TABLE OF

Figure.....

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Table.....

M68EM
EMULATOR
USER'S M

Third Ed

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the body, or other application in which the fai
situation where personal injury or death may oc
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or unauthorized use, even if such claim allege
design or manufacture of the part.

TABLE OF C

1.3 CONNECTORS P4 AND P5 PI

Figure 1-2 shows the pin assignments for con
correspond with the signal names of the MCU.
data book for the specific MCU.

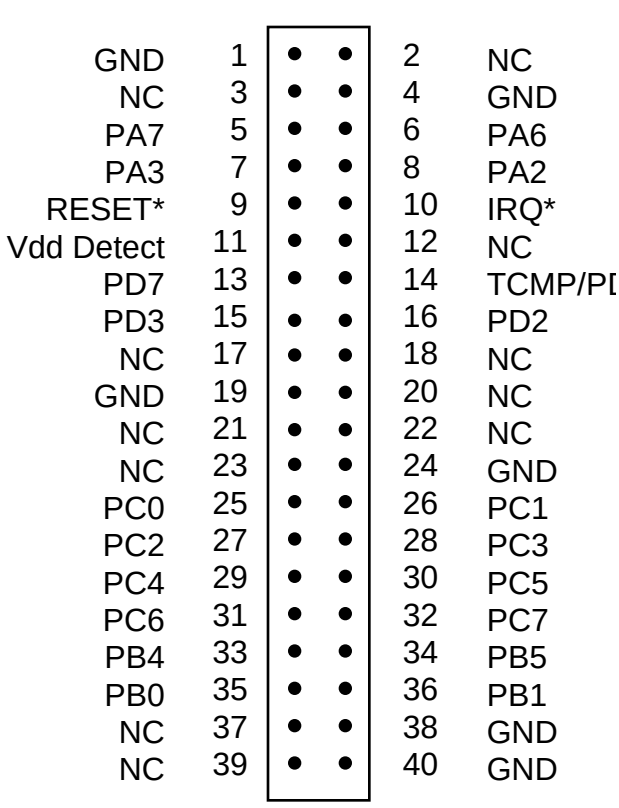


Figure 1-2. Connectors P4

As connector P1 has more importance to an HC(
for connector P1 are in Chapter 3.

To configure your C9EM for use as part of an M
2. To configure your C9EM for use as part o
Chapter 3.

1.5 COP WATCHDOG EMULATIO

Some of the devices emulated by this system in
2.2.x and 3.2.x for further configuration details.

CHAPT

INTRODU

This user's manual explains connection, configu
the M68EM05C9 Emulator Module (C9EM).
debugging of target systems based on these micr

MC68HC05C4A	MC68HC705C4A
MC68HC05C9A	MC68HC705C9A

The C9EM also emulates the following parts tha

MC68HC05C2	MC68HC05C3
MC68HC05C8	MC68HC705C8

The C9EM can be part of two development sys
and explains the layout of the C9EM.

1.1 DEVELOPMENT SYSTEMS

Your C9EM can be part of two Motorola devel
Development System (MMDS05) or the M68HC

1.1.1 Motorola Modular Development Sy

The MMDS05 is an emulator system that p
memory windows. The unit's integrated design e
user interface, and source-level debug. A compl

- **a station module** — the metal MMDS0
the internal power supply. Most system ca
(The cable to an optional target system, ho
module enclosure to connect directly to the
- **an emulator module (EM)** — such as
system functionality for a specific set of
through a sliding panel in the enclosure
cable.
- **two logic clip cable assemblies** —
module to your target system, a test fixtu
evaluation or analysis. One end of each ca
fits into station-module pod A or pod B. I
in female probe tips. Ball clips come with

- **a 9-lead RS-232 serial cable** — the
host computer RS-232 port.
- **a 9- to 25-pin adapter** — a moulded a
to a 25-pin serial port.
- **system software** — software, on 3-1/2
- **MMDS05 documentation** — an MMD
the appropriate EM user's manual.

