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4000

HP 64000 Logic Development System

Model 64500A Prom Programmer Reference Manual

HEWLETT PACKARD

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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 the 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.

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SAFETY SYMBOLS

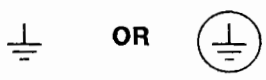
General Definitions of Safety Symbols Used on Equipment or in Manuals.



Instruction manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.



Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).

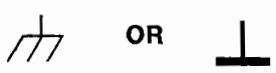


OR

Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.



Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with this symbol must be connected to ground in the manner described in the installation (operating) manual, and before operating the equipment.



OR

Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



Alternating current (power line).

Direct current (power line).



Alternating or direct current (power line).

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed, could result in injury or death to personnel.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE:

The NOTE sign denotes important information. It calls attention to procedure, practice, condition or the like, which is essential to highlight.

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HEWLETT PACKARD

OPERATING MANUAL

MODEL 64500S
PROM PROGRAMMER
REFERENCE MANUAL

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LOGIC SYSTEMS DIVISION
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Chapter 1

PROM PROGRAMMER

INTRODUCTION

This manual provides instructions for installing and operating the Model 64500S PROM Programmer option. The first part of the manual describes the Model 64500S PROM Programmer option and shows you how to install it in a Model 64100 terminal. The PROM Programmer is not compatible with the Model 64110A terminal. All of the error messages that can be displayed by the PROM Programmer are listed and described at the end of this manual.

DESCRIPTION

The Model 64500S PROM Programmer option provides the capability to program, verify, and read popular bipolar and MOS PROM's. A PROM Programmer consists of a 64502A PROM Interface Module, A 64501A Control Card, a special cable (HP Part No. 8120-4336), and a choice of unique personality PROM modules. The PROM Programmer includes circuitry for the operator self test and for the service self test.

Table 1 lists power supply requirements of the PROM Programmer option. This information will help you determine how many circuit cards can be loaded into the card cage of your terminal.

Table 1. PROM Programmer Power Requirements

Power Supply	+40V	+12V	+5V	-5.2V	-12V
Typical Current	0.38A	.03A	1.07A	.01A	.01A

CAUTION

Before turning on or turning off system power, make sure there are no PROM's or other devices installed in any of the module sockets. Otherwise, the device may be damaged or its program altered.

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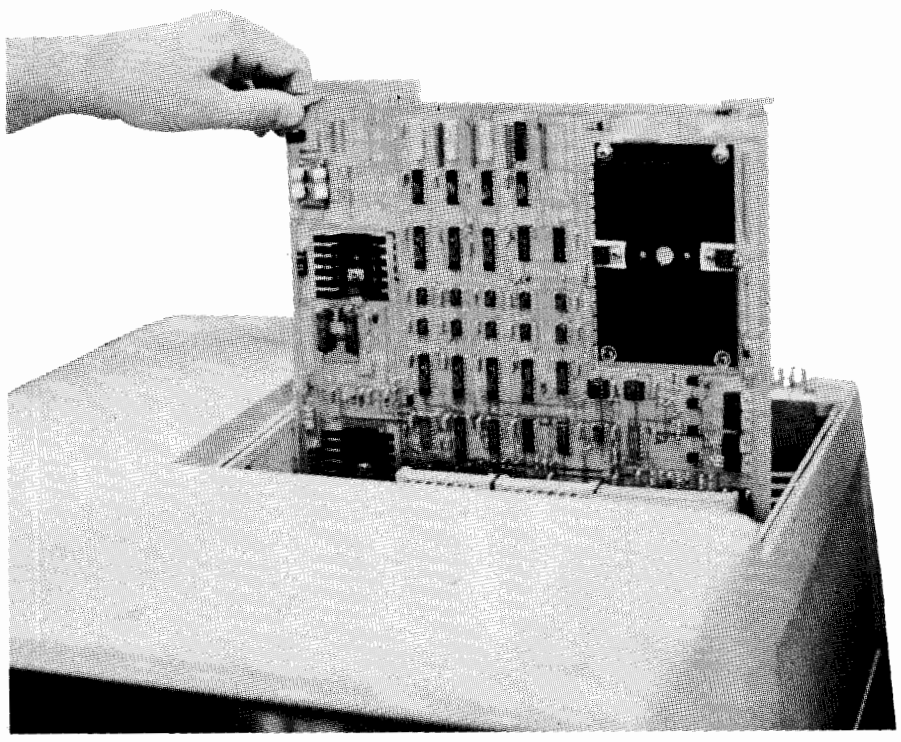


Figure 1. Control Board Installation

INSTALLATION

CAUTION

Turn off station power before installing PC card or connecting personality module.

Control Board Installation

Remove the card cage top lid by loosening the two screws, lifting the back of the lid, and pulling to the rear. Install the Model 64501A driver card in the card cage (component side toward front of instrument) in the card slot closest to the front of the 64100A terminal to minimize cable length problems. This will normally be slot 0 to slot 1 if a 64941A Floppy Disc system is installed.

Connect the single-keyed connector of the PROM cable (HP Part No. 8120-4336) to the top, left-hand connector of the circuit board.

Run the cable across the top of the card cage and down behind the right side of the front panel. Both connectors on the end of the cable should be visible in the well on the right-hand side of the keyboard.

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Personality Module Installation

Personality modules come with one or two connectors (see figure 2). The cable can be used with either type. If the module has only one connector, connect it to the end cable connector. This allows the module to seat fully into the well. If the module has two connectors, use both cable connectors.

NOTE

The cable and module connectors are keyed so there is only one way to connect them.

After the cable is connected, place the module in the well and adjust it until it is flush. Turn the hold-down screw clockwise until it is tight.

PROM Installation

To use the PROM Programmer Module, proceed as follows:

1. Before installing PROM in personality module, press the ***prom_prog*** softkey at the monitor level. This evokes the PROM Programmer Software module, ensuring no unwanted voltages will be present at pins of the personality module.

2. Install PROM into personality module. Pin 1 is identified on each personality module.

CAUTION

Certain PROM's can be damaged by static electricity. Observe the manufacturer's handling procedures to prevent damage. Verify the correct PROM programmer personality module is installed in the Model 64100.

3. Use any or all PROM Programmer functions.

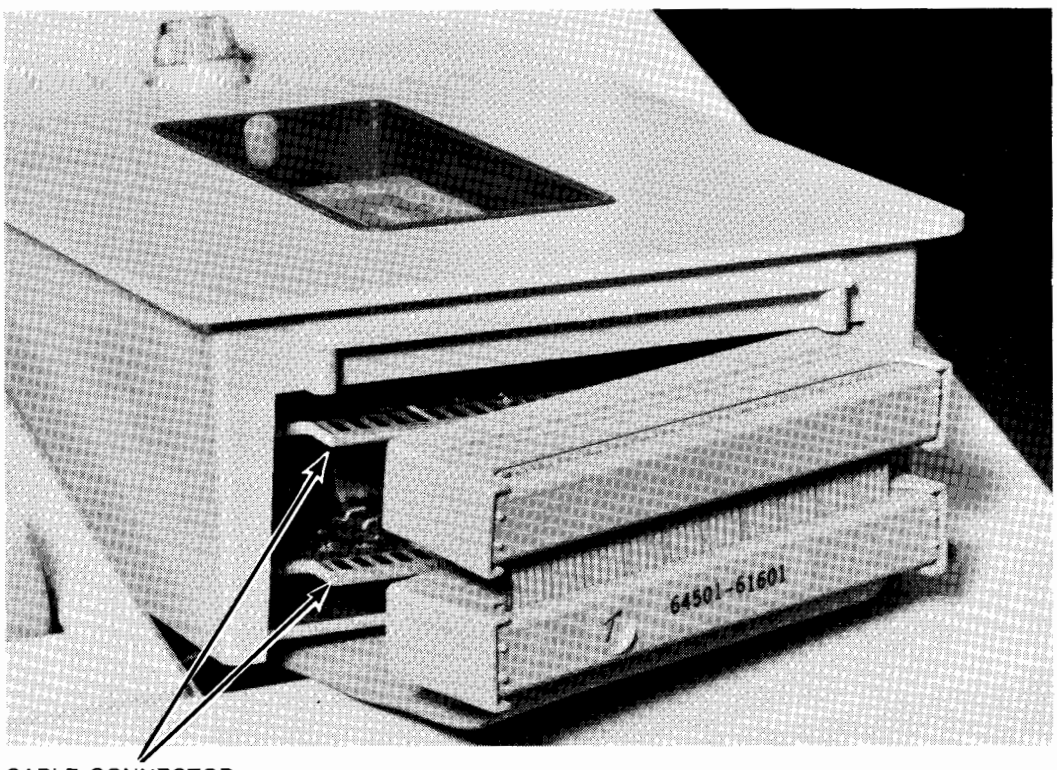
4. After programming session, remove PROM from personality module socket.

5. Exit PROM Programmer Software Module.

NOTE

Do not leave PROM's in the personality module socket when PROM Programmer Software Module is not in use.

