MOTOROLA
SEMICONDUCTOR
USERS MANUAL

M68HC705UGANG

M68HC705UGANG Gang Programmer

User's Manual

MOTOROLA

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CHAPTER 1   INTRODUCTION

This operations manual explains installation, connection, and operation information specific to the M68HC705UGANG gang programmer. The M68HC705UGANG gang programmer provides an economical and reliable means of programming a wide range of M68HC705 microcontroller units (MCUs). It is designed with a versatile hardware platform to support programming of different MCUs. Devices with different packages are supported via the use of programmer adapters.

The M68HC705UGANG can be configured to operate in two operating modes; namely Stand-alone and PC-based programming mode.

Stand-alone programming mode lets you program as many as ten devices simultaneously by copying data held in an external Eprom device to the MCUs' internal Eprom.

PC-based programming mode lets you copy data from a remote host computer into the internal Eprom of an MCU via an RS232 serial communications link.

1.1   FEATURES

The M68HC705UGANG features include:

- Economical means of programming the internal Eprom/EEprom of a wide range of M68HC705 family of microcontroller units.

- Stand-alone and PC-based programming modes of operation.

- RS232 terminal port for serial communications.

- ZIF (zero insertion force) socket for target code storage.

- Single +5Vdc power supply requirement.

- Ten pairs of 32-pin DIN male connectors to accommodate for up to ten MCU programmer stations.

- Status LEDs for each programming station.

- Supports a wide range of M68HC705 MCUs with various package types.

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1.2   OVERVIEW

Each M68HC705 MCU, supported by the M68HC705UGANG gang programmer, is equipped with a bootstrap program embedded in a section of its masked Rom area. This bootstrap program together with the M68HC705UGANG and programmer adapters allow you to program the internal Eprom/EEprom of the M68HC705 MCUs.

Programmer adapters are not shipped with the M68HC705UGANG gang programmer because the gang programmer can support a wide range of M68HC705 MCUs with different types of package. The user is required to order the desired programmer adapters separately from the gang programmer. Ordering part numbers for the various programmer adapters follow the numbering scheme listed below.

M68UPA05 <u>XXX</u> <u>PP</u> <u>NN</u>

No. of pins: e.g. 28, 40, 42, 44, 80,...

Package type: FU (QFP)
FN (PLCC)
B (SDIP)
P (DIP)

Device: e.g. SR3, BD3, BS8, A24,...
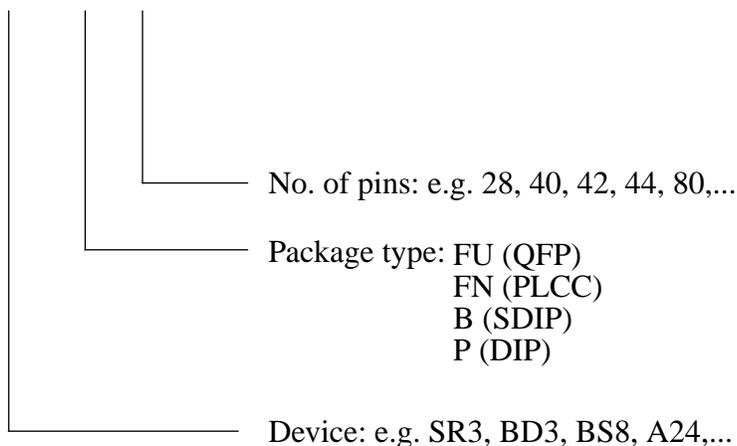
In addition to the programmer adapters, the user is required to provide an external +5V supply to power the M68HC705UGANG, and:

• a 25 lead serial communications cable for PC-based programming operation.

• an industry standard 27C64/27C128/27C2576/27C512 Eprom device for Stand-alone programming operation.

1.3   GANG PROGRAMMER LAYOUT

Figure 1-1 shows the layout of the M68HC705UGANG which is comprised of two printed circuit boards; a platform board and a control panel.

Connectors P1-P20, P21, P22, jumper headers P23, P24, P27, P30 and ZIF socket U17 are all located on the platform board. Connectors P1-P20 are programmer adapter board connectors. The connectors take up the upper two thirds of the platform board. Connector P21 is for +5Vdc external power. Connector P22 is for RS-232 communications with the computer when the gang programmer is operating in PC-based programming mode. Jumper header P23 selects the memory map size of the MCUs to be programmed in stand-alone programming mode. Jumper header P24 lets you select the source of Vpp (programming voltage) for the gang programmer. Jumper header P27 and P30 are used to identify the type of Eprom device installed in the ZIF socket U17. The gang programmer supports four types of industry Eprom devices; namely 27C64, 27C128, 27C256 and 27C512. U17 is an ZIF socket for holding the external Eprom device.

There are two control switches on the control panel; a rotary mode switch and a go/stop switch. The rotary switch lets you select the operating mode of the gang programmer while the go/stop switch enables you to start or stop the operation of the gang programmer.
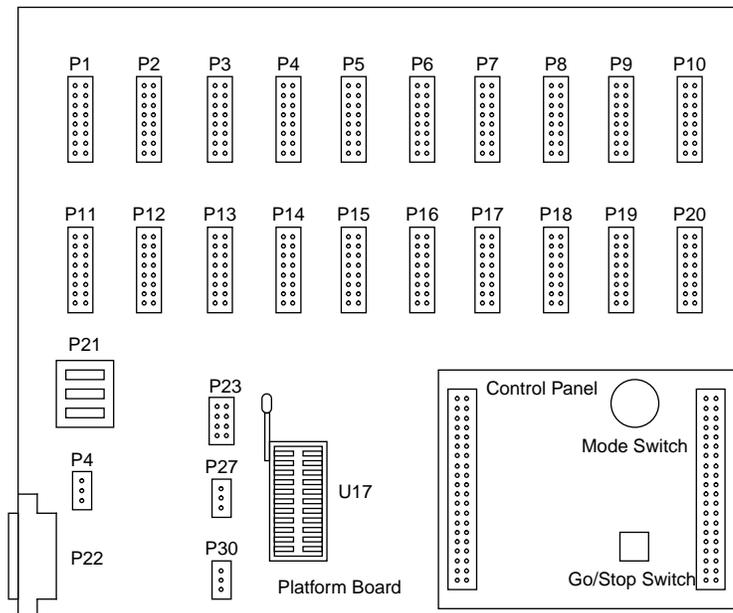
Figure 1-1 M68HC705UGANG Gang Programmer Layout

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1.4 SETTING JUMPER HEADERS

Your M68HC705UGANG has four jumper headers P23, P24, P27 and P30. paragraphs **1.4.1** through **1.4.3** explain these jumper headers.

