

**M68EM05K3UM/D**

MAY 15, 1994

**MC68HC05K3  
EMULATOR MODULE  
USER'S MANUAL**

**PRELIMINARY**

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# CHAPTER 1

## INTRODUCTION

This user's manual explains connection, configuration, and operation information specific to the M68HC05K3 Emulator Module (M68EM05K3). The M68EM05K3 makes possible emulation and debugging of target systems based on the following microcontroller units (MCUs):

MC68HC05K0

MC68HC05K1

MC68HC705K1

MC68HC05K3

The M68EM05K3 operates as part of a HC05 Motorola Modular Development System (MMDS05) or a HC05 Motorola Modular Evaluation System (M68MMEVS05).

### 1.1 MOTOROLA MODULAR DEVELOPMENT SYSTEM (MMDS05)

The MMDS05 is an emulator system that provides a bus state analyzer and real-time memory windows. The M68MMEVS05 is a scaled-down version of the MMDS05 that does not include such features as the bus state analyzer and the real-time memory window. Therefore most MMDS05 setup and configuration instructions apply to the M68MMEVS05. The unit's integrated design environment includes a user interface and source-level debug. A complete MMDS05 consists of:

- **A station module** — the metal MMDS05 enclosure, containing the control board and the internal power supply. Most system cables connect to the MMDS05 station module. (An optional emulation cable to a user's target system, however, runs through an aperture in the station module enclosure to connect directly to the emulator module.)
- **An emulator module (EM)** — such as the M68EM05K3: a printed circuit board that enables system functionality for a specific set of MCUs. The EM fits into the station module through a sliding panel in the enclosure top. The EM has a connector for the user's emulation target cable.
- **Two logic clip cable assemblies** — twisted-pair cables that connect the station module's bus state analyzer to the user's target system. One end of each cable assembly has a molded connector, which fits into station-module Pod A or Pod B. Leads at the other end of each cable terminate in female probe tips. Ball clips come with the cable assemblies.
- **A 9-lead RS-232 serial cable** — the cable that connects the station module to the host computer RS-232 port.

- **A 9- to 25-pin adapter** — a molded assembly that lets you connect the 9-lead cable to a 25-pin serial port.
- **System software** — software, on 3-1/2 inch diskettes.
- **MMDS05 documentation** — an MMDS05 operations manual (MMDS05OM/D) and the appropriate EM user's manual.

As mentioned before, your M68EM05K3 gives the MMDS05 the ability to emulate several MC68HC05Kx-series MCUs. Substituting a different EM, enables you to use your MMDS05 to emulate an MCU of a different series. (Your Motorola representative can explain all the EMs available.)

Chapter 2 explains how to configure and use your M68EM05K3 as part of an MMDS05 system. For information about MMDS05 software or the station module, see the MMDS05 operations manual. For layout and configuration information pertaining to a different EM, see the corresponding EM user's manual.

## 1.2 M68EM05K3 LAYOUT

Figure 1-1 shows the layout of the M68EM05K3. Jumper header J1 allows the user to emulate the HC05K1 family's Port A and B software programmable pulldown feature. Jumper header J2 enables emulation of Port A's IRQ capabilities. Jumper header J3 lets you select the EM board's clock signal source.

Connector P4 is an emulation cable interface to a user's target system. The emulation cable must be purchased separately. When you install the M68EM05K3 in the MMDS05 station module, the target cable passes through the slit in the station module enclosure. Connector P1 is available for connection to a logic analyzer. (Logic analyzer connection may not be necessary for your application, however, as the MMDS05 includes a bus analyzer.) Expansion header connectors P2 and P3 connect the EM board to the MMDS05 control board.