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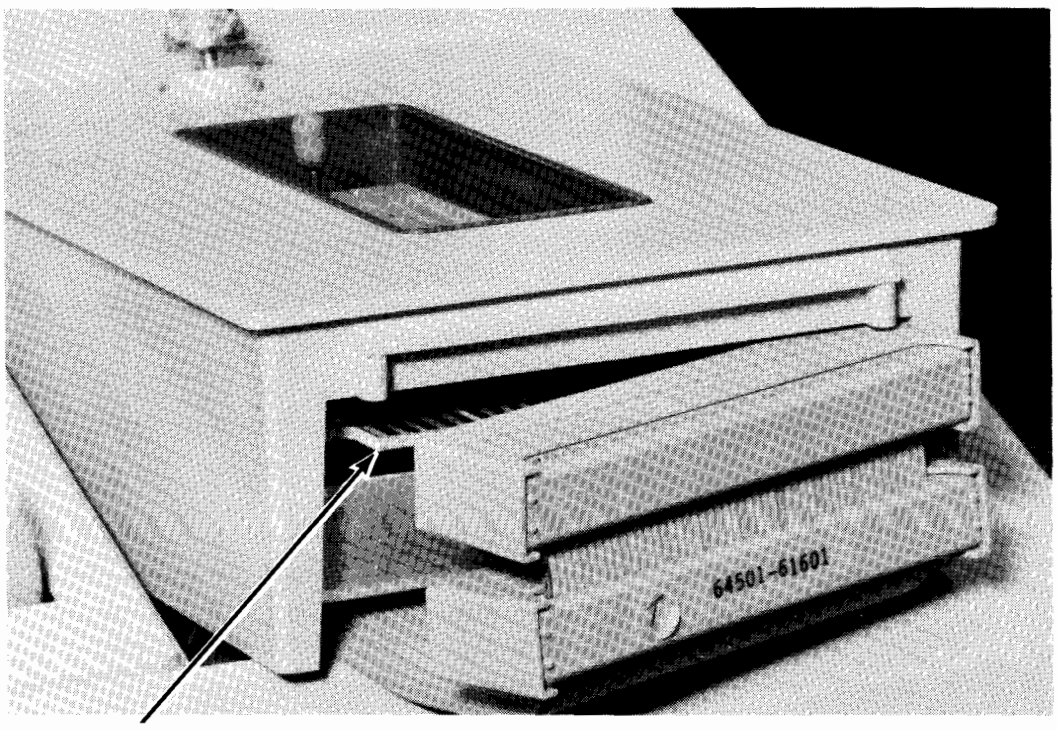


Figure 2. Personality Module Installation

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OPERATING THE PROM PROGRAMMER

The following paragraphs describe how to operate the PROM Programmer. First, all of the parameters common to the PROM Programmer softkeys are listed and described. Then the kinds of files used by the PROM Programmer are described. The formula used by the PROM Programmer to calculate addresses and data segments during programming is discussed. Finally, each of the softkeys is described in detail.

Parameters

The following parameters are used by many of the softkeys that appear during PROM Programmer operation.

<ADDRESS>

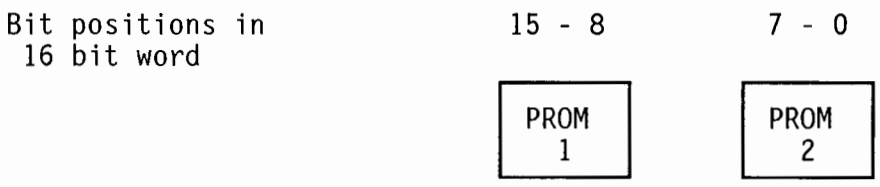
The <ADDRESS> parameter prompts you to specify where the terminal should begin its read or write of PROM data or of the content of the absolute file or the listing file, as applicable. If you make no entry in this field, the terminal will begin with address 0H.

START <ADDRESS>

The start parameter specifies the lowest address in the absolute or listing file, or in the PROM, where programming or reading should begin. The default is 0.

BIT <VALUE>

The bit parameter identifies a single logical unit. You can use this to extract bytes and nibbles from a file whose word size is greater than the PROM size. The bit number identifies the least significant bit of the byte or nibble. For example, if a processor word is 16 bits wide and memory is contained on two 8-bit PROM's, the bit number allows programming these PROM's from the same file as follows:




```
program_from FILE bit 8     PROM 1, bits 15 - 8

program_from FILE bit 0     PROM 2, bits 7 - 0

The "bit 0" entry was unnecessary in the second line. The default
bit value is 0.
```

ROM_ADDR

The PROM address function permits programming or reading a sub range of the PROM. Normally, programming or reading will affect the entire address range of the PROM, but there are occasions when you may want to affect only a portion of the PROM range. The rom_addr can specify a starting and ending address range in the PROM for programming or reading. In the case of

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"rom_addr 5 thru 8", for example, programming or reading will occur in PROM addresses 5 thru 8 inclusive.

NEG_DATA

If the system hardware is constructed using negative logic, it will expect the data to be complemented. In such cases, the neg_data option will perform a ones complement of the data before it is programmed into the PROM and will complement data read from the PROM.

NEG_ADDR

If the hardware expects an address to be negative logic, the programmer can store data at the ones complement of the address given. For example, if data would normally be programmed at PROM address 0, the programmer would store it at the ones complement of the address (in this case, the maximum PROM address).

No_Blank_Check

The PROM Programmer normally performs a blank check of the PROM before programming begins. It places an error message on screen if it finds the PROM is not blank. If your PROM is not blank, but you still want to program it, you can override the blank check feature by using the no_blank_check instruction.

Files Used by PROM Programmer

The PROM Programmer can use two types of files for programming or verifying PROM contents: absolute files and listing files. These two file types are described below.

Absolute files are created by the system linker. They contain information about the processor, the addresses where data is located in memory, and who generated the file. All of this information will be transparent to the user. The programmer is compatible with any microprocessor, regardless of word size.

Listing files provide several features within the programmer. For example, they allow the user to see what is in a PROM. By listing a PROM program to a file, it can be reviewed for changes or corrections via the system editor and returned to the programmer for downloading onto a PROM.

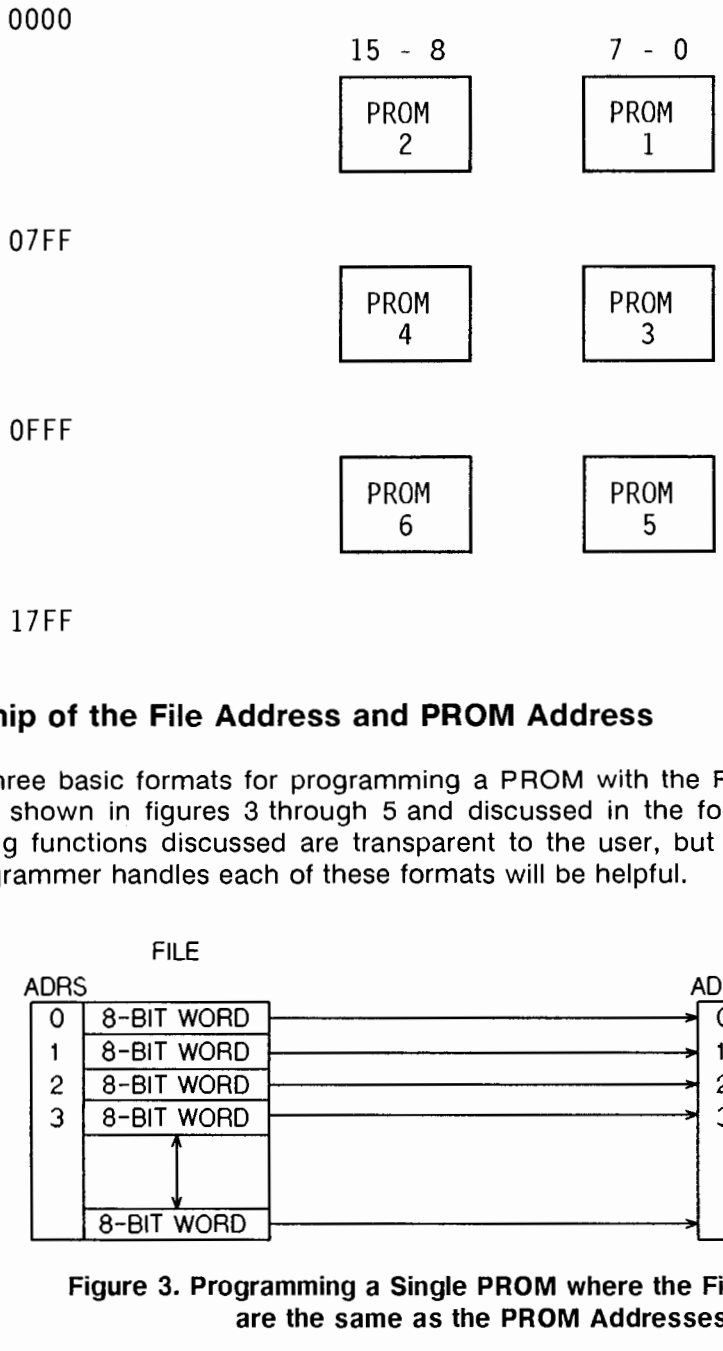
CAUTION

Syntax of the listing file is very important to the PROM Programmer. Be careful, therefore, not to change the basic structure of the file. This structure is described in Appendix A of this manual.