1.4.1 Map Size Select Header (P23)

Jumper header P23 configures the memory map size of the Eprom device installed in the ZIF socket U17 for compatibility with the Eprom MCUs to be programmed. Consequently, the correct configuration of this jumper header depends on the type of MCUs you will be programmed. Install a fabricated jumper onto jumper header P23 to identify the memory map size of the MCUs to be programmed. E.g. if the MCUs to be programmed have an 8K memory map, a fabricated jumper should be installed between pins 1 and 2. If the memory map size is 16K, install a fabricated jumper between pins 3 and 4 and so on. **Figure 1-2** depicts jumper header P23 without any fabricated jumpers.
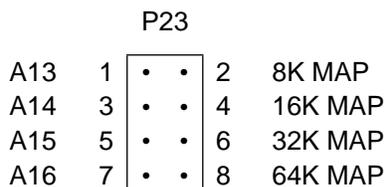
```
            P23

A13   1  • •  2   8K MAP
A14   3  • •  4   16K MAP
A15   5  • •  6   32K MAP
A16   7  • •  8   64K MAP
```
Figure 1-2   P23 - Map Size Select

1.4.2 Vpp Select Header (P24)

Jumper select P24 determines the source of the programming voltage for the gang programmer. **Figure 1-2** shows the factory configuration: the fabricated jumper between pins 2 and 3 selects the gang programmer's internal programming voltage source which is set to 13.5V by Motorola's factory personnel. Alternatively, you may use an external programming voltage source if the MCU programming voltage for your device is something other than this value (consult your device data book to see if you need to use an external Vpp source). To do so, reposition the P24 jumper between pins 1 and 2. You must ensure that the appropriate external programming voltage is applied to P21 contact 3 (Vpp pin of the power connector P21).
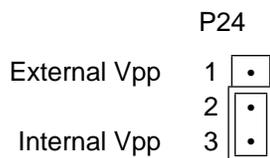
```
                     P24

External Vpp    1  [ • ]
                2  [ • ]
Internal Vpp    3  [ • ]
```
Figure 1-3   P24 - Vpp Select

1

1.4.3   Eprom Type Select Headers (P27 **and** P30)

Jumper headers P27 and P30 are use to identify the type of Eprom device installed in the ZIF socket U17. **Figure 1-2** and **Figure 1-2** depict the jumper headers P27 and P30 without any fabricated jumpers. For proper operation of the gang programmer, follow the instructions below to enable the gang programmer to identify the Eprom device installed in the ZIF socket U17.

If the Eprom device installed is a 27C64 or 27C128 device, the user is required to install a fabricated jumper between P27 pins 1 and 2, and P30 pins 1 and 2.

If the Eprom device installed is a 27C256 device, the user is required to install a fabricated jumper between P27 pins 2 and 3, and P30 pins 1 and 2.

If the Eprom device installed is a 27C512 device, the user is required to install a fabricated jumper between P27 pins 2 and 3, and P30 pins 2 and 3.

```
                                    P27
        27C64 / 27C128     1  | •
                           2  | •
        27C256 / 27C512    3  | •
```
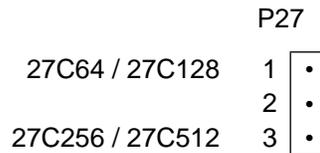
Figure 1-4   P27 - Eprom Type Select

```
                                       P30
     27C64 / 27C128 / 27C256     1  | •
                                 2  | •
                    27C512       3  | •
```
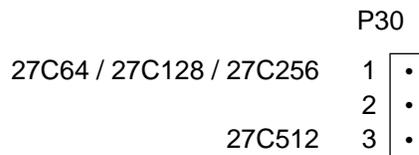
Figure 1-5   P30 - Eprom Type Select

1.5   GANG PROGRAMMER CONNECTIONS

Paragraph **1.5.1** explains the power connection requirement for the M68HC705UGANG. Paragraph **1.5.2** explains the connection between the gang programmer and the host computer.

1.5.1   Power Connection (P21)

Your M68HC705UGANG requires a Vdd (+5Vdc) power supply for operation. An optional external Vpp (programming voltage) supply may also be applied to the gang programmer.

Use connector P21 to connect Vdd and Vpp to the gang programmer. Contact 1 (labelled +5V) is for Vdd, the +5Vdc power. Contact 2 (labelled GND) is the ground. Contact 3 (labelled Vpp) is for the optional programming voltage. Use 20 or 22 AWG wire for power connections. Do not use wire larger than 20 AWG in connector P21; such wire could damage the connector. For each wire, trim insulation back a short distance from the end, lift the appropriate P21 lever, insert the bare wire into P21and close the lever.

1.5.2   Host Computer Connection (P22)

Connection of the M68HC705UGANG to the host computer requires a user-supplied 25-lead cable assembly. One end of the cable assembly needs a male DB25 connector; connect this end of the cable to the gang programmer connector P22. The diagram below gives the pin assignment for this connector. For signal descriptions, refer to **Table 1-1**. The other end of the cable assembly needs the appropriate connector for the serial I/O port of your host computer.

```
GND 1   ○
TXD 2   ○      ○   14 NC
RXD 3   ○      ○   15 NC
RTS 4   ○      ○   16 NC
CTS 5   ○      ○   17 NC
DSR 6   ○      ○   18 NC
SIG-GND 7 ○    ○   19 NC
DCD 8   ○      ○   20 DTR
NC 9    ○      ○   21 NC
NC 10   ○      ○   22 NC
NC 11   ○      ○   23 NC
NC 12   ○      ○   24 NC
NC 13   ○      ○   25 NC
```
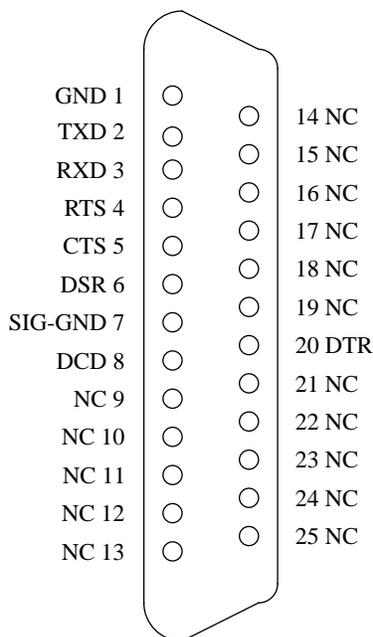
Table 1-1 Gang Programmer P22 I/O Port Connector Signals

PIN	MNEMONIC	SIGNAL
1	GND	GROUND
2	TXD	TRANSMIT DATA - Serial data output line.
3	RXD	RECEIVE DATA - Serial data input line.
4	RTS	REQUEST TO SEND - Input signal that requests permission to transfer data.
5	CTS	CLEAR TO SEND - Output signal that indicates a ready-to-transfer data status.
6	DSR	DATA SET READY - Output signal (held high) that indicates on-line/in-service/active status.
7	SIG-GND	SIGNAL GROUND - Signal ground or common return connection between the gang programmer and RS232 compatible terminal.
8	DCD	DATA CARRIER DETECT - Output signal (held high) that indicates detection of an acceptable carrier signal.
9-19, 21-25	NC	No connection.
20	DTR	DATA TERMINAL READY - Input signal that indicates on-line/in-service/active status.

The gang programmer is wired as data communication equipment (DCE) whereas a terminal and most serial modem ports on host computers are wired as data terminal equipment (DTE). This means that a straight-through cable is appropriate for most setups.

If you use a different type of cable for connection to the terminal or host computer, you may need a null modem adapter to match the cable to the gang programmer connector P22. A null modem adapter reverses the roles of various data and control signals to make a DTE device seem to be a DCE device, or vice versa.

1.5.3   **Programmer Adapter Connectors** (P1-P20)

Programmer adapter connectors P1-P20 are arranged in pairs. Each pair of programmer adapter connectors (i.e. P1-P2 and P3-P4 and so on...) can accommodate one programmer adapter. A programming station is said to be formed when a programmer adapter is inserted into one of these connector pairs. The gang programmer is designed to handle up to ten programming stations simultaneously in stand-alone mode, and one single programming station in PC-based mode. Programmer adapters can be installed arbitrarily anywhere in the gang programmer to form programming stations in stand-alone mode. In PC-based mode, only one specific programming station can be used; see section **3.3** for details.

