M68HC705UGANG

M68HC705UGANG Gang Programmer

Users Manual

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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 in such a way as to allow you to program as many as ten devices simultaneously by copying data held in an external Eprom device to the MCUs' internal Eprom.

1.1 FEATURES

The M68HC705UGANG features include:

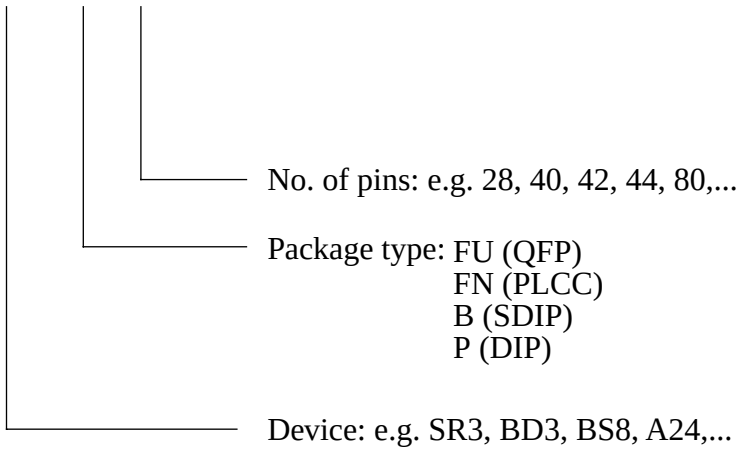
- Economical means of programming the internal Eprom/EEprom of a wide range of M68HC705 family of microcontroller units.
- Stand-alone programming mode of operation.
- ZIF (zero insertion force) socket for target code storage.
- Single +5Vdc power supply requirement.
- Ten pairs of 32-pin DIN male connectors 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.

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 XXX PP NN



In addition to the programmer adapters, the user is required to provide an external +5V supply to power the M68HC705UGANG, and:

- a 27C64/27C128/27C2576/27C512 Eprom device for Stand-alone programming operation.

1.3 GANG PROGRAMMER LAYOUT

The diagram below shows the layout of the M68HC705UGANG.

Connectors P1-P20, P21, jumper headers P23, P24, P27, P30 and ZIF socket U30 are located as shown in **Figure 1-1**. Connectors P1-P20 are programmer adapter board connectors. The connectors take up the upper two thirds of the gang programmer. Connector P21 is for +5Vdc external power. 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 U30. The gang programmer supports four types of Eprom devices; namely 27C64, 27C128, 27C256 and 27C512. U30 is an ZIF socket for holding the external Eprom device.

There are two control switches on the gang programmer board; a mode switch and a go/stop switch. The mode 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.

Test point TP1 and potentiometer VR1allow you to adjust the on-board programming voltage Vpp to match your MCUs' Vpp requirement.

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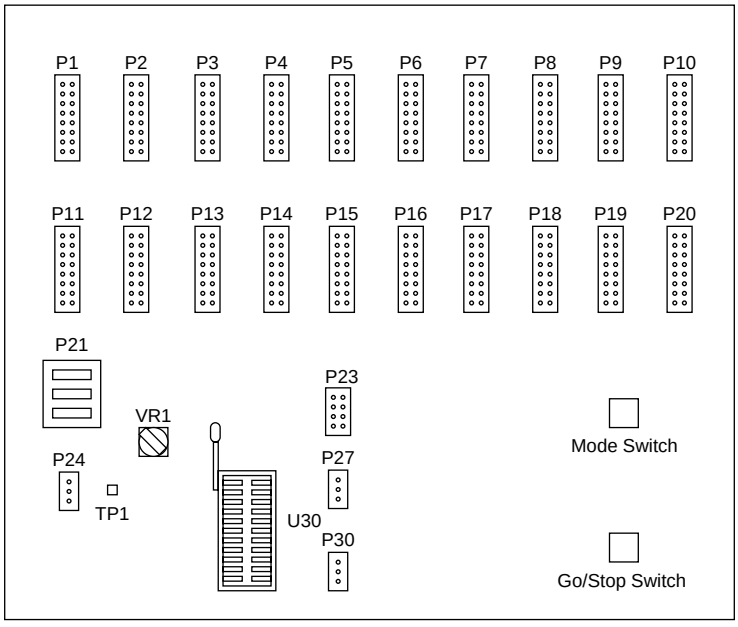

Figure 1-1 M68HC705UGANG Gang Programmer Layout

1.4 SETTING JUMPER HEADERS

Your M68HC705UGANG has four jumper headers (P23, P24, P27 and P30) and a test point (TP1). paragraphs **1.4.1** through **1.4.4** explain the significance of these components..

