

**64000**

**HP64000  
Logic Development  
System**

**Model 64502A  
Positive Prom  
Programmer Module**



## **CERTIFICATION**

*Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.*

## **WARRANTY**

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Warranty service of this product will be performed at Buyer's facility at no charge within HP service travel areas. Outside HP service travel areas, warranty service will be performed at Buyer's facility only upon HP's prior agreement and Buyer shall pay HP's round trip travel expenses. In all other cases, products must be returned to a service facility designated by HP.

For products returned to HP for warranty service. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

## **LIMITATION OF WARRANTY**

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. HP SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

## **ASSISTANCE**

*Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.*

*For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.*

Hewlett-Packard  
Service Manual  
Model 64502A  
Positive Prom Programmer Module

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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.**

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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 64502A PROM Programmer Module as used in the 64000 Logic Development System. The module is shown in figure 1-1.

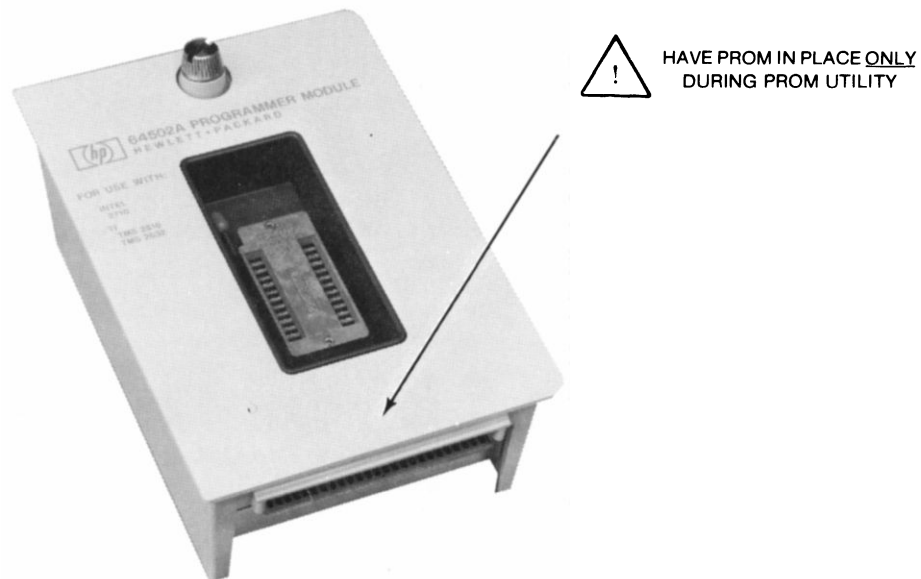


Figure 1-1. Model 64502A PROM Programmer Module

## 1-3. Safety Considerations.

1-4. There are no electrical shock hazards associated with the Model 64502A 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 64502A PROM Programmer Module with the 64502-66501 PC board installed.

1-7. An instrument manufactured after the printing of this manual may differ from the one described in this manual. The manual for this modified instrument is accompanied by a Manual Changes supplement. This supplement contains "change information" that explains how to adapt the manual to the modified instrument.

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 recommends 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. Description.

1-11. The Hewlett Packard Model 64502A Programmer Module provides the interface between the Model 64501A Positive PROM Programmer and the PROM being programmed. The 64502A is also used with the PROM Performance Verification.

**CAUTION**

The 64502A is the only Module that should be used with  
PROM Programmer Performance Verification. Other Modules  
can be damaged!

1-12. The programmer module provides the reference for the adjustable regulators in the PROM Programmer, if they are used.

1-13. A module identification code is returned to the CPU, when requested by the CPU, to determine which PROM or PROMs may be programmed.

1-14. I.D. code for the Model 64502A is: 01 HEX (1 DEC).

1-15. The Model 64502A will program the following PROMs:

INTEL 2716, INTEL 2758, Texas Instruments TMS2516, and TMS2532. These PROMs contain all 1s (high state) in all memory locations after erasure.



## Section II

## Installation and Removal

## 2-1. Introduction.

2-2. This section contains information for installing and removing the Model 64502A. Included are initial inspection procedures and instruction for repacking the instrument for shipment.

## 2-3. Initial Inspection.

2-4. Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, it should be kept until contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. Procedures for checking electrical performance are given in Section IV. If the contents are not complete, if there is mechanical damage or defect, or if the instrument does not pass the Performance Tests, notify the nearest Hewlett-Packard Office. If the shipping container is damaged, or if the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard Office. Keep the shipping materials for the carrier's inspection. The HP office will arrange for repair or replacement at HP's option so that there will be no waiting for the claim settlement.

## 2-5. Equipment Required.

2-6. The Programmer Module is installed in the front panel of the mainframe. If the system was purchased without a PROM Programmer Option, a blank Panel was installed in the opening. The blank panel or another PROM Programmer Module can be removed from the front panel without disassembling the mainframe. No tools are required for the installation or removal of the PROM Programmer.

## NOTE

The Model 64502A Programmer Module  
must be installed and removed with  
the mainframe power turned off!

## 2-7. Removal

2-8. The blank panel or a Programmer Module can be removed by turning the thumb screw counter clockwise and lifting the panel or module out.

## 2-9. PROM Programmer Cable

2-10. A 50 conductor ribbon cable, W1, connects the PROM Programmer to the Programmer Module. The end of the cable with the single connector is connected to the PROM Programmer. The cable should be routed across the top of the card cage and down behind the front panel. The two connectors should be visible in the opening for the Programmer Module. Depending on the module being used, it can have one or two P.C. boards. If it has only one board, use the connector nearest the end of the cable. The P.C. boards and cable connectors are keyed and fit only one way.

## 2-11. Installation

2-12. To install the Programmer Module, follow the PROM Programmer cable procedure, then insert the module in the front panel of the mainframe, and tighten the thumb screw, turning it in the clockwise direction.

## Section III

## Operation

The 64502A Programmer Module operates in conjunction with the PROM Programmer. The total PROM Programmer 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 manuals 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 REMOVED before the PROM programmer software module is exited.

## NOTE

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The PROM programmer software module is called by pressing the "prom\_prog" softkey then press the carriage return key. To exit the PROM programmer software press the "end" softkey then the carriage return key.

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## Section IV

## Performance Verification and Troubleshooting

For the details of this Performance Verificaton, see the service manual for the 64500S/64501A Positive PROM Programmer. This Programmer Module and the Positive PROM Programmer function as one unit and cannot operate by themselves.

**CAUTION**

The 64502A is the only module that should be used with PROM Programmer Performance Verification. Other modules can be damaged due to the +26 Volt DAC Test.



Section V

Adjustments

There are no adjustments in this Module.





## 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 two, 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 manufacturers' 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 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 office.