As mentioned, your C9EM gives the MMDS05
series MCUs. By substituting a different EM, y
MCU of a different series. (Your Motorola repre

Chapter 2 explains how to configure and use y
For information about MMDS05 software o
operations manual. For layout and configuratio
see the corresponding EM user's manual.

1.1.2 M68HC05EVS Evaluation System

An HC05EVS is an economical, two-board tool f
systems based on an MC68HC05 MCU. A comp

- **a platform board (PFB)** — the bottom
The platform board has connectors for pow
- **an emulator module (EM)** — such as
system functionality for a specific set of M
connectors for a target cable and for a cable
- **an RS-232 serial cable** — the cable th
232 port.
- **system software** — software, on 3-1/2
- **HC05EVS documentation** — an HC0
and the appropriate EM user's manual.

As mentioned, your HC05C9 EVS emulates
substituting a different EM, you can enable your
series. (Your Motorola representative can explai

Chapter 3 explains how to configure and use y
For information about HC05EVS software o
operations manual. For layout and configuratio
see the corresponding EM user's manual.

1.2 EM LAYOUT

Figure 1-1 shows the layout of the C9EM. Jur
CxA emulation (e.g. C4 vs C4A, C12A). Jum
clock source. Jumper J4 determines the logic
connector. Switch array S1 determines which dev
the user to set the port B mask option for CxA de

Connectors P4 and P5 provide the interface to t
the MMDS05 station module, the target cable
enclosure. Connector P1 connects to a logic ana
for an EVS system, as an MMDS05 system in
connectors P2 and P3 connect together the EM
the EM and the platform board (for an EVS).

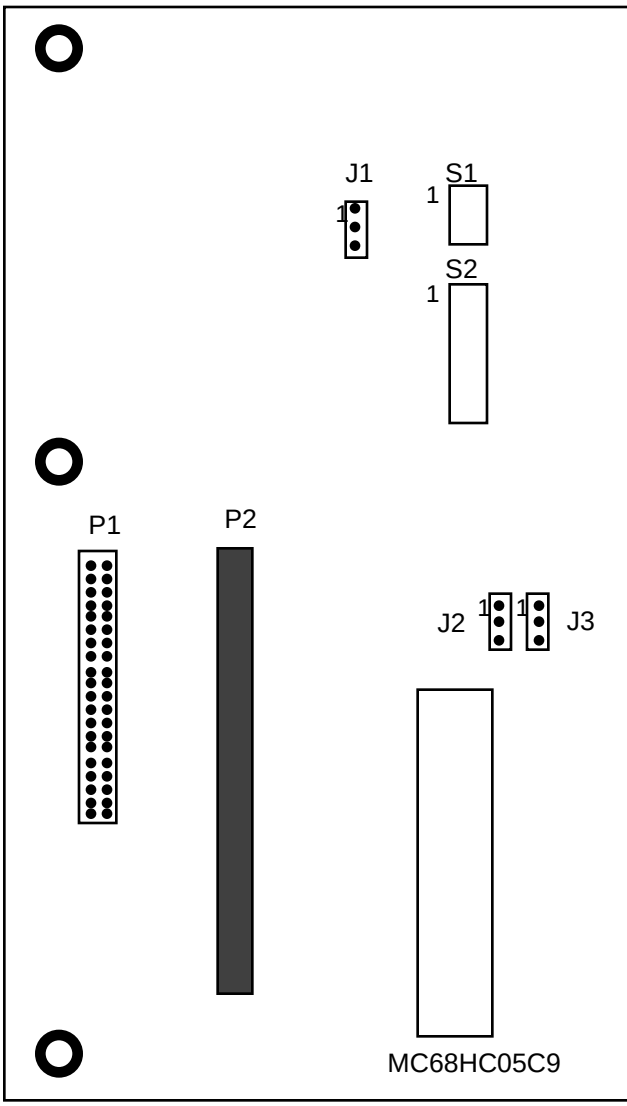


Figure 1-1. HC05C9

M68EM05C9/D

2.1.3 Emulation Device Selection (J1, S

Switch array S1 and jumper J1 together allow th
emulated. S1 is used to select the size of the n
some device specific features. J1 determines whe
for the CA style devices. The following table
required for each MCU emulated. Section 2.2 d
used with each device and the operation of
necessary. **Note that devices in *italics* have
present for historical reasons only.**

