to PPG-8/16)
3. Configure polarity of ASTB and BSTB inputs to PIO.
4. Install jumpers as shown below to accomplish steps 1-3.
5. Remove I.C. UR3 (1K Resistor Package)

FIGURE 3-2 J3 STRAPPING FOR MDX-PIO TO OPERATE WITH PPG-8/16



CHANGES AS SHOWN ON ERRATA SHEET 10/29/80 PUB # MK 79975

3-15. LOADING THE PPG-8/16 SOFTWARE DRIVER

3-16. In order to load the software driver into the MDX system, the second MDX-PIO port may be configured to utilize a paper tape reader and, for optional output device, a paper tape punch. As an alternate the driver can be loaded from an Silent 700 tape.

3-17. READER/PUNCH only the changes for the strapping are similar to those done in paragraph 3-11 and 3-12 utilizing jumper block J3. The paper tape reader and paper tape punch drivers

reside in the DDT-80 firmware and expect the I/O port addresses to be:

PIO #1

	PORT A (Paper Tape Reader	PORT B (Paper Tape Punch)
DATA	D0H	D2H
CONTROL	D1H	D3H

*Note that these port addresses apply only to the ROM Version of DDT-80 as the disk operating system has different port assignments. (Consult FLP-80DOS Manual).

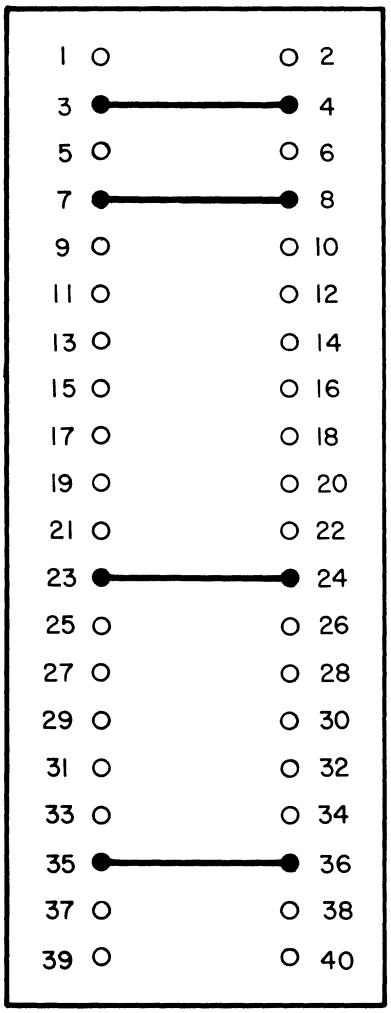
3-18. READER/PUNCH ONLY Since the port addresses jumper was done for ports Dx in paragraph 3-11, it is only necessary to configure the port direction and polarity.

3-19. READER/PUNCH ONLY Add the following jumpers to option block J3:

1. Configure Port A as unidirectional path - INPUT (from READER to PIO).
2. Configure Port B as unidirectional path - OUTPUT (from PIO to Paper Tape Punch)
3. Configure polarity of RDY and STB inputs to PIO

*Note that this configuration is for a Plessy CM-2040 reader/-punch unit and the use of other makes or models may require different option set-up.

FIGURE 3-3 J3 STRAPPING FOR MDX-PIO TO OPERATE WITH PLESSY CM-2040 READER/PUNCH UNIT



Section 4

OPERATING PROCEDURES

4-1. INTRODUCTION

4-2. Software to drive the PPG-8/16 is provided on paper tape (cassette tape optional) for the SDB-80 and SDB-50/70 systems with each PPG-8/16 purchased. The software to drive the PPG-8/16 on the AID-80F, SYS-80F, or MDX disk system is supplied on the system diskette shipped with each system, All three software packages offer the same functions and basically the same user interaction. The user should follow the General Operation Procedure for using the PPG-8/16 and refer to those sections dealing specifically with the type system he is using for further details.

4-3. GENERAL OPERATION PROCEDURE

CAUTION: In order to prevent possible destruction of PROMs, the user should not insert PROMs in the ZIP DIP socket until the software driver is started. Also, the user should insure that the PROM TYPE SWITCH is in the correct position for the type of PROM being used. The switch should be in the 2708 position for 2708 PROMs and in the 2716 position for 2716 and 2758 PROMs. If a PROM is inserted in the ZIP DIP socket with the PROM TYPE SWITCH in the wrong position, the PROM may be subjected to voltages which could destroy the PROM.