**6-10. Direct Mail Order System**

6-11. Within the USA, 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							
<b>A</b>	= assembly	<b>F</b>	= fuse	<b>MP</b>	= mechanical part	<b>U</b>	= integrated circuit
<b>B</b>	= motor	<b>FL</b>	= filter	<b>P</b>	= plug	<b>V</b>	= vacuum, tube, neon bulb, photocell, etc
<b>BT</b>	= battery	<b>IC</b>	= integrated circuit	<b>Q</b>	= transistor	<b>VR</b>	= voltage regulator
<b>C</b>	= capacitor	<b>J</b>	= jack	<b>R</b>	= resistor	<b>W</b>	= cable
<b>CP</b>	= coupler	<b>K</b>	= relay	<b>RT</b>	= thermistor	<b>X</b>	= socket
<b>CR</b>	= diode	<b>L</b>	= inductor	<b>S</b>	= switch	<b>Y</b>	= crystal
<b>DL</b>	= delay line	<b>LS</b>	= loud speaker	<b>T</b>	= transformer	<b>Z</b>	= tuned cavity network
<b>DS</b>	= device signaling (lamp)	<b>M</b>	= meter	<b>TB</b>	= terminal board		
<b>E</b>	= misc electronic part	<b>MK</b>	= microphone	<b>TP</b>	= test point		
ABBREVIATIONS							
<b>A</b>	= amperes	<b>H</b>	= henries	<b>N/O</b>	= normally open	<b>RMO</b>	= rack mount only
<b>AFC</b>	= automatic frequency control	<b>HDW</b>	= hardware	<b>NOM</b>	= nominal	<b>RMS</b>	= root-mean square
<b>AMPL</b>	= amplifier	<b>HEX</b>	= hexagonal	<b>NPO</b>	= negative positive zero (zero temperature coefficient)	<b>RWV</b>	= reverse working voltage
<b>BFO</b>	= beat frequency oscillator	<b>HG</b>	= mercury	<b>NPN</b>	= negative-positive-negative	<b>S-B</b>	= slow-blow
<b>BE CU</b>	= beryllium copper	<b>HR</b>	= hour(s)	<b>NRFR</b>	= not recommended for field replacement	<b>SCR</b>	= screw
<b>BH</b>	= binder head	<b>HZ</b>	= hertz	<b>NSR</b>	= not separately replaceable	<b>SE</b>	= selenium
<b>BP</b>	= bandpass	<b>IF</b>	= intermediate freq	<b>OB</b>	= order by description	<b>SECT</b>	= section(s)
<b>BRS</b>	= brass	<b>IMPG</b>	= impregnated	<b>OH</b>	= oval head	<b>SEMICON</b>	= semiconductor
<b>BWO</b>	= backward wave oscillator	<b>INCD</b>	= incandescent	<b>OX</b>	= oxide	<b>SI</b>	= silicon
<b>CCW</b>	= counter-clockwise	<b>INCL</b>	= include(s)	<b>P</b>	= peak	<b>SIL</b>	= silver
<b>CER</b>	= ceramic	<b>INS</b>	= insulation(ed)	<b>PC</b>	= printed circuit	<b>SL</b>	= slide
<b>CMO</b>	= cabinet mount only	<b>INT</b>	= internal	<b>PF</b>	= picofarads= 10 <sup>-12</sup> farads	<b>SPG</b>	= spring
<b>COEF</b>	= coefficient	<b>K</b>	= kilo=1000	<b>PH BRZ</b>	= phosphor bronze	<b>SPL</b>	= special
<b>COM</b>	= common	<b>LH</b>	= left hand	<b>PHL</b>	= phillips	<b>SST</b>	= stainless steel
<b>COMP</b>	= composition	<b>LIN</b>	= linear taper	<b>PIV</b>	= peak inverse voltage	<b>SR</b>	= split ring
<b>COMPL</b>	= complete	<b>LK WASH</b>	= lock washer	<b>PNP</b>	= positive-negative-positive	<b>STL</b>	= steel
<b>CONN</b>	= connector	<b>LOG</b>	= logarithmic taper	<b>P/O</b>	= part of	<b>TA</b>	= tantalum
<b>CP</b>	= cadmium plate	<b>LPF</b>	= low pass filter	<b>POLY</b>	= polystyrene	<b>TD</b>	= time delay
<b>CRT</b>	= cathode-ray tube	<b>M</b>	= milli=10 <sup>-3</sup>	<b>PORC</b>	= porcelain	<b>TGL</b>	= toggle
<b>CW</b>	= clockwise	<b>MEG</b>	= meg=10 <sup>6</sup>	<b>POS</b>	= position(s)	<b>THD</b>	= thread
<b>DEPC</b>	= deposited carbon	<b>MET FLM</b>	= metal film	<b>POT</b>	= potentiometer	<b>TI</b>	= titanium
<b>DR</b>	= drive	<b>MET OX</b>	= metallic oxide	<b>PP</b>	= peak-to-peak	<b>TOL</b>	= tolerance
<b>ELECT</b>	= electrolytic	<b>MFR</b>	= manufacturer	<b>PT</b>	= point	<b>TRIM</b>	= trimmer
<b>ENCAP</b>	= encapsulated	<b>MHZ</b>	= mega hertz	<b>PWV</b>	= peak working voltage	<b>TWT</b>	= traveling wave tube
<b>EXT</b>	= external	<b>MINAT</b>	= miniature			<b>U</b>	= micro=10 <sup>-6</sup>
<b>F</b>	= farads	<b>MOM</b>	= momentary			<b>VAR</b>	= variable
<b>FH</b>	= flat head	<b>MOS</b>	= metal oxide substrate			<b>VDCW</b>	= dc working volts
<b>FIL H</b>	= fillister head	<b>MTG</b>	= mounting			<b>W/</b>	= with
<b>FXD</b>	= fixed	<b>MY</b>	= "mylar"			<b>W</b>	= watts
<b>G</b>	= giga (10 <sup>9</sup> )	<b>N</b>	= nano (10 <sup>-9</sup> )	<b>RECT</b>	= rectifier	<b>WIV</b>	= working inverse voltage
<b>GE</b>	= germanium	<b>N/C</b>	= normally closed	<b>RF</b>	= radio frequency	<b>WW</b>	= wirewound
<b>GL</b>	= glass	<b>NE</b>	= neon	<b>RH</b>	= round head or right hand	<b>W/O</b>	= without
<b>GRD</b>	= ground(ed)	<b>NI PL</b>	= nickel plate				

