Freescale Semiconductor, Inc.

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MC68HC05J1A
EMULATOR MODULE
USER'S MANUAL

PRELIMINARY

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CHAPTER 1

INTRODUCTION

This user's manual provides connection, configuration, and operation information specific to the MC68HC05J1A Emulator Module (M68EM05J1A). The EM05J1A makes possible emulation and debugging of target systems based on the following microcontroller units (MCUs):

MC68HC05J1A   MC68HC705J1A   MC68HC05J2A

The M68EM05J1A operates as part of the HC05 Motorola Modular Development System (MMDS05) or the 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 M68EM05J1A: 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 EM05J1A gives the MMDS05 the ability to emulate several MC68HC05Jx-series MCUs. By substituting a different EM board, the user is able to use the 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 EM05J1A 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 EM LAYOUT

Figure 1-1 shows the layout of the EM05J1A. Jumper header J1 permits emulation of the J1A's Ports A and B software programmable pulldowns. Jumper J2 permits emulation of the J1A's Port A IRQ feature. Jumper header J3 allows the user to select between emulating the J1A or J2A MCU. Jumper header J4 lets you select the EM05J1A's clock signal source.

Connector P4 is the EM board's emulation cable interface to the user's target system. When the J1AEM is installed 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 an MMDS05 includes a bus analyzer.). Expansion header connectors P2 and P3 connect the EM and the MMDS05 control board.
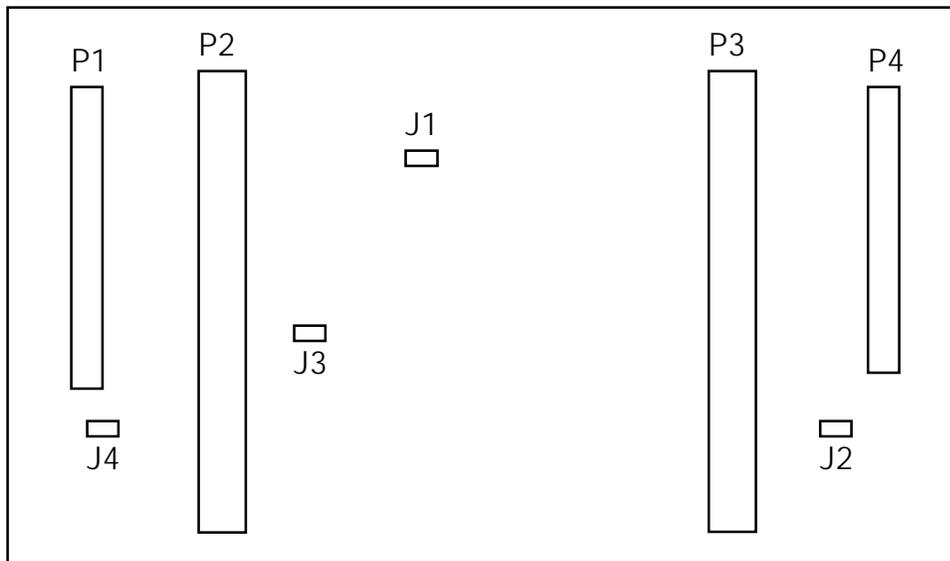
Figure 1-1 MC68HC05J1A Emulator Module

1.3 CONNECTOR P4 PIN ASSIGNMENTS

Figure 1-2 shows the pin assignments for Connector P4. The italic numbers correlate the P4 connector pins with the pins of the MC68HC05J1A. For signal descriptions, consult the technical data book for the MC68HC05J1A.

```
    MCU PINS          P4          MCU PINS
    20.........RST    1  o   o  2   NC ..........1
    19.........IRQ    3  o   o  4   OSC2.......2
    18.........PA0    5  o   o  6   PB5.........3
    17.........PA1    7  o   o  8   PB4.........4
    16.........PA2    9  o   o  10  PB3.........5
    15.........PA3    11 o   o  12  PB2.........6
    14.........PA4    13 o   o  14  PB1.........7
    13.........PA5    15 o   o  16  PB0.........8
    12.........PA6    17 o   o  18  NC..........9
    11.........PA7    19 o   o  20  GND........10
           GND        21 o   o  22  GND
           GND        23 o   o  24  GND
           GND        25 o   o  26  GND
           GND        27 o   o  28  GND
           GND        29 o   o  30  GND
           GND        31 o   o  32  GND
           GND        33 o   o  34  GND
           GND        35 o   o  36  GND
           GND        37 o   o  38  GND
           GND        39 o   o  40  GND
```

Figure 1-2. Connector P4 Pin Assignments

CHAPTER 2

MMDS05 CONFIGURATION AND OPERATION

This chapter explains how to configure and use your EM05J1A as part of a MMDS05 development system. For additional instructions on system installation and configuration, see the MMDS05 operations manual (MMDS05OM/D).

Paragraph 2.1 explains how to set the EM05J1A's jumper headers. Paragraph 2.2 provides MCU-specific setup information. Paragraph 2.3 discusses any remaining system installation issues.

