USER'S MANUAL

POWER-100

AND

EXPRO-60/80

PC-BASED UNIVERSAL

PROGRAMMER and TESTER

Version : V8.00

Manual released AUGUST 1994

SUNSHINE

CONTENTS

1. INTRODUCTION

2. INSTALLATION

3. USING THE PROGRAMMER

4. FUNCTION REFERENCE GUIDE

5. QUICK OPERATION

APPENDICES

<<< WARNING >>>

Before turning on the power, check the voltage switch at the base of the programmer to match your local power voltage.

110	
	220

BASE OF POWER-100   **SELECTABLE SWITCH**
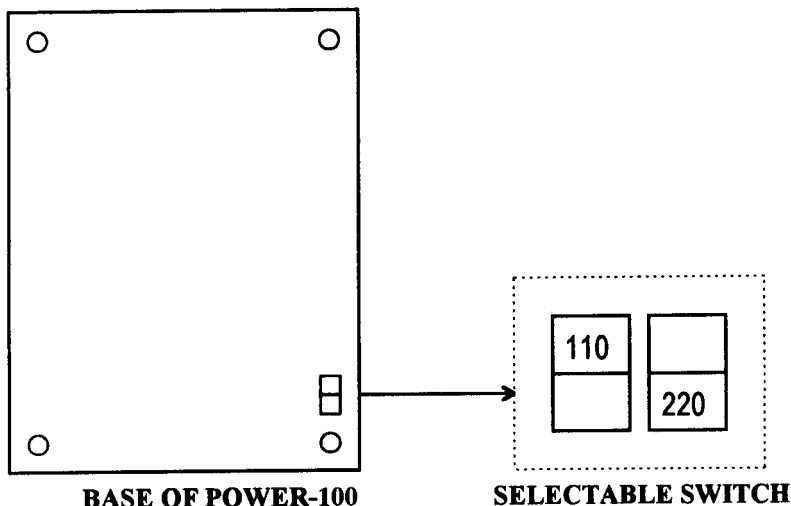
<<< WARNIGN >>>

Do not connect the POWER-100 to the system adapter card (SAC-101A.) It will damage the U21(GAL16V8) of the bottom board. Also, do not connect the POWER-100 to the RS-232 port as this will damage the U40 (74LS254) of the bottom board.

INTRODUCTION

1.1   Introduction to the POWER-100

1.10   An Overview

In addition to the features of EXPRO-80, the POWER-100 also has the following advantages.

* For enhanced programming quality it is equipped with :
  - a.   programming waveform adjusting circuit
  - b.   automatic programming voltage adjustment circuit according to the load
  - c.   own internal power supply

* New additional functions include :
  - a.   Printer port connection
  - b.   48-pin textool with various pin-drivers for each pin
  - c.   Hardware self-diagnosis
  - d.   IC insertion detection
  - e.   Auto sense
  - f.   Fast programming circuit for Flash E/EPROM

1.11   New Functions Usage and Description:

A. **48-pin Textool.** Each pin is simultaneously equipped with VCP (0-10V), VHH(0-16V), VPP (0-26V), GND, Quick pull-high, protection, and clocks (1,2,4,8 MHz). Complete pin-drivers reduces the need for adapters.

B. **Hardware Self-diagnosis.** Upon entering the system of the POWER-100, Self-diagnosis test each pin-driver. If error is discovered, it immediately warns user of hardware problem and indicates the pin-driver at fault. This prevents ICs from damage caused by faulty programmer.

C. **IC Insertion Detection.** Before programming, the Power-100 checks if the IC has been inserted backwards due to inadvertent operation and for overcurrent to protect both IC and programmer.

D. **Auto Sense.** This function can be enabled during mass production. User only needs to insert the IC into the textool and pull down the lever, and the hardware will do the rest. There is no need to press any key.

1.12   Adapters and converters not required with POWER-100:

ADP-MAX	: ALTERA EPM5016, EPM5032
ADP-MAX50B	: ALTERA EPM5064
ADP-EPM7032	: ALTERA EPM7032
ADP-MACH	: AMD MACH110,MACH210
ADP-26CV12	: AMD PALCE26V12/24V10; LATTICE GAL26CV12
ADP-ATV2500Y	: ATMEL ATV2500
ADP-7C33X	: CYPRESS CY7C330/331/332
ADP-5AC324	: INTEL 5AC324
ADP-MAPL244	: NS MAPL144,MAPL244
ADP-MAPL128	: NS MAPL128
ADP-PLS105	: SIGNETICS PLS105, PLUS105/405, PLC415
ADP-X2212	: XICOR X2212,X2210
ADP-63705	: HITACHI HD63705V0
ADP-PIC16	: MICROCHIP PIC16C54/55/56/57/58/ 71/84
ADP-PIC17	: MICROCHIP PIC17C42
ADP-68HC711D3	: MOTOROLA MC68HC711D3
ADP-TMS320E1	: TI TMS320E15/17
ADP-PSD301	: WSI PSD301/311/302/312/303/313
ADP-Z8E08	: ZILOG Z86E08
ADP-8796	: INTEL 8795BH,8798
ADP-PALTEST	: PLD VECTOR TEST

CNV-PLCC-EP1M44, CNV-PLCC-MPU51,
CNV-PLCC-PAL28A, CNV-PLCC-PAL28B,
CNV-PLCC-EP610,   CNV-PLCC-EP910

1.13   Analysis:

From the description above, the features mentioned are obviously extras to a basic programmer and are only found in expensive programmers (such as DATA I/O) as they upgrade programming quality, eliminate mistakes by inadvertent operation, prevent IC damage, and increase self-protection capability (avoiding unnecessary delay in user's project due to repairs.). The Power-100 combines both quality and the features you need in a low-cost unit.

1.2   Manual Contents

This manual describes the methods of installing and operating the UNIVERSAL Programmer with an IBM PC or compatible running MS-DOS or PC-DOS. It also contains information about the UNIVERSAL Programmer's usage and detailed functions.

The user is assumed to be an experienced user who is familiar with general software installation problems on the PC.

1.3   Product Configuration

Before using this product, please check carefully that your package includes:

- Programmer module (POWER-100 or EXPRO-80 or EXPRO-60)
- One 25-pin D-type cable
- User's manual
- One PC System Adapter Card (for EXPRO-60/80 only)
- One AC power cord (for POWER-100 only)
- Two diskettes

Diskette #1 contains the following files:

- DEVICE.LST   : List of devices supported by POWER-100 or EXPRO-60/80
- INSTALL.COM   : Installation file
- EXPROEXE.EXE : EXPRO-60/80 executable SELF-EXTRACTING file includes the main program, edit-driver, disassembler files, and utility files.
- POWEREXE.EXE : POWER-100 executable SELF-EXTRACTING file includes the main program, edit-driver, disassembler files, and utility files.
- README.DOC   : This document records the information of revision of both the S/W and H/W.

Diskette #2 contains the following files:

- EXPRODRV.EXE : EXPRO-60/80 executable SELF-EXTRACTING file includes all the device driver files.
- POWERDRV.EXE : POWER-100 executable SELF-EXTRACTING file includes all the device driver files.

1.4 Product Description

POWER-100
*Module size   : 286mm x 213mm x 72mm
*Module weight : 2.2Kg
*AC voltage   : 90 - 135VAC or 180 - 260VAC, 47 - 63Hz

<<< WARNING >>>

The voltage switch (110V/220V) is located at the base of the POWER-100. Make sure to set the switch to the correct setting before turning on the power.
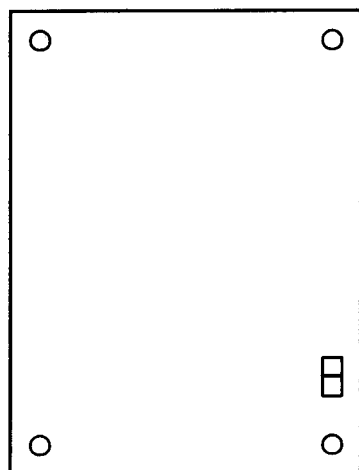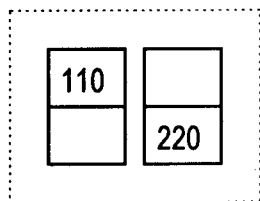
BASE OF POWER-100   **SELECTABLE SWITCH**

EXPRO-80
*Module size   : 262mm x 175mm x 50mm
*Module weight : 1.3Kg

EXPRO-60
*Module size   : 262mm x 142mm x 45mm
*Module weight : 1.1Kg

2. INSTALLATION

This chapter describes the method of installing a UNIVERSAL programmer on an IBM PC/XT/AT/386/486 computer or compatible running MS-DOS or PC-DOS.

It is assumed that the installer is familiar with the installation of PC add-on cards and software in PCs running MS-DOS.

Before starting the installation procedure, it is necessary for the user to duplicate the original software onto a working disk and use the lastter for programming. Do not use the original software diskette! If you attempt to use the original diskette, your monitor will display a "disk write error" message whenever you terminate the device driver file.

2.1   Host System Requirements

- IBM PC/XT/AT/386/486 or compatible PC.
- PC/386DX-33 or faster is recommended.
- Minimum 640K-byte memory.
- Minimum one floppy disk drive. A hard disk is preferable.
- Operation system: MS-DOS or PC-DOS, version 2.0 or later.

2.2   Software Installation Procedures

The software installation procedure is very simple. Please follow the listed steps to install all the files on the supplied diskettes to a subdirectory on the hard disk.

Whenever you have a new updated diskette in hand, you can easily perform your own updating by following the above steps..

Run INSTALL.COM to install the POWER-100's or EXPRO-60/80's software into the hard disk.

A:\>INSTALL<Enter>

```
POWER-100 Universal Programmer and Tester Installation

    Copyright (C) 1994 SUNSHINE Electronics Co., Ltd.
```

```
    Since we support more and more programs for  programmable
devices, and add functions into our programs, it may be not be
easy for user to install or upgrade.  Therefore,  we contacted
ARJ Robert K Jung and got  ARJ self-extractor license in order
to use this archive file, and to make installing or  upgrading
more convenient.
```

```
Source drive [A:]:
Target drive [C:\POWER]:

It will be installed from A: to C:\POWER
============================================================
Do you want to change any of the above options? [Y/n]:
```

```
    Insert Universal Programmer & Tester POWER-100  #1

    - = Press any key to continue or Ctrl+C to abort = -
```

after pressing any key ⇓

```
        Disk #1 installing now ...
```

after installing diskette #1 ⇓

```
    Insert Universal Programmer & Tester POWER-100  #2

    - = Press any key to continue or Ctrl+C to abort = -
```

after pressing any key ⇓

```
        Disk #2 installing now ...
```

after installing diskette #2 ⇓

```
Installation is completed

- = Please read USER'S MANUAL before running POWER.EXE = -
```

Running POWER.EXE(for POWER-100) or EXPRO.EXE (for EXPRO-60/80) will start the system when installation is completed.

2.3 Hardware Installation Procedures

To install the UNIVERSAL Programmer and the software supplied, follow these steps.

[POWER-100]

<<< WARNING >>>

Do not connect the POWER-100 to the system adapter card (SAC-101A.) It will damage the U21(GAL16V8) of bottom board. Also, do not connect the POWER-100 to the RS-232 port as this will damage the U40 (74LS254) of the bottom board.

Step 1: Check the local AC power source if it is 110V or 220V.

Step 2: A select switch for 110V/220V voltage is at the base of the unit. Standard factory setting is either at 220V or your local AC power source.

Step 3: Connect the POWER-100 to the PC's printer port using the supplied cable. The male cable end must be inserted into the PC's printer port while the female end must be connected to the POWER-100.

Step 4: Turn on the computer.

Step 5: Make sure that the power switch of POWER-100 is off, and the voltage select switch is in the correct setting before connecting the AC power cord to the unit's AC socket.

Step 6: Turn on the POWER-100.

> "ON" LED must be ON.
> "BUSY" LED must be OFF.

<<< WARNING >>>
If the LEDs are not in their correct state, turn off the power supply and check all connections between the PC's printer port and the POWER-100. Then turn on the power supply and check the LEDs on the programmer module again. Refer to TROUBLE SHOOTING.

Step 7: Installation is now completed.

[EXPRO-60/80]

Step 1: Switch off your computer system, and open the computer cover carefully.

Step 2: Check the DIP switch of the PC system adapter card.
For I/O address selection.2E0H (default)
SW1: all off.
SW2: position 7 on, others off.

For I/O wait state selection.
SW3 position 1 on, 8 waits. position 2 on, 4 waits (default). position 3 on, 2 waits. position 4 on, 1 wait.

Step 3: Insert the system adapter card gently into the PC slot, and fasten it to the PC frame with the slot cover screw.

Step 4: Connect the programmer module to the system adapter card using the supplied cable. The male cable end must be inserted into the system adapter card, while the female end must be connected to the programmer module.