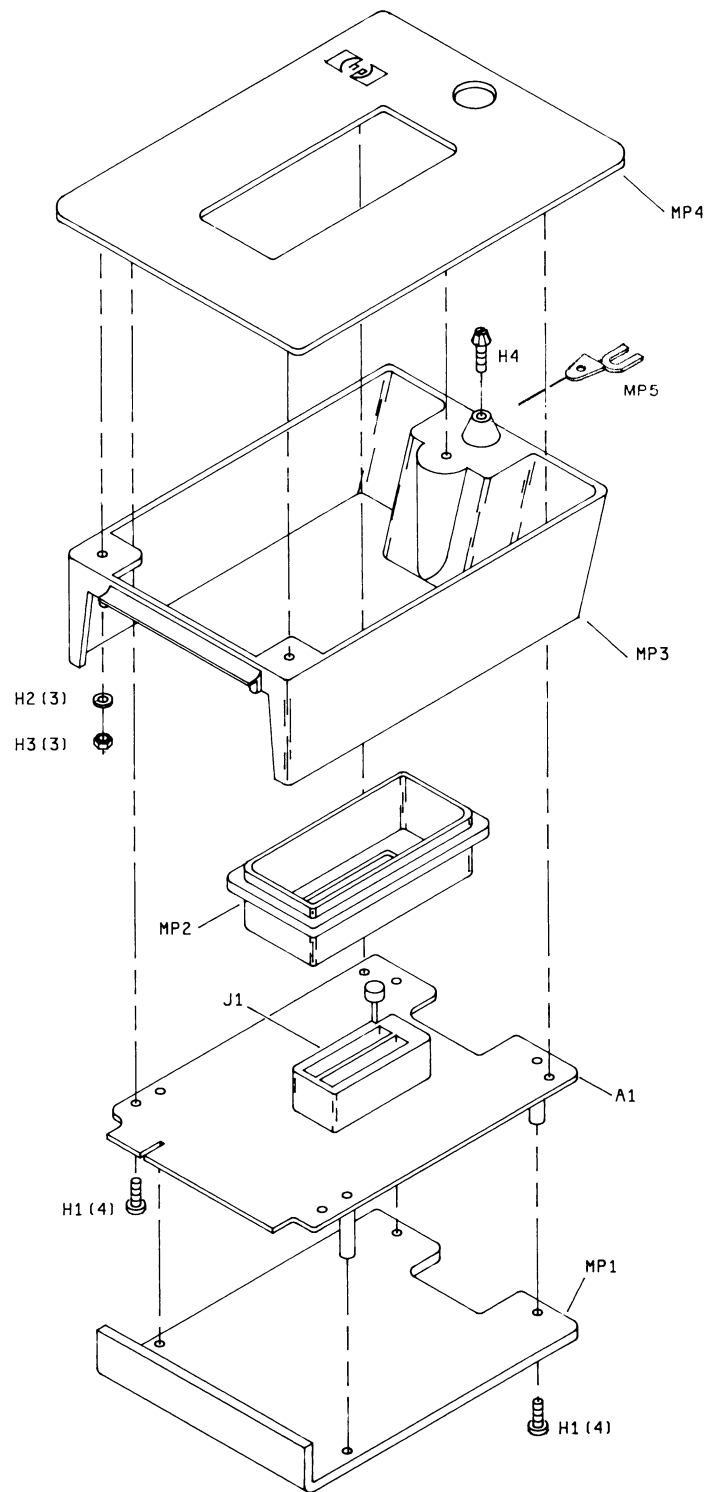


Figure 6-1. Model 64517A Illustrated Parts Breakdown

Table 6-2. Replaceable Parts List

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	64502-66501	1	1	BOARD ASSEMBLY, PROGRAM MODULE	28480	64502-66501
C1	0160-3622	8	1	CAPACITOR-FXD .1UF +80-20% 100VDC CER	26654	2130Y5V100R104Z
C2	0160-4832	4	1	CAPACITOR-FXD .01UF		
H1	2360-0113	2	8	SCREW=MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
H2	3050-0425	3	3	WASHER-FL MTLC NO. 4 125-IN-ID	28480	3050-0425
H3	2260-0009	3	3	NUT-HEX-W/LKWR 4-40-THD .093-IN-THK	28480	2260-0009
H4	0570-0661	8	1	SCREW-THUMB 6-32 .49-IN-LG	28480	0570-0661
J1	1200-0610	5	1	SOCKET-IC-TB 24-CONT DIP TEST DIP-SLDR	28480	1200-0610
MP1	64500-04101	5	1	SAFETY COVER	28480	64500-04101
MP2	64500-45204	5	1	"BATHTUB" FOR ZIP SOCKET (J1)	28480	64500-45204
MP3	5041-1576	0	1	SUPPORT PANEL	28480	5041-1576
MP4	64502-00201	0	1	FRONT PANEL	28480	64502-00201
MP5	64500-09101	2	1	GROUND CLIP	28480	64500-09101
R1	0698-3402	1	1	RESISTOR 316 1% .5W F TC=0+-100	28480	0698-3402
R2	0757-0159	5	1	RESISTOR 1K 1% .5W F TC=0+-100	28480	0757-0159
R3	0757-0421	4	1	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
R4	0698-3443	0	1	RESISTOR 287 1% .125W F TC=0+-100	24546	C4-1/8-T0-287R-F
R5	0757-0280	3	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
R6	0757-0417	8	1	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
R7	0684-6801	1	1	RESISTOR 68 10% .25W FC TC=-400/+500	01121	C86801
R8	0684-1211	7	1	RESISTOR 120 10% .25W FC TC=-400/+600	01121	C81211
U1	1906-0074	1	2	DIODE-ARRAY 50V 400MA	28480	1906-0074
U2	1810-0301	4	2	NETWORK-RES 16-DIP51.0 OHM X 8	01121	3168510
U3	1820-1851	8	2	IC 8HP-RGTR CMOS SYNCHRO POS-EDGE-TRIG	04713	74LS148
U4	1810-0301	4	4	NETWORK-RES 16-DIP51.0 OHM X 8	01121	3168510
U5	1906-0074	1	1	DIODE-ARRAY 50V 400MA	28480	1906-0074
U6	1820-1851	8	1	8-LINE-TO-3 LINE OCTAL PRIORITY ENCODOR	04713	74LS148
U7	1820-1198	0	1	IC GATE TTL LS NAND QUAD 2-INP	01295	8474LS03N
U8	1810-0279	5	1	NETWORK-RES 10-81P4.7K OHM X 9	01121	210A472

See introduction to this section for ordering information

Table 6-3. Manufacturers' Codes

Mfr No.	Manufacturer Name	Address	Zip Code
00000	ANY SATISFACTORY SUPPLIER		
00466	NORELCO NORTH AMER PHILIPS LTG CORP	LOS ANGELES CA	90021
01121	ALLEN-BRADLEY CO	MILWAUKEE WI	53204
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS TX	75222
01928	RCA CORP SOLID STATE DIV	SOMERVILLE NJ	08876
03888	KDI PYROFILM CORP	WHIPPANY NJ	07981
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85062
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94042
09023	CORNELL-DUBILIER ELEK DIV FED PAC	SANFORD NC	27330
13103	THERMALLOY CO	DALLAS TX	75234
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
20940	MICRO-OHM CORP	EL MONTE CA	91731
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
26654	VARADYNE INC	SANTA MONICA CA	90404
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA	95051
27777	VARO SEMICONDUCTOR INC	GARLAND TX	75040
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
30983	MEPCO/ELECTRA CORP	SAN DIEGO CA	92121
32997	BOURNS INC TRIMPOT PROD DIV	RIVERSIDE CA	92507
34344	MOTOROLA INC	FRANKLIN PARK IL	60131
34649	INTEL CORP	MOUNTAIN VIEW CA	95051
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	01247
71590	CENTRALAB ELEK DIV GLOBE-UNION INC	MILWAUKEE WI	50501
72136	ELECTRO MOTIVE CORP SUB IEC	WILLIMANTIC CT	06226
75042	TRW INC PHILADELPHIA DIV	PHILADELPHIA PA	19108
75382	KULKA ELECTRIC CORP	MT VERNON NY	10550
75915	LITTELFUSE INC	DES PLAINES IL	60016

See introduction to this section for ordering information

Section VII

Manual Back Dating

This Section normally contains information for backdating this Manual. However, this instrument does not have Repair Numbers assigned to it; therefore, it is not possible to backdate to a previous instrument.





## Section VIII

## Theory and Schematics

8-1. Introduction.

8-2. This section contains information for troubleshooting and repairing the Model 64502A Programmer Module.