The list function has another important feature. It allows the user to generate a memory map which may consist of more that one ROM and cover a 32-bit address space. A list file containing bit widths up to 128 bits wide can be constructed using the bit number function. Also, by specifying the starting address, PROM data can be placed anywhere in the list file, and the existing list data will automatically be updated. For example, if we had a memory which was 6K long by 16 bits wide and we wanted to construct a file reflecting the memory shown below, we would issue the following commands to construct the list file:

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```
list_rom_to LIST start 0000H bit 0    for PROM 1
list_rom_to LIST start 0000H bit 8    for PROM 2
list_rom_to LIST start 0800H bit 0    for PROM 3
list_rom_to LIST start 0800H bit 8    for PROM 4
list_rom_to LIST start 1000H bit 0    for PROM 5
list_rom_to LIST start 1000H bit 8    for PROM 6
```



Relationship of the File Address and PROM Address

There are three basic formats for programming a PROM with the PROM Programmer. The three formats are shown in figures 3 through 5 and discussed in the following paragraphs. All of the programming functions discussed are transparent to the user, but some explanation of how the PROM Programmer handles each of these formats will be helpful.

Figure 3. Programming a Single PROM where the File Addresses are the same as the PROM Addresses

Figure 3 shows the programming of a PROM where the word size in the file is the same as the word size of the PROM. In this case, you insert the PROM in the Personality Module, press the ***program*** softkey, and type in the name of your file. When you press RETURN, the terminal will automatically take the data word from file address 0 (bit-by-bit) and program it into PROM address

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0. Then it will take the word from file address 1 and program it into PROM address 1. It will continue this process until it reaches the end of the file.

Parameters are available in the PROM Programmer to help you overcome special programming problems. The parameters can be used as follows:

a. In the case where your file is too large to be contained in one PROM, you will have to distribute blocks of your file over two or more PROM's. You can program your first PROM from the file address 0, but subsequent PROM's will have to be programmed from addresses located further into the file. The ***start*** <ADDRESS> parameter is provided to help you accomplish this task. When you include a ***start*** <ADDRESS> in your command, the first word taken from the file will not come from address 0. Instead, it will come from the file address you specify. The next word will be taken from <ADDRESS>+1, and the word after that from <ADDRESS>+2, etc.

b. There is also a parameter that lets you program a portion of the available space in the PROM without programming the entire PROM. You can specify the address where programming will start in the PROM. You can also format the command as <value> thru <value> if you want to program a limited portion of the center of the PROM without affecting the content of either end of the PROM. The parameter to use for this requirement is the ***rom_addr*** <value> in your command, the first word taken from your file will be programmed into the PROM at PROM address <value>. The next word taken from your file will be programmed into PROM address <value>+1, etc.

c. You can use the ***start*** and ***rom_addr*** parameters together to program activity starting at any file address and any PROM address.

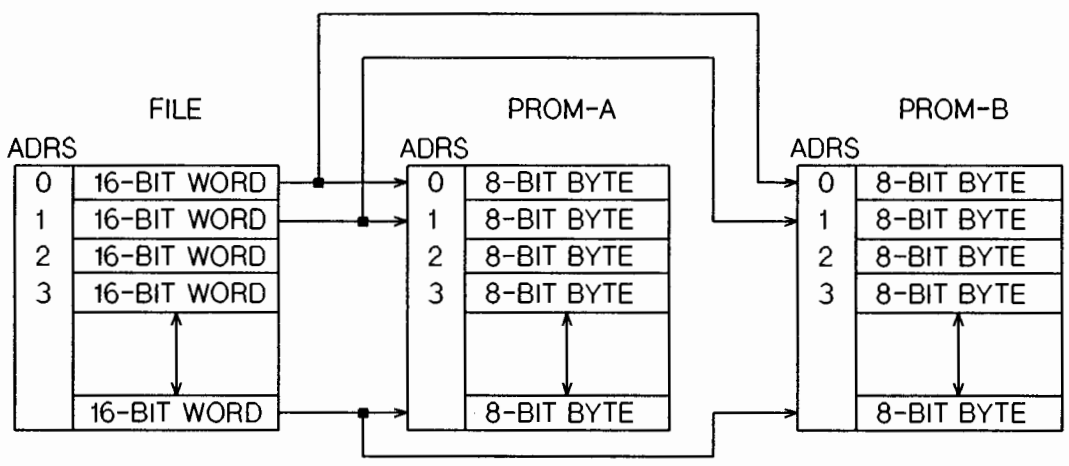


Figure 4. Programming Multiple PROM's where the File Address is the same as the PROM Address

When you are programming a set of PROM's like those shown in figure 4, you can only program one of the PROM's at a time (you might program PROM-A first and then program PROM-B next). To accomplish this programming, you will need to use the ***bit*** <value> parameter. To program PROM-A, you can simply specify a command of ***program*** <the name of your file> (RETURN). The PROM Programmer will program bits 0 through 7 of each word into the PROM and send bits 8 through 15 of each word to a location unrecognized by the Programmer Module.

Then you will need to add the ***bit*** <value> parameter to your command before you can program the next PROM. This time your command line will read ***program*** <the name of your file> ***bit*** <8>

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(RETURN). This command will cause the PROM Programmer to send bits 0-7 of each word to a location unrecognized by the Programmer Module and begin programming into the PROM with bit 8 of each word. The PROM Programmer reads every bit each time it goes through your file but it only enters the specified bits into the PROM.

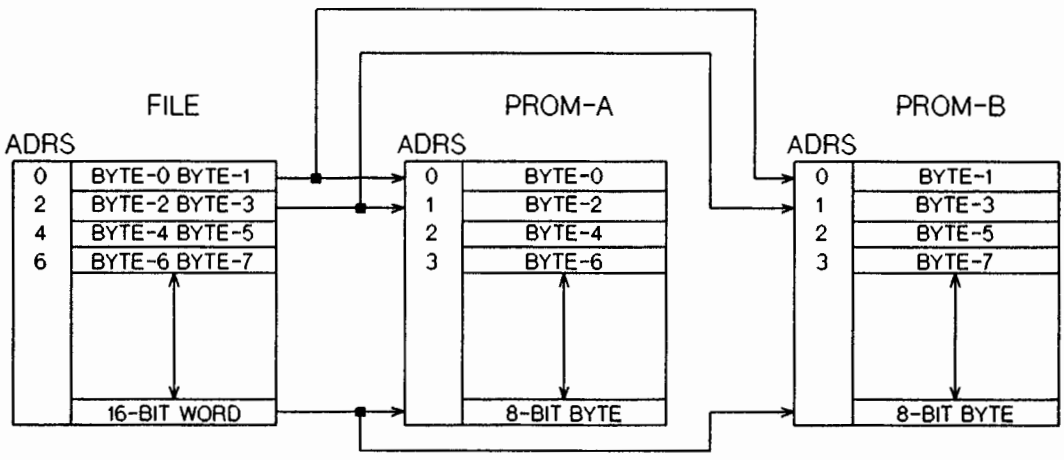


Figure 5. Programming Multiple PROM's where the File Address is different from the PROM Address

When you are programming PROM's in a situation like figure 5, you may find that the data is programmed into PROM addresses which are different from the addresses you expect to see. As shown above, you would find the first byte of the word at file address 200H programmed into PROM address 100H.

In figure 5, the PROM Programmer divides each word in your file into bytes and programs the bytes into consecutive PROM locations. The PROM Programmer accomplishes this task by making multiple passes through the file. On the first pass, the PROM Programmer will take all of the even numbered bytes and program them into PROM-A. It will send the odd-numbered bytes of each word to addresses which are not recognized by the Programmer Module. You must insert the other PROM into the Programmer Module before you start the next pass. Then the PROM Programmer will program PROM-B.

When it finishes programming a PROM address, the PROM Programmer will calculate the next PROM address to be programmed by using the formula shown in figure 6. The formula that was chosen to calculate the next address is universal. It will calculate correct PROM addresses for any programming arrangement, regardless of the size of the file word or the size of the PROM bytes. At the end of each pass through the file, the rom_addr parameter is incremented by 1 to begin the next pass through the file at the proper byte address in the file.

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```
     PROM address = (file address - file start) X

        (address base/word size) + rom_addr

Where:

 PROM address = next address to be programmed in PROM.

 file address = address in file where next data unit
                will be obtained.

 file start   = first file address where data was
                taken for PROM programming during
                present run.

 address base = smallest unit of data the processor
                can address.

 word size    = number of bits addressing a data word
                for the processor.

 rom_addr     = PROM address offset where first byte
                was programmed during the present run.
```

Figure 6. Formula PROM Programmer uses to calculate Next Addresses during programming.

To format your commands when programming PROM's that correspond to figure 5, use the following procedure:

1. Insert the first PROM to be programmed into the Programmer Module.
2. Enter ***program*** <the name of your file> ***bit*** 0, and press RETURN.
3. PROM_A will be programmed automatically with the correct set of bytes from your file.
4. Remove PROM-A.
5. Insert PROM_B.
6. Enter ***program*** <the name of your file> ***bit*** 8, and press RETURN. PROM_B will be programmed with the corresponding set of bytes from your file.

NOTE

You can program a set of PROM's with more that two PROM's in the set by using the PROM Programmer. Simply repeat steps 2 through 6 of this procedure, and select the correct bit numbers until all of your PROM's are programmed.

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Softkeys Used by the PROM Programmer

Table 2 lists each of the softkeys that is used in the operation of the PROM Programmer, and describes their functions. On the pages following table 2, each of these softkeys is discussed in detail.