<<< WARNING >>>

Do not connect the programmer module to the system adapter card when the computer is turned on. Such an installation can put the module in an "unknown" state, resulting in damage to the DEVICE and/or the module.

Step 5: Turn on the computer and check the LEDs on the programmer module.

> ON LED must be ON.
>
> BUSY LED must be OFF.
>
> Other LEDs are in random state.

<<< WARNING >>>

If the LEDs are not in their correct state, turn off the PC and check all connections between the system adapter card and PC slot, and cable connections between the system adapter card and programmer module. Then turn on the computer and check the LEDs on the programmer module.

Step 6: Installation is now completed.

3. USING THE PROGRAMMER

In this chapter we will step by step help the user to be familiar with his new UNIVERSAL Programmer tools. It is assumed that the Installation Procedures described in the previous chapter has already been performed.

3.1   Definition of Symbols

The most commonly used symbols are here defined and explained to enhance usage and for easy reference.

3.10   EPROM, EEPROM, BPROM, and MPU Device Symbols

- **BIT, NIBBLE, BYTE, WORD, ADDRESS, and BUFFER BASE ADDRESS**

BIT   : an element of Binary data.
NIBBLE   : a 4-bit Binary data Value from 0H to FH.
BYTE   : an 8-bit Binary data Value from 0H to FFH.
WORD   : a 16-bit Binary data Value from 0H to FFFFH.
ADDRESS : location of data on buffer; value from 0H to
                    FFFFFH.

- **BUFFER BASE ADDRESS**
The actual physical address of the buffer. Value from 0000:0000 to F000:FFFF.

- **Memory buffer**
The buffer is a block area of PC memory allocated by the main program through DOS. This buffer is used by the device driver file as an intermediate storage.

The device driver file can read the DEVICE contents to the buffer and save it on a disk file or perform the reverse operation, i.e., to load a disk file to the buffer and program it to the DEVICE. You can easily manipulate the buffer contents at will. The modified buffer can always be saved to a disk file for future reference.

The minimum size allocated to the buffer is 128K bytes, and the maximum size is the maximum available memory in the PC.

Since the size of the memory buffer is allocated by DOS, the actual base address on the PC may vary from system to system, software to software. The user need not refer to the actual base address of the memory buffer.

- **Buffer Start and Buffer End Address**
The buffer start and end address are offset addresses specified from the base address of the MEMORY BUFFER. This is the specified portion where information can be programmed to the DEVICE or the DEVICE contents can be read onto the buffer.

- **Device Start and Device End Addresses**
The start and end addresses are offset addresses specified on the DEVICE contents.

- **Check Sum**
This is the sum of all data contents between buffer start and end addresses. This value is calculated during the DEVICE reading, file loading, type changing or after buffer editing.

Bit count of the data contents:

NIBBLE WIDE PROM is 4 bit.
BYTE WIDE PROM is 8 bit.
WORD WIDE PROM is 16 bit.
MCU is 8 bit.

• EVEN and ODD address mapping

The address sequence of data contents can be assigned to be CONTIGUOUS, EVEN or ODD whenever you want to READ, PROGRAM or VERIFY the EPROM. For example, in a program function sub-menu, the screen displays a query,

Ready to start (Y/Even/Odd/<CR>)?

You may press 'Y' to program the data in the buffer to the device CONTIGUOUSLY as follows:

Buffer start +0	to	Device start	+0
+1	to		+1
+2	to		+2
........to			.....

You may press 'E' to program the data in the EVEN address to the device as follows:

Buffer start +0	to	Device start	+0
+2	to		+1
+4	to		+2
........to			.....

You may press 'O' to program the data in the ODD address to the device as follows:

Buffer start +1	to	Device start	+0
+3	to		+1
+5	to		+2
..........to			.....

In READ operation, the software will run in the reverse direction.

• I/O Address

This is the I/O base address of the system adapter card. Each of the I/O interface card added into a PC slot will occupy one or more I/O addresses. This default I/O base address of the system adapter card is 2E0h and occupies 4 contiguous spaces (2E0h to 2E3h).

- **Counter**

This is the programming address counter. During the DEVICE programming, the counter value will be progressively displayed on the screen.

- **MFR, TYPE, VPP, SPEED**

Every DEVICE has its own manufacturer (MFR), type number (TYPE), programming voltage (VPP) and programming speed (SPEED or ALGORITHM). Refer to Chapter 4 for more details.

3.11 Special Device PAL, FPL, GAL, PEEL, and EPLD Symbols

- **Programmable Logic Device (PLD)**

Generally speaking, PLD is a device that can be programmed to perform many different logic operations. PLDs are grouped into the following three categories:

PLD   : one time PLD such as a PAL device.
EPLD   : UV erasable PLD such as a EPLD device.
EEPLD : electrical erasable PLD such as a GAL, or
         PEEL device.

- **Programmer Object File (POF) for ALTERA devices**

The POF is the standard format of ALTERA devices which can be loaded by the programmer. Its contents can be edited in the BINARY mode. If not familiar with the POF format, the user should not edit the contents to avoid destroying the original format. If editing is neccessary, use ALTERA development tool. For more details, please contact ALTERA.

• JEDEC Fuse Map File of a PLD Device

The JEDEC fuse map file is the standard format that can be loaded by the programmer. It contains fuses information (BLOWN/ INTACT) and the FUNCTION TEST VECTOR of the PLD. Most PAL assemblers or compilers, such as PALASM, PLAN, OPAL, ABEL, SNAP, AMAZE, and PDK-1 will produce a JEDEC fuse map file.

• Array Fuses, Configuration Fuses

Array fuses are the main logic fuses in a PLD. Different arrangements (BLOWN/INTACT) will have different logic combinations.

Configuration fuses always indicate the I/O architecture of the PLD, such as COMBINATORIAL/REGISTERED, OUTPUT FEEDBACK/OUTPUT ENABLE.

• Security Fuses

Compared to PROM device, PLD has extra fuses inside. The arrangement of array fuses and configuration fuses will not normally be copied if the security fuses are blown.

• Fuse BLOWN and INTACT

Originally in the JEDEC fuse map definition, the new PLDs' fuses (Blank devices) are all in an INTACT state (i.e., 0 state). The user can only blow an INTACT fuse into a BLOWN state (i.e. 1 state).

Due to the rapid improvement of PLD technology, some new PLDs' fuses are in a BLOWN state, and can only be programmed into an INTACT state. Returning to the intitial state is only possible when the PLD is erasable.

3.2   Viewing the Main Menu

First, study the AUTO device driver file's MAIN MENU displayed on the screen to familiarize yourself with the menu-driven features.

Main Menu screen

← Status Field
← Adaptor
↖ Function Field
⟋ Logo
Quick-
← Function Keys
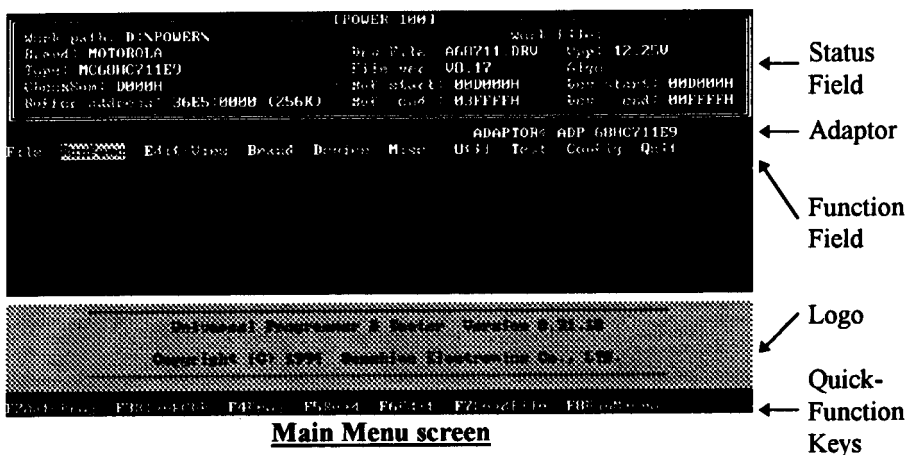
3.20   Status Field

At the top of the Main Menu screen is a group of text. Inside the window is the current DEVICE's BRAND, TYPE, memory BUFFER ADDRESS, DEVICE ADDRESS, driver file's VERSION, CHECKSUM, LOADED filename, VPP, and Programming ALGORITHM. This is the status field.

Whenever you are going to use this programmer, Be sure that the status in this field meets your requirements. Otherwise the DEVICE will be destroyed or programmed to an unknown state.

Work Path	: Current work path
Brand	: IC manufacturer
Type	: IC type number
CheckSum	: Check sum of memory buffer
	B : byte-wide (8-bit) checksum
	W: word-wide (16-bit) checksum
Buffer address	: Allocated memory buffer start address or file
	buffer EDBIN.MEM and buffer allocation
	size
Work file	: Displays last download file
Drv File	: Driver filename
File ver	: Driver file's version
Vpp	: IC programming voltage
Algo.	: IC programming algorithm
Buffer Start	: Buffer start address
Buffer End	: Buffer end address
Device Start	: IC start address
Device End	: IC end address

3.21 ADAPTOR

"ADAPTOR: adaptor's name" will be shown under the Status field, if the device to be programmed requires an adaptor.

3.22 Function field

Directly below the status field is the function field which includes File, Runfunc, Edit/View, Brand, Device, Misc., Util, Test, Config, and Quit. Refer to Chapter 4.

3.23 Logo, Hardware Model and Software Version

At the bottom of the Main Menu screen, you could see the LOGO, HARDWARE MODEL, and AUTO DRIVER FILE'S VERSION. These messages are for reference only.

3.24   Quick Function Keys

<F2> AutoProg   : Auto Program
<F3> BlankChk   : Blank Check
<F4> Prog   : Program
<F5> Read   : Read
<F6> Edit   : Edit
<F7> LoadFile   : Download File
<F8> RunMacro   : Run Macro
<F9> Macro Abort   : Abort Macro setup (Only provided in
                     Macro setup function)
<F10> Macro Save   : Save Macro file (Only provided in Macro
                     setup function)

By now you should be familiar with the Main Menu screen.
You may learn more about these features by reading the rest of
this section. The various functions will be discussed in detail in
Chapter 4.

3.3   Getting Started

This section presents a simple example to help you to be
familiar with the programmer and some commonly used
functions. You can refer to Chapter 4 for detailed description of
each function. If you did not get the desired results, make sure
that all the cables are connected firmly. Always double check
cable connections.

The following illustration will demonstrate how to start and
exit the Main Menu and operate functions such as File,
Runfunc, Edit/View, Brand, Device, Misc., Util, Test, and
Config.

In the illustration, we shall use an INTEL 27C010 (1Mbit)
EPROM.   You may also use other series PLD or EPROM
devices to practise this exercise.

Now, if you have at least one INTEL 27C010 (1Mbit) EPROM
on hand, you can begin by taking the following steps.

3.30 Execute the POWER.EXE or EXPRO.EXE

Type "POWER" or "EXPRO" command under the subdirectory POWER or EXPRO.

C:\POWER>POWER   (For POWER-100) or
C:\EXPRO>EXPRO   (For EXPRO-60/80)
After entering above command, the Main Menu appears. Type 'B' or move the highlighted bar to 'Brand' to select MFR. The following MFR list will appear on the screen:
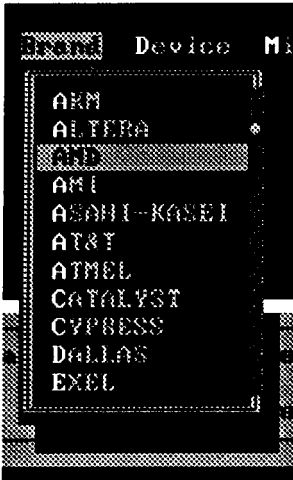
POINTER

▼: starting point
◆: ? pointer
▲: ending point

3.31   Select EPROM MFR and TYPE number.

Type 'I' or move the highlighted bar to select "INTEL", then type 'R' to select "EPROM". The screen will display the following:

Move the highlighted bar to select "27C010". After selecting the correct type, the system will automatically return to "Runfunc" and modify STATUS FIELD as you have selected.