8-3. Block diagrams, schematics, component locators, and other service information are provided on fold-out Service Sheets in this section to help you in servicing the 64502A.

8-4. The basic operation of the 64502A is as follows:

- a. The PROM Programmer is initiated by pressing the "prom\_prog" soft-key and then the carriage return key.
- b. The PROM Programmer I.D. (01 HEX) is output to the CPU. The CPU translates this information onto the screen as "Prom Programmer Utility" and will ask for one of the four Prom types that can be used.
- c. Select the Prom to be used by pressing one of the four Prom select softkeys and then the carriage return.
- d. The softkeys will now display all the functions available to the user.

8-5. General Programming Sequence.

8-6. The program sequence is as follows:

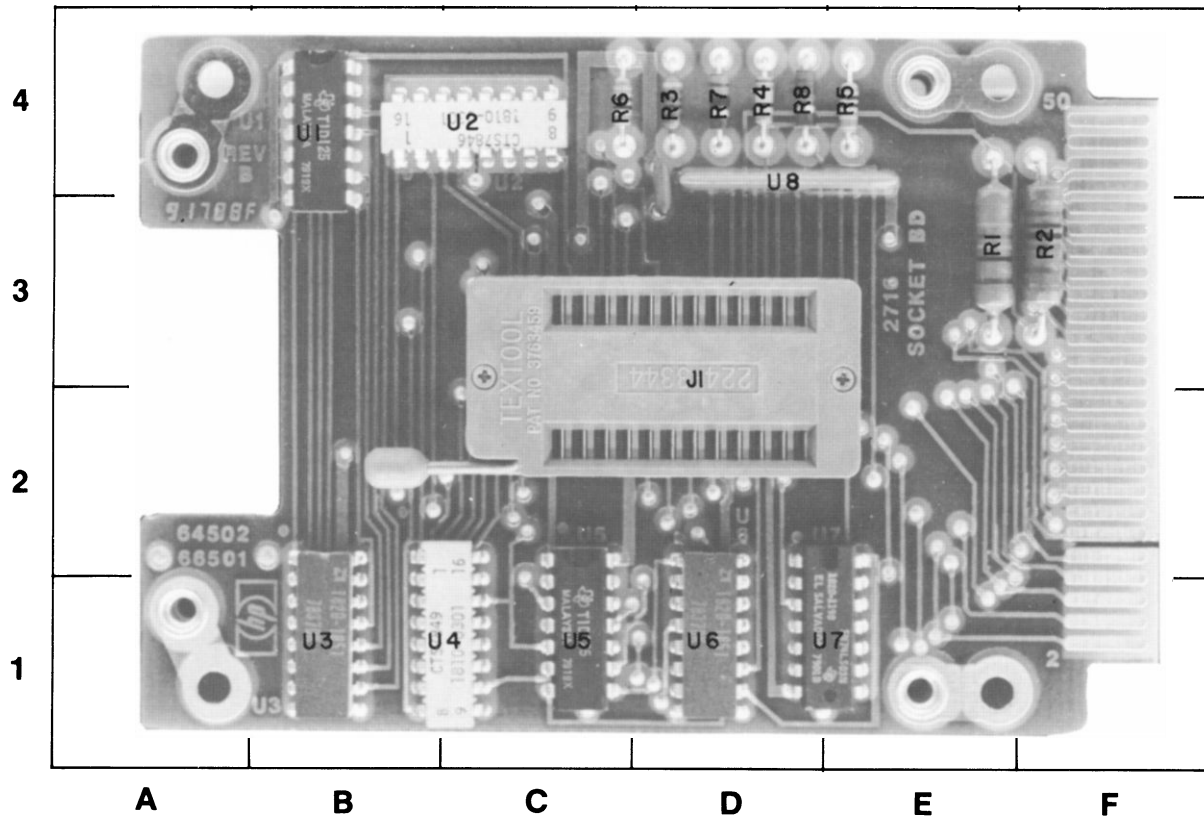
NOTE: The mainframe's software controls the sequence of steps to program the Prom.

- a. The starting address is output thru the Prom Controller PC board to the Prom on Address lines A11-A0.
- b. Data is then placed out on Data lines D7-D0 from lines DW7-DW0 via the Prom Controller PC board.
- c. VP3 will then be raised to +25 volts. When PGM (from A15) is pulsed high (+5V for 50 milliseconds), the data is programmed into the addressed location.
- d. PGM is lowered. The address is incremented and steps b thru d are repeated until the Prom has been fully programmed.