 Figure 1-6 below shows a typical programmer adapter. To install a programmer adapter in the gang programmer to from a programming station, fit together programmer adapter connectors P8 and P9 (on the bottom of the adapter) and any one of these connector pairs. The user must ensure that only one type of programmer adapters is used during Eprom MCU programming. Mixing different types of programmer adapters in the gang programmer may damage the board and the adapters.
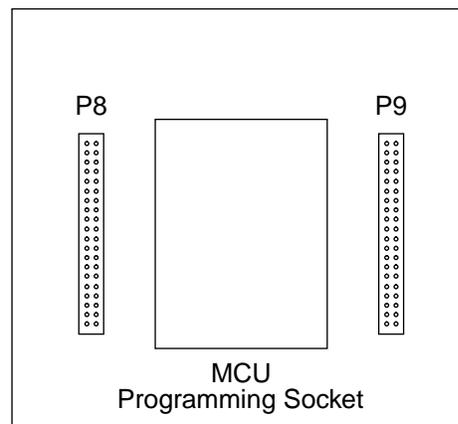
Figure 1-6 Programmer Apdater

<u>CAUTION</u>

The user must be aware that the programming socket on the programmer adapter has a limited number of insertions. The typical figure quoted by socket manufactures is 10K times. The user is therefore advised to replace any decrepit programmer adapters regularly for proper operation of the gang programmer.

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CHAPTER 2   STAND-ALONE OPERATION

This chapter explains how to use your M68HC705UGANG by itself to copy the contents of an external Eprom device into a set of Eprom MCUs. The only required connection for stand-alone operation is the +5Vdc power connection. You do not have to connect the M68HC705UGANG to a computer.

2.1   STAND-ALONE PROGRAMMING STEPS

The gang programmer is specifically designed for copying the contents of an external Eprom into a set of Eprom MCUs when it is configured for stand-alone operation. Before operating the gang programmer, the user must ensure that an exact duplicate of the software code to be trans-ferred to the MCUs is stored in an Eprom device. The user may use a 27C64, 27C128, 27C256 or 27C512 device to store the user code depending on the memory map size of the MCUs to be programmed. There is a direct correlation of addresses between the external Eprom and the on-chip Eprom/EEprom of the MCUs. During programming, only valid on-chip Eprom/EEprom locations are copied. Invalid addresses are bypassed by the gang programmer.

Table 2-1   Stand-alone Mode Selection

7-Segment LED Display	Mode Selected
0	PROGRAM EPROM - Program MCU Eprom from an external Eprom device (including MOR).
1	VERIFY - Verify MCU Eprom with external Eprom device.
2	BLANK CHECK - Blank check MCU Eprom.
6	PROGRAM EEPROM - Program and verify MCU EEprom from an external Eprom

2

To prepare the gang programmer for stand-alone operation, follow the instructions listed below:

1. Apply Vdd and Vpp (optional) to connector P21. The status LED on the control panel will turn on with a green color.

2. Configure jumper headers P23, P24, P27 and P30.

3. Install programmer adapters in gang programmer to form programming stations.

4. Insert Eprom device into ZIP socket U17.

5. Insert MCUs to be programmed into the programmer adapters. Empty programmer adapters will be ignored by the gang programmer and they will not affect the operation of the gang programmer.

6. Select one of the four stand-alone modes of operation by turning the rotary switch. Refer to **Table 2-1** for the available modes. The 7-segment LED display on the control panel will change to reflect the operating mode selected by the user.

7. Press the go/stop switch to start the selected operation. The status LED on the control panel will turn red to indicate that the gang programmer is running. If for any reason the color of the LED becomes yellow, the user must abort the selected operation by pressing the go/stop switch and check that all MCUs are properly installed in the programming stations. Re-initiate the operation of the gang programming after inspection by pressing the go/stop switch again.

8. When the gang programmer is running, the status LED of each programming station will flash. Upon successful completion of the selected operation, the status LED will turn off and the verified LED will light up. If the gang programmer detects an error for a particular programming station, the error LED of that station will turn on to indicate that the MCU installed in that programming station fails to complete the selected operation.

9. The user should note which are the good and which are the bad devices before pressing the go/stop switch to stop the gang programmer.

10. The status LED on the control panel should now return to green. The MCUs are now safe to be removed from the programming stations.

11. Repeat steps 5 to 10 for another set of MCUs if required. Otherwise remove power from the gang programmer.

CAUTION

> Never press the go/stop switch while the status LED of any programming station is flashing. Doing so could corrupt Eprom data.

CHAPTER 3   PC-BASED PROGRAMMING

This chapter explains how to use your M68HC705UGANG for PC-based programming. During PC-based programming, the user interacts with the gang programmer using an IBM, or compatible, host computer. A user supplied RS-232 serial communications cable is required to be used to connect the gang programmer to the user's host computer. When the gang programmer is configured for PC-based programming, only one MCU should be installed in the gang programmer.

3.1   USER INTERFACE SOFTWARE

A user interface program called SUPGM05 is supplied with the M68HC705UGANG gang programmer. The user interface program lets the user examine, edit, program and verify the on-chip Eprom/EEprom of the MCU installed in the programming station of the gang programmer via a user friendly software interface.

The minimum hardware and software requirements that your computer system needs to run the SUPGMR05 user interface program are listed below:

• MS-DOS version 3.3 or later.

• The user's host PC must be hardware and software compatible with the IBM PC/XT/AT. Memory size of 640KB is recommended. An asynchronous communications port, configured as either COM1 or COM2, for communications between the gang programmer and the host is required.

• The user interface program supports a Microsoft or IBM mouse. (Although a mouse is optional, it is highly recommended that the user should take advantage of the mouse driven graphical user interface.) Other mice that emulate the Microsoft or IBM mouse may perform satisfactorily when installed as specified for emulation of these mice. However, Motorola does not guarantee that these other mice perform satisfactorily with the user interface program.

Some additional system characteristics recommended for improved product performance and usability are: 80386 or 80486 based systems, a fixed disk drive, and a high resolution color monitor with VGA graphics adapter card.

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3.2 SOFTWARE INSTALLATION

Installation of the user interface program consists of copying the software to hard disk or to a diskette for backup purposes. The distribution diskette containing the software for the gang programmer should be stored in a safe place to serve as backup in the event of a hardware malfunction or accidental erasure. The software should be copied to hard disk or to another diskette, which is used as a working copy.

Before copying the software to a hard disk, the user may want to create a directory for the user interface program and related files. From the root directory on the hard disk, enter a DOS command, as follows:

C>MD \SUPGMR05

To copy the gang programmer software to hard disk, place the distribution diskette in the diskette drive A:; and enter the following DOS command:

C>COPY A:*.* C:\SUPGMR05

This command copies all files on the distribution diskette to directory SUPGMR05 on the hard disk. Execute the following PATH command:

C>PATH C:\; C:\SUPGMR05

This command assumes that file COMMAND.COM is in the root directory of drive C:. If the COMMAND.COM is in some other directory, replace C:\ in the command with the appropriate path. In the preceding commands, you may substitute whatever name you like for directory name SUPGMR05. If the directory is not on the root directory of your disk, include the full pathname in the PATH command. Also place the PATH command in the AUTOEXEC.BAT file to be executed whenever the host system is started.