Table 2. PROM Programmer Softkeys

Softkey Name	Function Selected
program	Causes the terminal to program and verify your PROM from the absolute file or listing file you specify.
verify	Causes the terminal to compare the data in your PROM with the data in the absolute file or listing file you specify.
list_rom	Causes the terminal to create a list of the content of your PROM either on the printer or in a listing file.
display	Causes the CRT to display the data at any PROM location you specify. Press display again to exit this selection.
check_sum	Causes the terminal to display a 32-bit total of all data stored either in your PROM or in the file you specify.
prog_loc	Causes the terminal to program only the PROM address you specify.
read_loc	Causes the terminal to read only the PROM address you specify.

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program

Syntax

```
program_from <FILE> [parameters]
```

Parameters

:absolute	identifies the program source as the absolute file.
:listing	identifies the program source as a listing file.
bit <value>	least significant bit of data unit (default 0).
rom_addr <value> thru <value>	PROM sub range (default entire range of PROM).
neg_data	negative logic for data (default positive logic).
neg_addr	negative logic for address (default positive logic).
no_blank	turns off the automatic blank_check feature.

Function

This function programs a PROM from either an absolute or a listing file. Each time a location is programmed, the location is read and compared to the file data. If the comparison does not match, the location is reprogrammed and compared again in an attempt to match the file data. This will occur five times. After the fifth try, the programmer will stop and display a message on the status line stating that the programming function has failed, and programming will stop. If no programming errors occur, the PROM will be programmed and an automatic verification of the PROM will be performed to make sure that programming one location did not affect any others.

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verify

Syntax

```
verify_from <FILE> [parameters]
```

Parameters

:absolute	identifies the file as the absolute file.
:listing	identifies the file as a listing file.
start <ADDRESS>	starting file address (default 0).
bit <value>	least significant bit of data unit (default bit 0).
rom_addr <value> thru <value>	PROM sub range (default entire range of PROM).
neg_data	negative logic for data (default positive logic).
neg_addr	negative logic for address (default positive logic).
listfile	list locations which fail verify.

Function

The verify command will compare file data with data in the PROM and report the number of failures on the status line. If the PROM verifies, the status will read:

Verify complete, no errors

If the PROM does not verify, the number of failures will be displayed on the status line. If you specify a list file, a summary of the failures will be listed with PROM address, PROM data, and file data. If the verify does not find any data in the range specified, and warning message will be displayed stating that no locations were verified.

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list_rom

Syntax

```
list_rom_to <FILE> [parameters]
```

Parameters

start <ADDRESS>	starting file address (default 0).
bit <value>	least significant bit of data unit (default 0).
rom_addr <value> thru <value>	PROM sub range (default entire range of PROM).
neg_data	negative logic for data (default positive logic).
neg_addr	negative logic for address (default positive logic).

Function

The list instruction allows the user to obtain a list of PROM contents by listing them to a file or to the printer directly. The list file can then be edited and used to construct memory maps of several PROM's. (Refer to paragraph entitled "File Data".)

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display

Syntax

```
display <ADDRESS>
```

Parameters

<ADDRESS> starting address of data display, default 0.

Function

The display command will show the hex value of data stored at each location in the PROM. Press display again to exit this mode.

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check_sum

Syntax

```
check_sum rom [parameters]
```

Parameters

rom_addr <value> thru <value>	PROM sub range (default entire range of PROM)
neg_data	negative logic for data (default positive logic)
neg_addr	negative logic for address (default positive logic)

Syntax

```
check_sum <FILE> [parameters]
```

Parameters

:absolute	identifies the file as the absolute file.
:listing	identifies the file as a listing file.
start <ADDRESS>	starting file address (default 0).
bit <value>	least significant bit of data unit (default bit 0).
rom_addr <value> thru <value>	PROM sub range (default entire range of PROM).
neg_data	negative logic for data (default positive logic).
neg_addr	negative logic for address (default positive logic).

Function

The check sum is a 32-bit sum of all data in the specified range in the PROM or from the file.

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prog_loc

Syntax

```
program_location <address> to <value> [parameters]
```

Parameters

neg_data — negative logic for data (default positive logic).

neg_addr — negative logic for address (default positive logic).

Function

This function permits the programming of one location at a time and is useful when dealing with check sums. The address specified must be in the PROM address range, and the lower 4 or 8 bits of the value must be used. The programmer will try to program the location without checking to see if it is a blank or not; then it will read the location back and compare data. The status line will tell if the location programmed or not.

NOTE

This function should not be used on any PROM which requires several passes through the address range to program it (such as the 2708).

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read_loc

Syntax

```
read_location <ADDRESS>
```

Parameters

neg_data	negative logic for data (default positive logic).
neg_addr	negative logic for address (default positive logic).

Function

This function will read the content at the specified address, and display the data on the status line.

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PROM PROGRAMMER SELF-CHECK

NOTE

Model 64502A Personality Module must be connected to run this test.

To evoke the PROM programmer self-check, proceed as follows:

1. At the system monitor level, press the ***opt_test*** softkey and press (RETURN). The display will show a list of modules that offer Option Performance Verification, and identify the slots where each is located.

2. Press the number key on the keyboard corresponding with the Slot # of the Prom Programmer, and press (RETURN). The top of the display will show "Prom Programmer Performance Verification". The bottom of the display will show "STATUS: Awaiting option_test command."

3. Press the ***cycle*** softkey. The system will perform each of the tests in sequence. It will count the number of tests performed, and count the number of test failures (if any).

4. You can perform any of the tests singly, if desired. Press ***next_test*** as required to move the bright bar to the desired test on screen. Then press ***disp_test*** to get the single-test mode.

5. Press the ***start*** key to run the test. Press it again to stop the test.

6. Press the ***exit_test*** key to return to the full list of prom programmer performance verification tests.

7. Press the ***print*** key anytime you want to obtain a copy of the present display on an associated printer, if available.

8. Press ***end***. This completes the operator's self-check. For a detailed description of the performance verification tests, refer to the PROM Programmer Service Manual.

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Table 3. PROM Programmer Error Messages

Bit number too large

Bit number specified is too large

Blank check failed

PROM is not blank.

Ending rom address too large

Specified end address is greater than maximum address.

Error found while reading listing file

This message indicates that an error was found in the list file. The error was probably made while editing the list file.

File prom:HP not present

This message indicates that the prom programmer software is not present on the system disc.

Mapping error

During programming, data was sent to an address specified as illegal in your memory map.

More than one prom card in cage

Two or more cards in cage. There must be only one.

No control card in card cage. Power down and insert card.

Control card not plugged in. Turn off station power and start again.

Programming error: prom address=XXXXH, data=XXH, file data=XXH

The indicated location failed to program. Contents of the PROM are displayed along with data from the file which should have been programmed in that location.

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Table 3. PROM Programmer Error Messages

Prom module not recognized

The socket is not recognized by the software. This message indicates that there is either a hardware error, or that the software does not recognize a new socket. In the latter case, a software update will be necessary.

Socket module not connected

Socket is not connected to PROM Control Card. Check cables.

Starting rom address too large

PROM address is greater than maximum address.

Test voltage overload, check prom or socket

When programmer is initialized, the socket is checked to see if it is drawing too much current. If this error message occurs, it indicates there is either a hardware problem, or the PROM is plugged in upsidedown.

User memory

During programming, data was sent to an address specified as user memory in your memory map.

Verify failed XXXX times

This message indicates the file data and PROM data did not match during the verify command.

Warning. No file data found in address range.

When verifying a file, if none of the file data is mapped into the PROM space, this message will be displayed.

64502A prom module ID not detected - only ID test may be run.

This message is displayed when the PROM Programmer self test detects any PROM socket other than a 64502A Programmer Module installed. Only the 64502A Programmer Module is capable of handling the voltage produced during performance verification. See service manual.

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NOTES

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TABLE OF CONTENTS

Appendix A: PROM LISTFILE FORMAT

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Appendix A

PROM LISTFILE FORMAT

The list option of the PROM Programmer can be used to list the contents of a PROM to the printer or to a listfile. The PROM Programmer can also program PROM's from listfiles, if the listfiles have been created in a particular format. The format that the PROM Programmer uses to create listfiles and/or to program PROM's is as follows:

```
<ADDRESS> data data data data data, etc
```

The listfile <ADDRESS> is similar to an address in an absolute file. It indicates that the next piece of data will reside at the address specified:

Example:

```
<0000> 00 01 02 03 04 05 06 07 08 09 0A 0B 0D 0E 0F
```

Here, the file address is <0000> and the data in that location is 01, etc.

Listfiles, like their absolute file counterparts, can range in width from 8 to 128 bits. In cases where more than one PROM is required to create the word width for a processor, the PROM Programmer can still create a single listfile to store the program, as described above. The number of characters in the data field of your command tells the PROM Programmer the size of the data word. For example, if you are using two 8-bit ROM's to store 16-bit words, you might issue the following command:

```
list_rom_to<FILE>start 0 bit 0
```

You might get the following listfile:

```
<0000> 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
<0010> 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
```

This listing would contain the lower 8 bits of each data word. Then by inserting the high order PROM and issuing the following list command:

```
list_rom_to<FILE>start 0 bit 8
```

The listfile might appear as follows:

```
<0000> 0000 0101 0202 0303 0404 0505 0606 0707 0808 0909 0A0A 0B0B 0C0C
<000D> 0D0D 0E0E 0F0F 1010 1111 1212 1313 1414 1515 1616 1717 1818 1919
```

In this example, the data stored in the upper 8 bits of each location is the same as the data stored in the lower 8 bits. Note that there are four characters in each data word. This indicates that the data width is 16 bits, each character represents 4 bits. The starting addresses are automatically adjusted in the listing because fewer data words can be shown on one line.