4-4. After starting the PPG-8/16 software driver (specifics for each system follow), the program will respond by issuing the software title to the console device and a prompt for the type of PROM being used. The software supports programming of 2708, 2716 and 2758 PROM types. The PROM TYPE SWITCH on the PPG-8/16 should be positioned to reflect the type of PROM being used and left in that position through out the programming session. The user may now answer the PROM type request by entering a two digit number corresponding to the type of PROM being used (08 for 2708, 16 for 2716 or 58 for 2758 PROMs). If an error is made on input of this number, the software will re-prompt the user until a valid number is entered. The user is asked to enter the PROM type only once during a session. To change the PROM type, the user must exit the PPG-8/16 driver, re-enter the driver, position the PROM TYPE SWITCH to the desired position, and enter the two digit number corresponding to the type of PROM to be used.

EXAMPLE: -user initiates driver

PPG-8/16 PROM PROGRAMER V1.0

ENTER PROM TYPE (08/16/58) 08

-user should position the PROM TYPE SWITCH to the desired position and answer the PROM type request. In this example, 2708 PROMs have been selected.

4-5. The PPG-8/16 software issues a request for action with five possible single-letter parameters. Each letter stands for a function to be performed by the PROM Programmer (L for Load data into memory, R for Read data from a PROM into memory, P for Program a PROM, V for Verify the contents of PROM against memory, and Q for Quit-exit the software driver). After the user enters the single letter to select the function desired, the software

will perform that function and then re-issue the action request. The user should ensure that the PROM to be used is positioned in the ZIP-DIP socket before answering the action request.

4-6. LOADING DATA INTO MEMORY

4-7. Data may be loaded into Memory by answering the action request with "L". After the data has been loaded, another action request is issued. The user should refer to the section in the manual which deals with the type of system he is using for specific details.

4-8. READ A PROM

4-9. The data contents of a PROM may be loaded into RAM by answering the action request with a "R". The entire contents of the PROM are read and stored into memory. The position in memory where the data is stored depends on the type of system being used.

4-10. PROGRAM A PROM

4-11. Data stored in memory may be programmed into a PROM by inserting an erased PROM in the ZIP-DIP socket and answering the action request with "P". The PPG-8/16 software first verifies that the PROM is erased (contains FF in all locations). If the software finds unerased locations, it prints the first unerased location as shown in Figure 4-1. To check for other unerased locations, the user enters a carriage return after each unerased location printed. If the PROM contains unerased locations, the user may erase the PROM again before starting programming or attempt programming the PROM as is by entering C. If there are no unerased locations, programming begins automatically. During the

programming sequence the PROGRAMMING LED will be on until programming is completed. To stop programming during the sequence, the user enters a period (.). The PPG-8/16 software prints ABORTED and repeates the action request. When the programming sequence is complete, the PPG-8/16 reads the PROM to verify that the data has been programmed correctly. If locations are found with erroneous data, it prints the bad locations as shown in Figure 4-1. To stop the error listing, the user enters a period, and the software returns to the start by repeating the action request. If the PROM is programmed correctly, the software will issue another action request immediately after completion of programming.

4-12. VERIFY A PROM

4-13. The user may verify a PROM against the contents of memory by inserting the PROM to be verified into the ZIP DIP socket and answering the action request with a "V". If the PPG-8/16 software finds locations with erroneous data, it prints the bad locations as shown in Figure 4-2. To stop the error listing the user enters a period, and the software returns to the start by repeating the action request.

4-14. COPY A PROM

4-15. Copying a master PROM into a subject PROM requires only that the master PROM be read into memory as described in paragraph 4-8 and the subject PROM be programmed as described in paragraph 4-10.

4-16. MODIFYING DATA IN MEMORY

4-17. The user may modify data that has been read into memory by

the Read or Load commands by exiting the PPG-8/16 driver and entering the DDT environment. The data may be modified using the M command in DDT (see User's Guide for system being used for use of DDT). After all memory modifications are complete, the user may re-enter the PPG-8/16 software driver and continue operation.