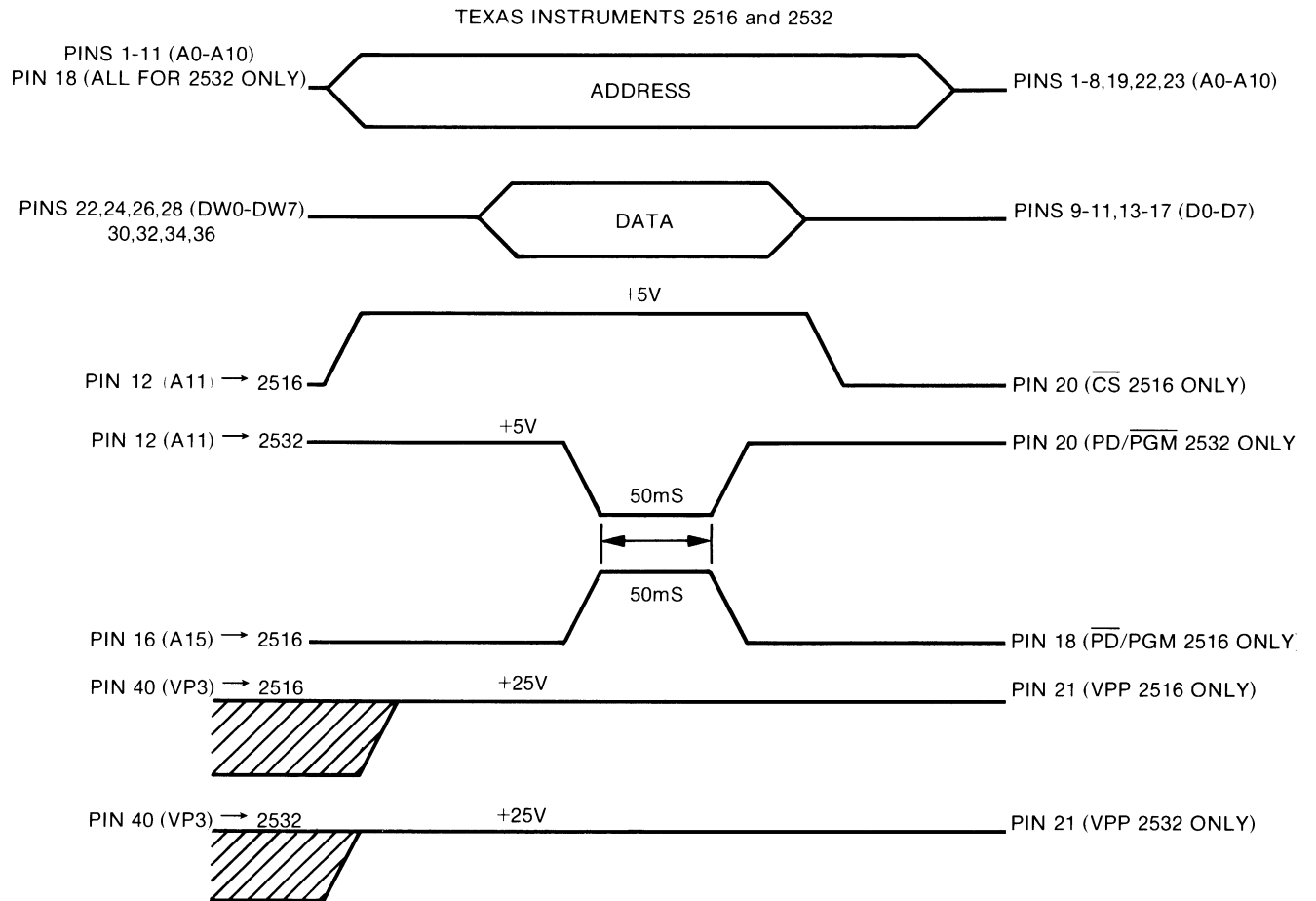
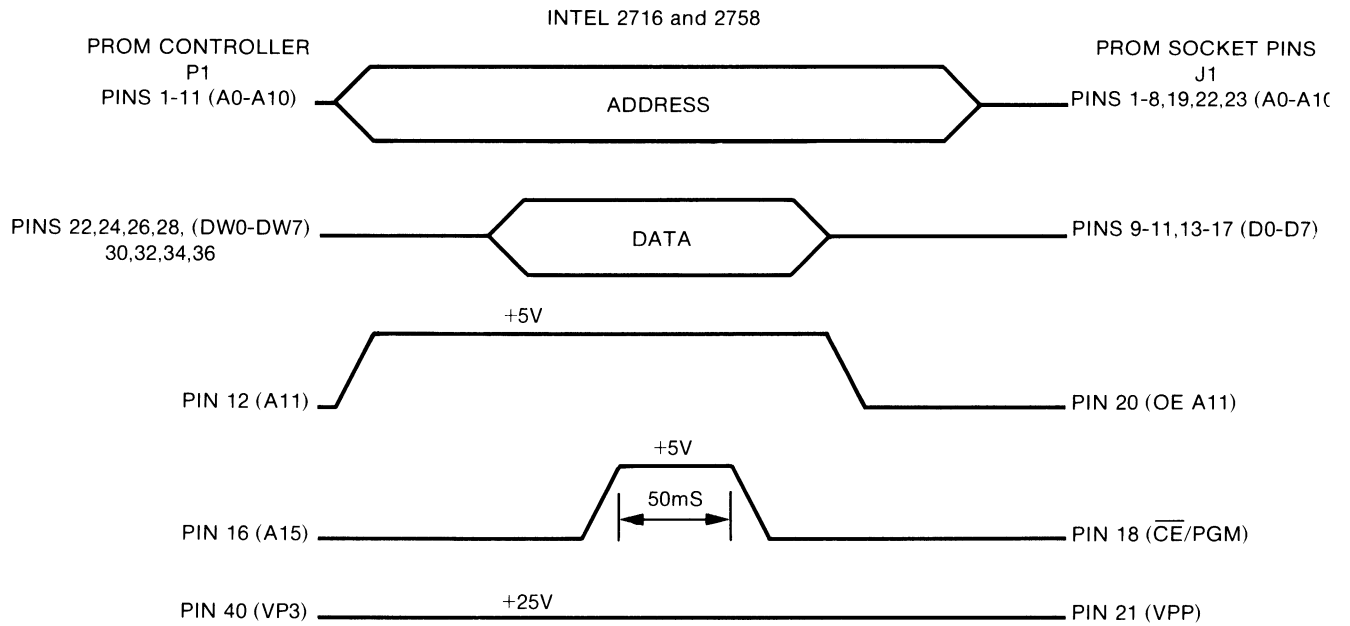
### 8-7. Performance Verification Components

8-8. U3 and U6 are Priority Encoders used in conjunction with U7. These ICs produce codes in response to stimulus from the CPU during the Prom Programmer Performance Verification. The codes are returned to the CPU for verification over the programmer module's identification lines (ID<sup>4</sup>-ID<sup>0</sup>), through the PROM Programmer to the CPU data bus.

8-9. R1-R7 make up a series of voltage dividers. LP1 and LP2 are control voltages which are fed to VPR1 and VPR2 . The voltage at VP1 and VP2 is always +1.2V greater than the voltage at VPR1 and VPR2 respectively. The output of VP1 and VP2 is fed to the ID lines. During Performance Verification the ID lines (ID<sup>4</sup>-ID<sup>0</sup>) are read, thus checking both the address lines and supply voltages.



REF DESIG	GRID LOC
J1	3-D
R1	3-E
R2	3-F
R3	4-D
R4	4-D
R5	4-E
R6	4-C
R7	4-D
R8	4-D
U1	4-B
U2	4-C
U3	1-B
U4	1-C
U5	1-C
U6	1-D
U7	1-D
U8	4-D
C1	4-D
C2	Back of PCB