The sequence of paths in the PATH command determines the sequence in which DOS searches for commands. For optimum performance, place the path for COMMAND.COM ahead of other paths in the PATH command.

To make a working copy of the distribution diskette on another diskette, place the distribution diskette in drive A: and a formatted diskette in drive B:. The enter the following DOS command:

C>DISKCOPY A: B:

This command copies all files on the distribution diskette to the working diskette in drive B:. This command is valid for a single-drive system also, but diskettes must be swapped manually as the operation proceeds.

3.3   PC-BASED PROGRAMMING STEPS

Follow the programming steps listed below for PC-based programming operation. Note that the symbol <CR> indicates the RETURN, ENTER, or carriage-return key of your keyboard.

1. Apply Vdd and Vpp (optional) to connector P21. The status LED on the control panel will turn on with a green color.

2. Configure jumper headers P24 to select the appropriate Vpp source.

3. Form a programming station by fitting together programmer adapter connectors P8 and P9 (on the bottom of the adapter) and connectors P1-P2 on the gang programmer.

CAUTION

Only the programmer adapter connected to the gang programmer via connectors P1-P2 can be used during PC-based programming. Do not try to install other programmer adapters in the gang programmer. Doing so may damage the gang programmer.

4. Type SUPGMR05 <CR> at the DOS prompt.

5. The main menu screen of the user interface program appears.

6. Insert an MCU into the programming station formed in step 3.

7. Press the go/stop switch on the control panel. The status LED on the control panel should light up with a red color. If the status LED changes to a yellow color, this indicates that the gang programmer has detected an error. The user should abort the PC-based programming operation by pressing the go/stop switch and examine the MCU and the programming socket to ensure that the MCU is properly installed. Repeat step 7 after checking and adjust the MCU.

8. Proceed the MCU by selecting appropriate commands from the pull-down menus. Section **3.5** explains the function of all the commands provide by the user interface program.

9. When you are done, press the go/stop switch on the control panel. The status LED should return to green to indicate that the MCU is now safe to be removed from the programming station.

10. Remove the MCU from the programming station.

11. Repeat steps 5 to 9 for another MCU if required. Otherwise terminate the user interface program by selecting the "QUIT" command and power down the gang programmer.

3

3.4   PROGRAMMING ENVIRONMENT

The user interface program provides the user with a user friendly environment to interact with the gang programmer. The host screen environment consists of a display window in the middle, a menu bar at the top, and a help line at the bottom of the screen. **Figure 3-1** shows a typical screen, with the various elements of the display screen identified. Commands can be invoked using Alt-key combinations. Alt-key combinations are entered by holding the Alt key down while pressing another key. Mouse support is also provided by the user interface program and all commands can be entered using a mouse. The user interface program will automatically check for a mouse device and its associated driver on start-up. If they both exist, a graphical mouse pointer (an arrow) will be displayed on the screen.
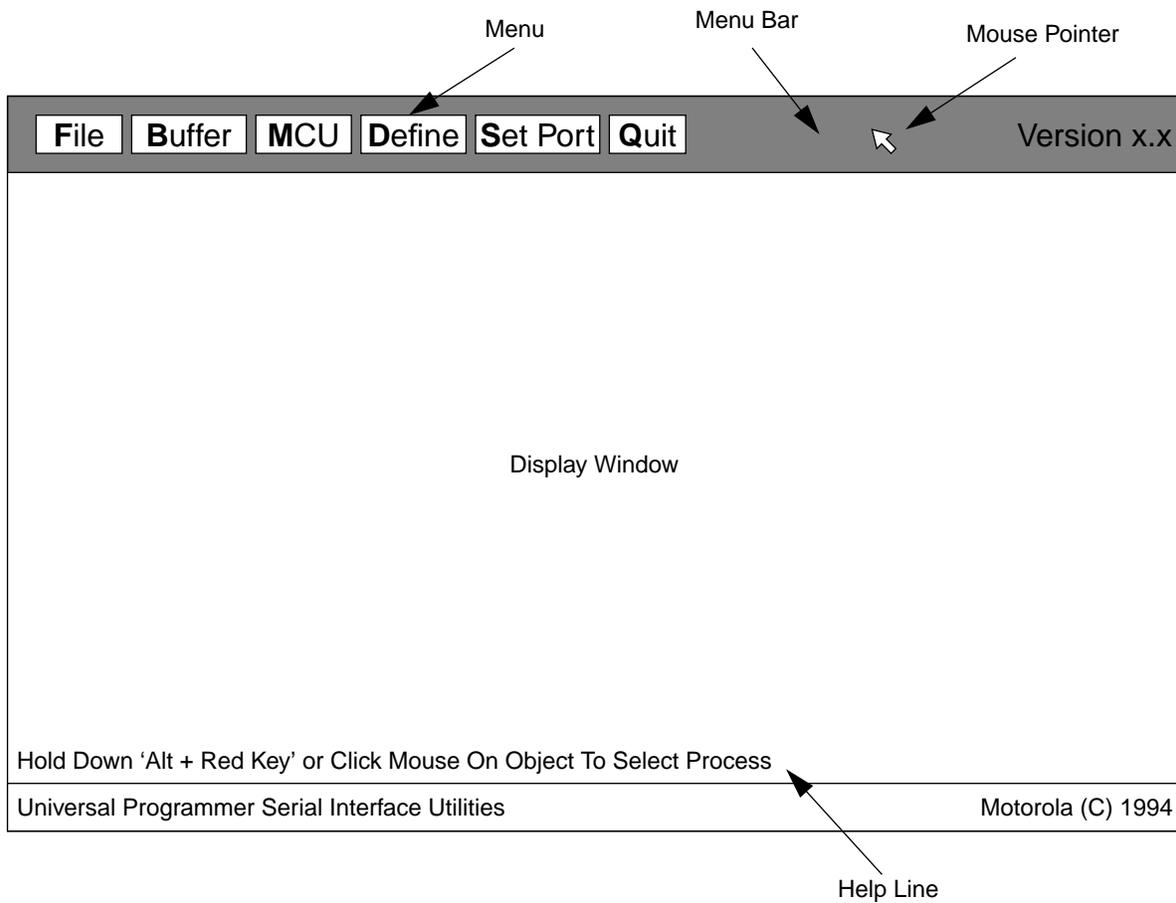
Figure 3-1 SUPGMR05 Interface Environment

3

As illustrated in **Figure 3-1**, the menu bar lists the currently available menus. There are six menus available for selection. Each menu can be pulled down using either the keyboard or the mouse. The pulled-down menus temporarily overlay part of the display area; the display area is restored when the menu is dismissed.

To open a menu using Alt-key combinations, press the Alt key and the key corresponding to the highlighted letter in the name of the menu. For example, press Alt-F to open the file menu. To select a menu item from a menu, press the Alt key and the key corresponding to the highlighted letter in the name of the menu item. To close a menu without selecting any item, press the ESC key.

To pull down a menu with a mouse, first position the mouse pointer, which is shown on the menu bar in **Figure 3-1**, on the menu bar at the name of the menu. Then press the left button on the mouse to pull down the menu. Position the mouse pointer on the required menu item and kick the left button on the mouse to select the menu item.

Some activities display transient windows that temporarily overlay part of the screen. There are two types of transient windows; namely dialog window and message window.