4-18. COPYING TWO 2708 or 2758 PROMS INTO A 2716 PROM

4-19. The PPG-8/16 software does not allow direct programming from 2708 or 2758 PROMs to 2716 PROMs due to the buffer arrangement. However, this function is possible by using the C command in DDT (see User's Guide for system being used for use of DDT) to arrange the data in memory. If using the SDB-80 system, all the user needs to do is read the low order PROM into memory and load the high order PROM 1K bytes higher in memory (e.q. load first PROM in memory locations 1000_H through $13FF_H$ and load the second PROM in memory locations 1400_F through $17FF_H$). If using the disk system, read in the high order PROM using the "R" command, exit the programmer, and enter the DDT environment. The PROM is read into memory at locations 1000_H through $13FF_H$ on the disk system. This data must be transferred up in memory using the DDT command as follows:

```
.C 1000, 13FF, 1400 (CR)    (for disk system)
```

The PPG-8/16 software driver should now be re-entered and the low order PROM read into memory using the "R" command. If using the SDB-50/70 system, the user is prompted for 1K quadrants to receive data. The user simply loads the low order PROM into Quadrant 1 and the high order PROM into Quadrant 2. Both Quandrants would be programmed into a 2716 if Quadrant 1 is selected in the 2716 programming mode (see SDB-50/70 Read and Program operation sections).

When data from both PROMs has been loaded into memory, the user must exit the driver, position the PROM TYPE SWITCH to the 2716 position and re-enter the driver entering 16 for PROM type. The data from the two PROMs remains in memory and may be programmed into a 2716 PROM by using the "P" command.

Figure 4-1. Programming a PROM

CONSOLE PRINTOUT - = COMMENT

ENTER TYPE OF ACTION REQUIRED (L,R,P,V,Q) P

-User selects to program a PROM. PROM should be in ZIP DIP socket before typing P.

NOT ERASED 0000 FE 36 (CR)

-PROM not erased. Software prints PROM location, data present, data to be programmed.

-The user may enter a period (.) to abort the function, a carriage return to check remaining locations, or a "C" to continue programming. The user selects to examine the next location.

NOT ERASED 0000 DF 97 C

-User selects to start programming.

BAD LOC 0000 2C 3C

-Upon completion of programming, a verification is made to ensure proper programming. If an error is found, the PROM address, data expected, and actual programmed data are printed. The list of errors continues until all are printed. The user may abort the error listing by entering a period (.) on the console device.

ENTER TYPE OF ACTION REQUIRED (L,R,P,Y,Q)

-The user is prompted with another action request upon completion of programming.

4-20. OPERATION WITH MOSTEK DISK SYSTEMS

4-21. The PPG-8/16 software for the disk system allows data to be read from a binary file on diskette or from PROM. If data is to be loaded from a binary file, the name of that file must be entered on the command line when entering the PPG-8/16 driver. When the driver is entered with the file name specified, the beginning address of the file is printed on the console device. In the following example, the user is to load data from a binary file on DK1. The user should load the diskette containing the PPG-8/16 software in DK0 and the diskette containing the binary file in DK1. After the diskettes are properly loaded, press the RESET switch of the disk system and enter a carriage return on the console device. The system should respond with the FLP-80DOS message and a "$" prompt.

EXAMPLE:

```
"RESET" (CR)
MOSTEK FLP-80DOS V2.0
$PPG DK1: FILE.BIN (CR)
PPG-8/16 PROM PROGRAMMER V1.0
FILE START ADDRESS IS 0000
ENTER PROM TYPE (08/16/58)
```

If the user does not wish to load data from a binary file, he may start the PPG-8/16 software without entering a file name on the command file.

4-22. LOADING A BINARY FILE

4-23. To load data into RAM from a binary file on diskette, the user must have entered the file name when starting the driver. If the "L" command is entered without the correct file having been entered, an error flag will be issued and control returned to the

Monitor. After entering "L", the program will prompt for file start and file end addresses. These addresses correspond to the binary file addresses only. All data from a file is stored in a fixed buffer on 1K or 2K boundries (2708 or 2716) beginning at 1000H. If the end address is not entered by the user, data will be loaded starting at the start address entered by the user and will continue loading until the buffer boundary is reached or an end of file is encountered. If the end address entered is larger than the end address of the buffer boundary, then loading will stop when the buffer boundary is reached.

EXAMPLE: $PPG DK1: FILE.BIN (CR)

-User enters program with FILE.BIN existing on DK1 (right hand drive).

FILE START ADDRESS IS 5700

-Program echos file start addres in HEX. (5700 in this example).

ENTER PROM TYPE (08/16/58) 08

-User selects 2708 PROM type. All blocks of data will now be loaded and programmed in 1K Sections (would have been 2K sections for 2716's).

