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SERVICE MANUAL

MODEL 64515C

PROM PROGRAMMER MODULE

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LOGIC SYSTEMS DIVISION
COLORADO SPRINGS, COLORADO, U.S.A.

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SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

GROUND THE INSTRUMENT.

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE.

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT.

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS.

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

SS-1-1/76

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SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. This manual contains technical information concerning the application, troubleshooting, replacing failed parts, and the theory-of-operation for the Model 64515C PROM Programmer Module as used in the 64000 Logic Development System. The module is shown in figure 1-1.

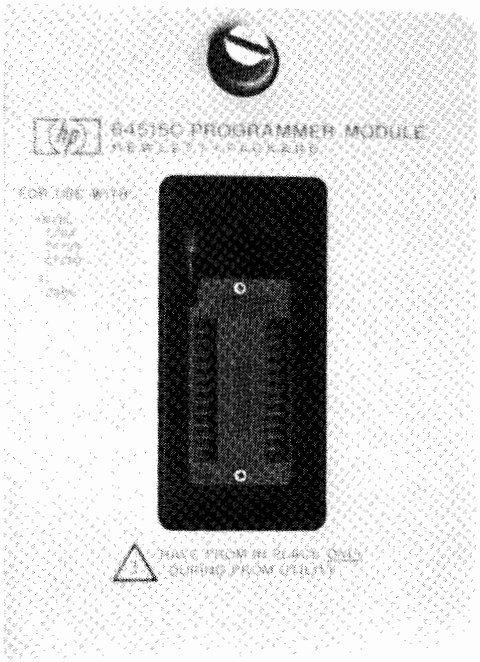


Figure 1-1. Model 64515C PROM Programmer Module

1-3. SAFETY CONSIDERATIONS.

1-4. There are no electrical shock hazards asssociated with the Model 64515C since there are no high voltages present. There are, however, high voltages associated with the 64100A Mainframe and appropriate warnings are given in the Mainframe Tab where these hazards exist.

1-5. INSTRUMENTS COVERED BY THIS MANUAL.

1-6. This manual covers the model 64515C PROM Programmer Module with the 64515-66504 or 64515-66505 PC board installed. A module manufactured after the print date of this manual may contain a PC board with a later revision letter.

1-7. The manual for a modified module will be accompanied by a "Manual Change" supplement. This supplement will be delivered with each modified module and will contain change information that explains how to adapt this manual to the newer modified module.

1-8. In addition to change information, the supplement will contain information for correcting errors in this manual. To keep this manual as current as possible, Hewlett-Packard recomends that you periodically request the latest manual changes supplement. The supplement for this manual is identified with the model number and manual print date both of which appear on the title page. Complimentary copies of the supplement are available from Hewlett-Packard Sales/Service Office.

1-9. For information concerning the applicability of this manual or the Manual Changes supplement, contact your nearest Hewlett-Packard Sales/Service Office.

1-10. APPLICATION.

1-11. The Model 64515C will program and/or readout the integral EPROMs listed in table 1.

Table 1-1. Applicable EPROM Devices

EPROM	Mfg.	Description
2564	TI	The TMS 2564 is a 65,536 bit, ultraviolet light erasable, electronically programable read only memory.
2764/2764A	Intel	The Intel 2764/2764A is a 65,536 bit ultraviolet light erasable and electronically programable read-only memory.
27128/27128A	Intel	The Intel 27128/27128A is a 5v only, 131,072 bit ultraviolet erasable and electronically programmable read-only memory.
27256	Intel	The Intel 27256 is a 262,144 bit ultraviolet erasable and electronically programmable read-only memory.

SECTION II

INSTALLATION AND REMOVAL

2-1. A 50-pin ribbon cable (HP P/N 8120-3346) connects the 64501A Programmer Controller PCB to the 64515C Programmer Module. The cable end with the single connector is connected to the Controller PCB and the end with the double connector is connected to the Programmer Module.

2-2. The cable should be routed across the top of the cardcage and down behind the front panel such that the two connectors are visible in the opening for the programmer module. Connect the cable to the PCB in the Programmer Module using the connector on the extreme end of the cable.

NOTE

The PCB and cable connectors are keyed and fit only one way.

************************* CAUTION **************************
*****
*****
***** To prevent possible damage to the PROM Programmer *****
***** circuits, turn Mainframe power OFF before install- *****
***** ing or removing the Programmer Module. *****
*****
****

SECTION III

OPERATION

The operation of the 64515C is a function of the system software. Complete operation from the keyboard of the system is beyond the scope of the Service Manual. Please refer to the Operator's Manual for the procedure.

```
****************** CAUTION ********************
*                                               *
*  The proper operation of the positive PROM    *
*  programmer requires that a PROM be inserted  *
*  ONLY AFTER the PROM programmer software      *
*  module is called and that the PROM be RE-    *
*  MOVED before the PROM programmer software    *
*  module is exited. Damage to the PROM may     *
*  result if this procedure is not followed!    *
*                                               *
************************************************
```

NOTE

The PROM programmer software module is called by pressing the "prom_prog" softkey then the Return key. To exit the PROM programmer software module, press the "end" softkey, then the Return key.

SECTION IV

PERFORMANCE VERIFICATION

4-1. INTRODUCTION.

4-2. This section normally contains the information for running the Performance Verification. However, due to the relative low cost of the PROM Programmer PC board, in this module, it is most likely more economical to discard it if it fails than to have the Hewlett-Packard Sales/Service repair it. The basic troubleshooting approach is to first determine if the Prom Controller PC board is at fault, or if the problem is in the module. This is done by using the 64502A PROM Programmer Module in conjunction with the 64501A controller board and running the PROM Performance Verification Tests.

PV TEST

4-3. PROCEDURE.

