PRODUCTION EPROM PROGRAMMER

Type: P8000

Instruction manual

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Zero insertion force socket. Correct EPROM insertion.

P8000 Manual

1.0 General Description

The P8000 has been designed as a reliable, simple to use EPROM Programmer capable of programming all the currently available 24 & 28 pin NMOS EPROMs. Personality cards and hardware changes are not required. Eight zero insertion force sockets are provided for programming along with a single master socket.

A 2k x 8 RAM buffer is provided for RS232 serial data transfers for programming from sources other than the master socket.

The 8 digit 7 segment LED display shows the selected device type and mode and also gives details of any operator errors, EPROM faults and system faults.

The discrete ZIF LED indicators serve to show when the devices are powered up or down and PASS/FAIL after any function mode.

The six keys control machine operation for device type and mode selection and start/stop.

The P8000 is protected against common programming faults such as reverse device insertion, shorted pins, and misplaced device insertion.

1.1 Supply voltage

Machines supplied in the UK are ready wired to operate from 230V AC +/-10% mains supply. A fused plug is supplied wired to the power cord, (3 Amp) in accordance with the following colour code.

LIVE - Brown

NEUTRAL - Blue

EARTH - Green and Yellow

Note:- If the case is to be opened for any reason, disconnect the P8000 from the mains power supply before doing so.

AC power may be applied to the P8000, the display will show P8000 and a short time later, after completion of a self test it will show ready.

1.2 Operating Procedure

To ensure trouble free operation, please observe the following points.

a. Operate the machine on a vibration free surface.

b. Do not locate the machine near any source of heat or in direct sunlight.

c. Ensure no metal parts ~~cald~~ can fall into the machine.

d. Disconnect from the mains supply when not in use.

e. Avoid switching the machine on or off with EPROM devices in the ZIF sockets.

f. Check the device type setting when inserting EPROM into the ZIF sockets.

g. Periodically clean the ZIF sockets with a stiff bristle brush to ensure good contact.

h. Never force an EPROM into or out of ZIF sockets - they are zero insertion force devices.

2.0 Discrete LED Indicators

Each copy ZIF socket has associated with it a corresponding ZIF LED. These are used to indicate a mode PASS/FAIL and power up/power down as described in the table below:

ZIF LED	Status
On	Socket powered down, mode PASS
Off	Socket powered up
Flashing	Socket powered down, mode FAIL

When any key is depressed after a mode cycle, all ZIF PASS/FAIL information is lost, the ZIFs now only indicating ZIF power on/off.

2.1 The 7 Segment Display

This is divided into 2 sections: A 5 digit device TYPE display and a 3 digit MODE display. Apart from its use for setting up the MODE and EPROM type, it also displays messages as described below.

Message	Meaning
READY	machine has just been powered up, has completed a self test successfully. mode and device have defaulted to 2716/blank check
BUSY	machine is actioning a mode cycle. also indicates when the ZIF sockets are powered up. any other message on display, ZIF sockets are powered down.
DONE	indicates completion of selected mode.
FAIL	means mode could not be completed due to a copy EPROM failure to PASS a pre-check.
FAULT	indicates a fault has occured during a mode cycle. The nature of the fault is shown by a fault code in the mode display.

3.0 EPROM Selection

The P8000 must be set up to correspond to the particular type of EPROM to be programmed. The device type is selected using the two arrow keys and the TYPE key.

By depressing the TYPE key the machine will display the current EPROM and MODE selected. (The P8000 defaults to 2716 on power on). The TYPE display decimal points flash to indicate that the machine is ready for selection. Depressing either of the arrow keys will step the TYPE display through the EPROM list, either up or down. Once the required device type appears in the window, no further action is required for selection. The table below gives the EPROM types corresponding to the TYPE display.

TYPE Display		EPROM
2704	512 x 8	3 rail EPROM
2708	1k x 8	3 rail EPROM
27163	2k x 8	3 rail EPROM TEXAS,MOTOROLA TMS2716
2508	1k x 8	1 rail EPROM TEXAS
2758A	1k x 8	1 rail EPROM Pin 19 Lo INTEL
2758B	1k x 8	1 rail EPROM Pin 19 Hi INTEL
2716	2k x 8	1 rail EPROM (Also TEXAS 2516) Position at power o...
48016	2k x 8	Electrically eraseable Hitachi EEPROM
2532	4k x 8	1 rail EPROM TEXAS
2732	4k x 8	1 rail EPROM INTEL
2732A	4k x 8	1 rail HMOS EPROM INTEL (program at 21v, not 25v)
87320	4k x 8	Pin 21 Lo MOTOROLA EPROM 68732-0
87321	4k x 8	Pin 21 Hi MOTOROLA EPROM 68732-1
68764	8k x 8	24 pin MOTOROLA EPROM
68766	8k x 8	24 pin MOTOROLA EPROM
2564	8k x 8	TEXAS EPROM
27640	8k x 8	HMOS INTEL EPROM (Mitsubishi,Fujitsu,Hitachi)
27641	8k x 8	MOSTEK MK2764
2528	16k x 8	TEXAS
27128	16k x 8	INTEL