3.32 Load Disk File into Buffer.

After you have taken the above-mentioned steps, type 'F' to select "Load file" function or press <F7> to transfer the file in BINARY or HEX format to the memory buffer, and the following file loading sub-menu will appear:
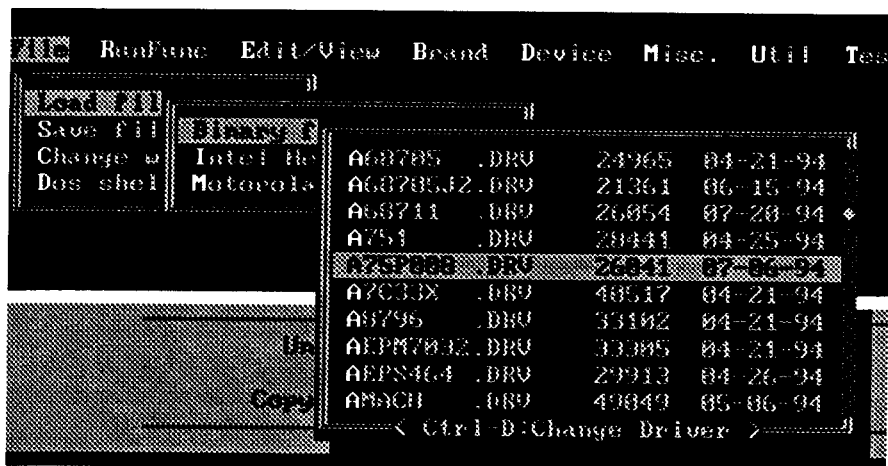
Sub-menu of file loading

Please follow the listed steps to execute the window selection:

- Use the <↑> or <↓> or <PgUp> or <PgDn> or type the hot key , i.e., the first letter of the filename, to move the highlighted bar to the desired file or subdirectory.
- Press the <Enter> key to select the desired file or subdirectory.
- If the subdirectory name is selected, the directory window will display all the files in that subdirectory for the next selection.
- Press <Ctrl + D> to change disk drive, then input the 'disk drive' name.
- After selecting the filename, the sub-menu will prompt you to enter the buffer starting address that you want to load from. You must now specify the memory buffer location (address) to which the disk file is to be sent. Type '0' if you

wish the disk file to be transferred to the starting position of the memory buffer. After entering the location, the software will begin to load the disk file to the internal memory buffer and display.

LOADING NOW...
End address: xxxxxxH

The file's contents are now in the memory buffer. Press <Esc> or <CR> to return to the "File" menu or "Quick keys" for the function desired.

3.33   Read Contents from Master EPROM.

If the EPROM data is in a Master EPROM instead of a disk file, you have to transfer it by typing 'R' to select "RunFunc". After typing 'R', moving the highlighted bar, or pressing <F5> to select "Read" function, the following sub-menu will appear:

ADAPTOR: ADP

RunFunc   Edit/View   Brand   Device   Misc.   Util   Test   Co

Auto (BL&E)&
Blank check   Ready to read (Y/<CR>) ?
Program
Read
Verify
Lock bits
Compare
Display devi

Copy   CheckSum: F000H
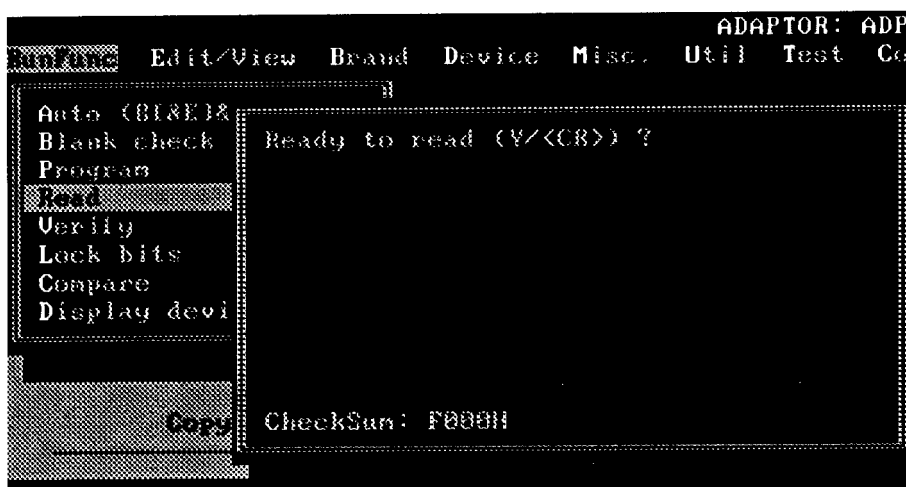
Sub-menu of Read

Insert the Master EPROM into the socket. With the pull lever in upright position, the lower left pin should match the EPROM GND pin. Then press 'Y'. The data of the Master EPROM will be transferred to the internal memory buffer while displaying:

READING NOW...
OK!

Press <Esc> or <CR> to return to "Runfunc" or "Quick keys" for the function desired.

<<< WARNING >>>

When operating any function under the Runfunc menu (such as Program, Read, etc.) DO NOT change the PC speed , i.e., do not press the Turbo button. If it is necessary to change the PC speed, then abandon the Runfunc-menu to do so.

3.34 Insert the Blank EPROM into Textool.

After transferring the data from the disk file or the Master EPROM, take out the Master EPROM and insert the blank EPROM into textool with the pull lever in upright position. The lower left pin should match the EPROM GND pin.

<<< CAUTION >>>

The notch-end of the EPROM must not be inserted into the end of the socket. If not, the EPROM will be destroyed or programmed to an unknown state.

3.35 Program Buffer Contents to EPROM.

After loading the disk file or reading the Master EPROM data into the memory buffer and inserting the blank EPROM, you can now program the EPROM by typing 'R' to select "RunFunc". After typing 'P', moving the highlighted bar or pressing <F4> to select "Program" function, the following sub-menu will be displayed:
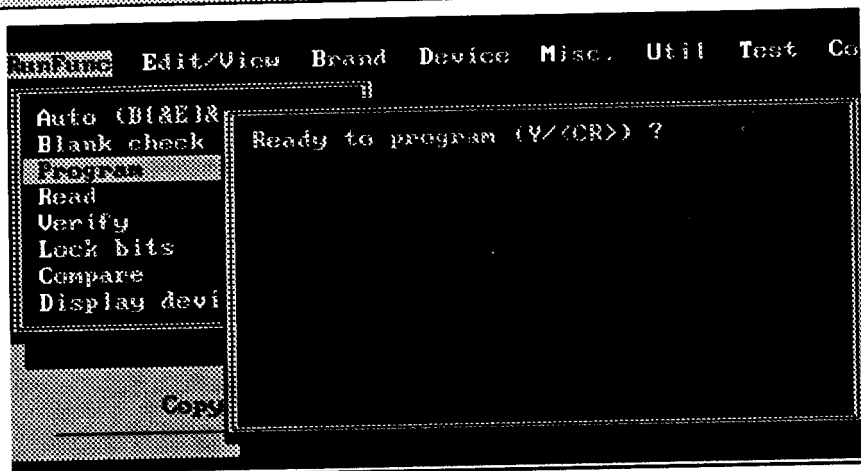
Sub-menu of Program

Then type 'Y', and the programmer will attempt to program the buffer contents onto the blank EPROM. At the end of the programming process, the programmer will compare the EPROM contents with the memory buffer. Any discrepancies between the buffer and the EPROM will be displayed.

This completes the programming process. To program other EPROMs, wait for the BUSY LED to shut off, then replace the EPROM and type 'Y 'again.

If you want to exit the programming process, press <Esc> or <CR> to return to "Runfunc" or "Quick keys" for the function desired.

We hope that with the aid of this manual, you can become a professional user of this programmer module without any difficulty.

The advanced user may want to modify the contents of the memory buffer, save the buffer contents in the disk, or change the I/O address to another address, etc. We will describe each of the functions in detail in Chapter 4's FUNCTION REFERENCE GUIDE.

4. FUNCTION REFERENCE GUIDE

The following reference guide describes the functions one by
one according to the order given in the menu. To enter into the
desired function, press the first letter of that function.

4.1 FILE menu

4.10 Load BINARY/HEX File to Buffer

Download file to memory buffer for programming or comparing.

Type 'F' to select "File" followed by 'L' to select "Load file"; or move highlighted bar to select "File" and "Load file"; or press <F7>.

a. BINARY format
b. Intel HEX format
c. Motorola HEX format

Before downloading the file, confirm the file format. After selecting the format, the screen displays the filenames in the current directory.

A dialog window will be displayed on the screen as follows:
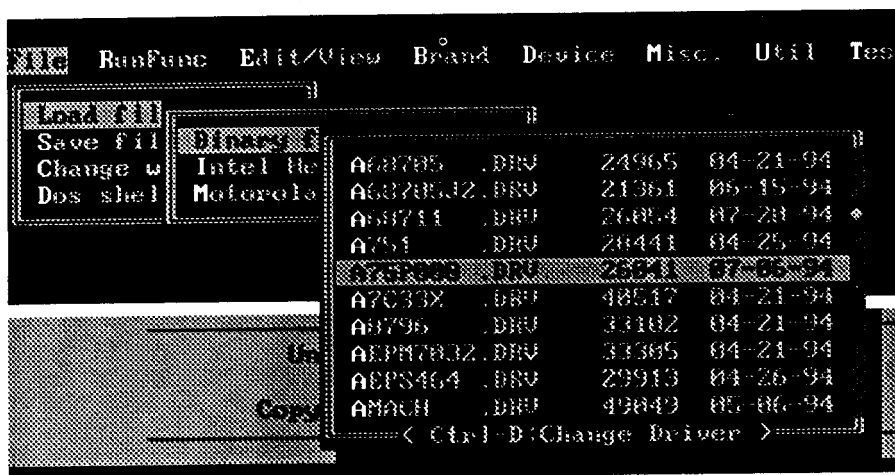
•Use <↑> or <↓> or <PgUp> or <PgDn> or hot keys, i.e., the first letter of the filename, to move the highlighted bar to the desired file or subdirectory.

•Press the <Enter> key to select the desired file or subdirectory.

•If the subdirectory name is selected, the directory window will show all the files of that subdirectory for the next selection.

•Press 'Ctrl+D' to change the disk drive.

•Press <Esc> to return to the "File".

Move the cursor to the file you wish to download and press
<Enter>. When "Start Address:" or "Start Segment:" appears,
input the start address or start segment that you wish to
download. The following is an example of downloading a
BINARY file After selecting the filename, the sub-menu will
prompt you to enter the buffer starting address that you want to
load from. Specify the memory buffer location to which the file
is to be sent. Type '0' if you wish the file to be transferred to
the starting position of the memory buffer. After entering the
location, the software will begin to load the file to the internal
memory buffer. After downloading, the following will be
displayed.

LOADING NOW...
End address: xxxxxxH

4.11 Save Buffer to Disk

Type 'F' to select "File" followed by 'S' to select "Save file"; or
move highlighted bar to select "File" and "Save file".

A dialog window will be displayed on the screen as follows:
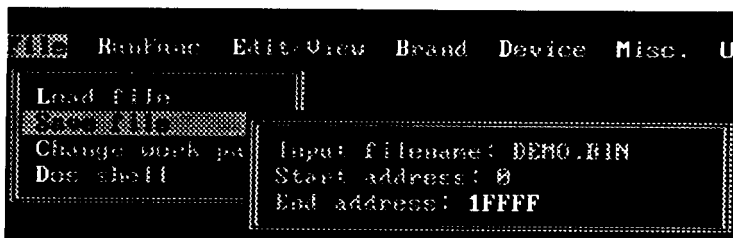
Use BINARY format to save the buffer's data to the current
work path. When prompted, key in the complete filename to be
saved, then press <CR>. Next, key in the starting address for
the portion of buffer to be saved, and press <CR>. Then, key in
the ending address for the portion of buffer to be saved, and
press <CR>.

4.12 Change work path

Type 'F' to select "File" followed by 'C' to select "Change work path"; or move highlighted bar to select "File" and "Change work path". A dialog window will be displayed on the screen as follows:
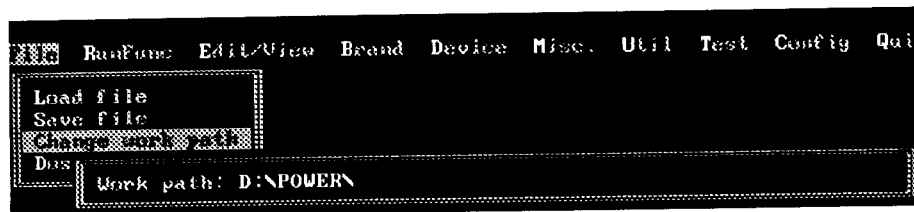
When prompted, key in the complete name of directory, then press <CR>. You can change to any directory to load and save files.

4.13 DOS Shell

Type 'F' to select "File" followed by 'D' to select "DOS shell"; or move highlighted bar to select "File" and "DOS shell".

After entering into this function, the software will search for the COMMAND.COM in the DOS boot disk drive. If it exists, the software will execute it, pass control to it and display a DOS command prompt as follows:

```
User EXIT to return to programmer
Microsoft ® MS-DOS ® Version 3.30
          © Copyright Microsoft Corp 1981 - 1987
C:\POWER>>
```

By now, the software is controlled by DOS and waiting for your command. The command format is the same as the DOS command. Under DOS command prompt, enter both text 'EXIT' and <CR> to return to "File".

> *<<< NOTE >>>*
>
> *This function need the COMMAND.COM. The user has to prepare this file on the DOS boot disk drive, otherwise the function will not work.*

4.2 RunFunc menu

Executes programming function selection

```
<<< WARNING >>>

When operating any function under the Runfunc-menu (such as
Program, Read, etc.) DO NOT change the PC speed , i.e., do
not press the Turbo button. If it is necessary to change the PC
speed, then abandon the Runfunc-menu to do so.
```

4.20 Auto (B [&E] & P & V [&S])

Automatic Program function.