Table 2-1. MCUs En

DEVICE	S1 SWITCH	S1 SWITC
	1	2
M68HC05C2	*CLOSED*	*CLOSE*
M68HC05C3	*CLOSED*	*CLOSE*
M68HC05C4	*CLOSED*	*CLOSE*
M68HC805C4	*CLOSED*	*CLOSE*
M68HC05C8	*CLOSED*	*CLOSE*
M68HC705C8	*OPEN*	*CLOSE*
M68HC05C9	*CLOSED*	*OPE*
M68HC705C9	*CLOSED*	*OPE*
M68HC05C4A	CLOSED	CLOSE
M68HC705C4A	CLOSED	CLOSE
M68HC05C8A	CLOSED	CLOSE
M68HC705C8A	OPEN	CLOSE
M68HC05C9A	CLOSED	OPE
M68HC705C9A	CLOSED	OPE
M68HC05C12A	CLOSED	OPE

CHAPT

MMDS05 CONFIGURATI

This chapter explains how to configure and us
other parts of system installation or configura
(MMDS05OM/D). (If you will use your C9
Chapter 3 for corresponding information.)

Paragraph 2.1 explains how to set C9EM
considerations pertaining to the MCU you emula
installation.

Note that you can configure a C9EM already
enclosure. To do so, switch off station-modul
guidance of this chapter.

CAUTI

Be sure to switch off power if you reconf
EM jumper headers with power left on ca

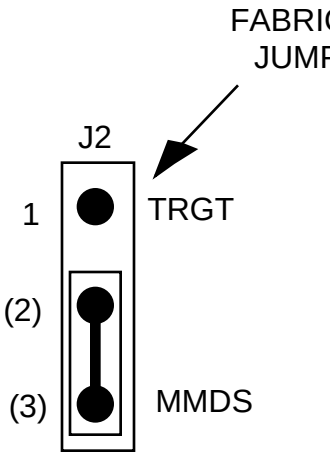
2.1 SETTING C9EM JUMPER HE

Your C9EM has four jumper headers, J1 thro
Paragraphs 2.1.1. through 2.1.4 explain how to c

M68EM05C9/D

2.1.1 Clock Source Select Headers (J2 a

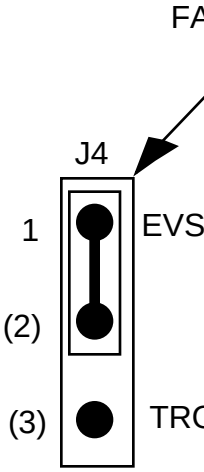
Jumper headers J2 and J3 select the source of t
choose between on-board oscillator (EM), MM
from the target system (TRGT). To select MM
position as well as correctly selecting the J2 set
configuration: the fabricated jumper on J3 betw
canned oscillator clock source.



Alternatively, you may use a clock source ori
position the J3 jumper between pins 2 and 3, the
a frequency. To use a clock source originating f
between pins 2 and 3, then position the J2 jumpe

2.1.2 Reset Select Header (J4)

Jumper header J4 controls the path of a target r
configuration: the fabricated jumper between p
resets. This is the only correct J4 configuration



NOT

The J2 pins 2-and-3 configuration is not
MMDS05 system. Such a configuration
of the RESETIN and RESETOUT comma

M68EM05C9/D

2.2.5 705C8A Emulation

To emulate the exact OPTION register RAM/R
MC68HC705C8A, use a MC68HC705C8A sub
the use of the RAM/ROM available, and watchd
as the resident MCU. When using the MC68
writes to the OPTION register should be made t

For more information about the MC68HC705C
corresponding technical data books.

2.2.6 (7)05C9A Emulation

To emulate an MC68HC(7)05C9A, use the MC

For more information about the MC68HC05C
corresponding technical data books.