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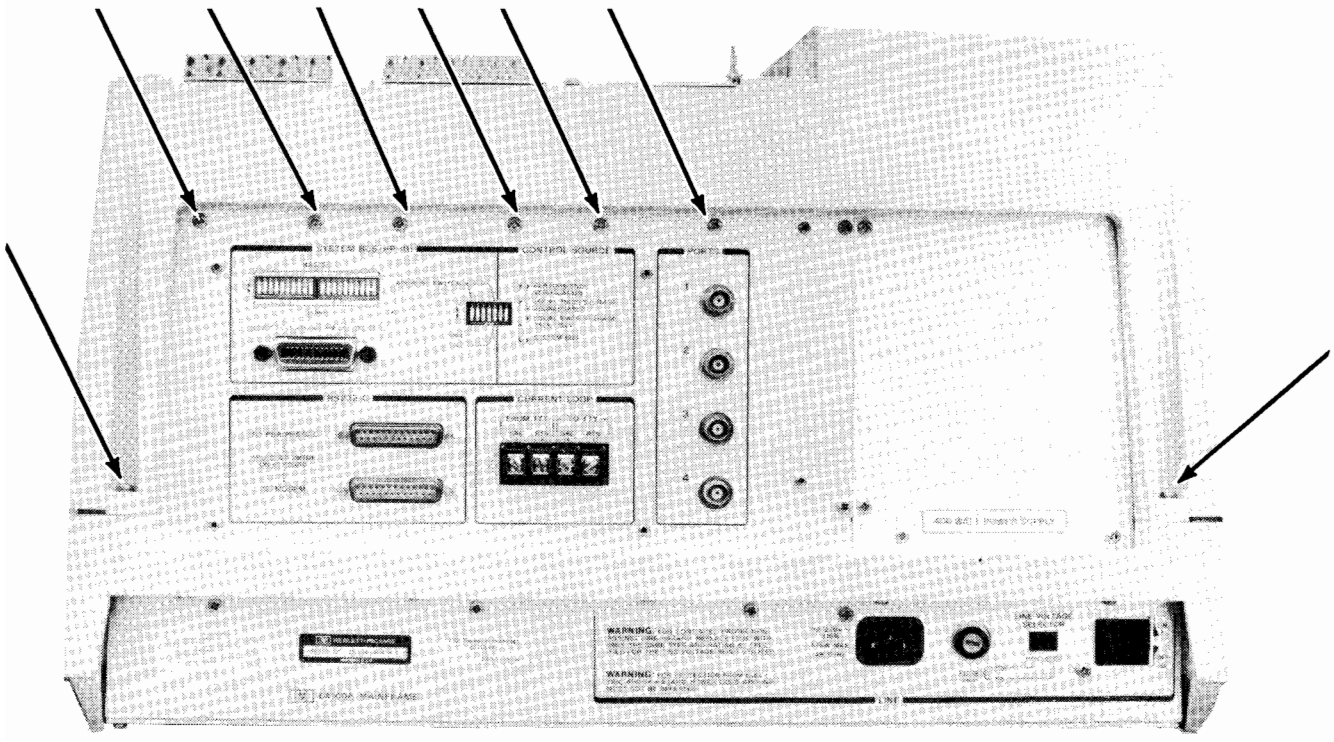


Figure 2-1. Screw Locations for Removing the Mainframe Cabinet

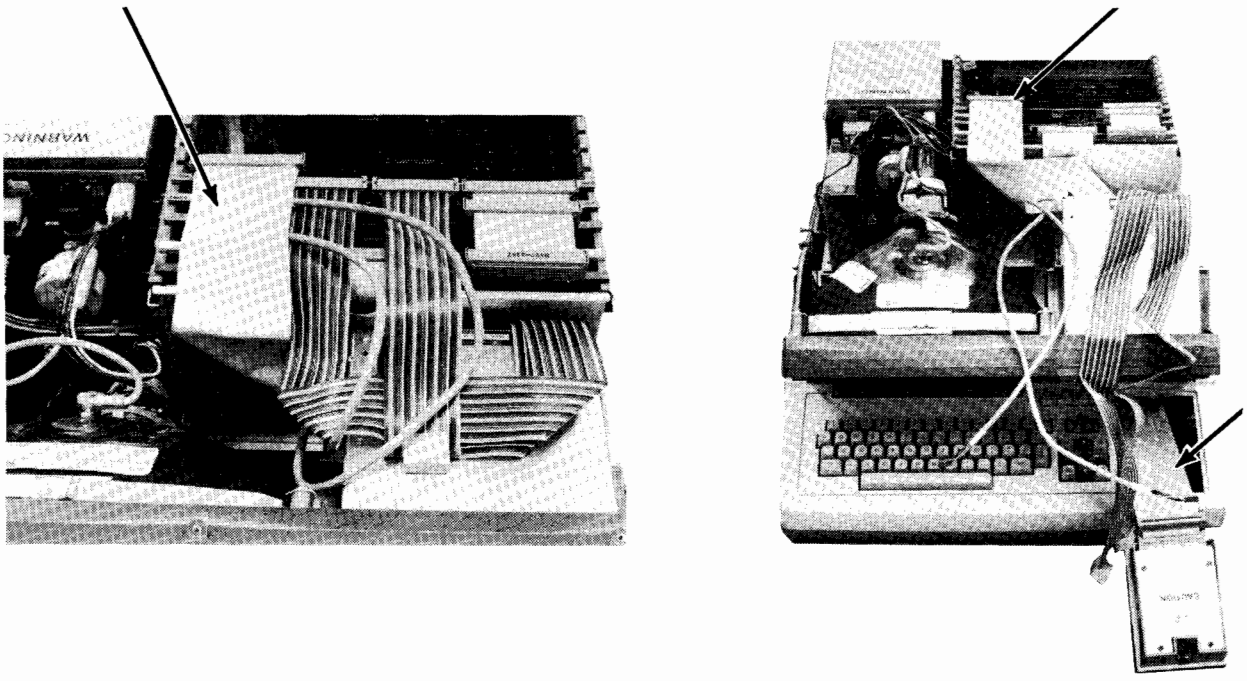


Figure 2-2. PROM Programmer Cable Installation

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Hewlett-Packard Asia Ltd.
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6877 Goreway Drive
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Tel: (416) 678-9430
Telex: 610-492-4246

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Hewlett-Packard Ges.m.b.h.
Lieblgasse 1
P.O.Box 72
A-1222 **VIENNA,** Austria
Tel: (222) 2500-0
Telex: 1 3 4425 HEPA A

NORTHERN EUROPE
Hewlett-Packard S.A.
Uilenstede 475
P.O.Box 999
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The Netherlands
Tel: 20 437771
Telex: 18 919 hpner nl

SOUTH EAST EUROPE
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World Trade Center
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Cable: HEWPACKSA Athens

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Hewlett-Packard Ltd.
Nine Mile Ride
Easthampstead, **WOKINGHAM**
Berkshire, IRGll 3LL
Tel: 0344 773100
Telex: 848805

EASTERN USA
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4 Choke Cherry Road
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OTHER INTERNATIONAL AREAS
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Intercontinental Headquarters
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Telex: 034-8300
Cable: HEWPACK

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Empresa Técnica de Equipamentos
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Telex: 3134
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A

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A

AUSTRALIA

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Telex: 32375
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P.O. Box 72
A-1222 **VIENNA**
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Woluwedal
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Atlantic House Building
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Hamilton 5
Tel: 295-1616
P

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Alameda Rio Negro, 750
Alphaville
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Tel: (011) 421.1311
Telex: (011) 33872 HPBR-BR
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I.e.C. Ltda.
Praia de Botafago 228
6° Andar-conj 614
Edificio Argentina - Ala A
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Tel: (02l) 552-6422
Telex: 21905 HPBR-BR
Cable: HEWPACK Rio de Janeiro
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458 Todos Os Santos
CEP 20771
RIO DE JANEIRO, RJ
Tel: 591-0197
Telex: 33487 EGLB BR
A

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Rua Bage, 103
04012 **SAO PAULO,** SP
Tel: (011) 572-6537
Telex: 24720 HPBR-BR
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Av. Pacaembu 746-C11
SAO PAULO, SP
Tel: (118) 260111
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C,P

CANADA

Alberta
Hewlett-Packard (Canada) Ltd.
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Tel: (403) 235-3100
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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 instructions 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. The electrical Procedures for checking Performance Verification 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 Sales/Service 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 Sales/Service Office. Keep the shipping materials for carrier's inspection. The HP office will arrange for repair or replacement at HP's option without waiting for claim settlement.

2-5. INSTALLATION PROCEDURE.

2-6. When the Positive PROM Programmer is installed in the Mainframe, it should be positioned in the front most unused connector. This is typically the fourth or fifth connector from the front of the Mainframe. The Input/Output Controller, Display Controller, and the CPU boards occupy the first three connectors respectively. The Floppy or Tape Controller board occupies the fourth connector when installed.