ENTER TYPE OF ACTION REQUIRED (L,R,P,V,Q) L

ENTER FILE START [, FILE END] 5700, 57FF (CR)

-User selects to load data from a binary file starting at 5700 Hex and ending at 57FF Hex. Since 57FF is the end of a 1K boundary, the end address did not need to be entered. The next 1K section of the file would begin at 5800 Hex and end at 5BFF Hex.

4-24. READING A PROM.

4-25. When the user answers the action request with a "R", the software will read the entire contents of the PROM and store the data in memory starting at location 1000_H.

4-26. PROGRAMMING A PROM.

4-27. The disk system software programs data into PROM from a fixed buffer beginning at address 1000_H. If programming 2708 PROMs, the entire PROM will be programmed and no parameters are requested. If programming 2758 or 2716 PROMs, the user is requested for PROM start and PROM end parameters. The PROM end parameter is optional. If not entered, the software will begin at the PROM start address and program the remainder of the PROM.

4-28. VERIFYING A PROM

4-29. PROM's are verified against data stored in memory beginning at location 1000_H. The entered PROM is verified.

4-30. OPERATION WITH SDB-80 AND MDX SERIES

> **CAUTION:** In order to prevent possible destruction of PROMs, the user should not insert PROMs in the ZIP DIP socket until the software driver is started. Also, the user should insure that the PROM TYPE SWITCH is in the correct positions for the type of PROM being used. The switch should be in the 2708 position for 2708 PROMs and in the 2716 position for 2716 and 2758 PROMs. If a PROM is inserted in the ZIP DIP socket with the PROM TYPE SWITCH in the wrong position, the PROM may be subjected to voltages which could destroy the PROM.

4-31. The PPG-8/16 software for the SDB-80 allows the user to store data anywhere in user memory except the area where the PPG-8/16 software resides ($0\text{-}3FF_H$). Therefore, all functions of the PPG-8/16 require that the user enter parameters specifying where that action is to take place. The prompt to the user is of

the form "ENTER RAM START, RAM END, PROM START" or "ENTER LOAD ADDRESS, # BYTES". The RAM START and END parameters specify the memory space in which the data is to be read or stored. The PROM START parameter defines the first PROM location to be read or programmed (normally 0). The LOAD ADDRESS parameter refers to the beginning address in RAM where an object tape is to be loaded. The number of bytes parameter allows the loading of a limited number of bytes from an object tape into RAM so that object modules can be loaded and programmed in blocks. If the load size parameter is not entered, the entire object tape will be loaded. All parameters must be separated by a comma or space and terminated with a carriage return. If no parameters are entered in front of the carriage return, the user will be re-prompted. If a period is entered before the end of the parameters, the software repeats the request for parameters allowing the user to correct the parameters.

4-32. In order to load and execute the PPG-8/16 software, the user must first initialize the :OI channel to the device being used (:PR for paper tape, :TI for Silent 700). After the :OI channel has been assigned, the user should load the PPG-8/16 software into memory and begin execution.

EXAMPLE: "Reset" (CR)
.M : OI (CR)
:OI XXXX :TI (CR)
:OO XXXX .
-assign :OI channel to read from paper Silent 700 cassette
.L (CR) -load PPG-8/16 tape
.E 0 (CR) -execute software
PPG-8/16 PROM PROGRAMMER V1.0
ENTER PROM TYPE (08/16/58)
-PPG-8/16 responds by printing title message and prompts for PROM type.

4-33. LOAD AN OBJECT TAPE

4-34. Data from an object tape may be read into memory using the :OI channel. The user should first load the object tape to be read in the tape cassette and then answer the action request by typing "L". The PPG-8/16 software asks the user to enter two parameters corresponding to the beginning address in memory where the data is to be stored and the number of bytes to be read from the first PROM location to be read (normally 0). The user should have the PROM to be read positioned in the ZIP DIP socket before answering the request for parameters. The RAM START address should always be greater than $3FF_H$ to avoid loading data over the PPG-8/16 software. When the read is complete, the software repeats the action request.

4-35. READING A PROM.

4-36. When the user answers the action request with a "R", the PPG-8/16 software asks the user to enter three parameters (RAM START ADDRESS, RAM END ADDRESS, and PROM START ADDRESS). The RAM START and END parameters specify the memory space into which the data is to be read. The PROM START defines the first PROM location to be read (normally 0). The user should have the PROM to be read positioned in the ZIP DIP socket before answering the request for parameters. The RAM START address should always be greater than $3FF_H$ to avoid loading data over the PPG-8/16 software. When the read is complete, the software repeats the action request.

