MMDS0508

Target Interface

Revised 2002/04/30

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Corporate Headquarters	Metrowerks Corporation 9801 Metric Blvd. Austin, TX 78758 U.S.A.
World Wide Web	`http://www.metrowerks.com`
Ordering & Technical Support	Voice: (800) 377-5416 Fax: (512) 997-4901

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1

General Description

1.1 Introduction

The M68MMDS05/08 Motorola Modular Development System (MMDS) is a tool for developing embedded systems based on an MC68HC05 or MC68HC08 microcontroller unit (MCU). A modular emulation system, the MMDS provides interactive control of a microcontroller application when connected to your target system.

The MMDS environment allows for source-level debugging and simplifies writing and debugging code. These features significantly reduce development time.

A complete MMDS includes a station module, an emulation module (EM), and a target cable assembly. The EM completes MMDS functionality for a particular MCU or MCU family.

1.2 MMDS Features

MMDS features include:

- Real-time, non-intrusive, in-circuit emulation
- Real-time bus state analysis
- MC68HC11K1 system controller, for fast command transfer
- Compliance with ECC92 European electromagnetic compatibility standards
- Four complex data breakpoints, each qualified by an address, an address range, data, or externally connected logic clips.
- 32 variables or real-time variables, plus a 32-byte block of real-time memory, mappable anywhere within a 1-kilobyte window over the 64-kilobyte HC05/HC08 memory map.
- 64 kilobytes of emulation memory, to accommodate the largest available ROM size of current HC05/HC08 MCUs.

- 64 hardware instruction breakpoints over the 64-kilobyte memory map
- A personality file for each EM. (Each personality file defines a memory-map.)
- Latch-up resistant design (47-Ω series resistor on I/O connections to the target system) to make power-up sequencing unimportant.
- Built-in bus state analyzer that includes:
- 8K x 64 real-time trace buffer
  - Four hardware triggers, for controlling real-time bus analysis and to provide breakpoints
  - Nine triggering modes
  - Display of real-time trace data as raw data, disassembled instructions, raw data and disassembled instructions, or assembly-language source code
  - As many as 8190 pre- or post-trigger points
  - Trace buffer that can be filled as you single-stepping through user software
  - 16-bit time tag, or an optional 24-bit time tag that sacrifices eight logic clips
  - Eight software selections for the time tag clock source, permitting wide time variance between analyzer events
  - 16 general-purpose logic clips, five of which can be used to trigger the bus state analyzer sequencer
- Four software-selectable internally generated oscillator clock sources
- Built-in power supply with 85 to 264 VAC input
- RS-232 operation speeds as high as 57600 baud
- Compact size: 15.38 inches (390.6 mm) deep, 10.19 inches (258.83 mm) wide, and 2.75 inches (69.85 mm) high. The station module weighs 6.0 pounds (2.72 kg).

For connection instructions, configuration instructions, and other related information, see the installation section of this hardware addendum. For similar information with regard to EMs, see the corresponding EM user's manual.

1.3 System Components

The MMDS components include:

- **Station module:** the MMDS enclosure, containing the platform board and the internal power supply. The access panel in the enclosure top lets you insert an EM easily.

- **9-lead RS-232 serial cable:** the cable that connects the station module to the host-computer RS-232 port.
- **Serial adapter:** a DB9M-to-DB25F RS-232 adapter, for use with a 25-pin host-computer serial port.
- **Two logic clip cable assemblies:** twisted-pair cables that connect the station module to your target system, a test fixture, a clock, an oscillator, or any other circuitry useful for evaluation or analysis. One end of each cable assembly has a molded connector, which fits into the pod A or pod B connector of the station module. Leads at the other end of each cable terminate in female probe tips. Ball clips come with the cables.