4-4. If a PROM programming problem is apparent (i.e., you can't sucessfully program and verify a particular PROM chip), perform the following troubleshooting procedure:

a. Turn OFF the mainframe power.

b. Install a 64502A PROM Programmer Module in place of the currently installed 64515C model.

```
******************** CAUTION ********************
*                                                *
*                                                *
*  The Model 64502A PROM Module  is the ONLY     *
*  module that  is compatible with the  PROM     *
*  PV tests. All other models are subject to     *
*  damage due to component  overstressing if     *
*  the PV  test is attempted  with any other     *
*  module installed.                             *
*                                                *
**************************************************
```

c. Turn ON the mainframe power.

d. Refer to Section IV of the 64500S Positive PROM Programmer Tab and run the PV tests described in that Section.

e. If there are no error messages while running the PV test, it is reasonable to assume that this PROM Programmer Module has failed. In this case, refer to the Illustrated Parts Breakdown (figure 4-1) and replace the PC board assembly (HP P/N 64515-66504 or 64515-66505).

NOTE

Section VIII describes the functions performed by the 64515C PC board.

d. Verify that the problem has been fixed by attempting to program and verify from a PROM chip like the type that was originally causing problems.

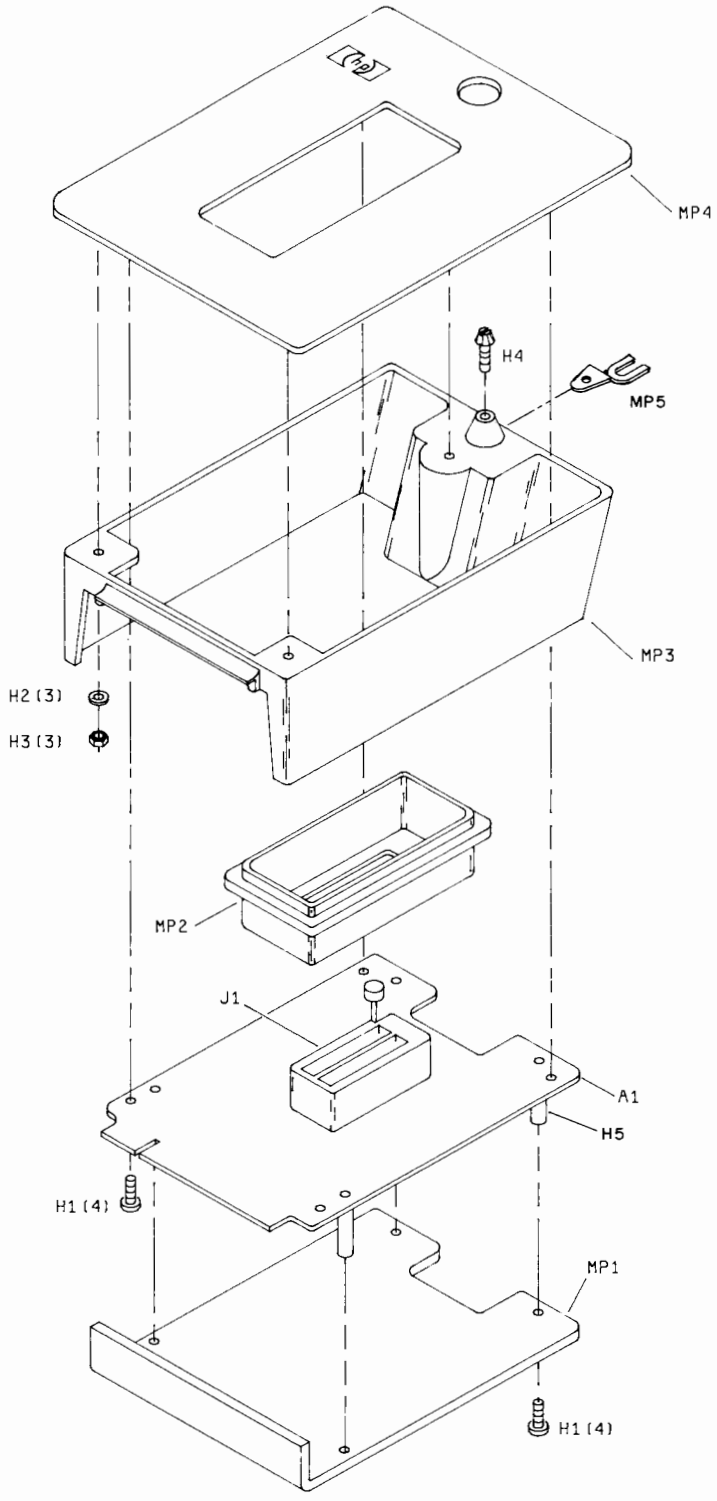


Figure 4-1. Model 64515C Illustrated Parts Breakdown

SECTION V

ADJUSTMENTS

5-1. The 64515C PROM Programmer Module has no adjustments.

SECTION VI

REPLACEABLE PARTS

6-1. INTRODUCTION.

6-2. This section contains information for ordering parts. Table 6-1 lists abbreviations used in the parts list and throughout the manual. Table 6-2 lists all replaceable parts in reference designator order. Table 6-3 contains the names and addresses that correspond to the manufacturers' five-digit code numbers.

6-3. ABBREVIATIONS.

6-4. Table 6-1 lists abbreviations used in the parts list, the schematics and throughout the manual. In some cases, two forms of the abbreviation are used: one all in capital letters, and one partial or no capitals. This occurs because the abbreviations in the parts list are always capitals. However, in the schematics and other parts of the manual, other abbreviation forms are used with both lowercase and uppercase letters.

6-5. REPLACEABLE PARTS LIST.

6-6. Table 6-2 is the list of replaceable parts and is organized as follows:

a. Chassis-mounted parts in alphanumerical order by reference designation.

b. Electrical assemblies and their components in alphanumerical order by reference designation.

c. Miscellaneous parts.