CAUTION

The Model 64501A Positive PROM Programmer and programmer modules must be installed and removed with the mainframe's power turned off.

WARNING!

Lethal voltages exist under the mainframe cover even with the power OFF. Exercise CAUTION around the CRT, Display Driver Board, and Power Supply. Only qualified service personel should install the PROM Programmer Cable.

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FRANCE (Cont'd)

Hewlett-Packard France
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Tel: (6) 907-78-25
Telex: 600048F
A,C,CM,E,M,P

Hewlett-Packard France
Paris Porte-Maillot
15, boulevard de L'Amiral-Bruix
75782 **PARIS** Cedex 16
Tel: (1) 502-12-20
Telex: 613663F
C,M,P

Hewlett-Packard France
124, Boulevard Tourasse
64000 **PAU**
Tel: (59) 80 38 02

Hewlett-Packard France
2 Allée de la Bourgonnette
35100 **RENNES**
Tel: (99) 51-42-44
Telex: 740912F
C,CM,E,M,P*

Hewlett-Packard France
98 avenue de Bretagne
76100 **ROUEN**
Tel: (35) 63-57-66
Telex: 770035F
C

Hewlett-Packard France
4, rue Thomas-Mann
Boite Postale 56
67033 **STRASBOURG** Cedex
Tel: (88) 28-56-46
Telex: 890141F
C,E,M,P*

Hewlett-Packard France
La Péripole III
20, chemin du Pigeonnier de la Cépière
F-31083 **TOULOUSE** Cedex
Tel: (61) 40-11-12
Telex: 531639F
A,C,E,P*

Hewlett-Packard France
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26000 **VALENCE**
Tel: (75) 42 76 16

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Tel: (8) 771 20 22
C

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Parc d'activité des Prés
1, rue Papin
59658 **VILLENEUVE D'ASCQ** Cedex
Tel: (20) 47 78 78
Telex: 160124F
C,E,M,P*

GABON

Sho Gabon
P.O. Box 89
LIBREVILLE
Tel: 721 484
Telex: 5230

GERMAN FEDERAL REPUBLIC

Hewlett-Packard GmbH
Geschäftsstelle
Keithstrasse 2-4
D-1000 **BERLIN** 30
Tel: (030) 21 99 04-0
Telex: 018 3405 hpbln d
A,C,E,M,P

Hewlett-Packard GmbH
Vertriebszentrun Südwest
Schickardstrasse 2
D-7030 **BÖBLINGEN**
Tel: (07031) 645-0
Telex: 7265 743 hep
A,C,CM,E,M,P

Hewlett-Packard GmbH
Vertriebszentrum West
Berliner Strasse III
D-4030 **RATINGEN** 3
Tel: (02102) 494-0
Telex: 589 070 hprad
A,C,E,M,P

Hewlett-Packard GmbH
Geschäftsstelle
Schleefstr. 28a
D-4600 **DORTMUND**-41
Tel: (0231) 45001
Telex: 822858 hepdad
A,C,E

Hewlett-Packard GmbH
Vertriebszentrum Mitte
Hewlett-Packard-Strasse
D-6380 **BAD HOMBURG**
Tel: (06172) 400-0
Telex: 410 844 hpbhg
A,C,E,M,P

Hewlett-Packard GmbH
Vertriebszentrum Nord
Kapstadtring 5
D-2000 **HAMBURG** 60
Tel: (040) 63804-1
Telex: 021 63 032 hphh d
A,C,E,M,P

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HONG KONG
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Telex: 031-2960
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Telex: 46748 BERSAL IA
Cable: BERSAL JAKARTA
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DUBLIN 2
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DUBLIN 5
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Telex: 30439
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ISSUE B

SERVICE MANUAL CHANGES

MANUAL IDENTIFICATION

Model Number: 64500S

Date Printed: January 1984

Part Number: 64500-90911

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections.

Make all appropriate serial number related changes indicated in the tables below.

Serial Prefix or Number	Make Manual Changes
ALL	

Serial Prefix or Number	Make Manual Changes

ERRATA

Title page,
Change: Serial prefix number on the title page from 24XX to 2410.

Pages 2-1 and 2-2,
Replace pages 2-1 and 2-2 with new pages 2-1 thru 2-4.

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

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ISSUE B
(ISSUE A must accompany this change sheet)

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Microcomputadoras Hewlett-Packard, S.A.
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Tel: 520-9127
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Av. Periferico Sur No. 6501
Tepepan, Xochimilco
16020 **MEXICO D.F.**
Tel: 6-76-46-00
Telex: 17-74-507 HEWPACK MEX
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Hewlett-Packard De Mexico (Polanco)
Avenida Ejercito Nacional #579
2da y 3er piso
Colonia Granada 11560
MEXICO D.F.
Tel: 254-4433
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Hewlett-Packard De Mexico, S.A. de C.V.
Czda. del Valle
409 Ote. 4th Piso
Colonia del Valle
Municipio de Garza Garciá
66220 **MONTERREY,** Nuevo León
Tel: 78 42 41
Telex: 038 410
P

MOROCCO

Etablissement Hubert Dolbeau & Fils
81 rue Karatchi
B.P. 11133
CASABLANCA
Tel: 3041-82, 3068-38
Telex: 23051, 22822
E

Gerep
2, rue Agadir
Boite Postale 156
CASABLANCA 01
Tel: 272093, 272095
Telex: 23 739
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Sema-Maroc
Dept. Seric
6, rue Lapebie
CASABLANCA
Tel: 260980
Telex: 21641
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NETHERLANDS

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Telex: 21261 HEPAC NL
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NL 5612 LV **EINDHOVEN**
P.O. Box 2342
NL 5600 CH **EINDHOVEN**
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Telex: 51484 hepae nl
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Hewlett-Packard (N.Z.) Ltd.
5 Owens Road
P.O. Box 26-189
Epsom, **AUCKLAND**
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Cable: HEWPAK Auckland
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Tel: 850-091
Telex: NZ 3380
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P.O. Box 244and
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NORTHERN IRELAND

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Hewlett-Packard Norge A/S
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N-5033 **FYLLINGSDALEN** (Bergen)
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Telex: 76621 hpnas n
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Hewlett-Packard Norge A/S
Osterndalen 16-18
P.O. Box 34
N-1345 **OSTERÅS**
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OMAN

Khimjil Ramdas
P.O. Box 19
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Telex: 5289 BROKER MB MUSCAT
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AL-KHOBAR 31952
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HUNTSVILLE, AL 35805
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99 South Hill Dr.
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C

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BOULDER, CO 80301
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WALLINGFORD, CT 06492
Tel: (203) 265-7801
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FORT LAUDERDALE, FL 33309
Tel: (305) 973-2600
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Hewlett-Packard Co.
6800 South Point Parkway
Suite 301
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Tel: (904) 398-0663
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6177 Lake Ellenor Drive
ORLANDO, FL 32809
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4700 Bayou Blvd.
Building 5
PENSACOLA, FL 32503
Tel: (904) 476-8422
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Hewlett-Packard Co.
5550 W. Idlewild, 150
TAMPA, FL 33614
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C,E,M,P

Georgia
Hewlett-Packard Co.
2000 South Park Place
ATLANTA, GA 30339
Tel: (404) 955-1500
Telex: 810-766-4890
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Hewlett-Packard Co.
3607 Parkway Lane
Suite 300
NORCROSS, GA 30092
Tel: (404) 448-1894
C,E,P

Hawaii
Hewlett-Packard Co.
Kawaiahao Plaza, Suite 190
567 South King Street
HONOLULU, HI 96813
Tel: (808) 526-1555
A,C,E,M

Idaho
Hewlett-Packard Co.
11309 Chinden Blvd.
BOISE, ID 83707
Tel: (208) 323-2700
C

Illinois
Hewlett-Packard Co.
304 Eldorado Road
P.O. Box 1607
BLOOMINGTON, IL 61701
Tel: (309) 662-9411
C,M**

Hewlett-Packard Co.
525 W. Monroe, 1308
CHICAGO, IL 60606
Tel: (312) 930-0010
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Hewlett-Packard Co.
1200 East Diehl Road
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Tel: (312) 357-8800
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Hewlett-Packard Co.
5201 Tollview Drive
ROLLING MEADOWS, IL 60008
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Indiana
Hewlett-Packard Co.
11911 N. Meridian St.
CARMEL, IN 46032
Tel: (317) 844-4100
A,C,CM,E,M

Hewlett-Packard Co.
3702 Rupp Drive
FT. WAYNE, IN 46815
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C,E

Iowa
Hewlett-Packard Co.
4070 22nd Av. SW
CEDAR RAPIDS, IA 52404
Tel: (319) 390-4250
C,E,M

Hewlett-Packard Co.
4201 Corporate Dr.
WEST DES MOINES, IA 50265
Tel: (515) 224-1435
A**,C,M**

Kansas
Hewlett-Packard Co.
7804 East Funston Road, 203
WICHITA, KS 67207
Tel: (316) 684-8491
C,E

Kentucky
Hewlett-Packard Co.
10300 Linn Station Road, 100
LOUISVILLE, KY 40223
Tel: (502) 426-0100
A,C,M