Separately purchased components are:

- **Emulation module (EM):** a printed circuit board that completes MMDS functionality for one or more MCUs. The two DIN connectors on the bottom of the EM fit into connectors on the top of the MMDS0508 platform board, providing power and signal connections. The EM also has a connector for the target cable. Each EM comes with its own user's manual.
- **Target cable:** a flat, flexible cable that connects the MMDS to the target system. The cable's emulator terminator mates to the EM target connectors; the cable's head terminator mates to a target head adapter. (A target cable and target head adapter make up a target cable assembly.)
- **Target head adapter:** a target-cable adapter that plugs into the MCU socket of the target system. (For some EMs, the target head adapter plugs into a surface-mount adapter.)

2

Installation

2.1 Introduction

Complete MMDS installation consists of:

- Configuring the platform board,
- Configuring the emulation module (EM),
- Installing the EM, and
- Making system cable connections.

This section explains all items except EM configuration. (As EM configuration is specific to each EM, you must follow the instructions of your EM user's manual.) Additionally, this sections explains how to remove an EM from the station module.

Figure 2.1 shows the right side of the MMDS station module, with the access panel open. Callouts indicate the reset switch and power LED (on the front of the station module), and the logic cable A and B connectors (on the right side of the station module). (Alternate names for the logic cable connectors are pod A and pod B.) If you use logic clip cables, always attach the black clip to ground.

Figure 2.2 shows the left side of the station module, with the access panel closed. Callouts indicate the power cord socket, the power switch, and the 9-pin RS-232 serial connector. The circular, +5 V out connector is reserved for possible future features. (A spacer covers the final enclosure cutout, for a future connector.)

Figure 2.1 M68MMDS0508 Station Module (Right Side)