The information given for each part consists of the following:

a. The Hewlett-Packard part number and the check digit.

b. The total quantity (Qty) in the instrument.

c. The description of the part.

d. A five-digit code that indicates the manufacturer.

e. The manufacturer's part number.

The total quantity for each part is given only once - at the first appearance of the part number in the list.

6-7. ORDERING INFORMATION.

6-8. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number and check digit, indicate the quantity required, and address the order to the nearest Hewlett-Packard Sales/Service office.

6-9. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument repair number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard Sales/Service office.

6-10. DIRECT MAIL ORDER SYSTEM.

6-11. Within the U.S.A., Hewlett-Packard can supply parts through a direct mail order system. Advantages of using the system are as follows:

a. Direct ordering and shipment from the HP Parts Center in Mountain View, California.

b. No maximum or minimum on any mail order (there is a minimum order amount, for parts ordered through a local HP office when the orders require billing and invoicing).

c. Prepaid transportation (there is a small handling charge for each order).

d. No invoices - to provide these advantages, a check or money order must accompany each order.

6-12. Mail-order forms and specific ordering information are available through your local HP office. Addresses and phone numbers are located at the back of this manual.

Table 6-1. Reference Designators and Abbreviations

REFERENCE DESIGNATORS

A	= assembly	**F**	= fuse	**MP**	= mechanical part	**U**	= integrated circuit
B	= motor	**FL**	= filter	**P**	= plug	**V**	= vacuum, tube, neon bulb, photocell, etc
BT	= battery	**IC**	= integrated circuit	**Q**	= transistor		
C	= capacitor	**J**	= jack	**R**	= resistor	**VR**	= voltage regulator
CP	= coupler	**K**	= relay	**RT**	= thermistor	**W**	= cable
CR	= diode	**L**	= inductor	**S**	= switch	**X**	= socket
DL	= delay line	**LS**	= loud speaker	**T**	= transformer	**Y**	= crystal
DS	= device signaling (lamp)	**M**	= meter	**TB**	= terminal board	**Z**	= tuned cavity network
E	= misc electronic part	**MK**	= microphone	**TP**	= test point		

ABBREVIATIONS

A	= amperes	**H**	= henries	**N/O**	= normally open	**RMO**	= rack mount only
AFC	= automatic frequency control	**HDW**	= hardware	**NOM**	= nominal	**RMS**	= root-mean square
AMPL	= amplifier	**HEX**	= hexagonal	**NPO**	= negative positive zero (zero temperature coefficient)	**RWV**	= reverse working voltage
		HG	= mercury				
BFO	= beat frequency oscillator	**HR**	= hour(s)				
BE CU	= beryllium copper	**HZ**	= hertz	**NPN**	= negative-positive-negative	**S-B**	= slow-blow
BH	= binder head					**SCR**	= screw
BP	= bandpass			**NRFR**	= not recommended for field replacement	**SE**	= selenium
BRS	= brass	**IF**	= intermediate freq			**SECT**	= section(s)
BWO	= backward wave oscillator	**IMPG**	= impregnated	**NSR**	= not separately replaceable	**SEMICON**	= semiconductor
		INCD	= incandescent			**SI**	= silicon
CCW	= counter-clockwise	**INCL**	= include(s)			**SIL**	= silver
CER	= ceramic	**INS**	= insulation(ed)	**OBD**	= order by description	**SL**	= slide
CMO	= cabinet mount only	**INT**	= internal	**OH**	= oval head	**SPG**	= spring
COEF	= coeficient			**OX**	= oxide	**SPL**	= special
COM	= common	**K**	= kilo=1000			**SST**	= stainless steel
COMP	= composition					**SR**	= split ring
COMPL	= complete	**LH**	= left hand	**P**	= peak	**STL**	= steel
CONN	= connector	**LIN**	= linear taper	**PC**	= printed circuit		
CP	= cadmium plate	**LK WASH**	= lock washer	**PF**	= picofarads= 10^{-12} farads	**TA**	= tantalum
CRT	= cathode-ray tube	**LOG**	= logarithmic taper			**TD**	= time delay
CW	= clockwise	**LPF**	= low pass filter	**PH BRZ**	= phosphor bronze	**TGL**	= toggle
				PHL	= phillips	**THD**	= thread
DEPC	= deposited carbon	**M**	= milli=10^{-3}	**PIV**	= peak inverse voltage	**TI**	= titanium
DR	= drive	**MEG**	= meg=10^{6}	**PNP**	= positive-negative-positive	**TOL**	= tolerance
		MET FLM	= metal film			**TRIM**	= trimmer
ELECT	= electrolytic	**MET OX**	= metallic oxide	**P/O**	= part of	**TWT**	= traveling wave tube
ENCAP	= encapsulated	**MFR**	= manufacturer	**POLY**	= polystyrene		
EXT	= external	**MHZ**	= mega hertz	**PORC**	= porcelain	**U**	= micro=10^{-6}
		MINAT	= miniature	**POS**	= position(s)		
F	= farads	**MOM**	= momentary	**POT**	= potentiometer	**VAR**	= variable
FH	= flat head	**MOS**	= metal oxide substrate	**PP**	= peak-to-peak	**VDCW**	= dc working volts
FIL H	= fillister head	**MTG**	= mounting	**PT**	= point		
FXD	= fixed	**MY**	= "mylar"	**PWV**	= peak working voltage	**W/**	= with
						W	= watts
G	= giga (10^{9})	**N**	= nano (10^{-9})	**RECT**	= rectifier	**WIV**	= working inverse voltage
GE	= germanium	**N/C**	= normally closed	**RF**	= radio frequency		
GL	= glass	**NE**	= neon	**RH**	= round head or right hand	**WW**	= wirewound
GRD	= ground(ed)	**NI PL**	= nickel plate			**W/O**	= without