2.2.7 C12A Emulation

To emulate the watchdog feature on a MC68H
resident MCU. The watchdog feature on the M
C12A.

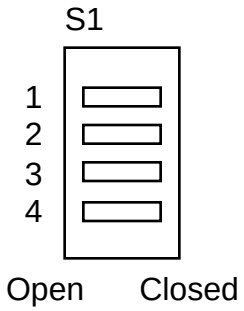
For more information about the MC68HC05C
corresponding technical data books.

2.2.8 C2, C3, C4(A), C8, C8(A), C12A

To emulate an MC68HC05C2,C3,C4(A),C8,
resident MCU. Remember that these devices do
For accurate emulation, do not use any of the ad

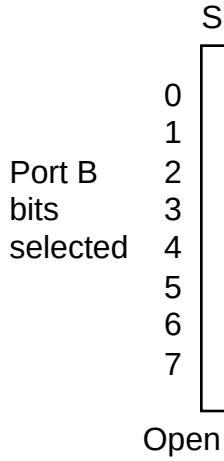
For example, the MC68HC705C9 has an OPTI
can enable extra RAM and ROM in memory, be
this register when emulated one of the above de
bit which deteremines IRQ sensitivity; either edg
used to emulate the IRQ mask option on these de

For more information about the MC68HC05C
features, see the corresponding technical data boo



2.1.4 Port B Keyboard Interrupt Mask o

Switch array S2 selects which bits in port B hav
CxA type devices. (The switch S2 settings sh
that you require for the device; in the 705C8A
selected are only active when programmed as in
in such cases a resistive pull up is activated on t
for the keyboard interrupt bit close the releva
selects the CA option. Switch array S2 is organi



2.2 THE EMULATED MCU

Your MMDS05 system uses a specific persona
For example, to emulate an MC68HC05C9 o
personality file 0021AVxx.MEM. Table 2-1 lis
C9EM. Note that personality file names follo
ZZZ is the EM identifier or MCU name, and **xx**
in *italics* have been or will soon be replace
only.

Table 2-2. MCUs an

EMULATED MCU	PERSONALITY FILE
M68HC05C2	*00C2_V01.MEM*
M68HC05C3	*00C3_V01.MEM*
M68HC05C4	*00C4_V01.MEM*
M68HC805C4	*00C4_V01.MEM*
M68HC05C8	*00218V01.MEM*
M68HC705C8	*00219V01.MEM*
M68HC05C9	*0021AV01.MEM*
M68HC705C9	*0021AV01.MEM*
M68HC05C4A	00C4AV01.MEM
M68HC705C4A	00C4AV01.MEM
M68HC05C8A	00218V01.MEM
M68HC705C8A	00219V01.MEM
M68HC05C9A	0021AV01.MEM
M68HC705C9A	0021AV01.MEM
M68HC05C12A	00C12V01.MEM

MMDS05 software loads the personality file
personality file with a different one, use the LO
about the LOADMEM command, see the explan

Alternatively, you can insert the line LOADM
script file. This way, the system automatically
system startup. (For more information about th
command explanation in the MMDS05 operation

2.2.1 Resident MCU Substitution

The socket at C9EM location U9 contains the r
with an MC68HC705C9 resident MCU, which
MCUs with some qualifications as described in t

Occasionally it may be necessary to replace the
level of emulation of a particular feature.

When you are ready to install the substitute MC
that you are grounded. Then remove the MC
resident MCU, and restore power.

2.2.2 C9 Emulation

To emulate either an MC68HC05C9 or MC68
resident MCU. The C9 has single mask option f
emulator operation.

2.2.3 (7)05C4A Emulation

To emulate the watchdog feature on a MC68H
the resident MCU. The watchdog feature on th
the C4A and the C4 has no watchdog present.

For more information about the MC68HC05C
corresponding technical data books.