4-37. PROGRAMMING A PROM.

4-38. When entering the programming mode, the software prompts

for addresses in RAM where the data to be programmed is stored. The user should place the PROM in the ZIP-DIP socket before answering the prompt for addresses. The software will begin programming at the PROM START address and continue until all addresses specified have been programmed.

4-39. VERIFYING A PROM.

4-40. The contents of PROM are verified against data stored in memory. Memory start and end addresses and PROM start address are specified by the user.

4-41. OPERATION WITH SDB-50/70.

CAUTION: In order to prevent possible destruction of PROMs, the user should not insert PROMs in the ZIP DIP socket until the software driver is started. Also, the user should insure that the PROM TYPE SWITCH is in the correct positions for the type of PROM being used. The switch should be in the 2708 position for 2708 PROMs and in the 2716 position for 2716 and 2758 PROMs. If a PROM is inserted in the ZIP DIP socket with the PROM TYPE SWITCH in the wrong position, the PROM may be subjected to voltages which could destroy the PROM.

4-42. The PPG-8/16 software for the SDB-50/70 stores data from PROM or object tape in four 1K quadrants of memory beginning at 5000_H. Program, Read, and Verify functions require that the user specify which quadrant is to be used. When a quadrant is selected, the PPG-8/16 software calculates memory start and end addresses for the type of PROM being used. Data from a 2708 or

2758 PROM fills a single quadrant. For most applications, only quadrant 1 needs to be selected. 2716 PROMs fill two quadrants with each read; therefore, quadrants 2 and 4 should never be selected. When the user is prompted for the quadrant to use, he should enter a single digit corresponding to that quadrant (1 for quadrant 1, 2 for quadrant 2, etc.). The quadrants correspond to the following memory locations:

Quadrant 1 = 5000_H through $53FF_H$
Quadrant 2 = 5000_H through $57FF_H$

4-43. In order to load and execute the PPG-8/16 software, the user must first initialize the :OI channel to the device being used (:PR for paper tape, :TI for Silent 700). After the :OI channel has been assigned, the user should load the software into memory and begin execution.

```
EXAMPLE:  "RESET" (CR)
          .M :OI (CR)
          :OI XXXX :PR (CR)
          :OO XXXX .
                          -assign :OI channel to read paper
                           tape
          .L (CR)         -load PPG-8/16 tape
          .E 4300 (CR)    -execute software
          PPG-8/16 PROM PROGRAMMER V1.0
          ENTER PROM TYPE (08/16/58)
                          -PPG-8/16 responds by printing title
                           message and prompts for PROM type.
```

4-44. **LOADING OBJECT TAPE.**

4-45. Data from an object tape may be read into memory using the :OI channel. The user should first load the object tape to be read in the tape reader and then answer the action request by typing "L". Both F8 and Intel hex formats are supported. When the LOAD command is initiated, the format type is determined (F8 or Intel) and the beginning address is stored. The beginning data storage address for memory is calculated in the following manner:

Memory address = tape address .AND. $FC00_H$ .OR. 5000_H. for 2708 and 2758 PROMs or:

Memory address = tape address .AND. $F800_H$ .OR. 5000_H. for 2716 PROMs.

Data read from tape will be loaded at 5000_H plus the offset as calculated above. All data read will be stored relative to the initial calculated address.

If the user wishes to load several tapes into memory at once for future programming, the user should load the tape with the lowest origin address first. All future tapes loaded must have an origin address larger than any previous tape loaded. Up to 4K bytes of data (4 quadrants) may be loaded into memory at once. If the user needs to modify data read from a tape, he should first complete the load operation for all the tapes he wishes to load. Exiting the PPG-8/16 software and re-entering to load more tapes causes a new beginning address to be stored.

4-46. READING A PROM

4-47. To read the contents of a PROM into memory, the user should place the PROM to be read in the ZIP-DIP socket, answer

the action request with a "R", and select the quadrant for the data to be stored in (note that 2716 PROM's fill the quadrant). The entire contents of the PROM will be read and stored at the beginning of the quadrant selected. When the read function is complete, the user will be prompted with another action request.