Type 'R' to select "Runfunc" followed by 'A' to select "Auto (B
& P & V [&S])"; or move highlighted bar to select "Runfunc"
and "Auto (B & P & V [&S])" or Press <F2>. The sub-menu
will be displayed as shown.
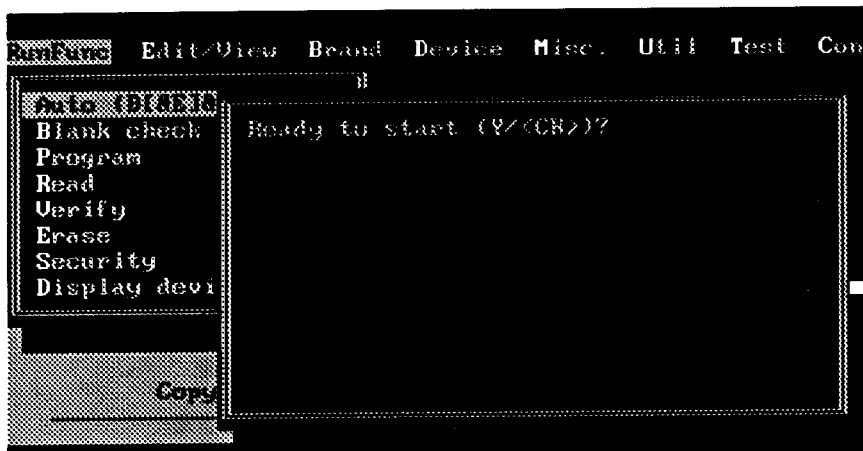
Sub-menu of Auto

Press 'Y' to start Auto function, or <CR> to return to
"Runfunc". The Auto function can simultaneously Blank
Check, [Erase], Program, Verify, and [security] the ICs in the
textools.

P.S. [   ] *means executable according to IC's configuration.*

4.21   Blank Check

Blank Check function.

Type 'R' to select "Runfunc" followed by 'B' to select "Blank check"; or move highlighted bar to select "Runfunc" and "Blank check" or Press <F3>. The sub-menu will be displayed as shown.
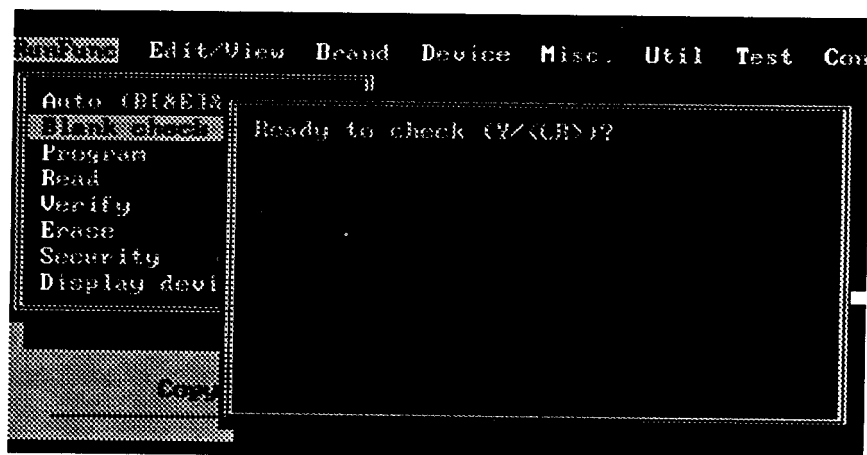
Sub-menu of Blank check

Press 'Y' to start the blank check, or <CR> to return to "Runfunc". If the chip is not blank, the first address will be displayed. Otherwise, the "Blank check OK!" message will be displayed.

4.22   Program

Program buffer's data to device.

Type 'R' to select "Runfunc" followed by 'P' to select "Program"; or move highlighted bar to select "Runfunc" and "Program" or Press <F4>. The sub-menu will be displayed as shown.
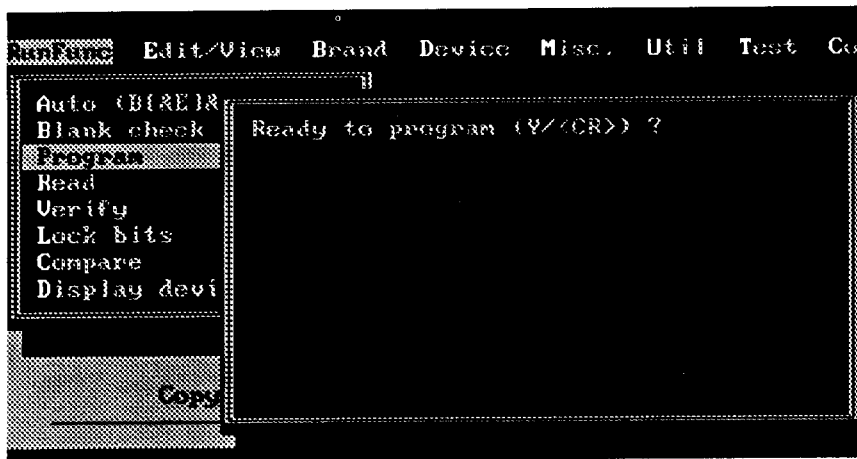
Sub-menu of Program

Now type 'Y' to begin the transfer of data from the memory buffer to the DEVICE, or press <CR> to return to "Runfunc". The first error address will be displayed when encountering program failure. Otherwise, the "Program OK!" message will be displayed on the screen. After programming is completed it automatically verifies the programmed data.

4.23 Read

Read device's data into buffer.

Type 'R' to select "Runfunc" followed by 'R' to select "Read"; or move highlighted bar to select "Runfunc" and "Read" or press <F5>. The sub-menu will be displayed as shown.
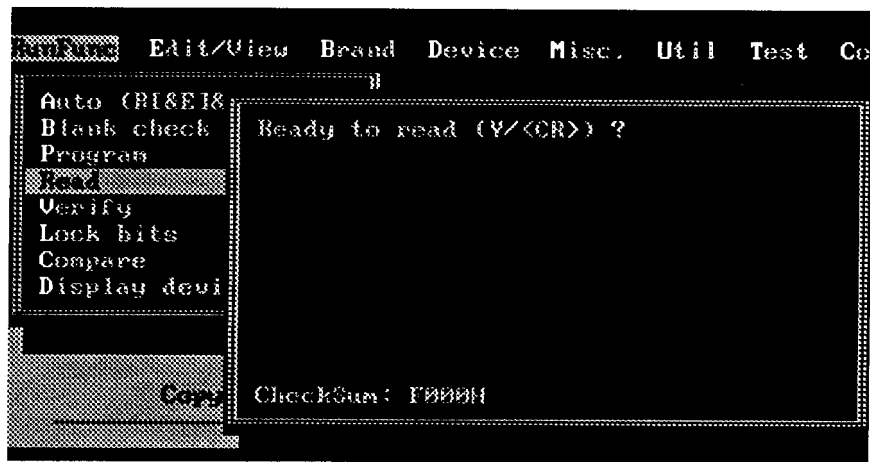
Sub-menu of Read

Press 'Y' to read data from the DEVICE to the buffer, or press <CR> to return to "Runfunc". The sub-menu will display the "Reading now..." message, and when reading is completed, the "Read OK!" message will be displayed.

The check sum will be automatically calculated after reading is completed.

4.24 Verify

Verify buffer and device data.

Type 'R' to select "Runfunc" followed by 'V' to select "Verify"; or move highlighted bar to select "Runfunc" and "Verify". The sub-menu will be displayed as shown.

Sub-menu of Verify

Press 'Y' to verify the DEVICE with the buffer shown in the STATUS FIELD, or press <CR> to return to "Runfunc". The sub-menu will display "Verifying Now" message.

The first error address will be displayed when encountering verify failure. Otherwise, the "Verify OK!" message will be displayed on the screen.

4.25 Compare & Display Error

Compare buffer and device data, display error.

Type 'R' to select 'Runfunc' followed by 'C' to select 'Compare'; or move highlighted bar to select 'Runfunc' and "Compare". The sub-menu will be displayed as shown.
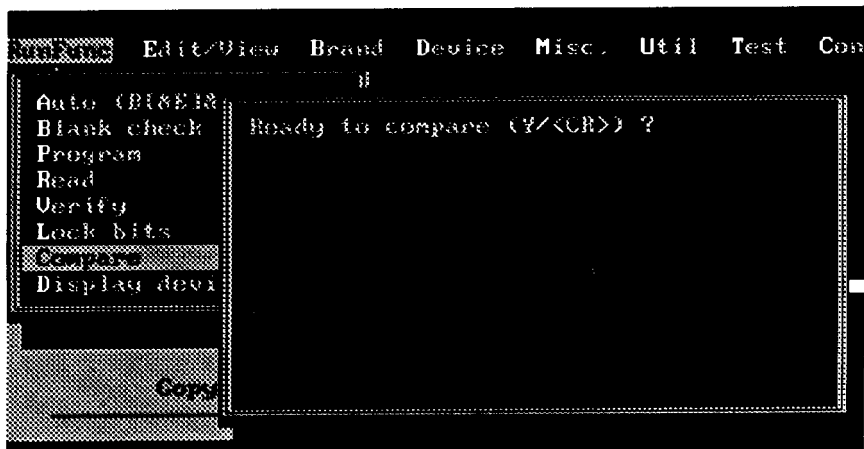
Sub-menu of Compare

Press 'Y' to compare the data in the device with the memory buffer, and the screen will display the differences in the format as shown below. Otherwise, press <CR> to return to "Runfunc".

```
Error at :
Press <Esc> to terminate display.
-----------------------------------------
00000:DA - (00000:21),00001:1F - (00001:05),

Press any key to continue.
```
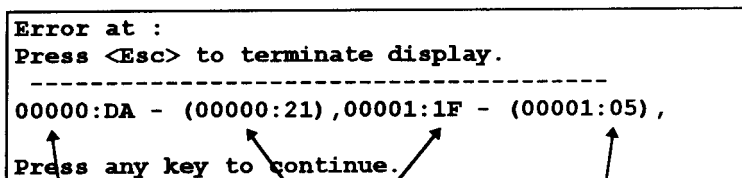
Device Address   Buffer contents

Device contents   Buffer Address

While the differences are being displayed, you can press the 'Ctrl+S' keys or 'Pause' key to hold the display. Press <Esc> to terminate the display, then any key to return to "Runfunc". If no errors are detected, "Compare OK!" message will be displayed.

4.26   Display contents of DEVICE

Type 'R' to select "Runfunc" followed by 'D' to select "Display device"; or move highlighted bar to select "Runfunc" and "Display device". The sub-menu will be displayed as shown.

Sub-menu of Display

The screen will display the address and the current contents of that address in the DEVICE, but does not save them into the buffer. Press <Esc> to exit the display, and press any key to return to "Runfunc".

4.27 Change Program Algorithm

Only for EPROM.

Type 'R' to select "Runfunc" followed by 'G' to select "chanGe algorithm"; or move highlighted bar to select "Runfunc" and "chanGe algorithm". The sub-menu will be displayed as shown.

Algorithm select

When prompted, select the new programming algorithm you wish to work on. The algorithm you have selected will be updated in the STATUS FIELD for programming reference.

Press <Esc> or <CR> to return to "Runfunc".

4.28 Security, Lock Bits & Encryption Code

In addition to ROM code programming function, some MCUs have other facilities such as Lock Bits, Security Bits, and Encryption Code to prevent unauthorized copying. MCU 8748AH, 8749AH and 87C51 series meet this category. The user can easily operate these functions individually by selecting "Lock bits", "Security" or "Encryption" under "Runfunc" or select "Auto" function to automatically execute the above 3 functions. (Each individual definition is available in your MCU's Manual.)

4.29   Extra Functions of PLD Programming

Load JEDEC File :

To program PLD, the user need to load JEDEC Fuse Map file
(not Binary file). This is a standard PLD file produced mostly
by standard PLD compilers, such as ABEL, CUPL, PALASM
II, SNAP, OPAL, PDK-1, and PLAN II. Refer to section 4.10
for operating details.

Save JEDEC File :

Under PLD Device file, data is always saved in JEDEC file
format for later use. Please refer to section 4.11 for operating
details.

Edit Buffer :

Though the Edit Buffer function is included, we recommend
that you use it only for reference. To edit the buffer directly the
user must be very familiar with the PLD JEDEC Fuse Map
assignment. Therefore, you are advised to edit with the PLD
compiler.

Display Device:

Under PLD Device File, the content of device is displayed in
the JEDEC format.

Security Fuses Blow :

The final step in PLD programming is to blow the security
fuses. Doing this will prevent any further access into the PLD
through "modification" or "reading". It also prevents anyone
from making unauthorized duplication of your PLD.

This function is automatically executed in the final process of
the "auto" function.