Louisiana
Hewlett-Packard Co.
160 James Drive East
ST. ROSE, LA 70087
P.O. Box 1449
KENNER, LA 70063
Tel: (504) 467-4100
A,C,E,M,P

Maryland
Hewlett-Packard Co.
3701 Koppers Street
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Tel: (301) 644-5800
Telex: 710-862-1943
A,C,CM,E,M

Hewlett-Packard Co.
2 Choke Cherry Road
ROCKVILLE, MD 20850
Tel: (301) 948-6370
A,C,CM,E,M

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Hewlett-Packard Co.
1775 Minuteman Road
ANDOVER, MA 01810
Tel: (617) 682-1500
A,C,CM,E,M,P*

Hewlett-Packard Co.
32 Hartwell Avenue
LEXINGTON, MA 02173
Tel: (617) 861-8960
C,E

Michigan
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4326 Cascade Road S.E.
GRAND RAPIDS, MI 49506
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NOVI, MI 48020
Tel: (313) 349-9200
A,C,E,M

Hewlett-Packard Co.
1771 W. Big Beaver Road
TROY, MI 48084
Tel: (313) 643-6474
C

Minnesota
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Hewlett-Packard Co.
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Hewlett-Packard Co.
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Hewlett-Packard Co.
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PENSACOLA, FL 32503
Tel: (904) 476-8422
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Hewlett-Packard Co.
5550 W. Idlewild, 150
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Georgia
Hewlett-Packard Co.
2000 South Park Place
ATLANTA, GA 30339
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Kawaiahao Plaza, Suite 190
567 South King Street
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Idaho
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BOISE, ID 83707
Tel: (208) 323-2700
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Illinois
Hewlett-Packard Co.
304 Eldorado Road
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BLOOMINGTON, IL 61701
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Tel: (312) 930-0010
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Hewlett-Packard Co.
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Hewlett-Packard Co.
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11911 N. Meridian St.
CARMEL, IN 46032
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Hewlett-Packard Co.
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Iowa
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4070 22nd Av. SW
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10300 Linn Station Road, 100
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A,C,M

Louisiana
Hewlett-Packard Co.
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P.O. Box 1449
KENNER, LA 70063
Tel: (504) 467-4100
A,C,E,M,P

Maryland
Hewlett-Packard Co.
3701 Koppers Street
BALTIMORE, MD 21227
Tel: (301) 644-5800
Telex: 710-862-1943
A,C,CM,E,M

Hewlett-Packard Co.
2 Choke Cherry Road
ROCKVILLE, MD 20850
Tel: (301) 948-6370
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Massachusetts
Hewlett-Packard Co.
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ANDOVER, MA 01810
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32 Hartwell Avenue
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Tel: (617) 861-8960
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Michigan
Hewlett-Packard Co.
4326 Cascade Road S.E.
GRAND RAPIDS, MI 49506
Tel: (616) 957-1970
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Hewlett-Packard Co.
39550 Orchard Hill Place Drive
NOVI, MI 48020
Tel: (313) 349-9200
A,C,E,M

Hewlett-Packard Co.
1771 W. Big Beaver Road
TROY, MI 48084
Tel: (313) 643-6474
C

Minnesota
Hewlett-Packard Co.
2025 W. Larpenteur Ave.
ST. PAUL, MN 55113
Tel: (612) 644-1100
A,C,CM,E,M

Missouri
Hewlett-Packard Co.
1001 E. 101st Terrace Suite 120
KANSAS CITY, MO 64131-3368
Tel: (816) 941-0411
A,C,CM,E,M

Hewlett-Packard Co.
13001 Hollenberg Drive
BRIDGETON, MO 63044
Tel: (314) 344-5100
A,C,E,M

Nebraska
Hewlett-Packard
10824 Old Mill Rd., Suite 3
OMAHA, NE 68154
Tel: (402) 334-1813
C,E,M

New Jersey
Hewlett-Packard Co.
120 W. Century Road
PARAMUS, NJ 07653
Tel: (201) 265-5000
A,C,CM,E,M

Hewlett-Packard Co.
20 New England Av. West
PISCATAWAY, NJ 08854
Tel: (201) 562-6100
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New Mexico
Hewlett-Packard Co.
7801 Jefferson N.E.
ALBUQUERQUE, NM 87109
Tel: (505) 292-1330
C,E,M

New York
Hewlett-Packard Co.
5 Computer Drive South
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Tel: (518) 458-1550
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Hewlett-Packard Co.
9600 Main Street
CLARENCE, NY 14031
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Hewlett-Packard Co.
200 Cross Keys Office Park
FAIRPORT, NY 14450
Tel: (716) 223-9950
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No. 1 Pennsylvania Plaza
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34th Street & 8th Avenue
MANHATTAN NY 10119
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WAPPINGER FALLS, NY 12590
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Hewlett-Packard Co.
250 Westchester Avenue
WHITE PLAINS, NY 10604
Tel: (914) 684-6100
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Tel: 520-9127
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Hewlett-Packard Mexicana, S.A. de C.V.
Av. Periferico Sur No. 6501
Tepepan, Xochimilco
16020 **MEXICO D.F.**
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Hewlett-Packard De Mexico (Polanco)
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Colonia Granada 11560
MEXICO D.F.
Tel: 254-4433
P

Hewlett-Packard De Mexico, S.A. de C.V.
Czda. del Valle
409 Ote. 4th Piso
Colonia del Valle
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66220 **MONTERREY,** Nuevo León
Tel: 78 42 41
Telex: 038 410
P

MOROCCO

Etablissement Hubert Dolbeau & Fils
81 rue Karatchi
B.P. 11133
CASABLANCA
Tel: 3041-82, 3068-38
Telex: 23051, 22822
E

Gerep
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LISBON 1
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SAUDI ARABIA

Modern Electronics Establishment
Hewlett-Packard Division
P.O. Box 281
Thouqbah
AL-KHOBAR 31952
Tel: 895-1760, 895-1764
Telex: 671 106 HPMEEK SJ
Cable: ELECTA AL-KHOBAR
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Hewlett-Packard Division
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Telex: 4027 12 FARNAS SJ
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Hewlett-Packard Division
P.O.Box 22015
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Tel: 219976
Telex: 577
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SINGAPORE

Hewlett-Packard Singapore (Sales) Pte. Ltd.
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450-2 Alexandra Road
Alexandra P.O. Box 58
SINGAPORE, 9115
Tel: 4731788
Telex: 34209 HPSGSO RS
Cable: HEWPACK, Singapore
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Unit 05-11 Block 6
Kolam Ayer Industrial Estate
SINGAPORE 1334
Tel: 747-6188
Telex: 26283 RS
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SOUTH AFRICA

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P.O. Box 120
Howard Place **CAPE PROVINCE** 7450
Pine Park Center, Forest Drive, Pinelands
CAPE PROVINCE 7405
Tel: (021) 53 7954
Telex: 57-20006
A,C,CM,E,M,P

Hewlett-Packard So Africa (Pty.) Ltd.
2nd Floor Juniper House
92 Overport Drive
DURBAN 4067
Tel: (031) 28-4178
Telex: 6-22954
C

Hewlett-Packard So Africa (Pty.) Ltd.
6 Linton Arcade
511 Cape Road
Linton Grange
PORT ELIZABETH 6001
Tel: 041-301201
Telex: 24-2916
C

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ISSUE B

SERVICE MANUAL CHANGES

MANUAL IDENTIFICATION

Model Number: 64500S

Date Printed: January 1984

Part Number: 64500-90911

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections.

Make all appropriate serial number related changes indicated in the tables below.

Serial Prefix or Number	Make Manual Changes
ALL	

Serial Prefix or Number	Make Manual Changes

ERRATA

Title page,
Change: Serial prefix number on the title page from 24XX to 2410.

Pages 2-1 and 2-2,
Replace pages 2-1 and 2-2 with new pages 2-1 thru 2-4.

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

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ISSUE B
(ISSUE A must accompany this change sheet)

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Hewlett-Packard France
Zone Industrielle de Courtaboeuf
Avenue des Tropiques
91947 Les Ulis Cedex **ORSAY**
Tel: (6) 907-78-25
Telex: 600048F
A,C,CM,E,M,P

Hewlett-Packard France
Paris Porte-Maillot
15, boulevard de L'Amiral-Bruix
75782 **PARIS** Cedex 16
Tel: (1) 502-12-20
Telex: 613663F
C,M,P

Hewlett-Packard France
124, Boulevard Tourasse
64000 **PAU**
Tel: (59) 80 38 02

Hewlett-Packard France
2 Allée de la Bourgonnette
35100 **RENNES**
Tel: (99) 51-42-44
Telex: 740912F
C,CM,E,M,P*

Hewlett-Packard France
98 avenue de Bretagne
76100 **ROUEN**
Tel: (35) 63-57-66
Telex: 770035F
C

Hewlett-Packard France
4, rue Thomas-Mann
Boite Postale 56
67033 **STRASBOURG** Cedex
Tel: (88) 28-56-46
Telex: 890141F
C,E,M,P*

Hewlett-Packard France
La Péripole III
20, chemin du Pigeonnier de la Cépière
F-31083 **TOULOUSE** Cedex
Tel: (61) 40-11-12
Telex: 531639F
A,C,E,P*

Hewlett-Packard France
9, rue Baudin
26000 **VALENCE**
Tel: (75) 42 76 16

Hewlett-Packard France
Carolor
ZAC de Bois Briand
57640 **VIGY** (Metz)
Tel: (8) 771 20 22
C

Hewlett-Packard France
Parc d'activité des Prés
1, rue Papin
59658 **VILLENEUVE D'ASCQ** Cedex
Tel: (20) 47 78 78
Telex: 160124F
C,E,M,P*

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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 instructions 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. The electrical Procedures for checking Performance Verification 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 Sales/Service 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 Sales/Service Office. Keep the shipping materials for carrier's inspection. The HP office will arrange for repair or replacement at HP's option without waiting for claim settlement.