4-48. PROGRAMMING A PROM

4-49. The PPG-8/16 software for the SDB-50/70 programs data into PROM from 1K quadrants. The user should place an erased PROM to program in the ZIP-DIP socket, answer the action request with a "P", and select the quadrant containing the data you wish to program (note that 2716 PROMs require data from the selected quadrant plus the next highest quadrant). The entire PROM will be programmed.

4-50. VERIFYING A PROM.

4-51. PROMs are verified against data stored in memory quadrants. The user should place the PROM to verify in the ZIP-DIP socket, answer the action request with a "V", and select the quadrant containing the data you wish to verify against (note that 2716 PROMs compare data against the quadrant selected plus the next highest quadrant). All errors located will be printed on the console device and another prompt for action issued upon completion.

APPENDIX A

FACTORY REPAIR AND LIMITED WARRANTY

A-1. FACTORY REPAIR

A-2. In the event that difficulty is encountered with this unit, it may be returned directly to MOSTEK for repair. This service will be provided free of charge if the unit is returned within 90 days of purchase. However, units which have been modified or abused in any way either will not be accepted for service or will be repaired at the owner's expense.

A-3. When returning the circuit board, place it inside a conductive plastic bag if available in order to protect the MOS device from electrostatic discharge during shipment. The circuit board must NEVER be placed in contact with styrofoam materials. ENCLOSE a letter containing the following information with the returned circuit board:

Name, address, and phone number of purchaser
Date and place of purchase
Brief description of the difficulty

Mail a copy of this letter SEPARATELY to:

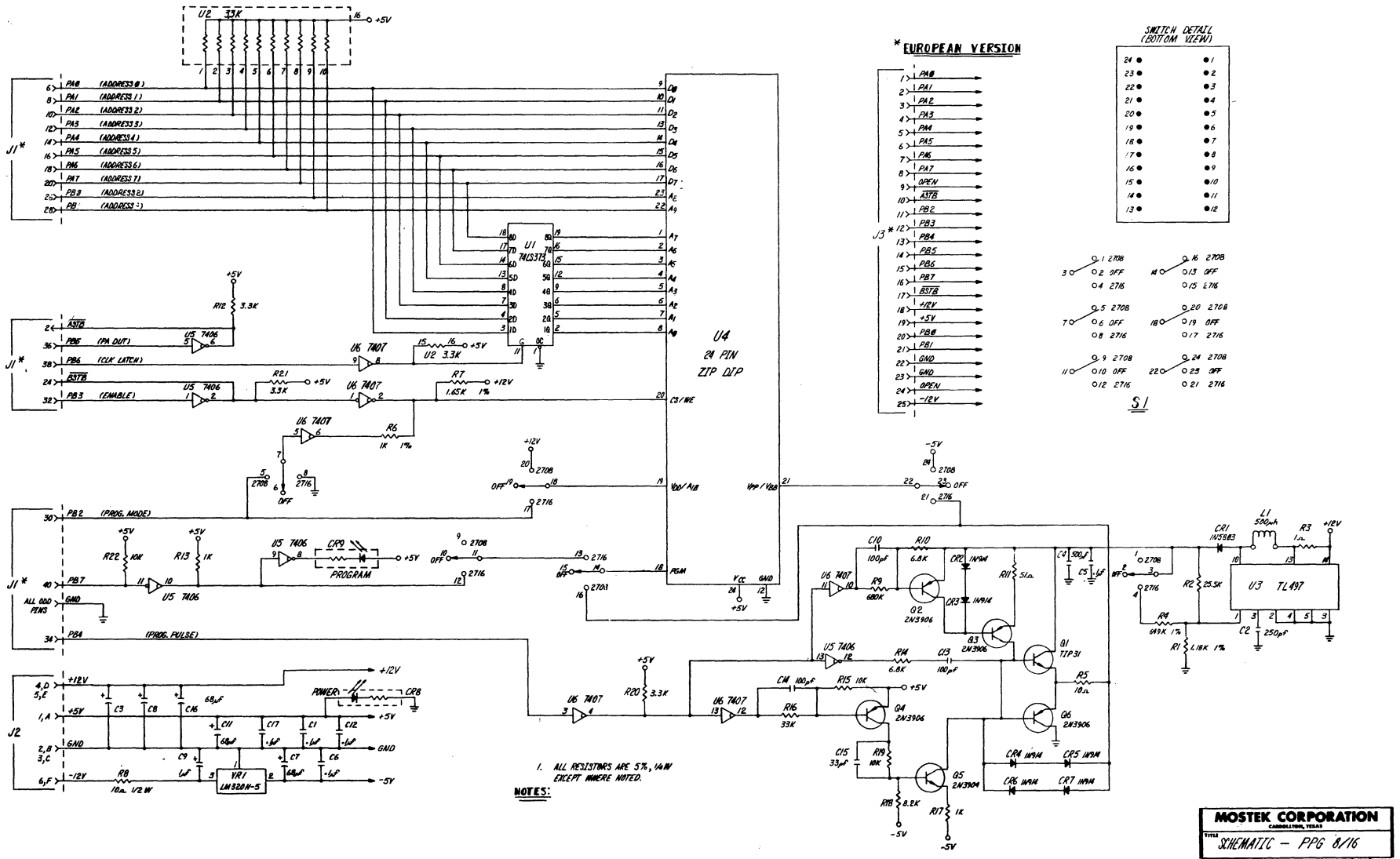
MOSTEK Corporation
Microcomputer Service Manager
1215 West Crosby Road
Carrollton, Texas 75006