4.3 EDIT/VIEW menu

4.30 Edit Buffer

Type 'E' to select "Edit/View" followed by 'E' to select "Edit buffer"; or move highlighted bar to select "Edit/View" and "Edit buffer" or press <F6> to obtain the editing command summary on the screen as shown.

```
                    >>   EDITING COMMAND SUMMARY   <<

D [start],[end]                <Enter> : Dump
E [start]                      <Enter> : Edit
M start,end,destination        <Enter> : Move Block
F start,end,code               <Enter> : Fill Block
P start,end                    <Enter> : Print Block
C start,end                    <Enter> : Check Sum
S start,end,ASCII code         <Enter> : ASCII Search max. 15 characters
B start,end,BINARY code        <Enter> : BINARY Search max. 7 bytes
W start,end                    <Enter> : Swap Block (high and low byte)
N start,end                    <Enter> : Swap Block (high and low nibble)
?                              <Enter> : Help
Q                              <Enter> : Quit

* The information listed below is for reference only :
  The absolute start address of Buffer : 36E5:0000
  The Buffer size : 40000 (256K) Bytes

>
```

Edit Command Summary

a. D [start], [end] <Enter>: Dump. Shows   range of the data in Hexadecimal and ASCII format

b. E [start], <Enter>: Edit. Edits the buffer in Hexadecimal or ASCII format.

c. M start, end, destination <Enter>: Move Block. Copies data of a range to another range. <Ctrl+X> to toggle between Hexadecimal and ASCII format.

d. F start, end, code <Enter>: Fill Block. Fills a range in Hexadecimal format.

e. P start, end <Enter>: Print Block. Prints data of a range in Hexadecimal and ASCII format.

g. S start, end, ASCII code <Enter>:ASCII Search. Searches a range with identical characters; searches simultaneously maximum of 15 ASCII characters.

h. B start, end, BINARY code <Enter>: BINARY Search. max. 7 bytes. Searches a range with identical bytes in BINARY code with maximum of 7 bytes.

i. W start, end <Enter>: Swap byte. Swaps high and low byte of a range.

j. N start, end <Enter>: Swap nibble. Swaps high and low nibble of a range.

k. ? <Enter>: Help. Displays again the Editing Command Summary.

l. Q <Enter>: Quit. Exits the Edit Buffer function.

P.S. [   ] *means not necessary to be input.*

```
The information listed below is for reference only.
Current filename: C:\POWER\EDBIN.MEM
File length: 80000H (524288) bytes
```

(The above three lines appears below the EDITING COMMAND SUMMARY field when the disk buffer is used as the buffer.)

```
The information listed below is for reference only.
The absolute start address of buffer: XXXX:0000
The buffer size: 40000H (256K) bytes
```

(The above three lines appears below the EDITING COMMAND SUMMARY field when the memory is used as the buffer.)

You may now proceed with the Edit procedure under command prompt "==>" by using the above command format.

4.31 Modify Buffer (Target Zone)

Modifies memory buffer's start and end address, and IC's start address

Type 'E' to select "Edit/View" followed by 'M' to select "Modify zone"; or move highlighted bar to select "Edit/View" and "Modify zone". The sub-menu will be displayed as shown.
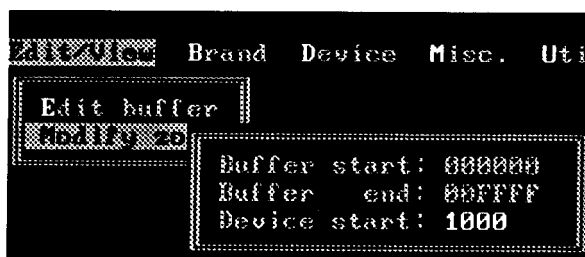
Modify buffer

When prompted, key in the new buffer start address and press <CR>. Next, key in the new buffer end address and press <CR>. Then input the new DEVICE start address and press <CR>. The values you have input in HEX code will be updated in the STATUS FIELD for programming reference.

Press 'Esc' key to abandon changes.

Example:

> Buffer start : 2000H
>
> Buffer end   : FFFFH
>
> Device Start : 1000H

The above three lines indicate that the contents between '2000H' and 'FFFFH' will be programmed to the device starting from '1000H'. Also, the contents of the device starting from '1000H' is read to the buffer starting from '2000H'.

P.S. *The length to be programmed or read is determined by the buffer' or device's range, whichever is smaller in size.*

4.4 Brand selection

Type 'B' or move highlighted bar to select "Brand". The sub-menu will be displayed as shown.

Sub-menu of Device

Move the highlighted bar or type the hot key, i.e., the first letter of the manufacturer's name, to select the manufacturer corresponding to your DEVICE. After selecting the Manufacturer, Device, and Type, the new Manufacturer, Type will be updated in the STATUS FIELD for programming reference. It will automatically return to "Runfunc".

4.5 Device Selection

Type 'D' or move highlighted bar to select "Device". The sub-menu will be displayed as shown.
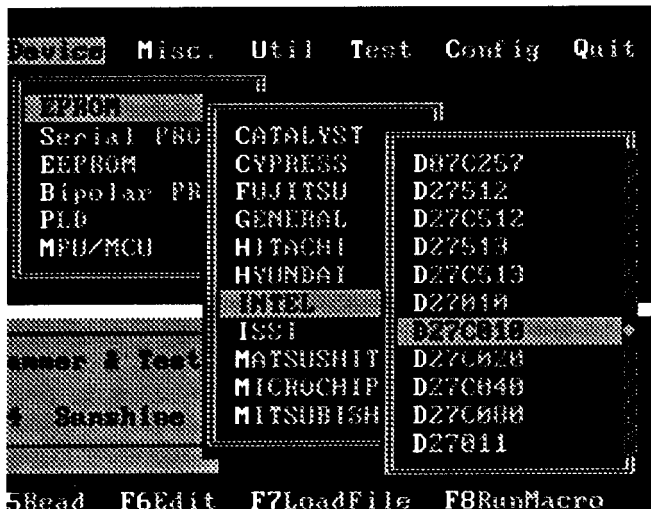
Sub-menu of Device

Move the highlighted bar to select the Device corresponding to your type of Device. After selecting the Device, Manufacturer, and Type, the new Manufacturer and Type will be updated in the STATUS FIELD for programming reference. It will automatically return to "Runfunc".

<<< NOTE >>>

EPROM chips are not always clearly labeled. It may be difficult, for example, to determine whether the EPROM you wish to program is a 2732 requiring 25V, or whether it is a 2732A requiring 21V. If you encounter this problem, try to program the EPROM with lower voltage first. If this does not work, erase the EPROM and try the higher voltage.

4.6 MISC.: Miscellaneous Functions Menu

4.60 Change I/O Base Address of the System Adapter Card

This section is for EXPRO-60/80 only.

Before performing this function you must also turn the DIP SWITCHES ON or OFF on the system adapter SAC-101A card.

(This must be done with the computer switched off.)

Please study the following list of I/O address and their corresponding DIP SWITCH positions. Only one position can be selected ON.

DIP SW	POSITION	I/O ADDRESS
SW1	1	200H
SW1	2	210H
SW1	3	220H
SW1	4	230H
SW1	5	240H
SW1	6	250H
SW1	7	260H
SW1	8	270H
SW2	1	280H
SW2	2	290H
SW2	3	2A0H
SW2	4	2B0H
SW2	5	2C0H
SW2	6	2D0H
(DEFAULT) SW2	7	2E0H
SW2	8	2F0H

Type 'M' to select "Misc." followed by 'S' to select "Set PC I/O addr."; or move the highlighted bar to select "Misc." and "Set PC I/O addr.". The sub-menu will be displayed as shown.
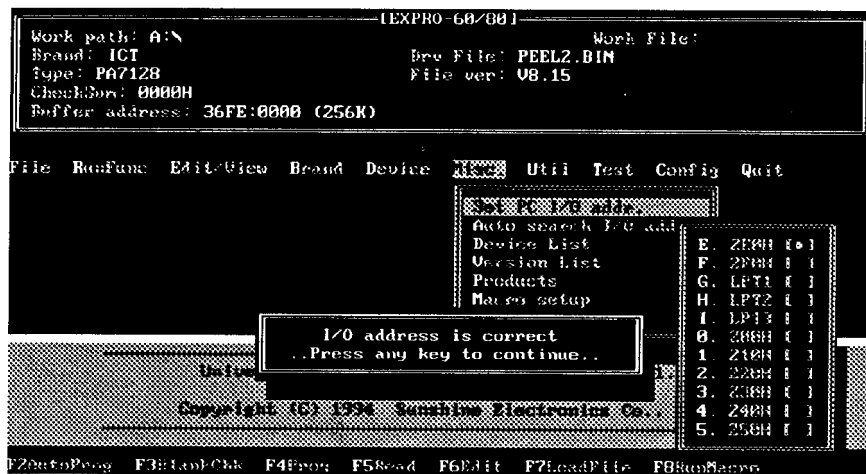
Sub-menu of SET I/O adr.

Then select the I/O address that is set on the system adapter card. The software will automatically check the hardware I/O circuit and display the result showing "I/O address is correct". If the result appears as "Communication error", it means the software I/O address does not match the hardware I/O address. Double check both I/O addresses.

When "Communication error" message appears on the screen, press 'Q' or <Esc> to quit to DOS prompt. Turn off the computer and re-check all connections between the system adapter card and the PC, and all cable connections between the system adapter card and the programmer module.

<<< NOTE >>>

Most problems are caused by poor contacts between the system adapter card and the PC slot, or cable connections between the system adapter card and programmer module.

If the software I/O address is identical to that of any other add-on card, the user may directly select the I/O address on the screen, and change the hardware I/O address as well to match both software and hardware.

When the both I/O addresses of the software and hardware match each other, and there's no problem with the connections, restart the computer and run the main program.

4.61   Auto search I/O adr. (for EXPRO-60/80 only)

This function automatically searches the I/O address.

4.62   Device list

A list of all the devices supported by the POWER-100 or EXPRO-60/80.

4.63   Version list

A list of all driver files version.

4.64   Products

An introduction to **SUNSHINE** products.

4.65 Macro setup

Setting up of Macro commands.

After selecting "Macro setup", the bottom corner of the status field displays " [Macro Mode]:<F9> to abort, <F10> to **save**". All keystrokes are recorded by the software till you press <F10> or <F9>. Upon pressing <10>, the user will be required to input Macro filename. After entering the filename or pressing <F9> (abandon Macro Setup), "[Macro Mode]:..." will then disappear.

This function was designed to simplify user's operating procedures. Note that this program will set the path "MAC\" where macro files are saved.

```
[Macro Mode]: <F9> to abort, <F10> to Save
File   RunFunc   Edit/View   Brand   Device   ▓▓▓▓   Util   Te:
                                         ┌──────────────────┐
                                         │ Device List      │
                                         │ Version List     │
                                         │ Products         │
                                         │▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓│
                                         │ Run macro        │
                                         └──────────────────┘
```
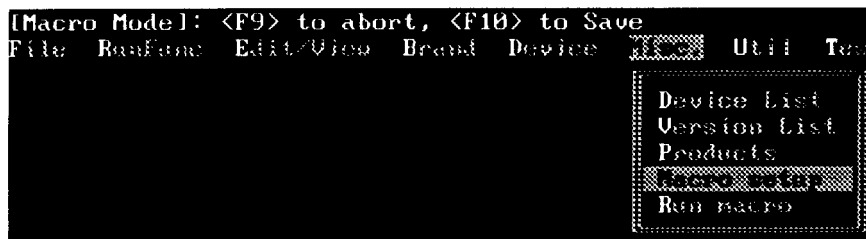
4.66 Run macro

Executes macro commands.

After selecting "Run Macro", the software will prompt you to input the Macro file to be executed. "Macro processing" will appear at the bottom corner of the status field after selecting the Macro file until execution is completed.
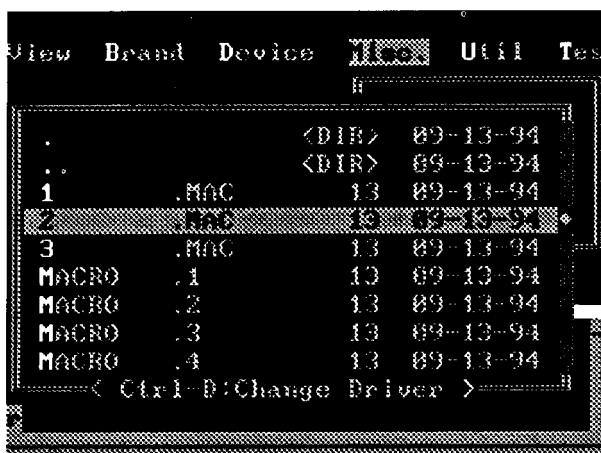
Note: *The Macro file's format is solely used by the system and cannot be altered to prevent any kind of damage.*

4.7 UTIL menu

4.70 Dump binary file

Dump BINARY file to console.