Only principle sources of devices are mentioned in the above table

3.1 Mode Selection

By depressing the MODE key, the P8000 will display the current mode and EPROM type. (The machine defaults to Blank Check mode when AC power is first applied). The MODE display decimal points flash to indicate the machine is ready for selection. Depressing either of the arrow keys will step the mode display up or down through the mode list.

Once the required mode appears in the display, no further action is required for MODE selection.

The table below shows the possible function modes and the corresponding MODE display.

Function	MODE Display	Comments
blank check	bCH	checks all devices are blank
illegal bit check	IbC	checks for programmability
checksum	CHS	calculates master checksum and compares with copy sockets
test	tSt	executes self-test
Serial in INTEL	Si1	programs devices with data from RS232 port INTEL format
Serial in MOTOROLA	Si2	programs devices with data from RS232 port MOTOROLA-S format
Erase (48016)	ErS	erases the 48016 EEPROM
program	Prg	programs devices following the illegal bit check-program-verify sequence
compare	CPr	compares master and copy socket data

3.2 Mode Descriptions

Once the required device type and mode have been set up, the GO key can be pressed to start the cycle. Prior to actioning the required mode, e.g. blankcheck, the P8000 will power up all the ZIF sockets and perform a socket test to check for misplaced or reverse inserted EPROMs.

During any mode function the machine will continually monitor the power supply and check for correct address and data set-up.

Any faults encountered will make the P8000 stop the cycle,power down the ZIF sockets and display a FAULT message - see FAULT codes. The ZIF LEDs are off when the sockets are powered up, on or flashing when powered down. Each mode is described in detail below:

a. BLANK CHECK

reads through all addresses, one device at a time, checking if the data at each address is hex FF. At the end of the cycle, non blank EPROMs are indicated by a flashing ZIF LED.

b. ILLEGAL BIT CHECK (programmability)

reads through all the devices, comparing with the master socket EPROM, checking that identical copies of the master can be made. If this is not possible, non programmable EPROMs will be indicated by a flashing ZIF LED.

c. CHECKSUM

Calculates the checksum of the master EPROM then compares each copy socket with the master. The 2 byte checksum is shown in the TYPE display.

d. COMPARE (Verify)

Compares the master EPROM data with each copy socket. Any EPROM not containing identical master data is indicated by flashing ZIF LED.

e. TEST

The machine tests the 2k RAM buffer, power supply, monitor program, ZIF socket buses and drivers.

f. SERIAL IN (INTEL)

Programs the copy EPROMs with data received from the RS232 port. Data is in INTEL hexadecimal format (also MOSTEK compatible).

g. SERIAL IN (MOTOROLA)

Programs devices with data received in MOTOTOLA'S' format from the RS232 serial port.

h. ERASE

Erases the Hitachi 48016 EEPROM. The device type selected must be 48016- any other selection will cause a FAULT message.

i. PROGRAM

The machine checks each device for programmability, programs the device, skipping unused bytes to reduce programming time, then compares each device with the master EPROM.

3.3 Fault Codes

During the course of operation the P8000 will generate FAULT codes in the event of a system, EPROM or operator error. Fault codes are detailed in the table below.

Fault Code	Fault
1	socket test-misplaced or reverse EPROM, data/address short
2	programming voltage fault
3	PSU fault - short or open circuit supply
4	programming driver short or open circuit
5	data bus fault during programming
6	address low fault
7	address high fault
8	attempted erase on EPROM - select 48016
9	attempted serial input for 68732, 68764 EPROMs
A	undefined mode or device selection
B	control RAM test
C	RAM buffer test
D	operating program test
E	control port test

Faults 1 - 7 occur in the case of faulty EPROMs. Remove all the devices and repeat the operation, one device at a time, until the faulty device(s) is located.

4.0 P8000 Serial Interface

The P8000 is designed to receive data via an RS232C interface. The formats recognised are MOTOROLA S and INTEL ASCII Hex.

The speed of data transfer is 1200 baud with RS232C handshaking compatible with both the DTR/DSR and RTS/CTS modes of operation.