Securely package and mail the circuit board, prepaid and insured to:

MOSTEK Corporation
Microcomputer Service Department
1215 West Crosby Road
Carrollton, Texas 75006

A-4. LIMITED WARRANTY

A-5. MOSTEK warrants this product against deffectiv materials and workmanship for a period of 90 days. This warranty does not apply to any product that has been subjected to misuse, accident, improper installation, improper application, or improper operation, nor does it apply to any product that has been repaired or altered by other than MOSTEK personnel. There are no warranties which extend beyond those herein specifically given.

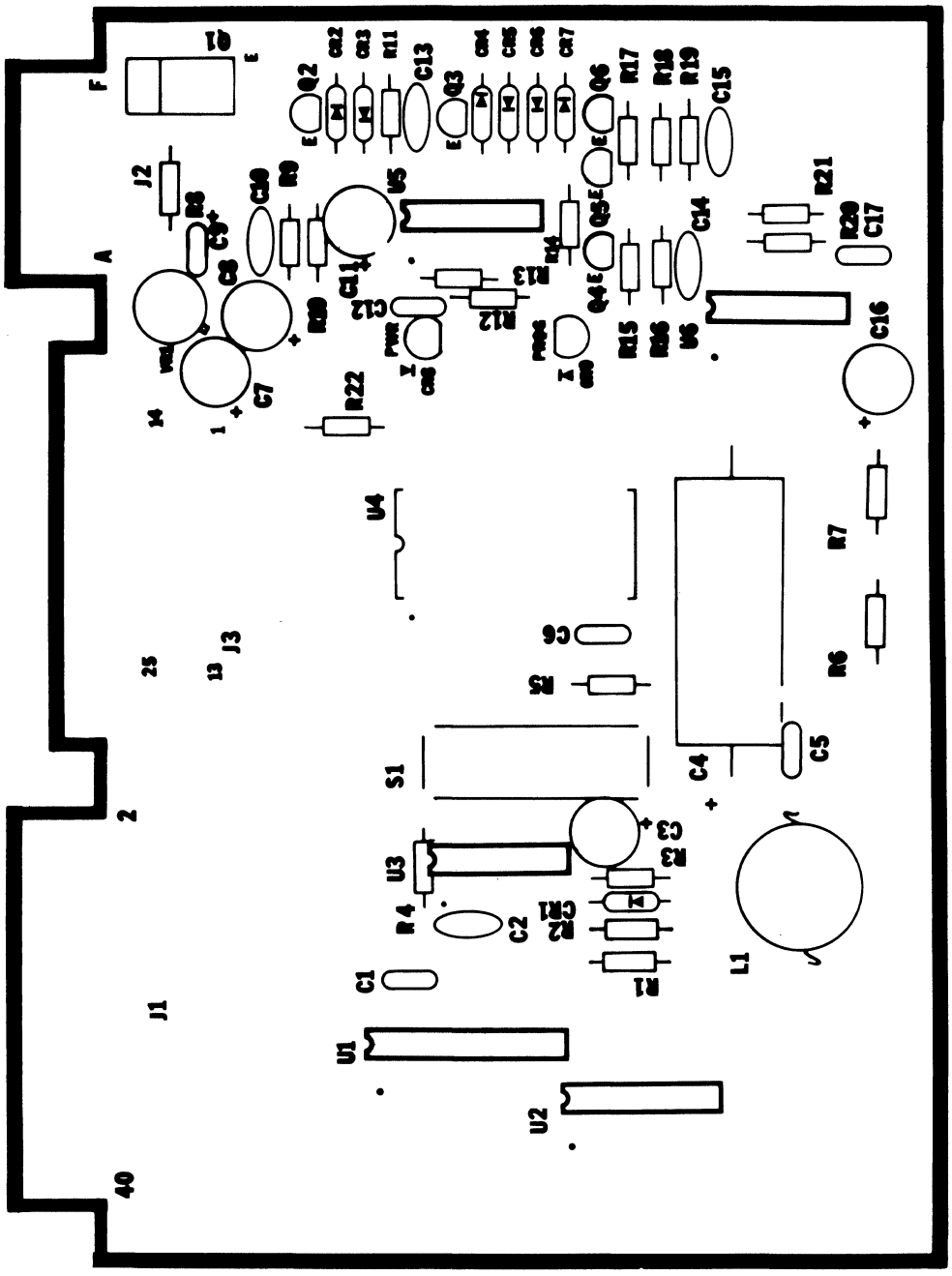


APPENDIX B

MOSTEK CORPORATION	CARROLLTON, TEXAS
TITLE	SCHEMATIC – PPG 8/16
DWG NO.	450-00351-00
REV	A

APPENDIX C

PPG-8/16 PARTS PLACEMENT DRAWING



APPENDIX D

PPG-8/16 PARTS LISTS

PART NO	QTY.	DESCRIPTION	REFERENCE DESIGNATOR	USED ON
4610100	1	FAB 450-00349-00 REV B		79081
0000000		ASSY 450-00350-00 REV B		79081
0000000		SCH 450-00351-00 REV B		79081
4150111	5	CAPACITOR .1UF	C1,5,6,12,17,	79081
4150090	3	CAPACITOR 100PF	C10,13,14	79081
4150086	1	CAPACITOR 33PF	C15	79081
4150150	1	CAPACITOR 250PF	C2	79081
4150114	5	CAPACITOR 68UF	C3,7,8,11,16	79081
4150119	1	CAPACITOR 500UF	C4	79081
4150078	1	CAPACITOR 1.0UF	C9	79081