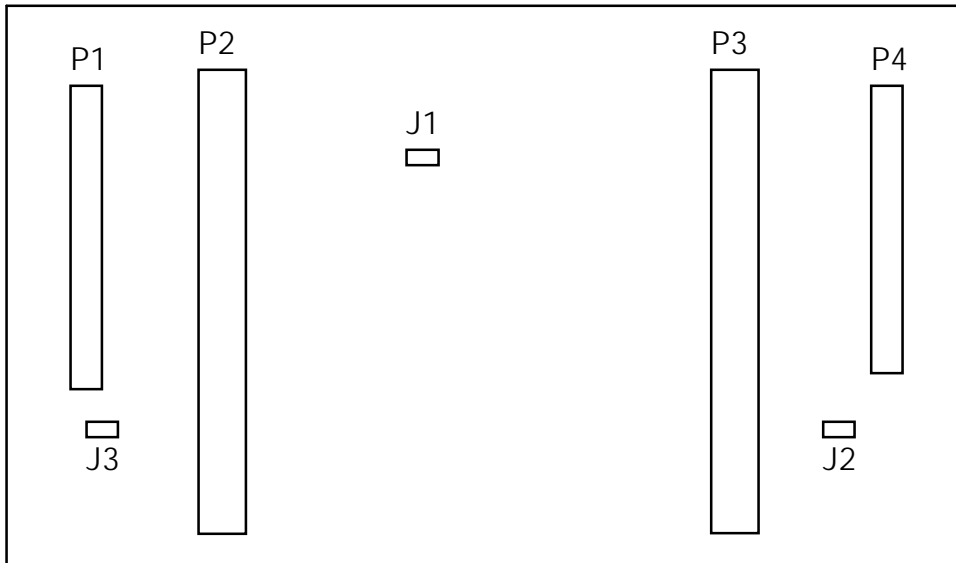


Figure 1-1 MC68HC05K3 Emulator Module

### 1.3 CONNECTOR P4 PIN ASSIGNMENTS

Figure 1-2 shows the pin assignments for connector P4. The italic numbers correlate the P4 pins with the pins of the MCU being emulated. For signal descriptions, consult the technical data book for the specific MCU you are emulating.

Figure 1-2. Connector P4 Pin Assignments

MCU PINS	P4		MCU PINS
16.....NC	1	○ ○	2 RST.....1
15.....OSC2	3	○ ○	4 PB1.....2
14.....GND	5	○ ○	6 PB0.....3
13.....NC	7	○ ○	8 IRQ.....4
12.....PA7	9	○ ○	10 PA0.....5
11.....PA6	11	○ ○	12 PA1.....6
10.....PA5	13	○ ○	14 PA2.....7
9.....PA4	15	○ ○	16 PA3.....8
GND	17	○ ○	18 GND
GND	19	○ ○	20 GND
GND	21	○ ○	22 GND
GND	23	○ ○	24 GND
GND	25	○ ○	26 GND
GND	27	○ ○	28 GND
GND	29	○ ○	30 GND
GND	31	○ ○	32 GND
GND	33	○ ○	34 GND
GND	35	○ ○	36 GND
GND	37	○ ○	38 GND
GND	39	○ ○	40 GND

## **CHAPTER 2**

### **MMDS05 CONFIGURATION AND OPERATION**

This chapter explains how to configure and use your M68EM05K3 as part of a MMDS05. For additional system installation and configuration information, see the MMDS05 operations manual (MMDS05OM/D).

Paragraph 2.1 explains how to set the M68EM05K3's configuration jumper headers. Paragraph 2.2 explains considerations pertaining to the MCU you emulate. Paragraph 2.3 discusses any remaining system installation issues.

Note that you can configure an M68EM05K3 that is installed in the MMDS05 station module. To do so, switch off station-module power, remove the panel, then follow the directions in this chapter.

#### **CAUTION**

Be sure to switch off power if you reconfigure an installed EM. Reconfiguring EM jumper headers with the power left on can damage MMDS05 circuits.

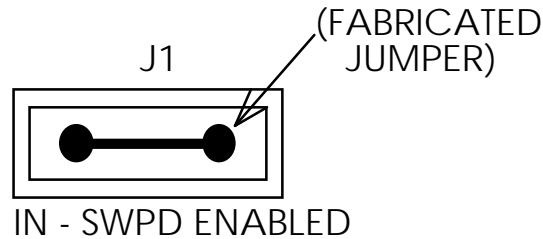
### **2.1 SETTING M68EM05K3 JUMPER HEADERS**

Your M68EM05K3 has three jumper headers: J1 through J3. Paragraphs 2.1.1 through 2.1.3 explain how to configure these headers.



### 2.1.1 Software Pulldown Select Header (J1)

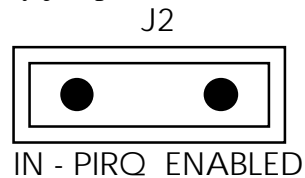
Jumper header J1 enables software programmable pulldown device pins (PA0 — PA7, PB0, PB1). The diagram below shows the factory configuration: the fabricated jumper in this header sets these input pins to a low state. This configuration is important for many keyboard applications.