2-5. INSTALLATION PROCEDURE.

2-6. When the Positive PROM Programmer is installed in the Mainframe, it should be positioned in the front most unused connector. This is typically the fourth or fifth connector from the front of the Mainframe. The Input/Output Controller, Display Controller, and the CPU boards occupy the first three connectors respectively. The Floppy or Tape Controller board occupies the fourth connector when installed.

CAUTION

The Model 64501A Positive PROM Programmer and programmer modules must be installed and removed with the mainframe's power turned off.

WARNING!

Lethal voltages exist under the mainframe cover even with the power OFF. Exercise CAUTION around the CRT, Display Driver Board, and Power Supply. Only qualified service personel should install the PROM Programmer Cable.

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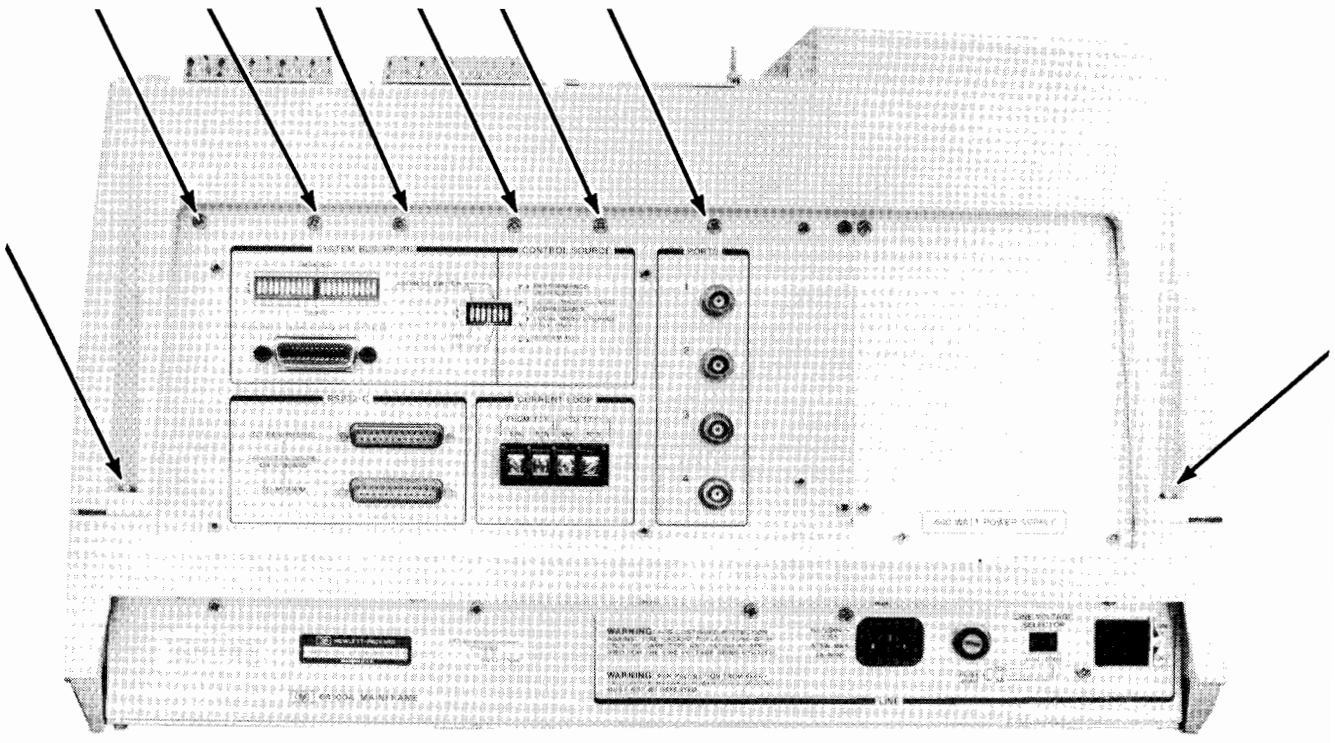


Figure 2-1. Screw Locations for Removing the Mainframe Cabinet

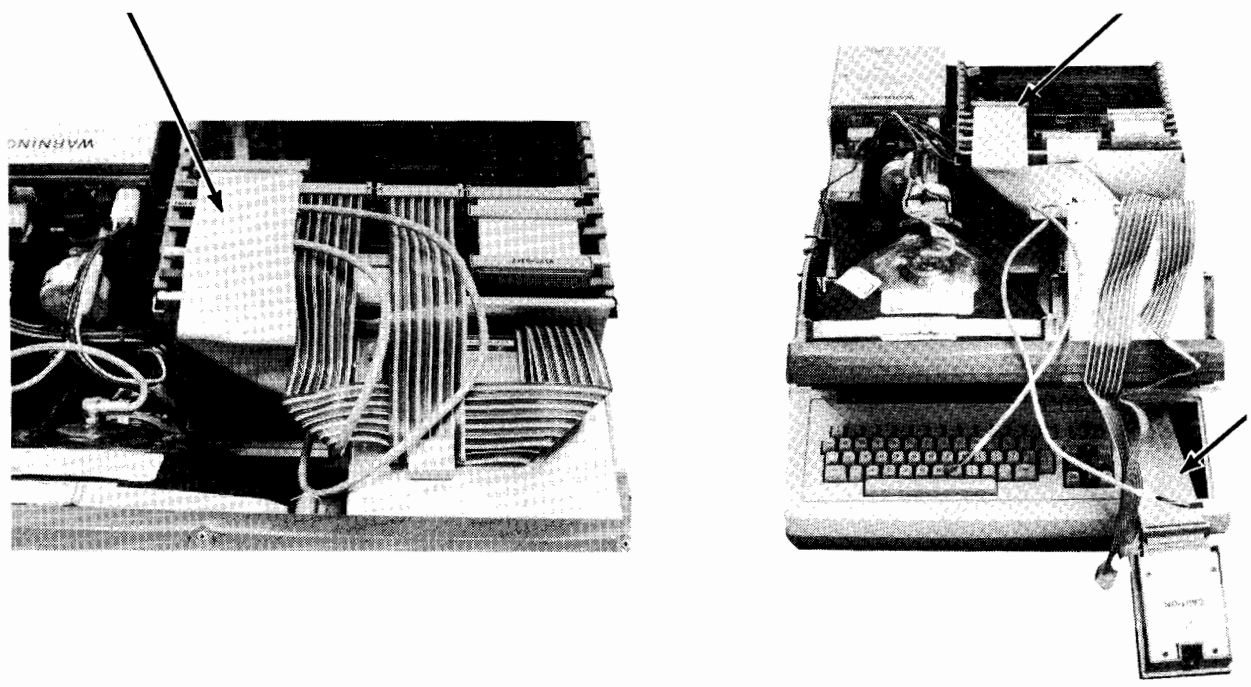


Figure 2-2. PROM Programmer Cable Installation

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Appendix A

PROM LISTFILE FORMAT

The list option of the PROM Programmer can be used to list the contents of a PROM to the printer or to a listfile. The PROM Programmer can also program PROM's from listfiles, if the listfiles have been created in a particular format. The format that the PROM Programmer uses to create listfiles and/or to program PROM's is as follows:

```
<ADDRESS> data data data data data, etc
```

The listfile <ADDRESS> is similar to an address in an absolute file. It indicates that the next piece of data will reside at the address specified:

Example:

```
<0000> 00 01 02 03 04 05 06 07 08 09 0A 0B 0D 0E 0F
```

Here, the file address is <0000> and the data in that location is 01, etc.

Listfiles, like their absolute file counterparts, can range in width from 8 to 128 bits. In cases where more than one PROM is required to create the word width for a processor, the PROM Programmer can still create a single listfile to store the program, as described above. The number of characters in the data field of your command tells the PROM Programmer the size of the data word. For example, if you are using two 8-bit ROM's to store 16-bit words, you might issue the following command:

```
list_rom_to<FILE>start 0 bit 0
```

You might get the following listfile:

```
<0000> 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
<0010> 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
```

This listing would contain the lower 8 bits of each data word. Then by inserting the high order PROM and issuing the following list command:

```
list_rom_to<FILE>start 0 bit 8
```

The listfile might appear as follows:

```
<0000> 0000 0101 0202 0303 0404 0505 0606 0707 0808 0909 0A0A 0B0B 0C0C
<000D> 0D0D 0E0E 0F0F 1010 1111 1212 1313 1414 1515 1616 1717 1818 1919
```

In this example, the data stored in the upper 8 bits of each location is the same as the data stored in the lower 8 bits. Note that there are four characters in each data word. This indicates that the data width is 16 bits, each character represents 4 bits. The starting addresses are automatically adjusted in the listing because fewer data words can be shown on one line.

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