BINARY file cannot use DOS type commands and be displayed on the screen. DUMP.EXE converts the BINARY file to a HEX file that can be displayed on the screen, saved in a file or printed out.

The operation is shown below:

A: [^P] DUMP filename [start address] <Enter>

    [   ]   : Alternative operation
    Start address : HEX starting dump address; the scope is
                   from OH to FFFFH.

To print the data, press <Ctrl+P>. The data will then be displayed on the screen and printed simultaneously.

4.71 Edit binary file

EDBIN.EXE can edit a BINARY file. There is no limit to the buffer size. Refer to section 4.3 Edit/View menu.

4.72 Hex to binary & Hex to binary (extended)

Conversion of HEX format to BINARY code.

(HEXBIN.EXE & HEXBIN2.EXE) The user's original file is produced as a HEX file after successfully passing through assemblers or compilers. It can be sent through the RS-232 to a standalone programmer or in-circuit emulator. The conversion software changes HEX files to usable BINARY files. It is assumed that the user understands the difference between the two formats.

HEXBIN.EXE can convert the following four formats of HEX files to BINARY files with maximum conversion length of 64 Kbit.

a. Intel HEX file format
b. Motorola S1/S2 HEX file format
c. Tektronix HEX file format
d. TI SDSMAC HEX file format

HEXBIN2.EXE can convert the following four formats of extended HEX files into BINARY files.

a. Intel extended HEX file format
b. Motorola S1/S2/S3 HEX file format
c. Digital Research HEX file format
d. Tektronix extended HEX file format

The following illustrates the execution of HEXBIN2.

```
A:>HEXBIN2 [HEX filename] [BINARY filename]
[conversion mode (HEX FORMAT)] [start address]
<Enter>
```

[   ]: *alternative operation*

Conversion method:

I - for Intel extended HEX file format
D - for Digital Research HEX file format
M - for Motorola S1/S2/S3 HEX file format
T - for Tektronix extended HEX file format

Start address: HEX value. To have a minimum output length, delete unnecessary data before the start address, The HEXBIN program does not need this parameter.

Remarks:

a. In using Intel extended HEX file format, the start address represents the segment address starting point. Conversion starts right after where the segment address is multiplied by 10H. The range of the address includes 0H to FFFFFH.

b. In using Motorola S1/S2/S3 HEX file format, the start address represents the real address of the starting point of the conversion. The range of the address is from 0H to FFFFFFFH.

For example:

```
A:>HEXBIN2 DEMO.HEX DEMO.TSK I 1000 <Enter>
```

HEXBIN2 converts HEX file, DEMO.HEX, into BINARY file, DEMO.TSK, with parameter using Intel HEX file format conversion.

Conversion starts from the file data address 10000H (segment address 1000H multiplied by 10H). Another operation method is as follows:

```
A:>HEXBIN2 <Enter>
HEX FILE NAME        : DEMO.HEX
BIN FILE NAME        : DEMO.BIN
HEX FILE FORMAT      :
<I>ntel <M>otorola <D>igital Research <T>ektronix : I
SEGMENT ADDRESS: 1000
```

4.73 File shuffler

Input format:
```
FILSHUFF filename mode [[input_1]
[input_2]...] <Enter>
filename: output filename
mode    : combining mode
input_n : input filename
```
Four types of operation mode are available:

Mode 1: Sectional appending of files – after entering the output filenames and mode, enter the filenames which you wish to append according to its order.

Mode 2: Combining two 8-bit files into a 16-bit file – this is to combine even files and odd files together. The first input file is the even file and the other is the odd file.

Mode 3: Combining 4 8-bit files into a 32-bit file – the relative position of the order of the input and output files are as follows:

1st input file -> output file 1, 5, 9, ... byte.
2nd input file -> output file 2, 6, 10, ... byte.
3rd input file -> output file 3, 7, 11, ... byte.
4th input file -> output file 4, 8, 12, ... byte.

Mode 4: Combining 8 8-bit files into a 64-bit file – the relative position of the order of the input and output files are as follows:

1st input file -> output file 1, 9, 17, ... byte.
2nd input file -> output file 2, 10, 18, ... byte.
3rd input file -> output file 3, 11, 19, ... byte.
4th input file -> output file 4, 12, 20, ... byte.
5th input file -> output file 5, 13, 21, ... byte.
6th input file -> output file 6, 14, 22, ... byte.
7th input file -> output file 7, 15, 23, ... byte.
8th input file -> output file 8, 16, 24, ... byte.

Remarks: *Mode 2 is 16-bit combination.*
Mode 3 is 32-bit combination.
Mode 4 is 64-bit combination.

4.75   File divider

Input format:
```
FILEDIV filename mode [size] <Enter>
filename : file to be divided
mode     : dividing mode
size     : only required in mode 1
```
Four types of operation mode are available:

Mode 1: Sectional dividing of a file – after entering the
filename to be divided, enter 1 (MODE) and the block
size; block size is in K BYTE; the file extension of
the output filename is 10X (where X means 1, 2, 3, ...)

Mode 2: Dividing a file into even byte and odd byte files – after
entering the filename to be divided, enter 2 (MODE),
the file extension of the output filename is 20X (where
X means 1, 2, 3, ...)

Mode 3: Dividing a file into 4 files – the file extension of the
output filenames are:

    301 -   original file's 1, 5, 9, ... byte composition
    302 -   original file's 2, 6, 10, ... byte composition
    303 -   original file's 3, 7, 11, ... byte composition
    304 -   original file's 4, 8, 12, ... byte composition

Mode 4: Dividing a file into 8 files – the file extension of the
output filenames are:

    401 -   original file's 1, 9, 17, ... byte composition
    402 -   original file's 2, 10, 18, ... byte composition
    403 -   original file's 3, 11, 19, ... byte composition
    404 -   original file's 4, 12, 20, ... byte composition
    405 -   original file's 5, 13, 21, ... byte composition
    406 -   original file's 6, 14, 22, ... byte composition
    407 -   original file's 7, 15, 23, ... byte composition
    408 -   original file's 8, 16, 24, ... byte composition

Remarks: *Mode 2 is 16-bit dividing.*
Mode 3 is 32-bit dividing.
Mode 4 is 64-bit dividing.

4.76   H/W self-diagnosis

- POWER-100 H/W is designed with **ADC circuit** (analog-to-digital converter). During self-diagnosis, the user does not need to use a meter to test the voltage level in the textool. The POWER-100 H/W self-detects and compares all the pin-drivers. Therefore, it is more reliable and faster than the EXPRO-60/80 which requires 1 pin to 1 pin test.

- **"Single step test"** function is designed for user to be able to self-repair when POWER-100 breaks down. The S/W will indicate the IC number and position upon determining the faulty pin-driver. (not available at the moment)

- **"Oscillator test".** Due to slow PC's I/O speed, it cannot use self-test circuit to test oscillator's frequency. It needs user to measure with oscilloscope by connecting the probe's GND clip to the 2 screws of the 25-pin D-type connector.

<<< NOTE >>>

During normal operations, no relationship exists between the POWER-100 and the PC speed. However, during hardware's self-diagnosis, there are two sets of driver circuits that are affected by the PC speed. At PC speed slower than **486DX-33 in Turbo mode,** the diagnosis of 'Quick pull-high' and 'capacitor circuit' will produce an error message of test failure that does not occur at faster PC speeds.

4.8 TEST menu

4.80 PLD vector test

The PLD vector test (PALTEST.EXE) presentment will appear after selecting this function. Through this function, the user can test PLD devices using JEDEC TEST VECTOR in the JEDEC fuse map file. A PLD whose security fuses are blown can then be tested easily.

The available JEDEC TEST VECTOR symbols are listed below:

    0 : Apply LOW to PLD
    1 : Apply HI to PLD
    H : HI output from PLD
    L : LOW output from PLD
    Z : Apply High-z to PLD
    N : Apply power to PLD
    X : Don't care
    C : Apply positive clock
    K : Apply negative clock

Exception : *The maximum number of vectors : 1500*

Test procedures:

a. Vector Table must be built when designing the PLD equation.(Refer to the usage of PLD Assemblers)
b. After Assembler, the Vector Table is included in the Jedec file generated by the Assembler.
c. After using the programmer to program the PLD successfully, perform the " PLD Vector Test".
d. Select correct Type by "T. Select Type" sub-menu.
e. After entering function" L. Load Test Vector of JEDEC file" download the JEDEC file to memory buffer.
f. Then enter function "F. Function Test", or "O. Loop Test", to test the internal Circuit of the PLD.

- Function test : This is a single loop function test, i.e., the possible logic combinations are carried out only once.
- Loop test : This option will repeatedly test the chip logic combinations in an endless loop. The test will stop, then convey an error message in the event of encountering any error during the process. The test may be terminated by pressing any button.

Others : "V. View Vector" function can be used to view the Vector downloaded.

"S. Set Vcc" function can be used to set the Voltage Vcc value for testing the PLD.

<<< NOTE >>>

Although PALTEST.EXE accepts the above vector symbols, we recommend the user not to edit PLD vectors using any editors other than the standard PLD assemblers or compilers such as ABEL, CUPL, PLAN II, PDK-1, PALASM II..

4.81   ROM emulator

This function requires extra adapters, such as ADP-ROM16, ADP-ROM32, ADP-ROM256, and ADP-ROM512.

The ROM emulator (AROM.EXE) presentment will appear after selecting this function. Through this function, the user can emulate ROM from 2716 to 27512.

Emulating procedures:

a. Select the correct type by "T. Type select" sub-menu.
b. Enter function "2. Load BIN or HEX file to buffer" to download the file to the memory buffer.
c. Enter function "P. Program" to write the buffer's data to the adapter.
d. After programming, take off the adapter from the socket, and place it in the user's target board.

4.82   DRAM module test

This function requires an extra adapter, ADP-RM1A.

The DRAM module test (ARM1.EXE) presentment will appear after selecting this function. Through this function, the user can test DRAM module.

a.   Select rhe correct type by "T. Type select" sub-menu.
b.   Enter function "F. Function Test" to test the DRAM module.

4.83   Logic IC test

The LOGIC IC test (LOGTEST.EXE) presentment will appear after selecting this function. Through this function, the user can test 74/54 TTL, HC, HCT or equivalent CMOS series, 40/140 CMOS series and 45/140 CMOS series.

Test procedures:

a.   Select the correct library by "T. IC Type select" sub-menu.
b.   Specify the correct IC number by "N. IC Number specify" sub-menu.
c.   Enter function "F. Function Test", or "O. Loop Test", to test the IC.

Others: "S. Search for unknown IC number" :
There are 3 libraries for selection. The unknown IC will be firstly checked with the current standard library. If it fails to find the IC, a message will be displayed. You will have to run the other 2 libraries to search. When the unknown IC encounters other ICs of similar logic during the process of searching, the screen will display these numbers.

TTL74.LIB

0000 0001 0002 0003 0004 0005 0006 0007 0008 0009
0010 0011 0012 0013 0014 0015 0016 0017 0020 0021
0022 0025 0026 0027 0028 0030 0032 0033 0037 0038
0040 0042 0043 0045 0046 0047 0048 0050 0051 0053
0054 0055 0060 0061 0064 0070 0072 0074 0085 0086
0089 0095 0107 0108 0109 0110 0111 0112 0113 0114
0116 0125 0126 1028 0132 0133 0136 0137 0138 0139
0145 0147 0148 0150 0151 0152 0153 0154 0155 0156
0157 0158 0159 0160 0161 0162 0163 0164 0165 0166
0168 0170 0173 0174 0175 0180 0183 0189 0190 0191
0192 0193 0194 0195 0240 0241 0242 0243 0244 0245
0247 0248 0249 0251 0253 0256 0257 0258 0259 0260
0266 0273 0276 0279 0280 0283 0290 0293 0295 0298
0299 0322 0323 0351 0352 0353 0365 0366 0367 0368
0373 0374 0375 0377 0378 0386 0390 0393 0465 0490
0540 0541 0573 0574 0590 0640 0641 0643 0644 0645
0646 0648 0669 0670 0688 0804 0805 0870

CMOS40.LIB

0000 0001 0002 0006 0007 0008 0009 0010 0011 0012
0013 0014 0015 0016 0017 0018 0019 0020 0021 0022
0023 0025 0026 0027 0028 0029 0030 0032 0033 0035
0038 0040 0041 0042 0043 0044 0048 0049 0050 0051
0052 0053 0054 0055 0056 0060 0063 0066 0067 0068
0069 0070 0071 0072 0073 0075 0076 0077 0078 0081
0082 0085 0086 0093 0094 0095 0096 0097 0099 0101
0102 0103 0105 0106 0108 0109 0160 0161 0162 0163
0174 0175 0192 0193 0194

CMOS45.LIB

0001 0002 0003 0004 0006 0008 0010 0011 0012 0014
0015 0016 0017 0018 0019 0020 0029 0032 0038 0043
0053 0055 0056 0072 0082 0084 0085

4.84   Dynamic RAM test

The DRAM test (DRAMTEST.EXE) presentment will appear after selecting this function. Through this function, the user can test DRAMs.

a. Select the correct DRAM number by "N. Number select" sub-menu.

b. Enter function "F. Function Test" to test the DRAM.