2.2.4 705C8 Emulation

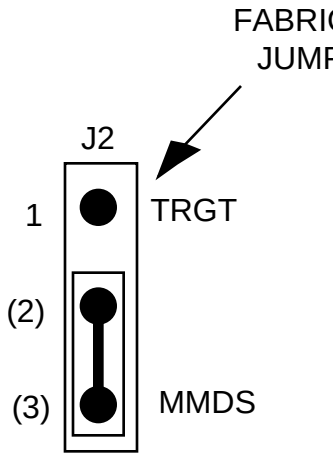
To emulate the exact OPTION register RAM/R
MC68HC705C8 substitute for the resident MC
available the MC68HC705C9 can be used a
MC68HC05C9 to emulate the MC68HC705C
made to address $3FDF rather than $1FDF.

For more information about the MC68HC705
corresponding technical data books.

M68EM05C9/D

3.1.1 Clock Source Select Headers (J2 a

Jumper headers J2 and J3 select the source of t
choose between on-board oscillator (EM) or clo
TRGT you must place the J3 jumper at the (J2)
jumper. The diagram below shows the factory
between pins 1 and 2 selects the C9EM on-board



NO

The J2 pins 2-and-3 configuration is not
HC05EVS system.

2.3 REMAINING SYSTEM INSTA

When you have configured headers J1 through J4
the resident MCU is appropriate, you are throug

- To install the C9EM in an MMDS05 static
module top. Fit together EM connectors
control-board connectors P11 and P12.
standoffs. Connect the target cable, if appr
- If your C9EM already is installed in the s
necessary). Replace the panel.

At this point, you are ready to make remaining
power. For instructions, consult the MMDS05

CHAPT

HC05EVS CONFIGURATI

This chapter explains how to configure your C
other parts of system installation or configura
(HC05EVSOM/D). (If you will use your C9
Chapter 2 for configuration information.)

Paragraph 3.1 explains how to set C9EM
considerations pertaining to the MCU you emul
the C9EM in an HC05EVS. Paragraph 3.4 expl
for the logic analyzer connector (P1). Paragraph

Note that you can configure a C9EM already ins
do so, disconnect platform-board power, then fol

CAUTI

This page intentio

Be sure to disconnect power if you reconf
EM jumper headers with power left on ca

3.1 SETTING C9EM JUMPER HE

Your C9EM has four jumper headers, J1 throu
Paragraphs 3.1.1. through 3.1.4 explain how to c

3.2 RESIDENT MCU SUBSTITUT

The socket at C9EM location U9 contains the r
with an MC68HC705C9 resident MCU, whicl
MCUs with some qualifications as described in t

Occasionally it may be necessary to replace the
level of emulation of a particular feature.

When you are ready to install the substitute MC
that you are grounded. Then remove the MC
resident MCU, and restore power.

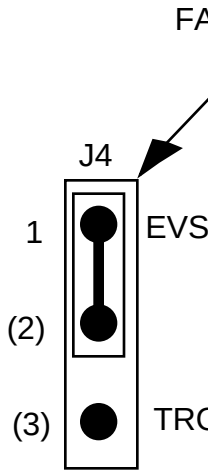
Table 3-2. Res

EMULATED MCU	RESIDENT MCU
M68HC05C2	*MC68HC705C9*
M68HC05C3	*MC68HC705C9*
M68HC05C4	*MC68HC705C9*
M68HC805C4	*MC68HC705C9*
M68HC05C8	*MC68HC705C9*
M68HC705C8	*MC68HC705C9*
M68HC05C9	*MC68HC705C9*
M68HC705C9	*MC68HC705C9*
M68HC05C4A	*MC68HC705C9*
M68HC705C4A	*MC68HC705C9*
M68HC05C8A	*MC68HC705C9*
M68HC705C8A	*MC68HC705C9*
M68HC05C9A	*MC68HC705C9*
M68HC705C9A	*MC68HC705C9*
M68HC05C12A	*MC68HC705C9*

Table 3-1 shows the resident MCU approp
information in th reference paragraphs. Also no
the information specific to the MCU you emulat

3.1.2 Reset Select Header (J4)

Jumper header J4 controls the path of a target r
configuration: the fabricated jumper between p
target when you press the user or master reset sv