4480076	1	DIODE 1N5803	CR1	79081
4480026	6	DIODE 1N914	CR2-7	79081
4240005	2	LED	CR8,9	79081
4210065	1	CONNECTOR 25PIN D	J3	79081
4180002	1	INDUCTOR 500UH	L1	79081
4480004	1	XISTOR TIP31	Q1	79081
4480011	4	XISTOR 2N3906	Q2-4,6	79081
4480010	1	XISTOR 2N3904	Q5	79081
4470222	1	RESISTOR 1.18K 1%	R1	79081
4470093	2	RESISTOR 6.8K	R10,14	79081
4470042	1	RESISTOR 51 OHM	R11	79081
4470085	1	RESISTOR 3.3K	R12,20,21	79081
4470073	2	RESISTOR 1K	R13,17	79081
4470097	3	RESISTOR 10K	R15,19,22	79081
4470109	1	RESISTOR 33K	R16	79081
4470095	1	RESISTOR 8.2K	R18	79081
4470225	1	RESISTOR 25.5K 1%	R2	79081
4470001	1	RESISTOR 1 OHM	R3	79081
4470224	1	RESISTOR 649K 1%	R4	79081
4470025	1	RESISTOR 10 OHM	R5	79081
4470221	1	RESISTOR 1K 1%	R6	79081
4470223	1	RESISTOR 1.65K 1%	R7	79081
4470177	1	RESISTOR 10 OHM 1/2W	R8	79081
4470141	1	RESISTOR 680K	R9	79081
4640035	1	SWITCH 6P3T	S1	79081
4313544	1	IC, 74LS373	U1	79081
4470163	1	DIP 3.3K 16 PIN	U2	79081
4313277	1	IC, TL497CN	U3	79081
4313008	1	IC, 7406	U5	79081
4313009	1	IC, 7407	U6	79081
4313223	1	IC, LM320H-5	VR1	79081
4620016	1	SOCKET 14 PIN	X3	79081
4620007	1	SOCKET ZIP DIP 24PIN	X4	79081
4620011	1	RECEPT ZIP DIP 24PIN	X4	79081

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PRINTED IN USA December 1978
Publication No. MK79603