Table 6-2. Replaceable Parts

Ref. Des.	HP Part Number	C D	Qty	Description	Mfr. Code	Mfr. Part Number
A1	64515-66505	0	1	PC BOARD ASSEMBLY	28480	64515-66505
C1	0180-0374	5	1	CF TA 10UF 20V	28480	0180-0374
C2,4	0160-5321	5	2	CF CE .01UF 100V	28480	0160-5321
C3	0160-5315	0	1	CF CE 3300PF 100V	28480	0160-5315
H1	2360-0113	2	8	MS 6-32 .250LG	28480	2360-0113
H2	3050-0425	3	3	WFL .125 .312 .04	28480	3050-0425
H3	2260-0009	3	3	NUTH 4-40 .093	28480	2260-0009
H4	0570-0661	8	1	SCREW-THUMB	28480	0570-0661
H5	0380-0162	1	4	SPRC 6-32 .750	28480	0380-0162
J1	1200-0870	9	1	ZIF SCKT 28 PIN	28480	1200-0870
MP1	64500-04101	5	1	COVER-SAFETY	28480	64500-04101
MP2	64500-45205	6	1	BATHTUB 28	28480	64500-45205
MP3	5041-1576	0	1	PANEL-SUPPORT	28480	5041-1576
MP4	64515-00204	8	1	PANEL INTEL 27256	28480	64515-00204
MP5	64500-09101	5	1	GROUND CLIP	28480	00180-09104
R1	0757-0401	0	1	RF .12MF 100	28480	0757-0401
R2	0757-0412	3	1	RF .12MF 365	28480	0757-0412
R3	0757-0420	3	1	RF .12MF 750	28480	0757-0420
RP1	1810-0279	5	1	RES NET-4.7K x 9	01121	210A472
RP2	1810-0280	8	1	RES NET-10K x 9	01121	210A103
U1	1820-1416	5	1	IC INVERTER	18324	74LS14
U2	1820-2102	8	1	IC 8 BIT LATCH	18324	74LS373N

Table 6-3. Manufacturers' Codes

Mfr. No.	Manufacturer Name	Address	Zip Code
28480	Hewlett-Packard Corp.	Palo Alto	Ca 94304
01121	Allen-Bradley Co.	Milwaukee	Wi 53204
18324	Signetics Corp.	Sunnyvale	Ca 94086
04222	AVX Ceramics Corp.	Myrtle Beach	SC 29577
19613	Textool Products INC.	Irving	Tx 75060
24546	Corning Glass Works	Bradford	Pa 16701

SECTION VII

BACKDATING

7-1. There is no backdating information applicable to the 64515C PROM Programmer Module at the publication date of this manual.

SECTION VIII

SERVICE

8-1. INTRODUCTION.

8-2. The 64515C PROM Programmer Module provides the electrical interface between the 64501A PROM Programmer Controller and the PROM chip being programmed, verified or read. The PROM programmer circuits are contained on one PC board (HP P/N 64515-66504 or 64515-66505).

8-3. Figure 8-1, 8-2 and 8-3 are timing diagrams, figure 8-5 is a detailed schematic diagram and figure 8-4 is the component locator for the 64515C PC board.

8-4. THEORY.

8-5. GENERAL. The PROM Programmer circuits provide the following basic functions:

a. Multiplexes via latch U1 the low order address bits to provide 14 address bits (A0 out - A13 out) to the EPROM chip. The Intel 2764/2764A and TMS 2564 use only 13 of the address bits.

   Since the Intel 27128/27128A is a 128K EPROM, an extra address bit is provided (A13) and the Intel 27256 requires 2 extra address bits (A13 and A14) to address its 256K memory locations (8 X 32K).

b. Uses the programming voltage signal (VP3) from the Controller PCB in conjunction with control bits A13 in, A14 in, and LP2 (2564 uses A4 in also) to generate the control signals neccessary to program the EPROM chip.

c. Generates the "1D HEX" ID code (ID0-ID4).

d. Routes "programming" data (DW0-DW7) from the Controller PCB to the EPROM chip.

e. Provides current sinking thru RP2 and current sourcing thru RP1 in the quiescient state for DW0-DW7 and DR0-DR7 data lines.

f. Routes "read" data (DR0-DR7) from EPROM chip back to the Controller PCB during verification and normal reading. It should be noted that the verification of all data programmed into the EPROM takes place after the chip has been programmed and not during the programming sequence.

8-6. ADDRESSING, WRITING and READING CIRCUITS. Thirteen bits of addressing (A0 out - A12 out) are used for selecting any one of the 8192 internal memory locations in the 2564 and 2764/2764A memories. A fourteenth bit A13 out is provided to address the 16K bytes of memory in 27128/27128A EPROM and address bits A13 and A14 out are provided to address the 32K bytes of memory in the Intel 27256 EPROM.

8-7. The low-order bits (A0 out - A7 out) are latched from the Controller PCB using Latch U1 on the 64515C PCB ,then the high-order bits (A8 out - A12 out) are multiplexed with low addresses A0-A4 and bypasses Latch U1 so that thirteen address lines address the EPROM on only eight address lines. The 27128/27128A chip uses A10 in from the EPROM Programmer Controller board for A13 out due to the chip size (16K x 8). The 27256 chip uses also A13 out and A14 out (32K x 8).

8-8. PROM MODULE ID. The final function provided by the 64515C PCB is the generation of the 1D HEX ID code. This is done by grounding ID0, ID2, ID3 and ID4 while tying ID1 to +5 V. Since ID0 is the LSB, this produces 00010 which becomes 11101 since the ID signals are low true. This is equivalent to decimal 29 (1D HEX).

8-9. PROGRAMMING SEQUENCE. In brief, the programming process consists of: 1) activating the program mode, 2) applying the lower 8 bits of address and latching them into U2, 3) applying the upper 5 bits of address via the lower 5 bits A0-A4 (multiplexing 13 bits on 8 lines), 4) appling data and VPP, 5) applying the programming pulse. Each 8-bit word is programmed completely into a specific location before moving on to the next and repeating steps 1 thru 5.