• A dialog window displays both available and currently selected values or options for an operation. The user can select new options or values or enter new options or values. When the dialog window is dismissed, the original screen contents are restored.

• A message window informs the user of the progress of a selected process. There are two types of color coded message window; a green message window shows the user the status of an operation, and a red message window displays error messages when the software detects an error. Each message window contains three components; message type, message(s), and acknowledgment as shown in **Figure 3-2**. When the message window is dismissed, the original screen contents are restored.

Message(s)   Message Type

Error Message

Unable To Open File... Process Terminated...!!!

Press Any Key To Return

Acknowledgment
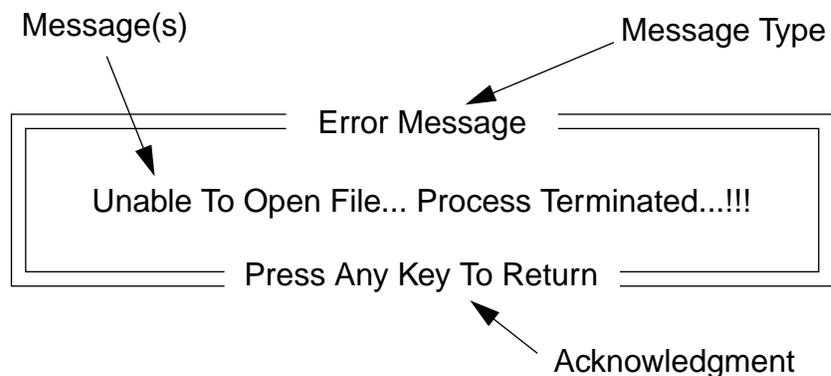
Figure 3-2 Message Window

3.5 COMMANDS

This section summarizes the commands supported by the user interface program. It also includes a detailed description of the function of each command. In this section, Alt-key combinations, which are entered by holding the Alt key down while pressing another key, are shown by the abbreviation Alt followed by the other character. For example, the Alt key and letter C combination is shown as Alt-C.

3.5.1 File Menu (Alt-F)

The File Menu enables the user to save or load the contents of the memory buffer and the appropriate MCU memory map parameters to or from a user defined file. **Figure 3-3** shows the menu items of the File Menu.

```
┌─────────────────────────────────────────────────────────────────────┐
│  File │ Buffer │ MCU │ Define │ Set Port │ Quit         Version x.x   │
│  ┌──────────────────────┐                                             │
│  │ Save Buffer All      │                                             │
│  │ Save Buffer N Setting│                                             │
│  │ Load Buffer User S19 │                                             │
│  │ Save Device Setting  │                                             │
│  │ Load Device Setting  │                                             │
│  └──────────────────────┘        ⬉                                    │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│  Hold Down 'Alt + Red Key' or Click Mouse On Object To Select Process │
│ ───────────────────────────────────────────────────────────────────── │
│  Universal Programmer Serial Interface Utilities      Motorola (C) 1994│
└─────────────────────────────────────────────────────────────────────┘
```

Figure 3-3 Menu Items Of The File Menu

3.5.1.1 Save Buffer All (Alt-A)

This command saves the contents of the memory buffer to a specified file in Motorola S-record format. When this command is invoked, a dialog window is displayed for specifying the file to which data will be stored as shown in **Figure 3-4**. The user should input the filename without any file extension as the user interface program will automatically append the extension.S19 to the end of the filename.

```
┌────────────────────────────────────────────────────────────────────────┐
│  ┌──────┐ ┌───────┐ ┌─────┐ ┌────────┐ ┌────────┐ ┌──────┐              │
│  │ File │ │ Buffer│ │ MCU │ │ Define │ │Set Port│ │ Quit │   Version x.x│
│  └──────┘ └───────┘ └─────┘ └────────┘ └────────┘ └──────┘              │
│  ┌──────────────────────────────┐                                       │
│  │ Save Buffer All              │                                       │
│  │ Save Buffer N Setting        │                                       │
│  │ Load Buffer User S19         │                                       │
│  │ Save Device Setting          │                                       │
│  │ Load Device Setting          │                                       │
│  └──────────────────────────────┘                                       │
│                         ⬉                                                │
│              ┌──────────────────────────────────────┐                   │
│              │ ─────────── Filename ──────────       │                   │
│              │ ┌────────────────────────────────┐    │                   │
│              │ │ UPGMR:>                         │    │                   │
│              │ └────────────────────────────────┘    │                   │
│              └──────────────────────────────────────┘                   │
│                                                                          │
│                                                                          │
│                                                                          │
│  Hold Down 'Alt + Red Key' or Click Mouse On Object To Select Process    │
├──────────────────────────────────────────────────────────────────────────┤
│  Universal Programmer Serial Interface Utilities      Motorola (C) 1994  │
└────────────────────────────────────────────────────────────────────────┘
```
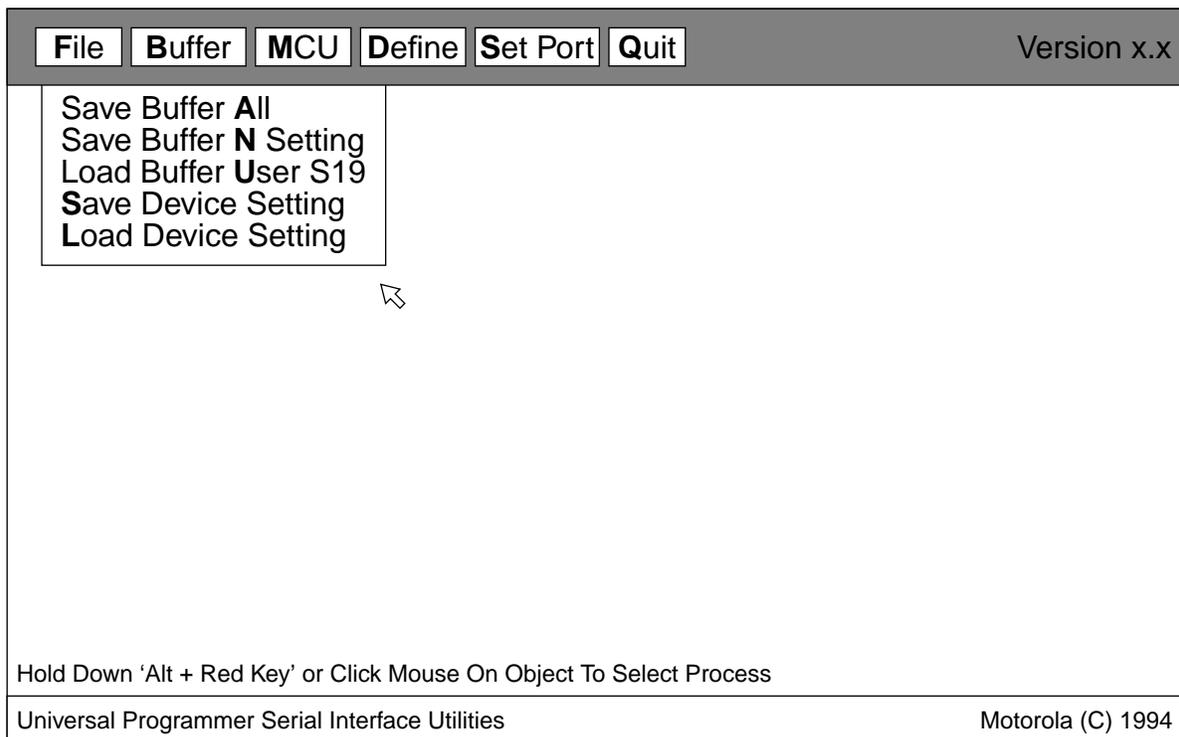
Figure 3-4 Filename Dialog Window

3.5.1.2 Save Buffer N Setting (Alt-N)

This command is used to save the contents of the memory buffer and the current MCU memory map parameters. The user will be prompted by the user interface program to enter a filename via a dialog window. Upon entering the filename, two files will be created:

• file 'filename.S19' contains the contents of the memory buffer in S-record format.