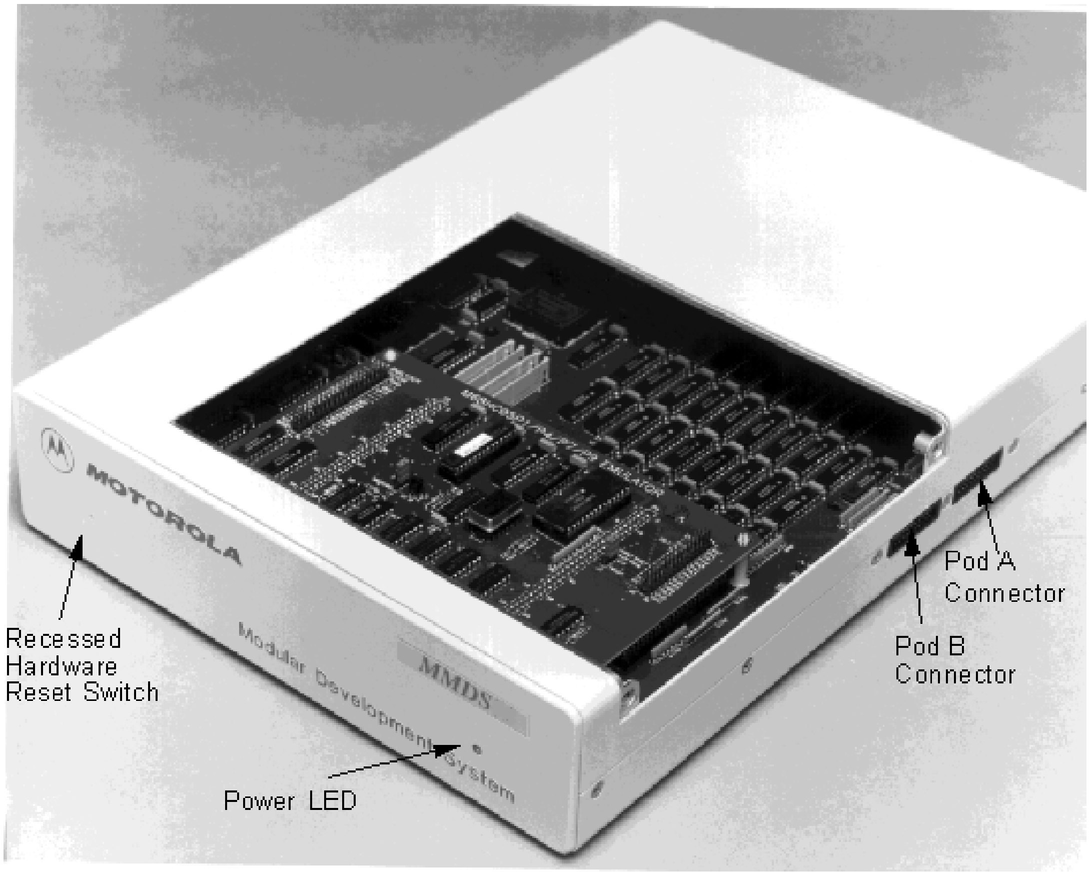
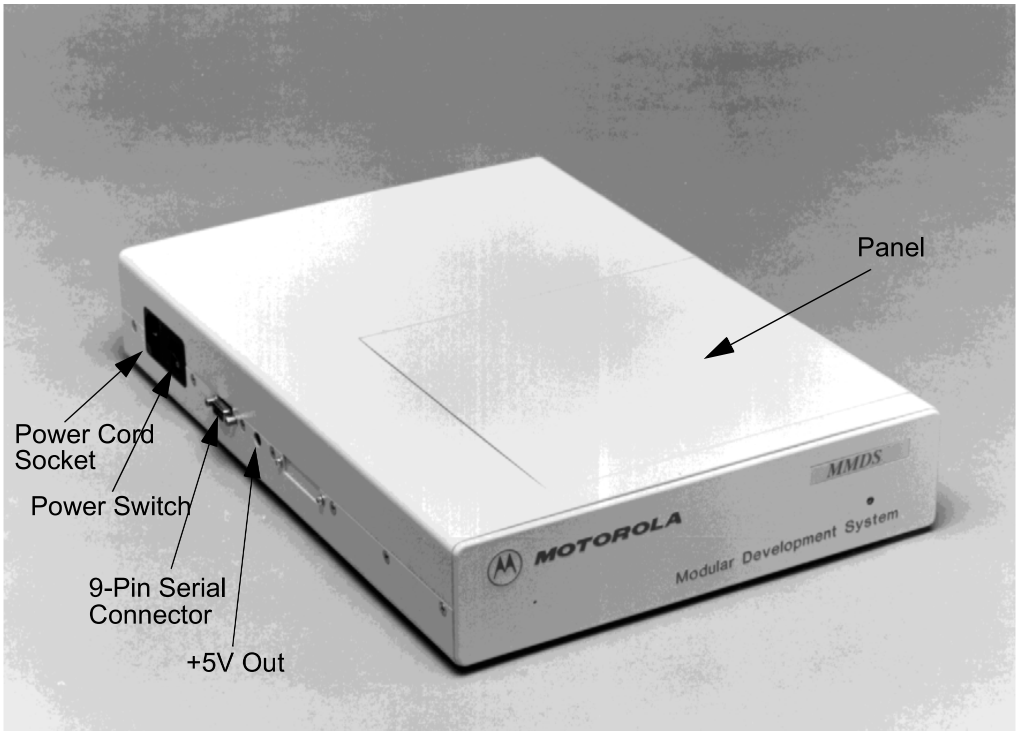


Figure 2.2 M68MMDS0508 Station Module (Left Side)



2.2 Configuring the Platform Board

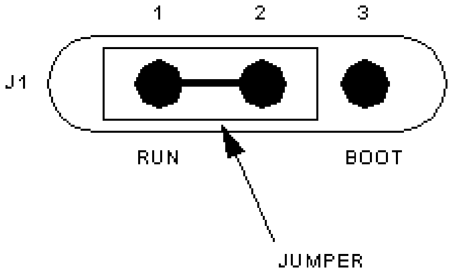
The MMDS platform board has four jumper headers, all located near the front. Jumper header J1 is for factory test. Jumper headers J2, J3, and J4 control the voltage levels for ports A through D.

NOTE Before shipping the MMDS, factory personnel configure the platform board correctly for virtually all users. You should not reconfigure platform-board headers unless your EM user's manual tells you to.

2.2.1 Factory Test Header (J1)

The diagram in Figure 2.3 shows the factory configuration of jumper header J1. The jumper between pins 1 and 2 is correct for MMDS operation.