Table 8-1. MODE Selection

	MODE	$\overline{CE}$	$\overline{OE}$	$\overline{PGM}$	VPP	VCC	OUTPUTS
	Read	V low	V low	V hi	Vcc	Vcc	D out
	Standby	V hi	X	X	Vcc	Vcc	High Z
**	Program	V low	V hi	V low	Vpp	Vcc	D in
	Program Verify	V low	V low	V hi	Vpp	Vcc	D out
	Program Inhibit	V hi	X	X	Vpp	Vcc	High Z

X can be either V low or V hi

NOTE

There is no "Program" pin on the 27256

Table 8-2. Program/Verify Sequence for the 2564

1. Press the [prom_prog] softkey. Select the 2564 EPROM (softkey).
2. Initial conditions: a) VPP = +1.2 VDC
   b) $\overline{CE}$ = +5 VDC
   c) $\overline{CS1}/\overline{CS2}$ = 0 VDC
   d) $\overline{PGM}$ = 0 VDC
3. Insert EPROM chip into ZIF socket J1.
4. VPP (VP3) gets raised to +5 VDC.
5. Apply address for bit location to be programmed.
6. Latch lower 8 bits of address then pass upper bits of address.
7. Apply data to Bus (bits DW0-DW7).
8. Apply programming power. VPP goes to +21 Volts.
9. $\overline{PGM}$ is the programming signal and is brought low for 50 mS.
10. Lower programming power (VPP goes to +5 VDC).
11. Repeat step 4 through 8 to program remaining data into PROM memory.
12. The Verify Sequence will begin and run through all the previously programmed locations of memory. A failure message will be displayed if any memory location was not programmed correctly.

NOTE

Programmer should be at conditions of step 1 when PROM chip is removed from ZIF socket J1.

Table 8-3. Program/Verify Sequence for the 2764/2764A, 27128/27128A

1. Press the [prom_prog] softkey. Select the 2764, 2764A, 27128, or the 27128A EPROM (softkey).

2. Initial conditions: a) VPP = +1.2 VDC

   b) $\overline{CE}$ = +5 VDC

   c) $\overline{OE}$ = +5 VDC

   d) $\overline{PGM}$ = 0 VDC

3. Insert EPROM chip into ZIF socket J1.

4. VPP gets raised to +5 VDC.

5. Apply address for bit location to be programmed.

6. Latch lower 8 bits of address then pass upper bits of address.

7. Apply data to Bus (bits DW0-DW7).

8. Apply programming power. VPP goes to +21 volt (11.5 volts for 2764A/27128A).

9. $\overline{CE}$ goes low for duration of programming sequence

9. $\overline{PGM}$ is the programming signal and goes low for 1 mS initially.

10. $\overline{OE}$ goes low and a Verify Sequence takes place. If the Verify Sequence fails, the PROM is reprogrammed and a Verify Sequence takes place again. The Programm/Verify Sequence (steps 9 and 10) will occur for up to 15 failures and then drop out of the program mode. When/if the PROM passes the verify test, it then will be programmed X number of times (X = the number of times the PROM went through the program/verify sequence).

11. Lower programming power (VPP goes to +5 VDC).

12. Repeat step 4 through 11 to program remaining data into PROM memory.

13. The Read/Verify Sequence will begin and run through all the previously programmed locations of memory. A failure message will be displayed if any memory location was not programmed correctly.

Table 8-4. Program/Verify Sequence for the 27256

1. Press the [prom_prog] softkey. Select the 27256 EPROM (softkey).
2. Initial conditions: a) VPP = +1.2 VDC
   b) $\overline{CE}$ = +5 VDC
   c) $\overline{OE}$ = +5 VDC
   d) $\overline{PGM}$ = 0 VDC
3. Insert EPROM chip into ZIF socket J1.
4. VPP gets raised to +5 VDC.
5. Apply address for bit location to be programmed.
6. Latch lower 8 bits of address then pass upper bits of address.
7. Apply data to Bus (bits DW0-DW7).
8. Apply programming power. VPP goes to +12 Volt.
9. $\overline{CE}$ is the programming signal and goes low for 1 mS initially.
10. $\overline{OE}$ goes low and a Verify Sequence takes place. If the Verify Sequence fails, the PROM is reprogrammed and a Verify Sequence takes place again. The Programm/Verify Sequence (steps 9 and 10) will occur for up to 15 failures and then drop out of the program mode. When/if the PROM passes the verify test, it then will be programmed X number of times (X = the number of times the PROM went through the program/verify sequence).
11. Lower programming power (VPP goes to +5 VDC).
12. Repeat step 4 through 11 to program remaining data into PROM memory.
13. The Verify Sequence will begin and run through all the previously programmed locations of memory. A failure message will be displayed if any memory location was not programmed correctly.