Note that you can configure an EM05J1A that is installed in a MMDS05 station module enclosure. To do so, switch off station-module power, remove the panel, then follow the instructions given in this chapter.

CAUTION

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

2.1 SETTING EM05J1A JUMPER HEADERS

Your EM05J1A has four jumper headers: J1 through J4. Paragraphs 2.1.1 through 2.1.4 explain how to configure these headers.

2.1.1 Software Pulldown Select Header (J1)

Jumper header J1 permits emulation of the J1A's Ports A and B software programmable pulldown pins (PA0-PA7, PB0, PB1). The diagram below shows the factory configuration: the fabricated jumper in the header pulls these input pins to a low state. This configuration is important for many keyboard applications.
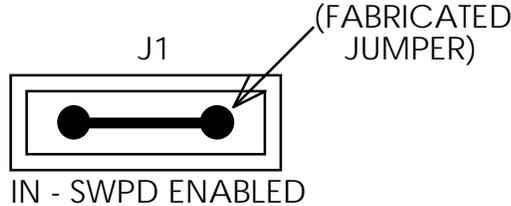
Alternatively, you may use these pins as regular Port A or B pins. To do so, remove the jumper from header J1.

2.1.2 PIRQ Enable Header (J2)

Jumper header J2 allows emulation of Port A IRQs. The diagram below shows the factory configuration: no fabricated jumper in the header. This means that pins PA0-PA3 are regular port A pins (unless configured otherwise by jumper header J1).
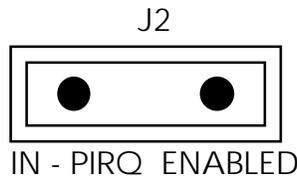
Alternatively, you may OR the PA0-PA3 pins with the IRQ signal to produce IRQ interrupts. For this arrangement, insert a fabricated jumper into header J2.

2.1.3 MCU Select Header (J3)

Jumper header J3 allows the user to select between emulating the J1A or J2A MCUs.
The diagram below shows the factory configuration: the fabricated jumper between
pins 1 and 2 enables J1A emulation.

J3   (FABRICATEDJUMPER)

1   (2)   (3)

J1A/J2A
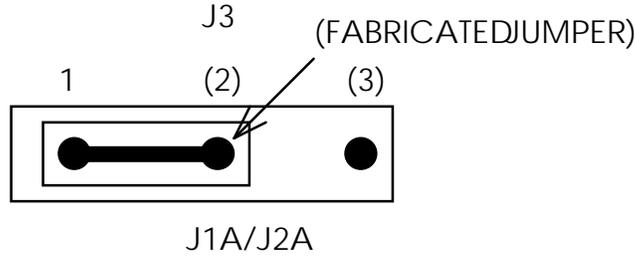
2.1.4 Clock Source Select Header (J4)

Jumper header J4 determines the source of the clock signal. The diagram below shows
the factory configuration: the fabricated jumper between pins 1 and 2 selects the
EM05J1A canned oscillator clock source.

(FABRICATED
JUMPER)

1   J4

XTAL   (2)   (3)   CDS8
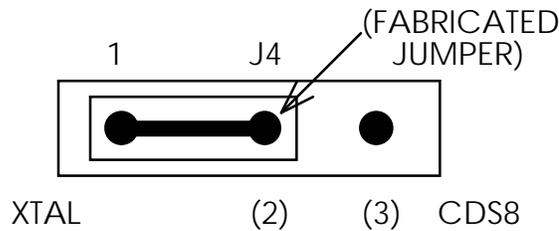
Alternatively, you may use a clock source originating from the control board. To do so,
reposition the J1 jumper between pins 2 and 3, then use the MMDS05's OSC command
to select a frequency.

2.2 THE EMULATED MCU

The MMDS05 system uses a specific personality file for the MCU type being emulated. For example, to emulate a MC68HC05J1A the system uses personality file 00100Vxx.MEM. Table 2-1 lists the personality files that pertain to the EM05J1A. Note that personality file names follow the pattern 00zzzxx.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
MC68HC05J1A MC68HC705J1A	00100Vxx.MEM
MC68HC05J2A	00101Vxx.MEM

MMDS05 software loads a personality file upon powerup; the default personality file for the EM05J1A is 00100Vxx.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 a part of system startup. (For more information about the STARTUP.05 script file, see the SCRIPT command explanation in the MMDS05 operations manual.)

NOTE

The MCU shipped with the EM05J1A has the Computer Operating Properly (COP) option enabled. Therefore it is necessary for the the user to reset the COP register periodically in his/her code to prevent the MCU from executing a COP reset while executing user code. If the user wishes to emulate a J1A device without the COP option, the resident MCU must be replaced with a J1A 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 through J4 you are through with EM05J1A configuration:

- To install the EM05J1A in an MMDS05 station module, remove the panel from the station module top. Connect EM connectors P2 and P3 (on the bottom of the board) to the 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, connect EM connectors P2 and P3 (on the bottom
  of the board) to M68MMEVS05 PFB connectors P6 and P7.

- If your EM05J1A already is 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 and restore power. For
further instructions consult the MMDS05 user's manual (MMDS05OM/D).

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