• file 'filename.MUD' contains the MCU memory map parameters pertaining to the MCU installed in the gang programmer.

3.5.1.3   Load Buffer User S19 (Alt-U)

This command initiates the loading of Motorola S-records from a spec-
ified file into the computer's memory buffer. When this command is
invoked, the user will be prompted by the user interface program to enter
a filename via a dialog window.

3.5.1.4   Save Device Setting (Alt-S)

This command is used to save the current MCU memory map parame-
ters. The user will be prompted by the user interface program to enter a
filename via dialog window. The user should input the filename without
any file extension. The user interface program will automatically append
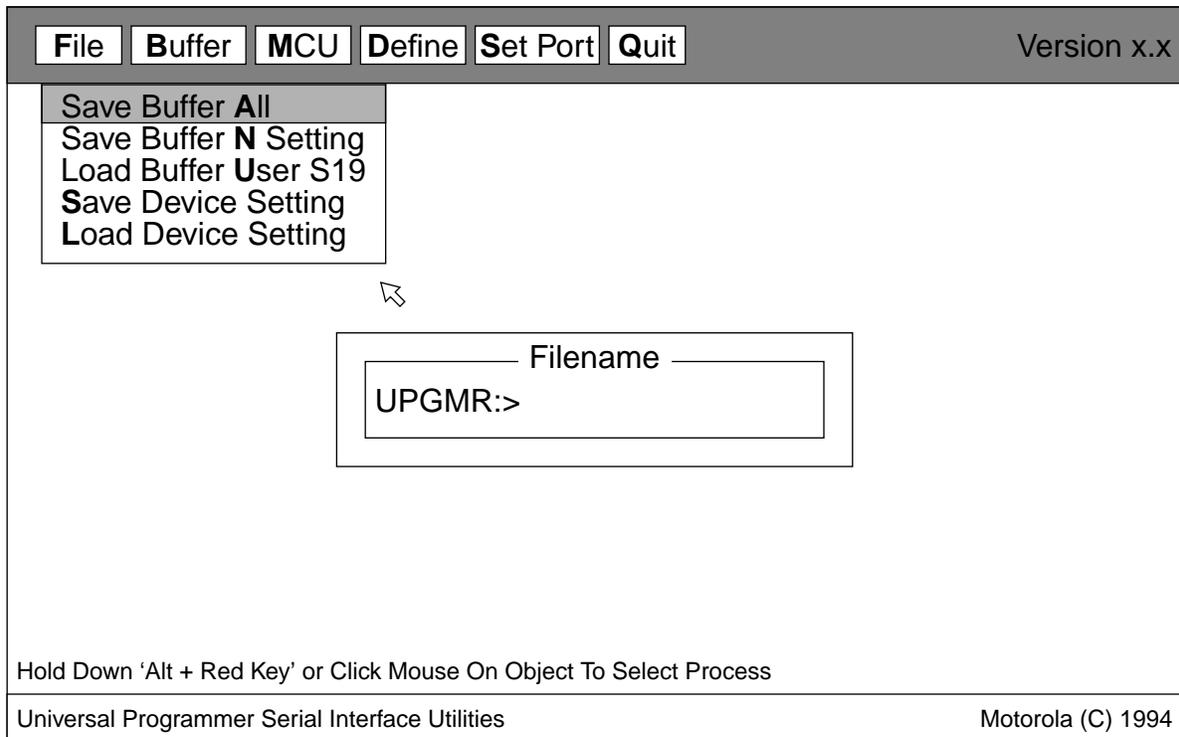the file extension. MUD to the end of the filename.

3.5.1.5   Load Device Setting (Alt-L)

This command initiates the loading of the desired MCU memory map
parameters from a specified file. When this command is invoked, the
user will be prompted by the user interface program to enter a filename
via a dialog window.

3.5.2   Buffer Menu (Alt-B)

The Buffer Menu provides commands that allow the user to edit the
memory buffer. **Figure 3-5** shows the menu items of the Buffer Menu.
The following paragraphs provide an explanation of each command in
the buffer menu.

3.5.2.1   Fill Buffer $FF (Alt-F)

This command fills the defined memory buffer with the data $FF.

3.5.2.2   Fill Buffer $00 (Alt-O)

This command fills the defined memory buffer with the data $00.

3.5.2.3   View Eprom Buffer (Alt-V)

This command lets the user view the contents of the memory buffer
interactively. The user interface program displays a dialog window
showing the present contents of the Eprom memory buffer. The user can
examine the buffer contents but is refrained from changing the values
displayed. There are two scrolling buttons; one for scrolling up and the
other for scrolling down. This command is terminated by press the ESC
key.

```
┌─────────────────────────────────────────────────────────────────────────────┐
│  File   Buffer   MCU   Define  Set Port  Quit                  Version x.x    │
├─────────────────────────────────────────────────────────────────────────────┤
│          ┌──────────────────────────┐                                         │
│          │ Fill Buffer $FF          │                                         │
│          │ Fill Buffer $00          │                                         │
│          │ View Eprom Buffer        │                                         │
│          │ View EEprom Buffer       │                                         │
│          └──────────────────────────┘                                         │
│                                                                               │
│                          ⌖                                                    │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│                                                                               │
│  Hold Down 'Alt + Red Key' or Click Mouse On Object To Select Process         │
├─────────────────────────────────────────────────────────────────────────────┤
│  Universal Programmer Serial Interface Utilities          Motorola (C) 1994   │
└─────────────────────────────────────────────────────────────────────────────┘
```