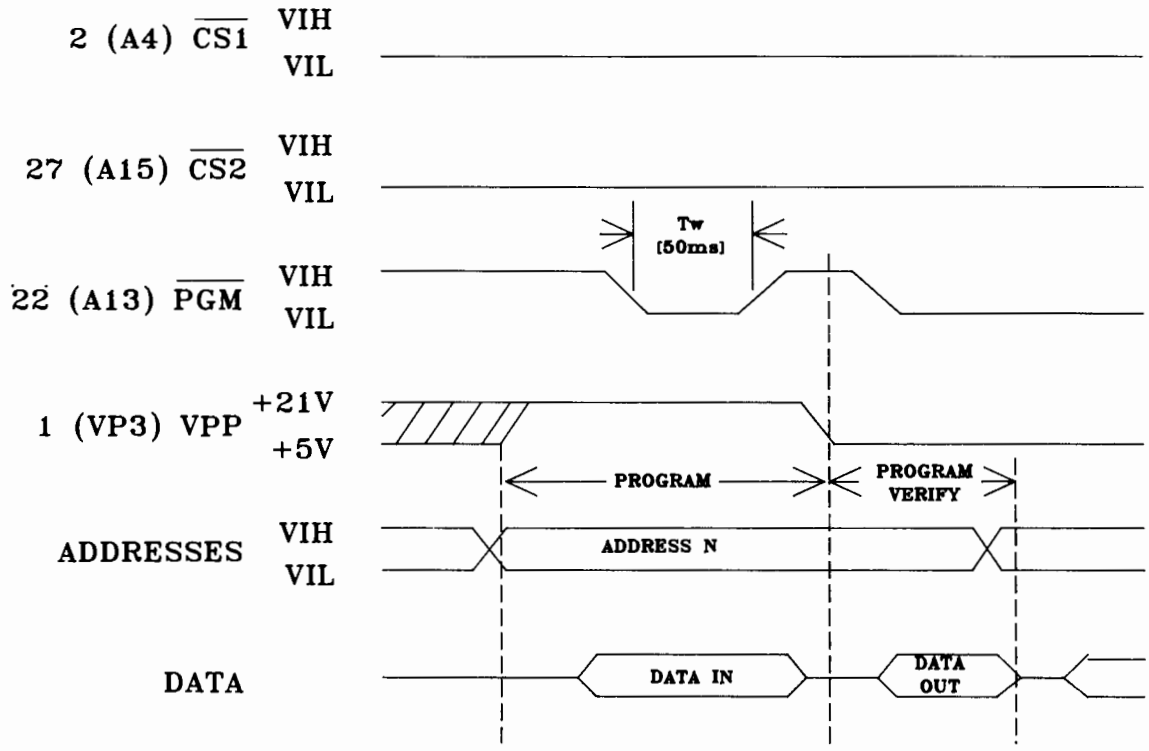


Figure 8-1. Timing Diagram for the 2564

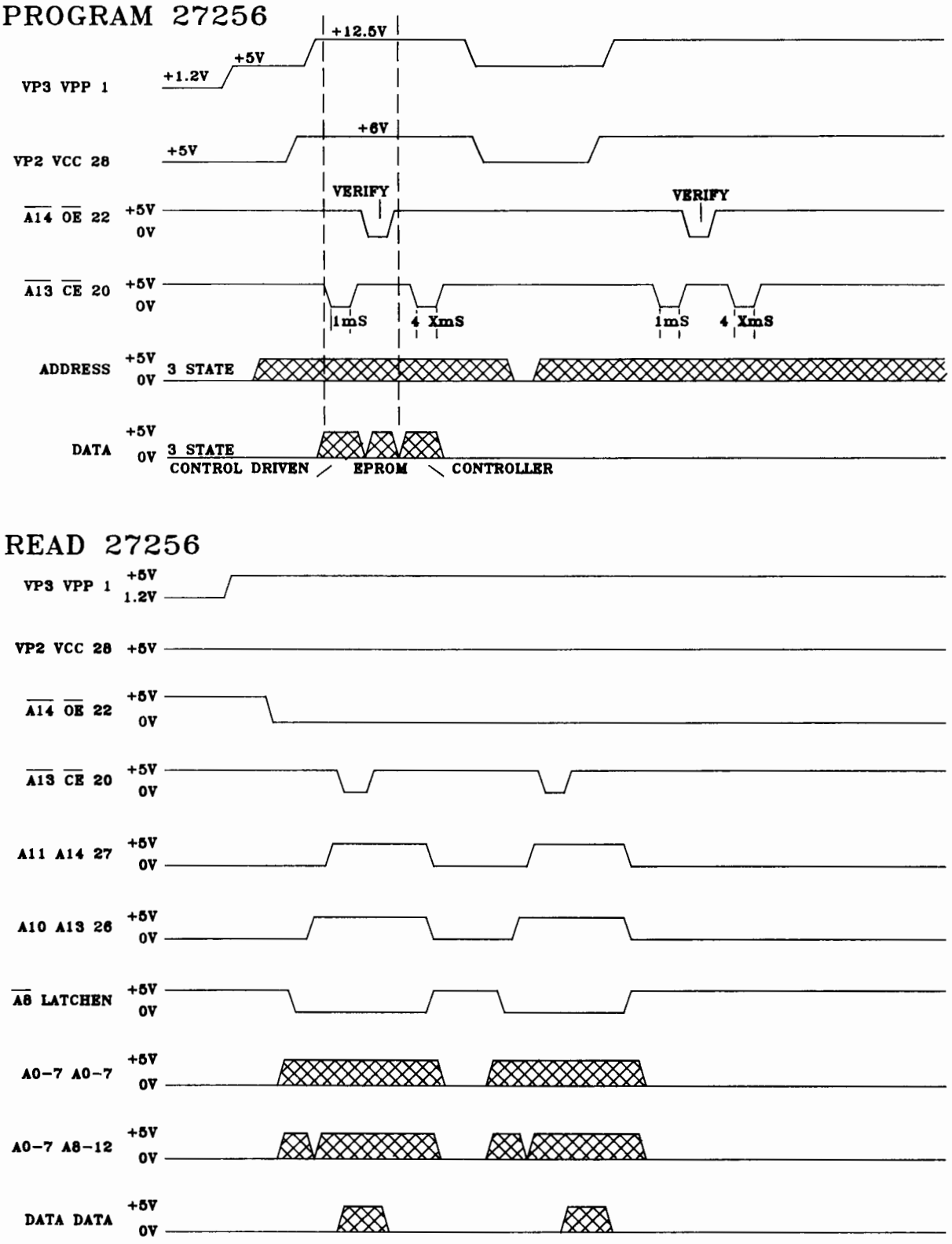


Figure 8-2. Timing Diagram for the 27256

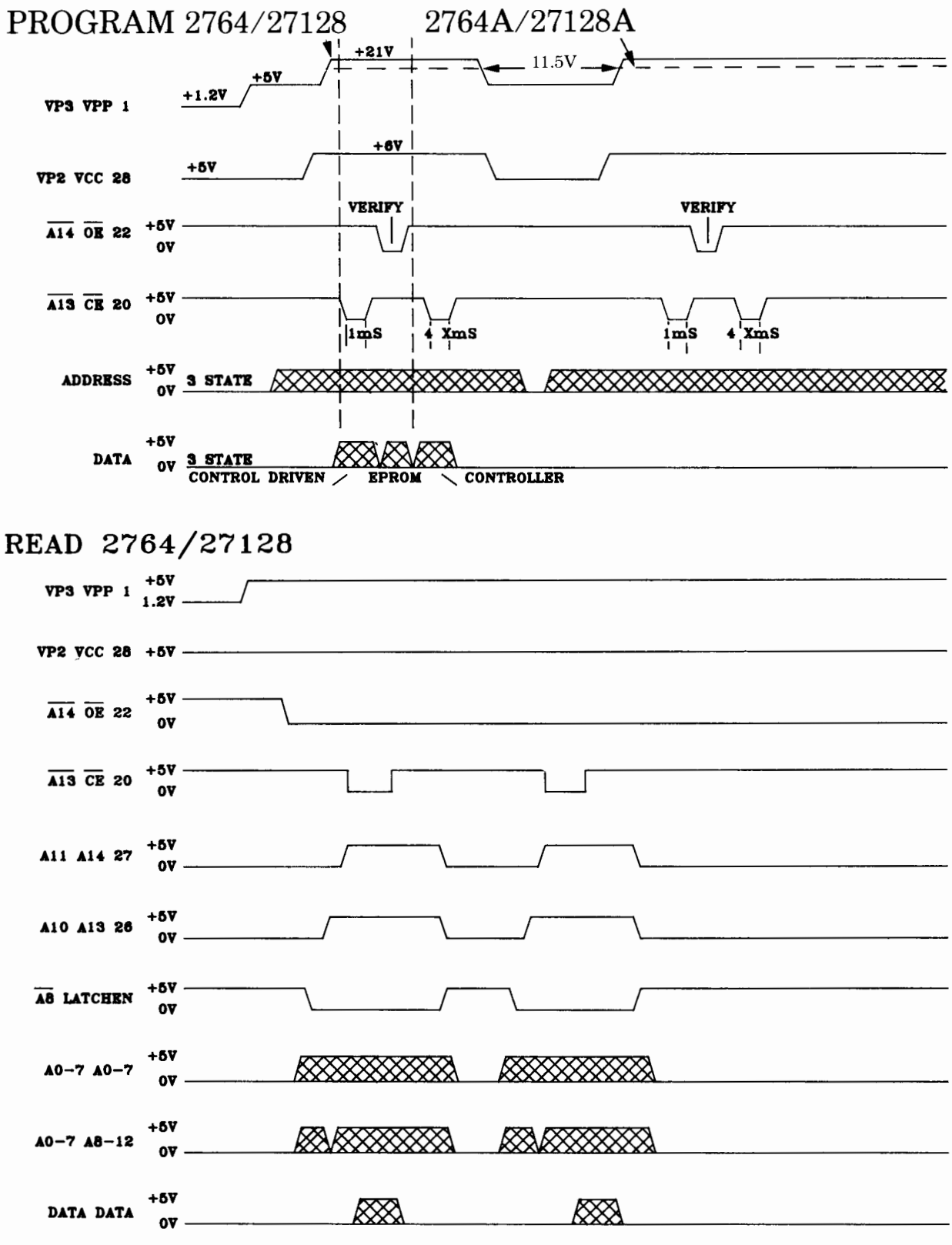


Figure 8-3. Timing Diagram for the 2764/2764A and 27128/27128A

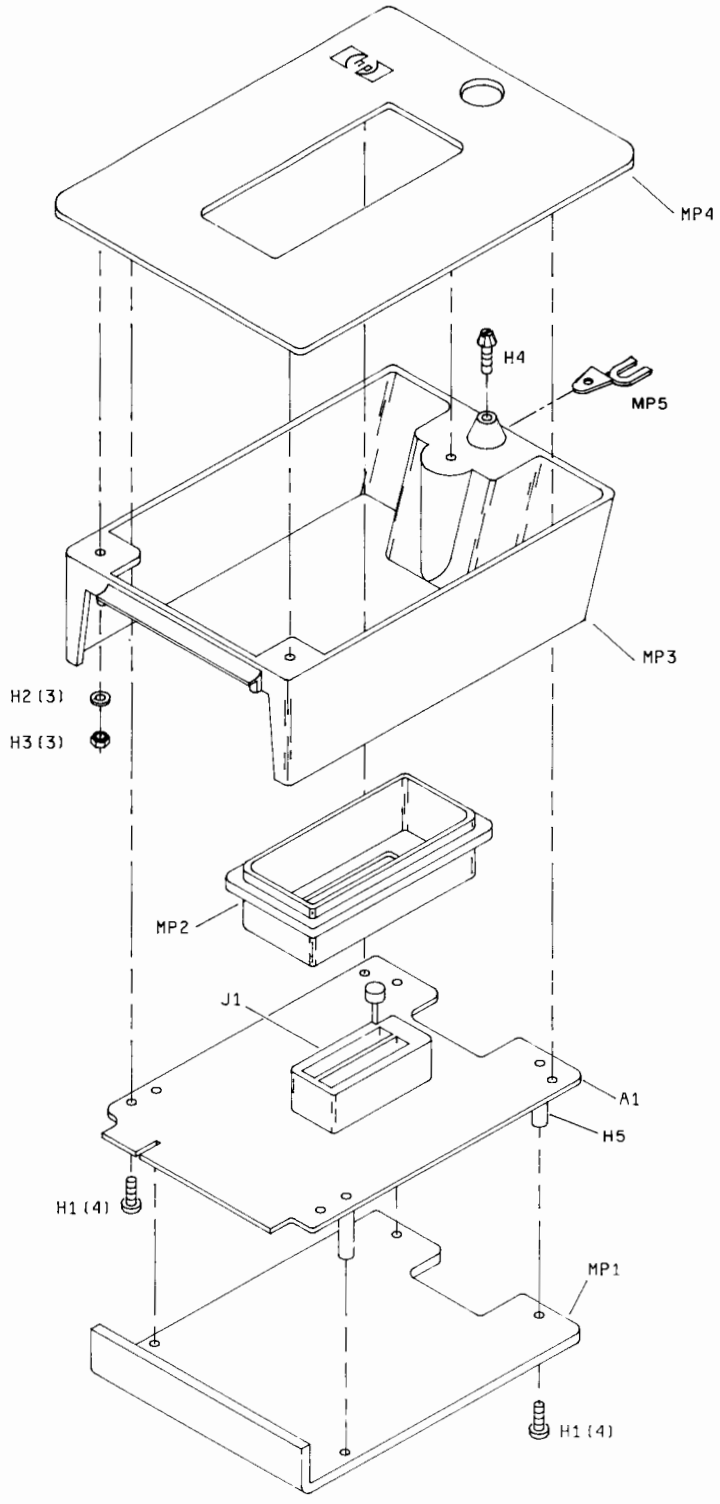


Figure 8-4. Model 64515C Illustrated Parts Breakdown

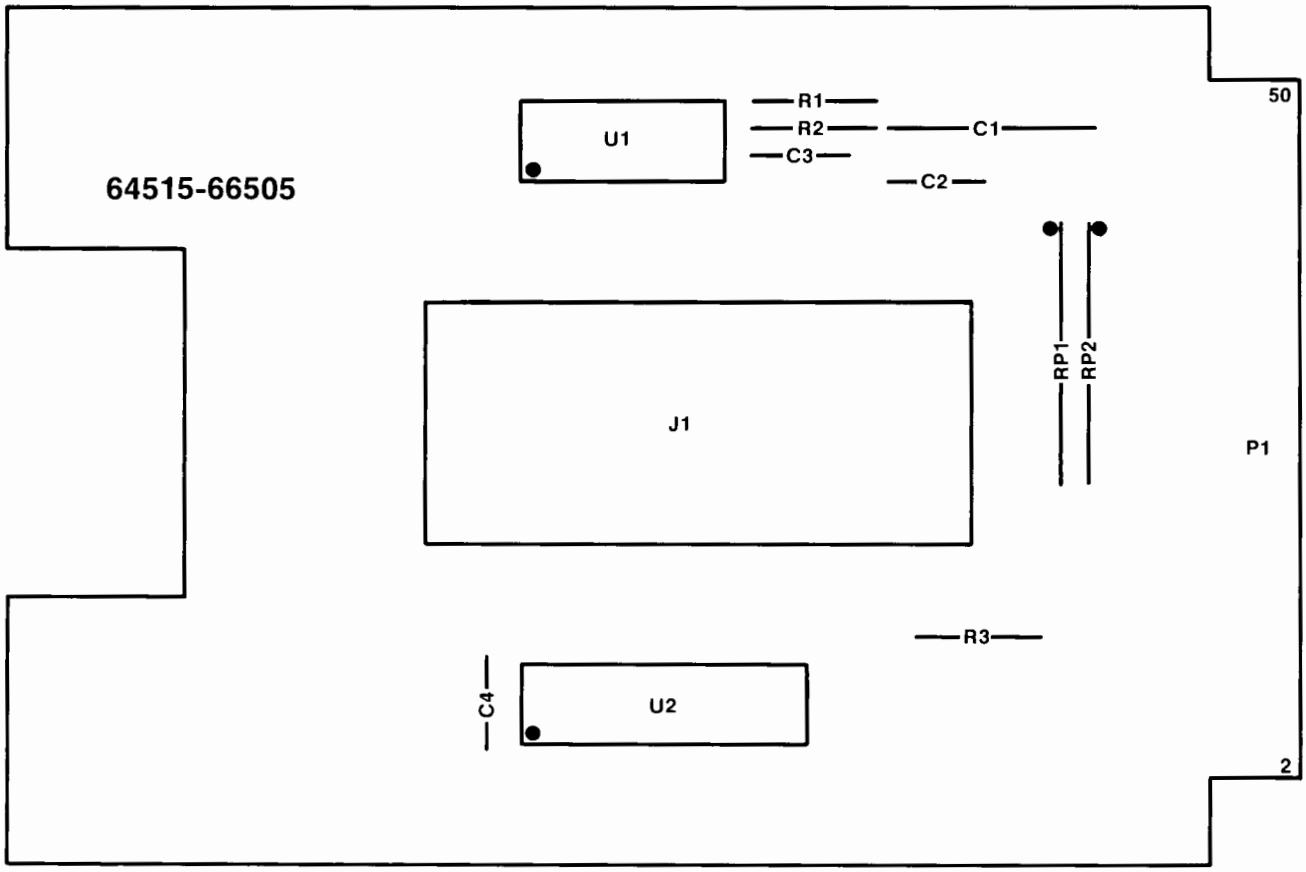


Figure 8-5. Model 64515C Component Locator

SALES & SUPPORT OFFICES
Arranged alphabetically by country

Product Line Sales/Support Key

Key Product Line
A Analytical
CM Components
C Computer Systems
E Electronic Instruments & Measurement Systems
M Medical Products
P Personal Computation Products
*** Sales only for specific product line**
**** Support only for specific product line**

IMPORTANT:These symbols designate general product line capability.They do not insure sales or support availability for all products within a line, at all locations.Contact your local sales office for information regarding locations where HP support is available for specific products.

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Microprog S.A.
Juan Tomás Mejía y Cotes No. 60
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PERU

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PHILIPPINES

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