4.1 Serial Format Si1 INTEL ASCII HEX (INTELLEC)

The P8000 recognises two record types:

Type 00 data record

Type 01 end of file record

Format of each record

Note: All valid bytes must be in ASCII

Byte 1	Colon (:) delimiter
Byte 2-3	Number of binary bytes of data in the record. The maximum is 32 binary bytes. If the number of bytes is zero, then end of file is assumed.
Byte 4-5	Most significant byte of start address of data.
Byte 6-7	Least significant byte of start address of data.
Byte 8-9	ASCII 00 signifies data record ASCII 01 signifies end-of-file-record
Byte 10-	Data bytes - The number of binary bytes is defined by the record length.
Last two bytes	The two's complement (negative) of all the binary bytes in this record.

Note: This includes the byte count, start address and record type, but excludes the delimiter and any carriage returns or line feeds.

4.2 Serial Format Si2 MOTOROLA 'S' Format

Also known as the MOTOROLA EXORCISER format.

The P8000 recognises two record types:

Type 1 - Data record

Type 9 - End-of-file-record

Format of each record

Note: All valid bytes must be in ASCII

Byte 1	ASCII 'S' delimiter
Byte 2	ASCII '1' signifies a data record
	ASCII '9' signifies end-of-file-record
Byte 3-4	Byte count. The number of binary bytes in the data record plus three (1 for checksum and 2 for address)
Byte 5-6	Most significant byte of start address of data
Byte 7-8	Least significant byte of start address of data
Byte 9 -	Data bytes
Last two bytes	One's complement (EXCLUSIVE OR WITH FF) of preceeding bytes in data record (including byte count, address and data bytes) in hexadecimal notation.

4.3 Operating procedure for programming using data from the serial port

a. Select device type as usual

b. Select mode Si1 or Si2 for INTEL or MOTOROLA formats respectively

c. Insert devices into the sockets

d. Key GO

The P8000 will now perform a blank check on the copy sockets. If any device is not blank, the P8000 will display FAIL BCH. The devices in error will be indicated by the relevant ZIF LED flashing.

If the blankcheck is successful, the P8000 will set the DTR/CTS line high to indicate that the programmer is ready to receive data.

The amount of data loaded into the RAM buffer now depends upon the device type selected. If the device is 2k x 8 or less, data will be accepted until an 'end-of-file record' is received. The machine will then set DTR/CTS low and program the devices.

If the device is larger than 2k x 8, the programmer will receive one record, and then program and verify that record.

This will continue until an end-of-file record is received causing the programming mode to be terminated.

In all cases a verify is performed, and the programming mode will be aborted once an error is detected.

NOTE: It is impossible to directly program the MOTOROLA devices 68732-0, 68732-1 and 68764 from a serial input. However, the following procedure does enable these devices to be serially programmed.

a. With the device type set to 2564, program a 2564 from the serial input.
b. Remove the 2564 and set the device type to whichever of the MOTOROLA devices is to be programmed.
c. Place the MOTOROLA devices in the copy sockets.
d. Place the 2564 in the master socket.
e. Perform a normal program.

CAUTION: This technique is possible because the MOTOROLA 68 series devices are READ COMPATIBLE with the 2564. The devices are in no way compatible as far as programming is concerned.

4.4 Error checking

As the P8000 receives serial data, a checksum is performed on each record. If this checksum is incorrect, the P8000 will abort the serial transfer and display FAIL Si1/Si2.

Every time a block of data is programmed from the RAM buffer, a verify is performed. If this fails the P8000 will not attempt to load further data, and will display FAIL CPR.

If non HEX characters are sent in the data stream, the P8000 will simply ignore them and wait for the next valid HEX character.

4.5 Addressing information

The 16 bit address contained in each data record contains an absolute address of this data within a 64k addressing field in which the device will finally reside.

As the number of address bits on a device are determined by the size of the device, the other address bits must be ignored.

The P8000 therefore masks off the address bits which are not required for the current device type. It is therefore essential that DATA INTENDED FOR MULTIPLE DEVICE SETS MUST NOT BE SENT IN A SINGLE TRANSMISSION. If this was done, the data would all be programmed into the same device, resulting in total corruption of data.

4.6 RS232C Handshaking

The RS232C specification,which is most widely used serial computer interface was devised for modem control. It is therefore not ideally suited to the control of programmers, and there is no absolute standard for this particular application.