Figure 3-5 Menu Items Of The Buffer Menu

3.5.2.4   View EEprom Buffer (Alt-E)

This command lets the user view the contents of the memory buffer interactively. The user interface program displays a dialog window showing the present contents of the EEprom memory buffer. The user can examine the buffer contents but is refrained from changing the values displayed. There are two scrolling buttons; one for scrolling up and the other for scrolling down. This command is terminated by press the ESC key
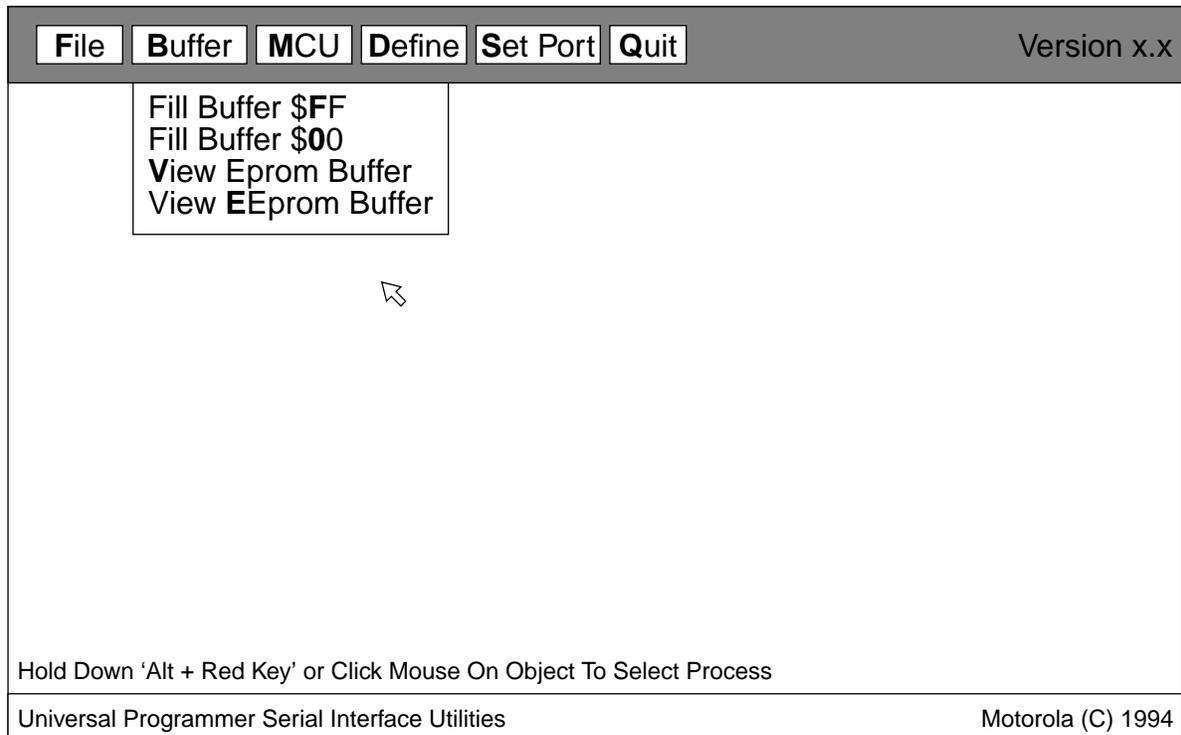
3

3.5.3   MCU Menu (Alt-M)

The MCU Menu provide commands that allow the user to program and verify the on-chip memory of the MCU installed in the gang programmer. Other commands that provide such functions as blanking and uploading the contents of the MCU to the computer's memory buffer are also included. When this menu is selected, the user interface program performs a check to see if the MCU to be programmed is installed properly in the gang programmer. If the MCU is indeed installed properly, the MCU Menu will be pulled down and the menu items shown in **Figure 3-6** will be displayed.
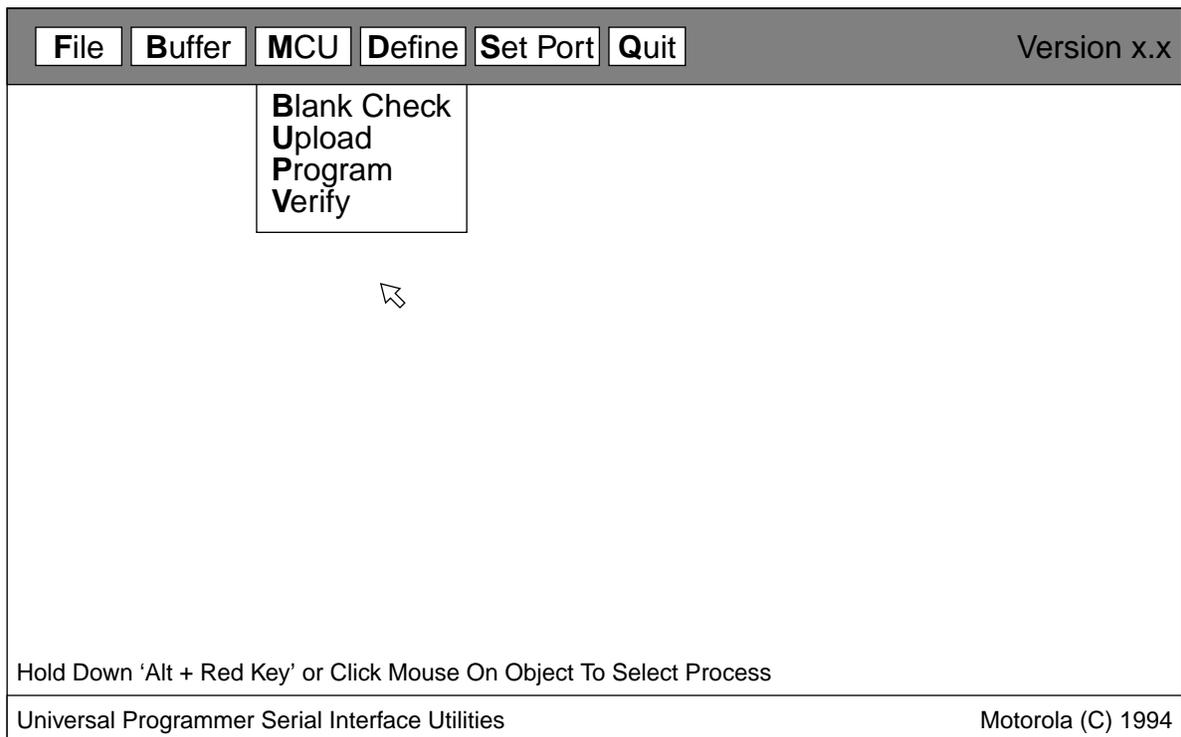
```
┌────────────────────────────────────────────────────────────────────────┐
│  ┌──────┐ ┌────────┐ ┌─────┐ ┌──────┐ ┌────────┐ ┌──────┐              │
│  │ File │ │ Buffer │ │ MCU │ │Define│ │Set Port│ │ Quit │   Version x.x │
│  └──────┘ └────────┘ └─────┘ └──────┘ └────────┘ └──────┘              │
│                      ┌──────────────┐                                    │
│                      │ Blank Check  │                                    │
│                      │ Upload       │                                    │
│                      │ Program      │                                    │
│                      │ Verify       │                                    │
│                      └──────────────┘                                    │
│                                                                          │
│                              ⌖                                           │
│                                                                          │
│                                                                          │
│                                                                          │
│                                                                          │
│                                                                          │
│                                                                          │
│                                                                          │
│  Hold Down 'Alt + Red Key' or Click Mouse On Object To Select Process    │
│ ──────────────────────────────────────────────────────────────────────  │
│  Universal Programmer Serial Interface Utilities     Motorola (C) 1994   │
└────────────────────────────────────────────────────────────────────────┘
```

Figure 3-6 Menu Items Of The MCU Menu

3.5.3.1   Blank Check (Alt-B)

This command performs a check to determine if the Eprom contents of the MCU are properly erased.

3.5.3.2   Upload (Alt-U)

This command is used to dump out the contents of the MCU's on-chip memory and save the data in the computer's memory buffer. The contents can be displayed for examination by issuing the "View Eprom Buffer" or "View EEprom Buffer" command.

3.5.3.3   Program (Alt-P)

This command is used to copy the contents of the memory buffer and transfer the data to the MCU installed in the gang programmer board. When this command is invoked, a dialog window will be displayed prompting the user to select the type of memory to be programmed.