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 U30 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 7and 8. If the memory map size is 16K, install a fabricated jumper between pins 5 and 6 and so on. **Figure 1-3** depicts jumper header P23 without any fabricated jumpers.

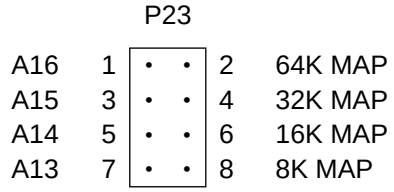

Figure 1-2 P23 - Map Size Select

Note

The user should select 8K map for MCUs with map size less than 8K.

1.4.2 Vpp Select Header (P24)

Jumper select P24 determines the source of the programming voltage for the gang programmer. **Figure 1-3** shows the factory configuration: the fabricated jumper between pins 2 and 3 selects the gang programmer's internal programming voltage source which is preset to 13.5V by Motorola's factory personnel. This preset value could be altered by adjusting potentiometer VR1in conjunction with test point TP1 (see section **1.5.1** for details.

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).

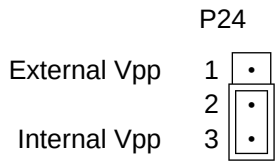

Figure 1-3 P24 - Vpp Select

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 U30. **Figure 1-3** and **Figure 1-3** 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 U30.

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.

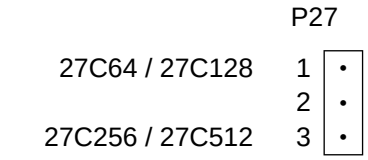

Figure 1-4 P27 - Eprom Type Select

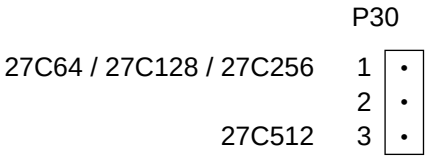

Figure 1-5 P30 - Eprom Type Select

1.4.4 Test Point (TP1)

Figure 1-6 shows the test point TP1 which allows you to measure the programming voltage Vpp generated by the gang programmer. You may need to have access to Vpp should you require to adjust the internal programming voltage of the programmer.

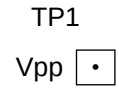

Figure 1-6 TP1 - Test Point

1.5 GANG PROGRAMMER CONNECTIONS

Paragraph **1.5.1** explains the power connection requirement for the M68HC705UGANG and paragraph **1.5.2** explains how to connect programmer adapters to the gang programmer board.

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.

The M68HC705UGANG is capable of generating its own programming voltage Vpp which is preset to 13.5V by Motorola's factory personnel. You may need to adjust this voltage if the MCU programming voltage for your devices is something other than this value (consult your device data book to see if you need to adjust Vpp). To do so, use an multimeter to measure Vpp via test point TP1 and adjust the potentiometer VR1 using a screwdriver until the required Vpp appears on TP1.

1.5.2 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. Programmer adapters can be installed arbitrarily anywhere in the gang programmer to form programming stations in stand-alone mode.

Figure 1-7 below shows a typical programmer adapter. To install a programmer adapter in the gang programmer to form a programming station, fit together programmer adapter connectors (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.

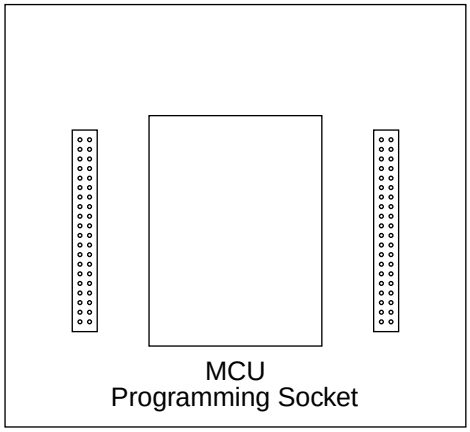

Figure 1-7 Programmer Adapter

CAUTION

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.

CHAPTER 2 STAND-ALONE OPERATION

This chapter explains how to use your M68HC705UGANG 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.

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. Before operating the gang programmer, the user must ensure that an exact duplicate of the software code to be transferred 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

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 programmer board 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 pressing the mode 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 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 programmer board 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.

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