The P8000 therefore offers a choice of two handshake modes. These are DSR/DTR and RTS/CTS.

a. DSR (DATA SET READY)/DTR (DATA TERMINAL READY)

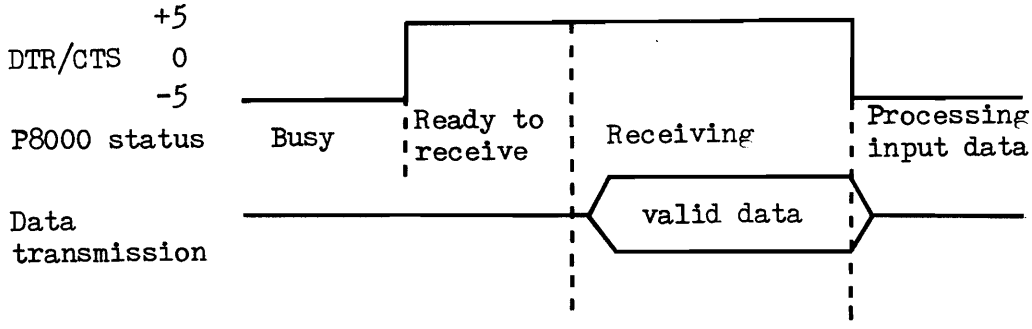
The DSR line is a signal from the outputting machine that it is ready to send data. This line need not be connected to the P8000 as the P8000 continuously scans the RS232 port looking for data.

The DTR line is a signal from the P8000 to the outputting machine indicating that it is ready to receive data.

b. RTS (REQUEST TO SEND)/CTS(CLEAR TO SEND)

The RTS line is an output from the transmitting machine that it requires to send data. This line is not connected to the P8000.

The CTS line is output by the P8000 indicating that it is ready to receive data.

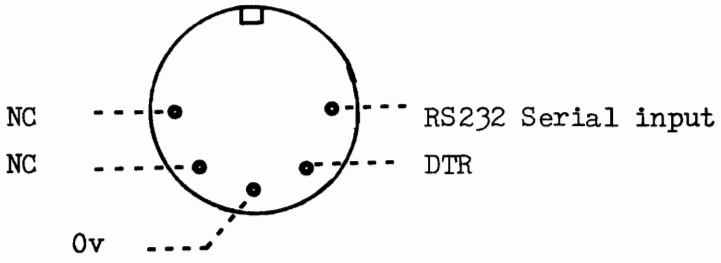


When the RAM buffer is full, the DTR/CTS line goes low during the stop bit of the last valid data byte. This prevents the sending machine from sending more data.

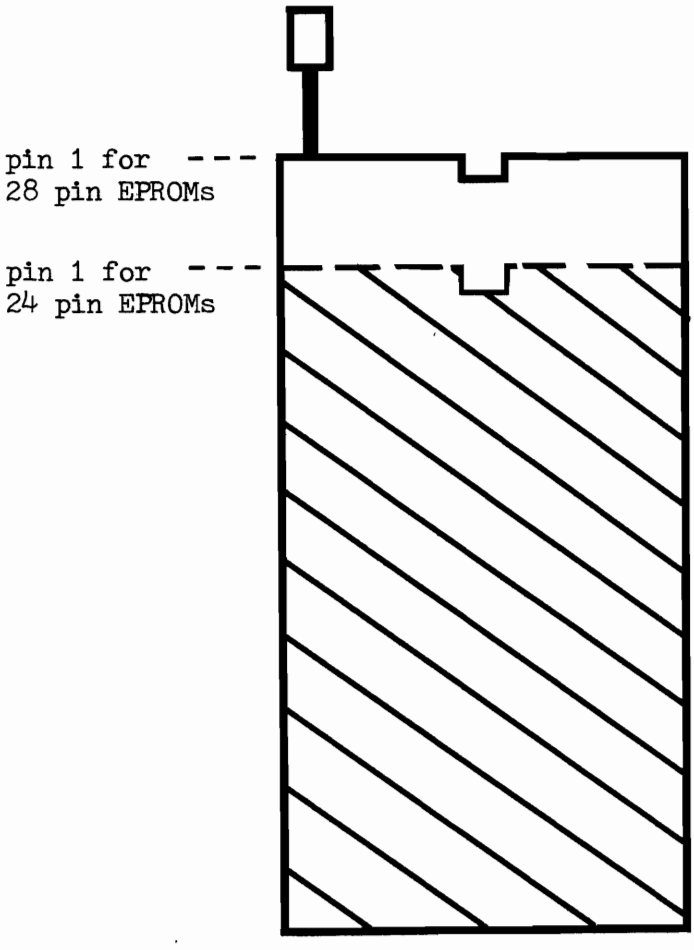
RS232 Connector (as viewed from rear of unit)

NC = Not connected

DTR = Data Terminal Ready



ZERO INSERTION FORCE SOCKETS (ZIFS)



It is important that all EPROMs should be placed in the ZIF sockets so that they occupy the pins furthest from the ZIF lever. Hence with 24 pin EPROMs, the unused pins are those nearest the ZIF lever.