- Alt-E selects the EEprom area(s). This command is only meaningful to MCUs that have EEprom. If this command is entered when an MCU that does not contain EEprom is installed in the gang programmer board, the command terminates with an error message.

- Alt-O selects Eprom area(s) including the vector locations of the MCU installed in the gang programmer board.

3.5.3.4   Verify (Alt-V)

This command is used to verify the MCU's memory against the contents of the memory buffer. When this command is invoked, a dialog window will be displayed prompting the user to select the type of memory to be verified.

- Alt-E selects the EEprom area(s). This command is only meaningful to MCUs that have EEprom. If this command is entered when an MCU that does not contain EEprom is installed in the gang programmer board, the command terminates with an error message.

- Alt-O selects Eprom area(s) including the vector locations of the MCU installed in the gang programmer board.

3.5.4   Define Menu (Alt-D)

The Define Menu provides the user with commands that define the address ranges of different types of MCU memory areas such as Ram, EEprom, Eprom and vector areas. It also lets the user define the Program Control Register and Option Register addresses, if required. Defining memory address ranges tells the user interface program to reserve memory buffer areas which are used to reflect the contents of the memory of the MCU installed in the gang programmer. **Figure 3-7** shows the menu items of the Define Menu.

```
┌──────────────────────────────────────────────────────────────────┐
│  File    Buffer   MCU   Define  Set Port  Quit           Version x.x │
│                         ┌─────────────┐                            │
│                         │ Eprom Map   │                            │
│                         │ EEprom Map  │                            │
│                         │ Vector Map  │                            │
│                         │ Ram Map     │                            │
│                         └─────────────┘                            │
│                                                                    │
│                            ⬚                                       │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│  Hold Down 'Alt + Red Key' or Click Mouse On Object To Select Process │
│  Universal Programmer Serial Interface Utilities    Motorola (C) 1994 │
└──────────────────────────────────────────────────────────────────┘
```
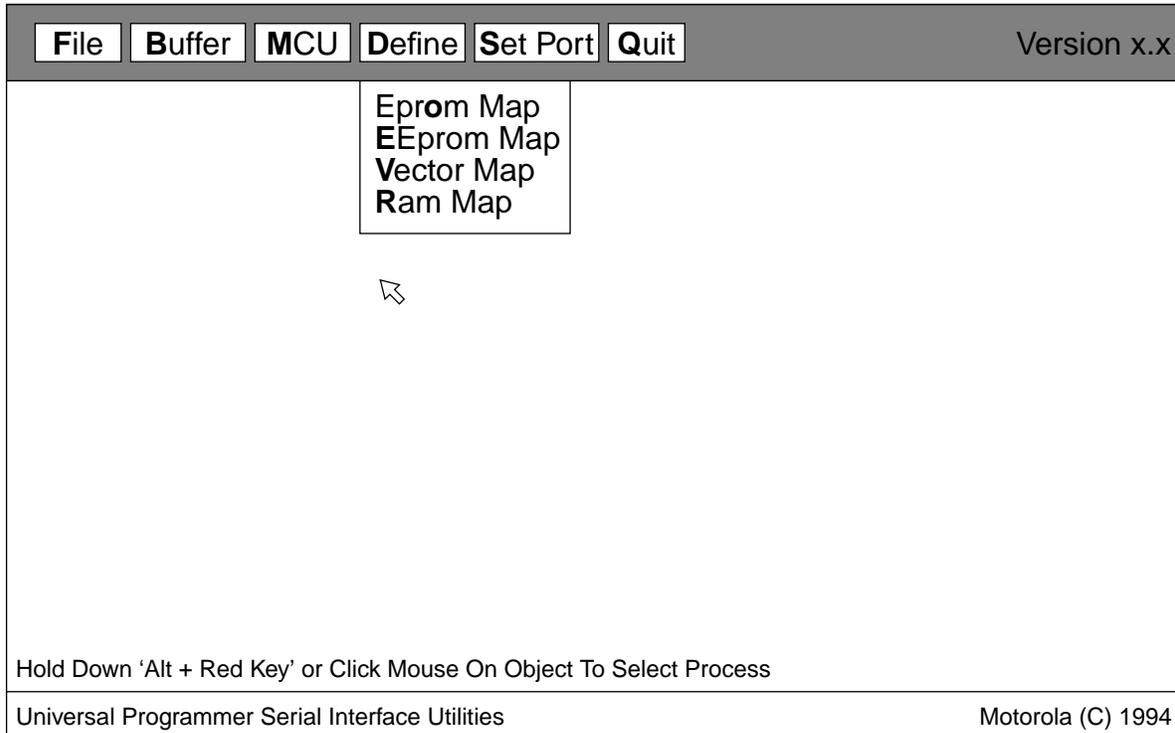
Figure 3-7 Menu Items Of The Define Menu

3.5.4.1   Eprom Map (Alt-o)

This command opens up a dialog window to let the user define the address ranges of the MCU Eprom. Only three blocks of Eprom are allowed to be specified. Unused blocks should have $0000 starting and ending addresses. The dialog window also allow the user define the Eprom Control Register address. The user can cycle through the different fields of the dialog window using the TAB key.

3.5.4.2   EEprom Map (Alt-E)

This command opens up a dialog window to let the user define the address ranges of the MCU EEprom. Only three blocks of EEprom are allowed to be specified. Unused blocks should have $0000 starting and ending addresses. The dialog window also allow the user define the EEprom Control Register and EEprom Option Register addresses. The user can cycle through the different fields of the dialog window using the TAB key.

3.5.4.3   Vector Map (Alt-V)

This command opens up a dialog window to let the user define the address range of the MCU vector area. The user can cycle through the different fields of the dialog window using the TAB key.

3.5.4.4   Ram Map (Alt-R)

This command opens up a dialog window to let the user define the address ranges of the MCU Ram. Only two blocks of Ram are allowed to be specified. Unused blocks should have $0000 starting and ending addresses.

3.5.5   Set Port Menu (Alt-S)

The Set Port Menu allows the user to specify which serial communications port to use on the host computer to communicate with the gang programmer.

3.5.5.1   Set To COM1 (Alt-1)

This command selects the COM1 serial communications port.

3.5.5.2   Set To COM2 (Alt-2)

This command selects the COM2 serial communications port.

3.5.6   Quit Menu (Alt-Q)

This is actually a command for terminating the user interface program. Invoking this command will terminate the programming session and return a DOS prompt to the user.

3

3.6   TYPICAL PROGRAMMING SEQUENCE

Although we do not have a unique way of dealing with different programming requirements. The following steps are typical for most users. You may want to refer to the following programming sequence when you use the user interface program for the first time.

1. Use either of the following methods to initialize the MCU parameters.

   - Select "Load Device Setting" from the File Menu to load the MCU memory and other programming parameters.

   - Choose the appropriate commands from the Define Menu to specify the memory map and programming register address(es).

2. Select "Load User S19" from the File Menu to load the desired data file in S-record format into the computer's memory buffer.

3. Select "Blank Check" from the MCU Menu to blank check the MCU. Memory must be blank before it can be programmed.

4. Select "Program" from the MCU Menu to program the contents of the memory buffer into the MCU's on-chip memory.

5. Select "Verify" from the MCU Menu to verify the programming operation.

6. To program another MCU, follow the steps in Section **3.3** before replacing the newly programmed MCU with another one.

7. When you are done programming the MCUs, select "Quit" from the Menu Bar to terminate the programming session.

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