Alternatively, you may enable the target system

- Reposition the C9EM J4 jumper between p
- Insert a fabricated jumper into platform-bo

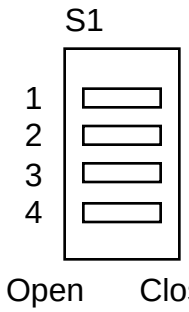
M68EM05C9/D

3.1.3 Emulation Device Selection (J1, S

Switch array S1 and jumper J1 together allow th
emulated. S1 is used to select the size of the n
some device specific features. J1 determines whe
for the CxA style devices. The following table
required for each MCU emulated. **Note that de
replaced and are present for historical reasor**

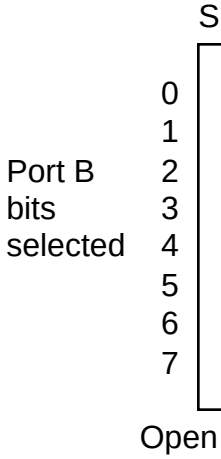
Table 3-1. MCUs En

DEVICE	S1 SWITCH	S1 SWITC
	1	2
M68HC05C2	*CLOSED*	*CLOSE*
M68HC05C3	*CLOSED*	*CLOSE*
M68HC05C4	*CLOSED*	*CLOSE*
M68HC805C4	*CLOSED*	*CLOSE*
M68HC05C8	*CLOSED*	*CLOSE*
M68HC705C8	*OPEN*	*CLOSE*
M68HC05C9	*CLOSED*	*OPE*
M68HC705C9	*CLOSED*	*OPE*
M68HC05C4A	CLOSED	CLOSE
M68HC705C4A	CLOSED	CLOSE
M68HC05C8A	CLOSED	CLOSE
M68HC705C8A	OPEN	CLOSE
M68HC05C9A	CLOSED	OPE
M68HC705C9A	CLOSED	OPE
M68HC05C12A	CLOSED	OPE



3.1.4 Port B Keyboard Interrupt Mask o

Switch array S2 selects which bits in port B hav
CxA type devices. The bits selected are only a
port B data direction register, in such cases a
question. To enable the mask option for the key
in S2 and ensure that jumper J1 selects the C
follows:



3.4 LOGIC ANALYZER CONNEC

Figure 3-1 shows the pin assignments for logic a
descriptions for this connector.

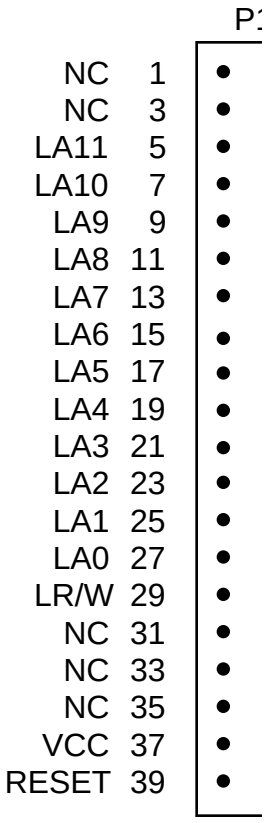


Figure 3-1. Connector

3.2.1 Resident MCU Substitution

The socket at C9EM location U9 contains the r
with an MC68HC705C9 resident MCU, which
MCUs with some qualifications as described in t

Occasionally it may be necessary to replace the
level of emulation of a particular feature.

When you are ready to install the substitute MC
you are grounded. Then remove the MCU from
MCU, and restore power.

3.2.2 C9 Emulation

To emulate either an MC68HC05C9 or MC68
resident MCU. The C9 has single mask option f
emulator operation.

3.2.3 (7)05C4A Emulation

To emulate the watchdog feature on a MC68H
the resident MCU. The watchdog feature on th
the C4A and the C4 has no watchdog present.

For more information about the MC68HC05C
corresponding technical data books.