Alternatively, you may use these pins as regular Port A or B pins. To do so, remove the jumper from header J1.

### 2.1.2 Port A IRQ Enable Header (J2)

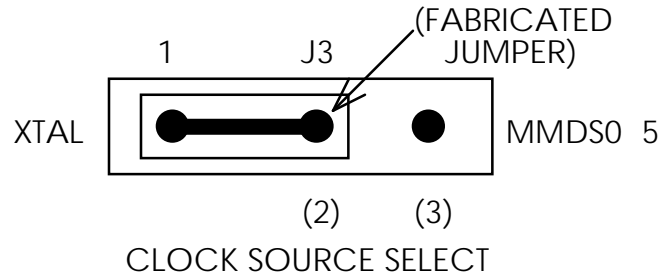
Jumper header J2 enables Port A IRQs. The diagram below shows the factory configuration: no fabricated jumper in this header. This means that pins PA0 — PA3 are regular Port A pins (unless configured otherwise by jumper header J1).



Alternatively, you may OR the PA0 — PA3 pins with the IRQ signal, to produce IRQ interrupts. For this arrangement, insert a fabricated jumper into header J3.

### 2.1.3 Clock Source Select Header (J3)

Jumper header J3 determines the source of the clock signal. The diagram below shows the factory configuration: the fabricated jumper between pins 1 and 2 selects the M68EM05K3's canned oscillator clock source.



Alternatively, you may use a clock source originating from the control board. To do so, reposition the J3 jumper between pins 2 and 3, then use the MMDS05 OSC command to select a frequency.

## 2.2 THE EMULATED MCU

Your MMDS05 system uses a specific personality file for the MCU type being emulated. For example, to emulate a MC68HC05K1, or MC68HC705K1 MCU, the system uses personality file 000K1Vxx.MEM. Table 2-1 lists the personality files that pertain to the M68EM05K3. Note that personality file names follow the pattern **00ZZZVxx.MEM**, where **ZZZ** is the EM identifier or MCU name, and **xx** is the version of the file.

**Table 2-1. MCUs and Personality Files**

EMULATED MCU	PERSONALITY FILE
MC68HC05K0	000K0Vxx.MEM
MC68HC05K1	000K1Vxx.MEM
MC68HC705K1	000K1Vxx.MEM
MC68HC05K3	00014Vxx.MEM

MMDS05 software loads a personality file upon powerup; the default personality file for the M68EM05K3 is 00014Vxx.MEM. To replace this file with a different one, use the LOADMEM command. (For more information about the LOADMEM command, see the explanation in the MMDS05 operations manual.)

Alternatively, you can insert the line LOADMEM 00ZZZVxx.MEM in the STARTUP.05 script file. This way, the system automatically loads the specified personality file as part of system startup. (For more information about the STARTUP.05 script file, see the SCRIPT command explanation in the MMDS05 operations manual.)

Since the MC68HC05K1, and MC68HC705K1 MCU share the same memory map, port configurations, and other such details, they use the same personality file. The MC68HC05K0 and the MC68HC05K3 have different memory maps, so they use their own personality files.

### NOTE

The MCU shipped with your M68EM05K3 may have the Computer Operating Properly (COP) option enabled. This is indicated by the MCU periodically resetting while executing user code. If the COP option is enabled, the user must periodically clear the COP register (\$3F0) in his/her code to prevent the MCU from executing a COP reset while executing code. If the user wishes to emulate a device without the COP option, the resident MCU must be replaced with a K3 device that has the COP option disabled. (Contact your Motorola representative for more information.)

## 2.3 REMAINING SYSTEM INSTALLATION

When you have configured headers J1, J2, and J3, you are through with M68EM05K3 configuration:

- To install the M68EM05K3 in an MMDS05 station module, remove the panel from the station-module top. Fit together EM connectors P2 and P3 (on the bottom of the board) and control-board connectors P11 and P12. Snap the corners of the EM onto the plastic standoffs. Connect the target cable, if appropriate. Replace the panel.

If you are using the M68MMEVS05, fit EM connectors (on the bottom of the board) with PFB connectors P6 and P7.

- If your M68EM05K3 is already installed in the station module, reconnect the target cable (if necessary). Replace the panel.

At this point, you are ready to make any remaining cable connections, as necessary, and restore power. For additional instructions, consult the MMDS05 operations manual (MMDS05OM/D).

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