Others :   "Set row address zone" can be set to test a scope of DRAMs.

4.85   Static RAM test

The SRAM test (SRAMTEST.EXE) presentment will appear after selecting this function. Through this function, the user can test SRAMs

a. Select the correct SRAM number by "N. Number select" sub-menu.

b. Enter function "F. Function Test" to test the SRAM.

4.86   User vector editor

This function allows any logic input, expected output, 5V and GND to be defined on the 40 pins of the test socket box.

You may write your own vectors to test new IC's logic in sequence (including PAL, EPLA, PROM etc.) The test vector syntax is described in detail below. Please note that *only logic testing is carried out. Loading and IC speed tests are excluded.*

•   A test vector is the definition of input and output logic states applicable to the various pins of an IC. A single IC can be edited up to 1500 vectors, allowing test of logic in sequence. It can also test vectors of ICs below 40 pins.

- Relation between IC's pins and socket's pins
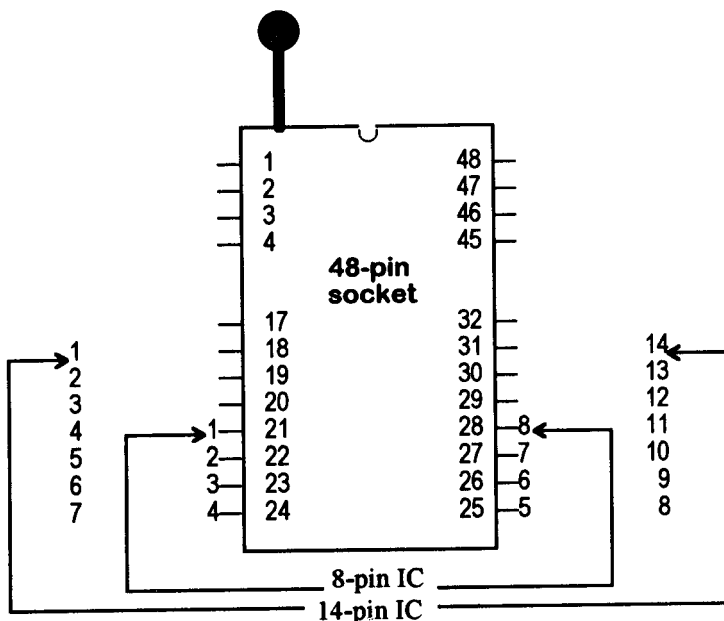
* The syntax of a vector is as follows:

```
00000000011111111122222
123456789012345678901234
```

V0001   XXX01NLHL01G0101HLHL0XLE <CR>

V0001   specifies vector line number

- G   on pin 12 applies GND to IC.
- E   on pin 24 applies 5v to IC.
- X   on pins 1,2,3,22, doesn't care about input or expected output from IC.
- N   on pin 6 applied input or expected output are same as the last vector.
- O   on pins 4,10,13,15,21 applies LOW to IC.
- 1   on pins 5,11,14,16 applies HI to IC.
- L   on pins 7,9,18,20,23 expected output from IC is low.
- H   on pins 8,17,19 expected output from IC is HI.

* A vector can be executed by selecting the Function or Loop test. The test sequence is as follows:

  * Apply G and then apply E to IC pins.
  * Apply 0,1,N,X to pins.
  * Read the value on each pin and compare if with the expected value defined in the vector.
  * If an error occurs, the error is displayed and the test is stopped.
  * If the test is successful, proceed to the next vector..
  * Maximum number of vectors : 1500.

* '1' loads the vector into the buffer.

* '2' saves the vector to the disk.

* The vector test can be edited using the built-in software by pressing '3' under USER TEST VECTOR MENU. The editing key functions will be shown on the screen. Other wordprocessors may be used, provided they are in ASCII code, e.g. Wordstar in the N mode.

* USER function test and LOOP test.

  * 'F' for vector function testing.
  * 'L' for vector loop testing.

* 'D' will invoke the DISPLAY RESULT DURING TESTING function.

  This function can display the test results step by step or successively depending on your choice. The results can be printed.

* Refer to PLD vector test section.

4.9   CONFIG menu

4.90   Memory Initialization :

Initializing contents of the memory and disk-buffer – "00H", "FFH" can be toggled by pressing [ENTER] key. After entering the main program (POWER.EXE or EXPRO.EXE), the set value will be used to initialize the contents of memory and disk buffer.

4.91   Disk Buffer Path :

Setting up the disk number and path of the disk buffer. – When the DOS allocated memory buffer is out of space, the system automatically uses the set path to create additional disk buffer. A RAM-Disk or fast hard disk is recommended.

4.92   Self-testing [ON/OFF]: (For POWER-100 only)

Self-testing function [ENABLE/DISABLE] – When self-testing function is enabled, the system will perform it on all programming driver circuits before entering the main menu. When there is a hardware circuit error, the system will warn the user with error messages and recommend the user to run "SELFDIAG.EXE" for further testing and diagnosis. The Self-testing function takes 4-12 seconds.

[ON/OFF] *can be toggled by pressing* [ENTER] *key.*

4.93   IC inserted test [ON/OFF]: (For POWER-100 only)

Testing IC inserted position [ENABLE/DISABLE] – When it is enabled, system performs IC inserted position test before programming the IC. This test prevents any damage to the IC inserted. Furthermore, to protect the hardware of the programmer from being damaged by ICs overcurrent, the system warns the user with "IC overcurrent" message when this situation occurs and discontinues the IC programming process.

[ON/OFF] *can be toggled by pressing* [ENTER] *key.*

4.94   Auto sense [ON/OFF]: (For POWER-100 only)

Auto-sensing function [ENABLE/DISABLE] – When it is enabled, after entering any "Runfunc-menu" function, system automatically senses the socket of the programmer to check if there is any IC present. If an IC is present, system automatically executes the function without the need of pressing "YES" key. This function will facilitate large volume production.

<<< NOTE >>>

When this function is enabled, after entering any "Runfunc-menu" function, the "BUSY" LED of the POWER-100 will be turned on.

[ON/OFF] *can be toggled by pressing* [ENTER] *key.*

4.10   Quit Menu

There are two ways to exit the main program. One is to exit with this function, and the other is to press <Esc> and then 'Y' when the message "Are you sure you want to exit (Yes/No)" appears on the screen. Upon exiting, the selected type number, brand, work path, equipment setting, etc. are saved in POWER.DAT and POWER.CFG. Pressing 'N' or any key will abandon the Quit function.

5. QUICK OPERATION

5.1 Host System Requirements

- IBM PC/XT/AT/386/486 or compatible PC.
- PC/386DX-33 or faster is recommended.
- Minimum 640K bytes memory.
- Minimum 1 floppy disk drive. A hard disk is preferable.
- Operation system :MS-DOS or PC-DOS ,version 2.0 or later.

5.2 Hardware Installation Procedures

To install the UNIVERSAL Programmer and the software supplied, follow these steps.

[POWER-100]

<<< WARNING >>>

Do not connect the POWER-100 to the system adapter card (SAC-101A.) It will damage the U21(GAL16V8) of bottom board. Also, do not connect the POWER-100 to the RS-232 port as this will damage the V40 (74LS254) of the bottom board.

Step 1: Check the local AC power source if it is 110V or 220V.

Step 2: Set the select switch located at the base of the unit to the correct setting. Standard factory setting is either at 220V or your local AC power source.

Step 3: Connect the POWER-100 to the PC's printer port using the attached cable. The male cable end must be inserted into the PC's printer port while the female end must be connected to the POWER-100.

Step 4.: Turn on the computer.

Step 5.: Ensure the power switch of POWER-100 is off, before connecting the AC power cord to the unit's AC socket.

Step 6: Turn on the POWER-100.

"ON" LED must be ON.
"BUSY" LED must be OFF.
Other LEDs are in random state.

<<< WARNING >>>

If the LEDs are not in their correct state, turn off the power supply and check all connections between the PC's printer port and POWER-100. Then turn on the power supply and check the LEDs on the programmer module again. Refer to TROUBLE SHOOTING section.

Step 7. Installation is now completed.

[EXPRO-60/80]

Step 1: Switch off your computer system,and open the computer cover carefully.

Step 2: Check the DIP switch of the PC system adapter card.

For I/O address selection.2E0H(default)
SW1:all off.
SW2:position 7 on,others off.

For I/O wait state selection.
SW3 position 1 on,8 waits.
position 2 on,4 waits(default).
position 3 on,2 waits.
position 4 on,1 wait.

Step 3: Insert the system adapter card gently into the PC slot, and fasten it to the PC frame with the slot cover screw.

Step 4: Connect the programmer module to the system adapter card using the attached cable. The male cable end must be inserted into the system adapter card, while the female end must be connected to the programmer module.

<<< WARNING >>>

Do not connect the programmer module to the system adapter card when the computer is turned on. Such an installation can put the module in an "unknown" state, resulting in damage to the DEVICE and/or the module.

Step 5: Turn on the computer and check the LEDs on the programmer module.

ON LED must be ON.
BUSY LED must be OFF.
Other LEDs are in random state.

<<< WARNING>>>

If the LEDs are not in their correct state, please turn off the PC and check all connections between the system adapter card and PC slot and cable connections between the system adapter card and programmer module. Then turn on the computer and check the LEDs on the programmer module again.

Step 6. Installation is now completed.

5.3 Software Installation Procedures

Running the INSTALL.COM to install the POWER-100's or
EXPRO-60/80's software into the hard disk.

A:\>INSTALL<Enter>

```
   POWER-100 Universal Programmer and Tester Installation

     Copyright (C) 1994 SUNSHINE Electronics Co., Ltd.


     Since we support more and more programs for  programmable
devices, and add functions into our programs, it may be not be
easy for user to install or upgrade.  Therefore,  we contacted
ARJ Robert K Jung and got  ARJ self-extractor license in order
to use this archive file, and to make installing or  upgrading
more convenient.
```

```
Source drive [A:]:
Target drive [C:\POWER]:

It will be installed from A: to C:\POWER
============================================================
Do you want to change any of the above options? [Y/n]:
```

```
     Insert Universal Programmer & Tester POWER-100  #1

     - = Press any key to continue or Ctrl+C to abort = -
```

after pressing any key ⇓

```
          Disk #1 installing now ...
```

after installing diskette #1 ⇓

```
     Insert Universal Programmer & Tester POWER-100  #2

     - = Press any key to continue or Ctrl+C to abort = -
```

after pressing any key ⇓

```
Disk #2 installing now ...
```

after installing diskette #2 ⇓

```
Installation is completed

- = Please read USER'S MANUAL before running POWER.EXE = -
```

Running POWER.EXE(for POWER-100) or EXPRO.EXE (for EXPRO-60/80) will start the system when installation is completed.

C:\POWER>POWER<Enter>

After executing the "POWER" command, the following MAIN MENU will appear:

Main Menu

5.30 Read Contents from Master EPROM.

If the EPROM data is in a Master EPROM instead of a disk file, you have to transfer it by typing 'R' or <F5> to select "RunFunc". After typing 'R' or moving the highlighted bar to select the "Read" function , the following sub-menu will appear:

Sub-menu of Read

<<< WARNING >>

When operating any function under the Runfunc-menu (such as Program, Read, ect.) DO NOT change the PC speed, i.e., do not press the TURBO button. If it is necessary to change the PC speed, abandon the Runfunc-menu to do so.

Insert the Master EPROM into the socket. With the pull lever in the upright position, the lower left pin should match the EPROM GND pin. Then press 'Y'. The data of the Master EPROM will be transferred to the internal memory buffer and the following will be displayed:

READING NOW...
OK!

Press <Esc> or <CR> to return to the "Runfunc" or "Quick keys" for the functions you want.

5.31 Insert the Blank EPROM into Textool.

After transferring the data from the disk file of the Master EPROM, remove the Master EPROM and insert the blank EPROM into the textool with the pull lever in the upright position. The lower left pin should match the EPROM GND pin.

<<< CAUTION >>>

The notch-end of the EPROM must not be inserted into the end of the socket., If so, the EPROM will be destroyed or programmed to an unknown state.