3.2.4 705C8 Emulation

To emulate the exact OPTION register RAM/R
MC68HC705C8 substitute for the resident MC
available the MC68HC705C9 can be used a
MC68HC705C9 to emulate the MC68HC705C
made to address $3FDF rather than $1FDF.

For more information about the MC68HC705
corresponding technical data books.

3.2.5 705C8A Emulation

To emulate the exact OPTION register RAM/R
MC68HC705C8A, use a MC68HC705C8A sub
the use of the RAM/ROM available, and watchd
as the resident MCU. When using the MC68
writes to the OPTION register should be made t

For more information about the MC68HC705C
corresponding technical data books.

3.2.6 (7)05C9A Emulation

To emulate an MC68HC(7)05C9A, use the MC

For more information about the MC68HC05C
corresponding technical data books.

3.2.7 C12A Emulation

To emulate the watchdog feature on a MC68H
resident MCU. The watchdog feature on the M
C12A.

For more information about the MC68HC05C
corresponding technical data books.

3.2.8 C2, C3, C4(A), C8, C8(A), C12A E

To emulate an MC68HC05C2,C3,C4(A),C8,
resident MCU. Remember that these devices do
For accurate emulation, do not use any of the add

For example, the MC68HC705C9 has an OPTI
can enable extra RAM and ROM in memory, be
this register when emulated one of the above de
bit which deteremines IRQ sensitivity; either edg
used to emulate the IRQ mask option on these de

For more information about the MC68HC05C
features, see the corresponding technical data boo

3.3 EVS LIMITATIONS

This paragraph explains the limitations that ap
(These limitations apply regardless of the reside

Limitation 1. CLI/RTI. You may not trace a
interrupt (RTI) instruction with an interrupt e
handling. Attempting such a trace causes an i
software reset of the HC05EVS. User brea
instructions; you must remove such SWI instruct

Limitation 2. Branch. Do not trace a condition
branches to itself. As the monitor places an SW
system never would execute the instruction. F
instruction had executed. You may enter a G c
instruction as long as the instruction is not a brea

Limitation 3. IRQ/SWI. Whenever possible,
user software interrupts (SWIs). This preven
concurrent hardware interrupt and SWI could c
program execution. To recover from such a
statistically), press the master reset switch (SW3

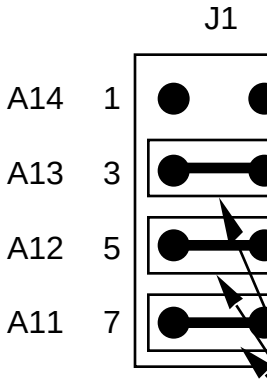
Limitation 4. Memory Map. You must be aw
simulated; be sure to use only valid ROM lo
protection to limit user programs to the exac
information about memory maps, consult the tec

Limitation 5. COP. The computer operating
EPROM location for the resident MCU. Ac
jumper header must enable write protection. C
register change the value stored in user pseudo R

3.5 REMAINING SYSTEM INSTA

When you have configured headers J1 through J4 the resident MCU is appropriate, you are throug

Find jumper header J1 of the HC05EVS platfo jumpers are installed, per the diagram below.



To install the C9EM on an HC05EVS platform (on the bottom of the board) and platform-boar the EM onto the plastic standoffs.

At this point, you are ready to make remaining power. For instructions, consult the HC05EVS

Table 3-3. Logic Analyzer Conn

PIN	MNEMONIC	
1, 3, 4, 10, 12, 14, 31, 33 — 36, 40	-----	No connec
2, 6	GND	GROUND
5, 7, 8, 9, 11. 13. 15. 17, 19, 21, 23, 25, 27	LA13 — LA0	LATCHED A output add
8	LA12	LATCHED output add
16, 18, 20, 22, 24, 26, 28, 30	AD7 — AD0	DATA BUS bus.
29	LR/W	LATCHED signal th transferre
32	LIR	LOAD INS active-low instructio
37	VCC	+5 VDC PC used by EV
38	E	EXTERNAL clock sign frequency of the sign
39	RESET	RESET - starting ar

M68EM05C9/D 3

Freescale Semiconductor, Inc.