Timing Diagrams

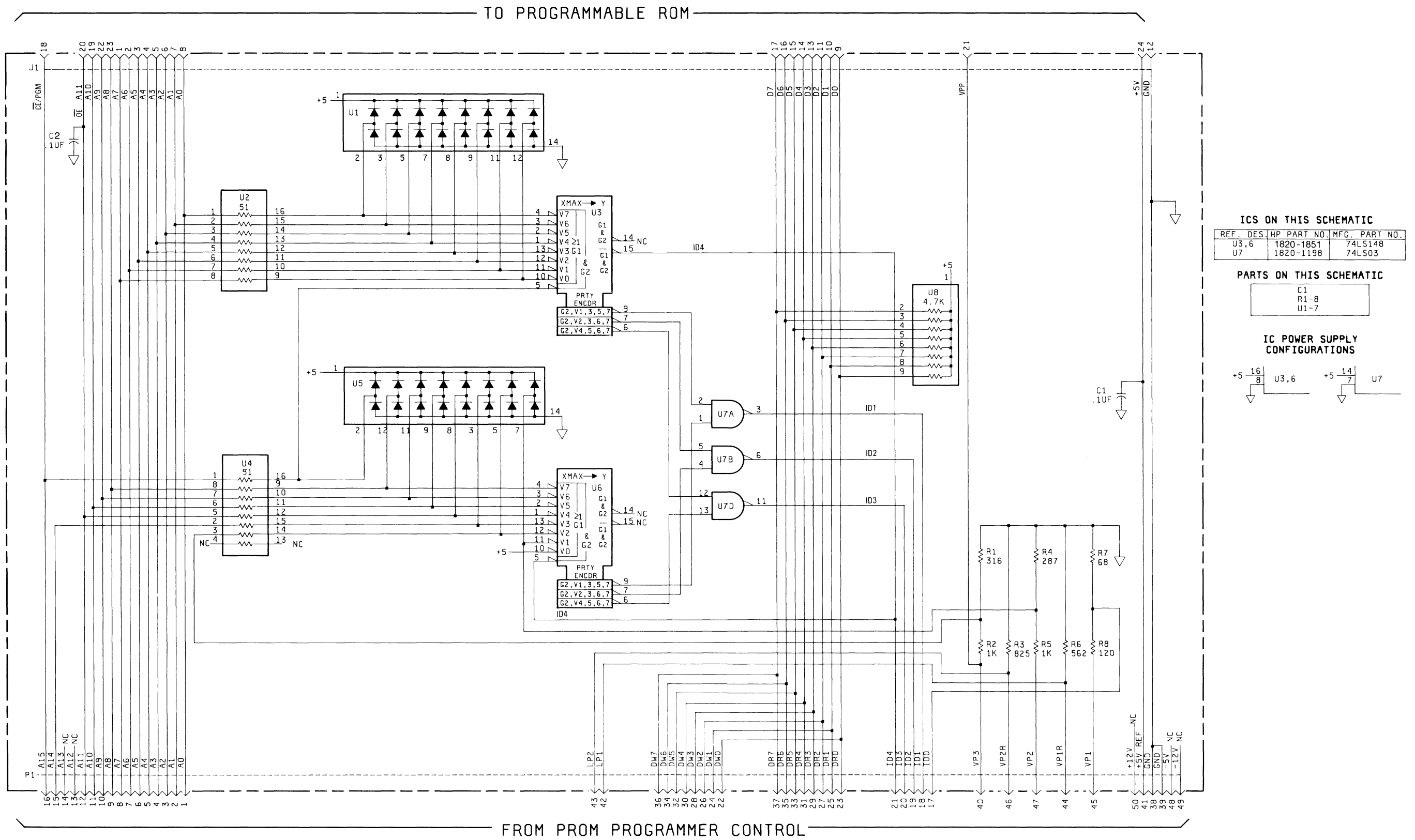


Figure 8-2  
Schematic  
Prog Mod 8-5



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Wing On Centre, 28th Floor  
Cornaught Road, C.  
HONG KONG  
Tel: 5-455644  
Telex: 74766 SCHMX HX  
A, M

### ICELAND

*Elding Trading Company Inc.*  
Halnarnvoli-Tryggvagotu  
P.O. Box 895  
IS-REYKJAVIK  
Tel: 1-58-20, 1-63-03  
M

### INDIA

*Blue Star Ltd.*  
11 Magarath Road  
BANGALORE 560 025  
Tel: 55668  
Telex: 0845-430  
Cable: BLUESTAR  
A, CH, CM, CS, E  
*Blue Star Ltd.*  
Band Box House  
Prabhadevi  
BOMBAY 400 025  
Tel: 422-3101  
Telex: 011-3751  
Cable: BLUESTAR  
A, M

*BERCA Indonesia P.T.*  
P.O. Box 174/SBY.  
Jl. Kutei No. 11  
SURABAYA  
Tel: 68172  
Telex: 31146 BERSAL SB  
Cable: BERSAL-SURABAYA  
A\*, E, M, P

*Blue Star Ltd.*  
Sahas  
414/2 Vir Savarkar Marg  
Prabhadevi  
BOMBAY 400 025  
Tel: (021) 7458800  
Telex: 011-4093  
Cable: FROSTBLUE  
A, CH, CM, CS, E, M

*Blue Star Ltd.*  
Kalyan, 19 Vishwas Colony  
Berkshire RG11 5AR  
Tel: (0734) 784774  
Telex: 847178  
A, CS, E, M

*Blue Star Ltd.*  
7 Hare Street  
CALCUTTA 700 001  
Tel: 12-01-31  
Telex: 021-7655  
Cable: BLUESTAR  
A, M

*Blue Star Ltd.*  
133 Kodambakkam High Road  
MADRAS 600 034  
Tel: 82057  
Telex: 041-379  
Cable: BLUESTAR  
A, M

*Blue Star Ltd.*  
Bhandari House, 7th/8th Floors  
91 Nehru Place  
NEW DELHI 110 024  
Tel: 682547  
Telex: 031-2463  
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A, CH, CM, CS, E, M

*Blue Star Ltd.*  
15/16, C Wellesley Rd.  
PUNE 411 011  
Tel: 22775  
Cable: BLUE STAR  
A

*Blue Star Ltd.*  
1-1-117/1 Sarojini Devi Road  
SECUNDERABAD 500 033  
Tel: 70126  
Telex: 0155-459  
Cable: BLUEFROST  
A, E

*Blue Star Ltd.*  
T.C. 7/603 Poornima  
Maruthankuzhi  
TRIVANDRUM 695 013  
Tel: 65799  
Telex: 0884-259  
Cable: BLUESTAR  
E

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Hewlett-Packard Trading S.A.  
Mansoor City 9B/3/7  
**BAGHDAD**  
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Telex: 2455 HEPAIRAQ IK  
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Clanwilliam Court  
Lower Mount Street  
**DUBLIN 2**, Eire  
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Telex: 30439  
A,CH,CM,CS,E,M,P  
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*Kilmore Road*  
*Artane*  
**DUBLIN 5**, Eire  
Tel: (01) 351820  
Telex: 30439  
M

**ISRAEL**

*Electronics Engineering Division*  
*Motorola Israel Ltd.*  
*16 Kremenetski Street*  
*P.O. Box 25016*  
**TEL-AVIV 67899**  
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Telex: 33569 Motil IL  
Cable: *BASTEL Tel-Aviv*  
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Hewlett-Packard Italiana S.p.A.  
Traversa 99C  
Giulio Petroni, 19  
I-70124 **BARI**  
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Hewlett-Packard Italiana S.p.A.  
Via Martin Luther King, 38/111  
I-40132 **BOLOGNA**  
Tel: (051) 402394  
Telex: 511630  
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Hewlett-Packard Italiana S.p.A.  
Via Principe Nicola 43G/C  
I-95126 **CATANIA**  
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Telex: 970291 C,P  
Hewlett-Packard Italiana S.p.A.  
Via G. Di Vittorio 9  
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Telex: 334632  
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Via Nuova san Rocco A  
Capodimonte, 62/A  
I-80131 **NAPOLI**  
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Hewlett-Packard Italiana S.p.A.  
Viale G. Modugno 33  
I-16156 **GENOVA PEGLI**  
Tel: (010) 68-37-07 E,C  
Hewlett-Packard Italiana S.p.A.  
Via Turazza 14  
I-35100 **PADOVA**  
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Telex: 430315  
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Viale C. Pavese 340  
I-00144 **ROMA**  
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Telex: 610514  
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Hewlett-Packard Italiana S.p.A.  
Corso Giovanni Lanza 94  
I-10133 **TORINO**  
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Telex: 221079  
CH,CM,E

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Yokogawa-Hewlett-Packard Ltd.  
Inoue Building  
1-1348-3, Asahi-cho  
**ATSUGI**, Kanagawa 243  
Tel: (0462) 24-0451  
CM,C\*,E  
Yokogawa-Hewlett-Packard Ltd.  
Sannomiya-Daichi Seimei-Bldg. 5F  
69 Kyo-machi Chuo-ku  
**KOBE 650**  
Tel: (078) 392-4791  
C,E  
Yokogawa-Hewlett-Packard Ltd.  
Kumagaya Asahi Yasoji Bldg 4F  
3-4 Chome Tsukuba  
**KUMAGAYA**, Saitama 360  
Tel: (0485) 24-6563  
CH,CM,E  
Yokogawa-Hewlett-Packard Ltd.  
Mito Mitsui Building  
1-4-73, San-no-maru  
**MITO**, Ibaragi 310  
Tel: (0292) 25-7470  
CH,CM,E