5.32 Program Buffer Contents to EPROM.

After reading the Master EPROM data into the memory buffer, and inserting the blank EPROM, you can now program the EPROM by typing 'R' or <F4> to select "RunFunc". After typing 'P' or move the highlighted bar to select "Program" function, the following sub-menu will be displayed:
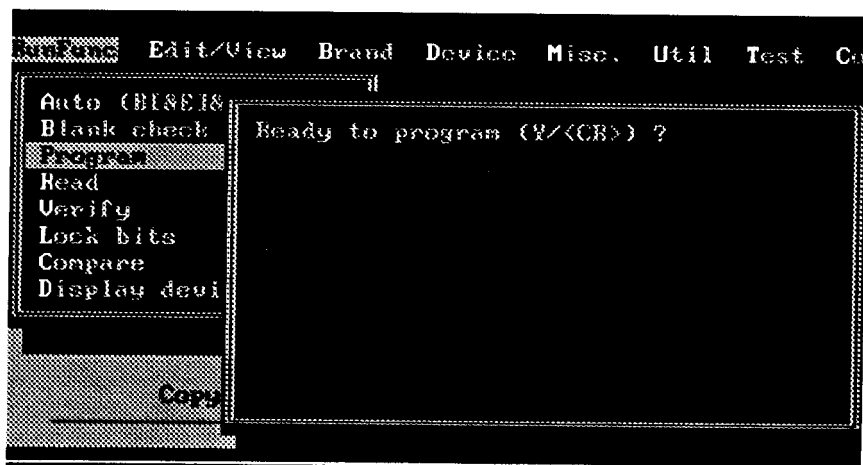
Sub-menu of Program

Then type 'Y', and the programmer will attempt to program the buffer contents onto the blank EPROM. At the end of the programming process, the programmer will compare EPROM contents with the memory buffer. Any discrepancies between the buffer and the EPROM will be displayed.

This completes the programming process. To program other EPROMs, wait for the BUSY LED to shut off, then replace the EPROM and type 'Y' again.

If you want to exit the programming process, press <Esc> or <CR> to return to the "Runfunc" or "Quick keys" for the function you want.

Each of the functions will be discussed in detail in Chapter 4's FUNCTION REFERENCE GUIDE.

APPENDIX

A. External Key and LEDs

The only external key on the programmer module is the "Yes" key. The function of the "Yes" key is the same as the 'Y' on the PC keyboard. When the sub-menu prompts you to enter 'Y', you may press the "Yes" key instead of pressing 'Y' on the PC keyboard.

The three LEDs on the programmer module are "ON" LED, "BUSY" LED, and "GOOD" LED.

The "ON" LED will light up after switching on the computer power or power supply. The "BUSY" LED will light up when performing device programming, reading, blank checking, and verifying. The "GOOD" LED will light up when the verifying result is without error.

B. Relation between Device and socket

first pin of 48-pin IC ☛
first pin of 40-pin IC ☛
first pin of 32-pin IC ☛
first pin of 28-pin IC ☛
first pin of 24-pin IC ☛
first pin of 20-pin IC ☛
first pin of 18-pin IC ☛
first pin of 16 pin-IC ☛

48-pin socket

8-pin IC
14-pin IC
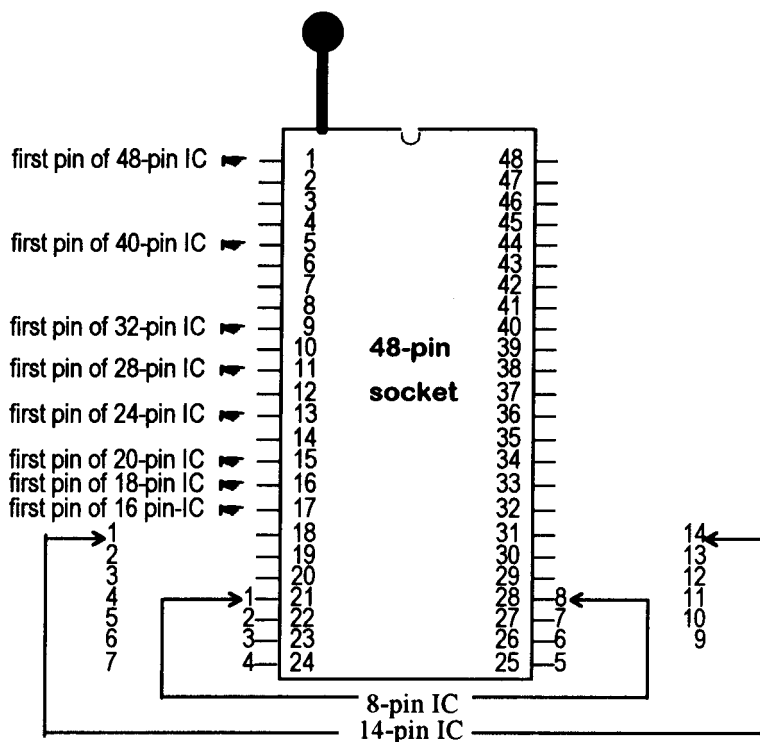
C. Error messages

♦ Communication error

The system finds an error in the communication between the PC and programmer. Refer to 'D. Trouble shooting'.

> <<< NOTE >>>
>
> Most problems are caused by poor contacts between the interface card and the PC slot, or cable connections between the interface card and programmer module.

♦ Drive not ready

This message appears during changing disk drives. It is either the disk drive is empty, the drive is not closed, or the diskette in the drive is already damaged.

♦ Driver file not found

The system can not find the driver file after the device has been selected. Install the software of programmer again.

♦ File already exists

The filename you are about to save in the current "work path" already exists. The system will then ask if you to overwrite the file or enter another filename.

♦ Hardware error (for POWER-100 only)

Before the main program enters the main menu, all pin-drivers of the hardware will be tested. Upon finding any error, the programmer gives a warning and suggests the user to run 'SELFDIAG.EXE' for the hardware to undergo a further test. Refer to 'H/W self-diagnosis.' When 'Hardware Error" message appears, stop current operation until the problem is solved.

<<< NOTE >>>

Poor contacts may occur during transport of the POWER-100. Hence, before testing, use your thumb to press down the textool (IC socket) to provide better contacts between the top board and middle board. Then tighten the screw.

♦ IC backward insertion (for POWER-100 only)

Before executing the Program/Read or other functions inside 'Runfunc', the system checks if the IC in the socket has been inserted backwards. Hence, the user is asked to insert IC in the correct position so that the error message would disappear. This function only works when the Config.Menu 'IC Insertion Test' is enabled. If the error message still appears when IC position is correct, it is possible that the wrong diagnosis is caused by critical testing requirements. If this happens, disable the function and contact your dealer for assistance.

♦ IC overcurrent (for POWER-100 only)

Before executing the Program/Read or other functions inside 'Runfunc', the system first checks the IC's Vcc and Vpp pins. If there is a 'short-circuit' to GND, the system stops current function to prevent any damage. When ICs inserted experience "ICs overcurrent" error message, the hardware might be faulty. Run SELFDIAG.EXE to check the hardware and refer to "H/W self-diagnosis".

♦ Insufficient memory

The system cannot allocate sufficient memory buffer for its use. If this error message appears, release some resident programs before running the main program, or keep not more than 250 files under the work path.

♦ Macro file format error

When the macro file format detected by the system and the required format don't match, it might be caused by the creation of additional macro functions in the system. Therefore, the user must reset the macro file.

◆ No entries exists

The current work path does not contain any file.

◆ No ICs or error inserting (for POWER-100 only)

Please refer to "IC backward insertion".

◆ Notice: BUSY LED will be turned on

Upon entering the 'Runfunc' function while Auto Sense is enabled, BUSY LED is automatically turned on. The system then starts to check the presence of any IC in the socket.

◆ POWER.INF or EXPRO.INF format error

The main program detects Power.inf or Expro.inf format error. Re-install the software.

◆ Remove IC from socket (for POWER-100 only)

The hardware checks if any IC is in the socket before executing hardware self-diagnosis. When an IC is detected, the user is required to remove IC from the socket to prevent it from getting damaged. If no IC is in the socket and the hardware still shows the message, it means that the hardware is already faulty. Use SELFDIAG.EXE to check the hardware and refer to 'H/W self-diagnosis."

◆ Warning: H/W Error

When the power supply is turned off or the programmer is disconnected from the PC while still in the 'Runfunc' function, this error message and the sound from the speaker persist to warn the user until the user exits from the 'Runfunc' function.

◆ Warning: Content of memory buffer will be modified

Before entering the Test Menu function, the system warns the user that the memory buffer of the system will be overwritten by the Test program. If the data in the memory buffer would still be used after the Test function, then save it first.

D. Trouble shooting

The following troubleshooting guide is provided to help you tackle some most commonly encountered problems. This guide, however, is not intended to be a repair manual. If you encounter problems other than those described here, contact your dealer or our Sales Department.

• **Installation problems (for POWER-100 only)**

If the POWER-100 has communication error with the PC's printer port, note the following:

a. Before using the POWER-100, check the AC voltage (110 or 220 VAC) switch located at the base of the unit.

b. The POWER-100 should not be connected to SAC-101A card. If this happens, the bottom board's U21 (GAL-16V8) will be damaged. Replace it with another GAL16V8. Also, the POWER-100 should not be connected to RS-232 port as it will damage the bottom board's U40 (74LS254). In the POWER-100 "Util" path, there is POWER.JED which is the fuse map of U21.

c. If the above steps are correct, connect the POWER-100 to the PC's printer port, turn on the power supply, and execute POWER.EXE. The S/W will search for the POWER-100 via the PC's printer port to determine which I/O port it has been installed. It is not necessary for the user to make the setting.

d. If the problem still exists after the above steps are taken, then disconnect the POWER-100 from the printer port and test the printer port with a printer.
If the printer will not print, then the super I/O card should be faulty. If it prints, then it might have been caused by interferences from the super I/O card since some cards produce interferences. Therefore use another super I/O card to test and let us know the brand of the 'incompatible' card for our information.

e. If the unit still does not work, return the POWER-100 to your dealer for repair.

Installation problems (for **EXPRO-60/80 only**)

Problem 1 :

When I turn my computer on, I hear no beeps, the fan does not spin, nothing happens!

Solution 1 :

a. The power cord may be disconnected from the computer or the outlet. Check the power cable.
b. The chip might have been incorrectly inserted in the ZIF socket. Make sure your chip is correctly installed and the handle is down.
c. Your power supply is insufficient to drive both your system and system adapter card.

Problem 2 :

When I try to use a programmer module, I get communication error messages!

Solution 2 :

1. The I/O port setting of your programmer might be incorrect. Double check the I/O port assignment.
2. The chip might have been incorrectly inserted in the ZIF socket. Make sure your chip is correctly installed and the handle is down.
3. It might be due to improper connection between the system adapter card and the programmer module. Double check the cable connection.
4. Your system might be running too fast. Try to slow down your system by turning off the turbo mode.
5. The I/O bus speed on your system may be too fast. The system adapter card will not run with I/O bus speed greater than ISA 8mhz.

Problem 3 :

When I install the system adapter card, some of my other peripherals have strange reactions!

Solution 3 :

You are probably experiencing an I/O port conflict. Double check the I/O port assignments on all your peripherals, including the system adapter card.

- **10 Things to do Before Calling Your Dealer**

1. Reboot the computer and try again.
2. If you change switches or jumpers, write down the original settings.
3. Repeat all the steps, according to the instructions in
4. this manual.
5. Make sure that all cards and cables are firmly attached.
6. Remove any memory resident programs from memory.
7. Check whether your problem is listed in the Trouble-Shooting section.
8. Try it on another system.
9. Compare system requirements with your configuration.
10. Ask your in-house "guru" (every office has one).
11. Ask the one who installed the product.

- **General troubleshooting checklist**

If your problem is not described in the above section, check the following:

1. Is the system adapter card fully inserted in its slot ?
2. Are all cable connections securely attached ?
3. Does the system adapter card jumper setting match the I/O address displayed by the programmer software ?
4. Is there any other card on the bus having the same I/O address as the system adapter card?

5. When the 'Communication Error' message has been encountered, refer to 'Installation problems' section. If problems related to Program, Read and other functions (such as cannot program, high faulty rate, sometimes can sometimes cannot program situations) are found, check the following points and do the necessary steps.

a. Textool not cleaned. When programmers are not kept after use or old ICs are often used, it could cause the textool to have bad contacts due to accumulated dirt.

b. Long usage of the textool. Basically, each textool has a limited life. (3M textool lifespan is 25,000 insertions) Hence, usage of the textool exceeding its 'lifespan' could easily caused bad contacts, affecting programming yield rate. When this happens, replace with a new textool.

c. ICs not well-gripped after pulling down the textool lever. When ICs are not properly secure after locking with the lever, the resulting bad contacts could damaged the IC during programming. When this happens, replace with a new textool.

d. If it is not one of the above-mentioned points that has been encountered, use TESTPRO.EXE (for Expro-60/80) or SELFDIAG.EXE (for Power-100) to adjust the voltage or check each group of pin-driver voltage supply if they are within specifications. Basically, the voltages should be checked after every six months of usage for any need of adjustments to ensure a high yield rate. During any voltage adjustments, the steps shown in the software must be strictly followed.

e. If the above four points has been followed and Program/Read is still not possible, contact your dealer to check for any software updates. At the same time, advise your current driver file version and main program (EXPRO.EXE or POWER.EXE) version.

f. When devices are not yet supported in the device list, ask your dealer for any software updates. If the devices are not supported, IC samples and programming specs can be provided to us to facilitate support of the device.