Yokogawa-Hewlett-Packard Ltd.  
Sumitomo Seimei Nagoya Bldg.  
11-2 Shimo-sasajima-cho  
Nakamura-ku  
**NAGOYA**, Aichi 450  
Tel: (052) 571-5171  
CH,CM,CS,E,MS  
Yokogawa-Hewlett-Packard Ltd.  
Chuo Bldg., 4th Floor  
5-4-20 Nishinakajima, 5-chome  
Yodogawa-ku  
**OSAKA**, 532  
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Telex: YHPOSA 523-3624  
A,CH,CM,CS,E,MP,P\*  
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3-29-21 Takaido-Higashi 3-chome  
Suginami-ku  
**TOKYO 168**  
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Telex: 232-2024 YHPTOK  
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Yokogawa-Hewlett-Packard Ltd.  
3-30-4 Tsuruya-cho  
Kanagawa-ku,  
**YOKOHAMA** Kanagawa, 221  
Tel: (045) 312-1252  
CH,CM,E

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*P.O. Box 1387*  
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Telex: 21456 SABCO JO  
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*City House, Wabera Street*  
*P.O. Box 30635*  
**NAIROBI**  
Tel: 331955  
Telex: 22639  
E,M

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*Samsung Electronics*  
*Industrial Products Div.*  
*76-561 Yeoksam-Dong*  
*Kangnam-Ku*  
*C.P.O. Box 2775*  
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*Photo & Cine Equipment*  
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**KUWAIT**  
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*Achrafieh*  
*P.O. Box 165.167*  
**BEIRUT**  
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Telex: MA31011  
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*Lot 319, Satok Road*  
*P.O. Box 1917*  
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Tel: 53544  
Telex: MA 70904 PROMAL  
Cable: *PROTELENG*  
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*Philip Toledo Ltd.*  
*Natabile Rd.*  
**MRIEHEL**  
Tel: 447 47, 455 66  
Telex: MW.649  
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Hewlett-Packard Mexicana, S.A. de  
C.V.  
Avenida Periferico Sur No. 6501  
Tepepan, Xochimilco  
**MEXICO CITY 23, D.F.**  
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Telex: 017-74-507  
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Hewlett-Packard Mexicana, S.A. de  
C.V.  
Rio Volga 600  
Colonia del Valle  
**MONTERREY, N.L.**  
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Telex: 038-410  
CH

**MOROCCO**

*Dolbeau*  
*81 rue Karatchi*  
**CASABLANCA**  
Tel: 3041-82, 3068-38  
Telex: 23051, 22822  
E  
*Gerep*  
*2 rue d'Agadir*  
*Boite Postale 156*  
**CASABLANCA**  
Tel: 272093, 272095  
Telex: 23 739  
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Hewlett-Packard Nederland B.V.  
Van Heuven Goedhartlaan 121  
NL 1181KK **AMSTELVEEN**  
P.O. Box 667  
NL1080 AR **AMSTELVEEN**  
Tel: (20) 47-20-21  
Telex: 13 216  
A,CH,CM,CS,E,MP,P  
Hewlett-Packard Nederland B.V.  
Bongerd 2  
NL 2906VK **CAPPELLE, A/D IJssel**  
P.O. Box 41  
NL2900 AA **CAPELLE, IJssel**  
Tel: (10) 51-64-44  
Telex: 21261 HEPAC NL  
A,CH,CM,CS  
Koning en Hartman Electrotechniek  
B.V.  
Koperwerf 30  
2544 En den Haag  
The **NETHERLANDS**  
Tel: 070-210101  
Telex: 31528  
CM

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Hewlett-Packard (N.Z.) Ltd.  
169 Manukau Road  
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Epsom, **AUCKLAND**  
Tel: 687-159  
Cable: HEWPACK Auckland  
CH,CM,E,P\*  
Hewlett-Packard (N.Z.) Ltd.  
4-12 Cruickshank Street  
Kilbirnie, **WELLINGTON 3**  
P.O. Box 9443  
Courtenay Place, **WELLINGTON**  
Tel: 877-199  
Cable: HEWPACK Wellington  
CH,CM,E,P  
*Northrop Instruments & Systems*  
*Ltd.*  
*369 Khyber Pass Road*  
*P.O. Box 8602*  
**AUCKLAND**  
Tel: 794-091  
Telex: 60605  
A,M

*Northrop Instruments & Systems*  
*Ltd.*  
*110 Mandeville St.*  
*P.O. Box 8388*  
**CHRISTCHURCH**  
Tel: 486-928  
Telex: 4203  
A,M

*Northrop Instruments & Systems*  
*Ltd.*  
*Sturdee House*  
*85-87 Ghuznee Street*  
*P.O. Box 2406*  
**WELLINGTON**  
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Telex: NZ 3380  
A,M

**NORTHERN IRELAND**

*Cardiac Services Company*  
*95A Finaghy Road South*  
**BELFAST BT 10 OBY**  
Tel: (0232) 625-566  
Telex: 747626  
M

**NORWAY**

Hewlett-Packard Norge A/S  
Folke Bernadottesvei 50  
P.O. Box 3558  
N-5033 **FYLLINGSDALEN (BERGEN)**  
Tel: (05) 16-55-40  
Telex: 16621 hpnas n  
CH,CM,E  
Hewlett-Packard Norge A/S  
Oesterdalen 18  
P.O. Box 34  
N-1345 **OESTERAAAS**  
Tel: (02) 17-11-80  
Telex: 16621 hpnas n  
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**OMAN**

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*P.O. Box 19*  
**MUSCAT**  
Tel: 72-22-17, 72-22-25  
Telex: 3289 BROKER MB MUSCAT  
P

**PAKISTAN**

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*10, Bazar Road*  
*Sector G-6/4*  
**ISLAMABAD**  
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Cable: *FEMUS Rawalpindi*  
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*Oosman Chambers*  
*Abdullah Haroon Road*  
**KARACHI 0302**  
Tel: 511027, 512927  
Telex: 2894 MUSKO PK  
Cable: *COOPERATOR Karachi*  
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*Calle Samuel Lewis*  
*Apartado 4929*  
**Panama 5**  
*Edificio "Alfa" No. 2*  
**CIUDAD DE PANAMA**  
Tel: 64-2700  
Telex: 0383 ELECTRON PG  
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Arranged alphabetically by country

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Foto Internacional, S.A.  
Free Zone Colon  
Apartado 2068  
COLON 3  
Tel: 45-2333  
Telex: 379 8626, 386 8722  
P

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Cla Electro Médica S.A.  
Los Flamencos 145, San Isidro  
Casilla 1030  
LIMA 1  
Tel: 41-4325, 41-3703  
Telex: Pub. Booth 25306  
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## PHILIPPINES

The Online Advanced Systems  
Corporation  
Rico House, Amorsolo Cor. Herrera  
Street  
Legaspi Village, Makati  
P.O. Box 1510  
Metro MANILA  
Tel: 85-35-81, 85-34-91, 85-32-21  
Telex: 3274 ONLINE  
A,CH,CS,E,M  
Electronic Specialists and  
Proponents Inc.  
690-B Epifanio de los Santos  
Avenue  
Cubao, QUEZON CITY  
P.O. Box 2649 Manila  
Tel: 98-96-81, 98-96-82, 98-96-83  
Telex: 40018, 42000 ITT GLOBE  
MACKAY BOOTH  
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Buro Informacji Technicznej  
Hewlett-Packard  
Ul. Stawki 2, 6P  
P.00-950 WARSZAWA  
Tel: 39-59-62, 39-67-43  
Telex: 812453 hepa pl

## PORTUGAL

SOQUIMICA  
Av. da Liberdade 220-2  
P-1298 LISBOA Codex  
Tel: 56 21 81, 56 21 82  
Telex: 13316  
Telectra-Empresa Técnica de  
Equipamentos Eléctricos S.a.r.l.  
Rua Rodrigo da Fonseca 103  
P.O. Box 2531  
P-LISBON 1  
Tel: (19) 68-60-72  
Telex: 12598  
CH,CS,E,P  
Mundinter  
Intercambio Mundial de Comércio  
S.a.r.l.  
P.O. Box 2761  
Avenida Antonio Augusto de Aguiar  
138  
P-LISBON  
Tel: (19) 53-21-31, 53-21-37  
Telex: 16691 munter p  
M

## PUERTO RICO

Hewlett-Packard Puerto Rico  
P.O. Box 4407  
CAROLINA, Puerto Rico 00630  
Calle 272 Edificio 203  
Urb. Country Club  
RIO PIEDRAS, Puerto Rico 00924  
Tel: (809) 762-7255  
Telex: 345 0514  
A,CH,CS

## QATAR

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Tel: 22170  
Telex: 4439 NASSER  
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DOHA  
Tel: 329515  
Telex: 4806 CHPARB  
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Boulevard Nicolae Balcescu 16  
BUCURESTI  
Tel: 130725  
Telex: 10440

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P.O. Box 193  
AL-KHOBAR  
Tel: 44-678, 44-813  
Telex: 670136  
Cable: ELECTA AL-KHOBAR  
CH,CS,E,M,P  
Modern Electronic Establishment  
P.O. Box 1228, Baghdadiah Street  
JEDDAH  
Tel: 27-798  
Telex: 401035  
Cable: ELECTA JEDDAH  
CH,CS,E,M,P  
Modern Electronic Establishment  
P.O. Box 2728  
RIYADH  
Tel: 62-596, 66-232  
Telex: 202049  
CH,CS,E,M,P

## SCOTLAND

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Royal Bank Buildings  
Swan Street  
BRECHIN, Angus, Scotland  
Tel: 3101, 3102  
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Hewlett-Packard Ltd.  
SOUTH QUEENSFERRY  
West Lothian, EH30 9GT  
GB-Scotland  
Tel: (031) 3311000  
Telex: 72682  
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SINGAPORE, 9115  
6th Floor, Inchcape House  
450-452 Alexandra Road  
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Tel: 631788  
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Telex: 57-0006  
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P.O. Box 37099  
Overport  
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Hewlett-Packard South Africa (Pty.)  
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1st Floor East  
Constantia Park Ridge Shopping  
Centre  
Constantia Park  
PRETORIA  
Tel: 01298-1126  
Telex: 32163  
CH,E  
Hewlett-Packard South Africa (Pty.)  
Ltd.  
Private Bag Wendywood  
SANDTON 2144  
Tel: 802-5111, 802-5125  
Telex: 89-84782  
Cable: HEWPACK Johannesburg  
A,CH,CM,CS,E,MS,P

## SPAIN

Hewlett-Packard Española S.A.  
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E-BARCELONA 29  
Tel: (3) 322-24-51, 321-73-54  
Telex: 52603 hpbee  
A,CH,CM,CS,E,MS,P  
Hewlett-Packard Española S.A.  
c/San Vicente S/N  
Edificio Albia II, 7 B  
E-BILBAO 1  
Tel: (944) 423-8306, 423-8206  
A,CH,CM,E,MS  
Hewlett-Packard Española S.A.  
Calle Jerez 3  
E-MADRID 16  
Tel: 458-2600  
Telex: 23515 hpe  
A,CM,E  
Hewlett-Packard Española S.A.  
c/o Costa Brava 13  
Colonia Mirasierra  
E-MADRID 34  
Tel: 734-8061, 734-1162  
CH,CS,M  
Hewlett-Packard Española S.A.  
Av Ramón y Cajal 1-9  
Edificio Sevilla 1,  
E-SEVILLA 5  
Tel: 64-44-54, 64-44-58  
Telex: 72933  
A,CM,CS,MS,P  
Hewlett-Packard Española S.A.  
C/Ramon Gordillo, 1 (Entlo.3)  
E-VALENCIA 10  
Tel: 361-1354, 361-1358  
CH,CM,P

## SWEDEN

Hewlett-Packard Sverige AB  
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S-16120 BROMMA  
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Telex: (854) 10721 MESSAGES  
Cable: MEASUREMENTS  
STOCKHOLM  
A,CH,CM,CS,E,MS,P

Hewlett-Packard Sverige AB  
Sunnanvagen 14K  
S-22226 LUND  
Tel: (46) 13-69-79  
Telex: (854) 10721 (via BROMMA  
office)  
CH,CM  
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Vastra Vintergatan 9  
S-70344 OREBRO  
Tel: (19) 10-48-80  
Telex: (854) 10721 (via BROMMA  
office)  
CH,CM  
Hewlett-Packard Sverige AB  
Fröfällsgratan 30  
S-42132 VÄSTRA-FRÖLUNDA  
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Telex: (854) 10721 (via BROMMA  
office)  
CH,CM,E,P

## SWITZERLAND

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CH-4058 BASLE  
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A,CM  
Hewlett-Packard (Schweiz) AG  
Bahnhöherweg 44  
3018 BERN  
Tel: (031) 56-24-22  
CH,CM  
Hewlett-Packard (Schweiz) AG  
47 Avenue Blanc  
CH-1202 GENEVA  
Tel: (022) 32-30-05, 32-48-00  
CH,CM,CS  
Hewlett-Packard (Schweiz) AG  
29 Chemin Château Bloc  
CH-1219 LE LIGNON-Geneva  
Tel: (022) 96-03-22  
Telex: 27333 hpag ch  
Cable: HEWPACKAG Geneva  
A,CM,E,MS,P  
Hewlett-Packard (Schweiz) AG  
Zürcherstrasse 20  
Allmend 2  
CH-8967 WIDEN  
Tel: (57) 50-111  
Telex: 59933 hpag ch  
Cable: HPAG CH  
A,CH,CM,CS,E,MS,P

## SYRIA

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Nuri Basha-Ahmad Ebn Kays Street  
P.O. Box 5781  
DAMASCUS  
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Telex: 11215 ITIKAL  
Cable: ELECTROBOR DAMASCUS  
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Middle East Electronics  
Place Azme  
Boite Postale 2308  
DAMASCUS  
Tel: 334592  
Telex: 11304 SATACO SY  
M,P

## TAIWAN

Hewlett-Packard Far East Ltd.  
Kaohsiung Office  
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KAOSIUNG  
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E,MS,P

Hewlett-Packard Far East Ltd.  
Taichung Office  
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Hewlett-Packard Far East Ltd.  
Taiwan Office  
5th Floor  
205 Tun Hwa North Road  
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Bangkok Business Equipment Ltd.  
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Tel: 280-144  
E,P  
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M

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Teknim Company Ltd.  
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