Figure 2.3 Factory Test Header (J1)



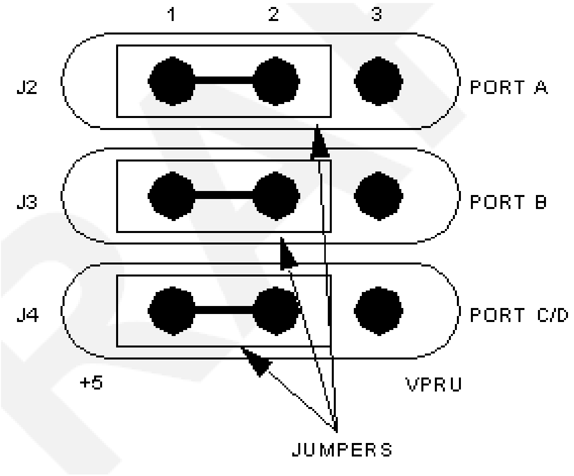
(Ignore the alternate jumper position, which is reserved for factory tests.)

2.2.2 Port Voltage Control Headers (J2–J4)

Jumper headers J2 through J4, near the right front corner of the platform board, set the voltage levels for ports A through D. Header J2 is the port A control; header J3 is the port B control; header J4 is the control for port C or D (whichever pertains to your EM).

The diagram Figure 2.4 shows the factory configuration. The jumpers between pins 1 and 2 of these headers set the +5-volt level for all ports. This is the correct configuration for MMDS operation, unless your EM user's manual says that your EM is a low-voltage board.

Figure 2.4 Port Voltage Control Headers (J2–J4)



If your EM can operate at low voltage, you can configure any of the ports for the low-voltage level. To do so, reposition the corresponding header's jumper to pins 2 and 3.

2.3 Installing the EM

CAUTION Be sure to turn off power to the MMDS when you install or remove an EM. This prevents power surges that could damage MMDS circuits.

Follow these steps to install an EM in the MMDS enclosure:

1. Make sure that station module power is off.
2. Unscrew (one quarter turn) the two captive screws of the access panel, then remove the panel.
3. Install the EM on the platform board: Carefully fit the female 96-pin DIN connectors (on the bottom of the EM) onto the corresponding male DIN connectors (on the top of the platform board). Snap the EM onto the plastic standoffs and make sure that the DIN connectors are joined firmly.
4. Connect the target cable, if appropriate.
5. Reposition the access panel, securing it with the screws.

NOTE Many EM boards have 64-pin female DIN connectors. Like their 96-pin counterparts, these smaller connectors also mate with the male DIN connectors of the platform board. The connector keys ensure proper alignment.

2.4 Removing the EM

Follow these steps to remove an EM from the MMDS enclosure:

1. Make sure that station module power is off.
2. Unscrew (one quarter turn) the two captive screws of the access panel, then remove the panel.
3. Disconnect the target cable from the EM target connectors.
4. Unsnap all plastic standoffs from the edges of the EM.
5. Carefully lift the EM straight up, separating it from the platform board.
6. You are ready to install a different EM or to configure the platform board. When you finish such other actions, reposition the access panel, securing it with the screws.

2.5 Making Cable Connections

You must connect the station module to the host computer and to line power. According to your specific application, you also may need to connect the EM to your target system, or to connect the logic clip cable assemblies.

2.5.1 Host Computer Connection

Connect the 9-lead serial cable between the MMDS 9-pin serial connector and the COM1 serial port connector of the host computer.

- COM1 is the default serial port. You may use a different host serial port, provided that you use the appropriate software startup command to specify the port number.
- A 9-to-25-pin adapter came with your MMDS. If the host serial port is a 25-pin connector, use this adapter between the port connector and the serial cable.

2.5.2 Bus State Analyzer Connection

If your work session includes bus state analysis, you may need the logic clip cable assemblies. The two logic clip connectors, pod A and pod B, let the analyzer capture external events. Logic clip connections also let you input external clock signals for the emulator and analyzer.

The pod A and pod B connectors are on the right side of the station module. Pod A is nearest the station module power supply. These pod connectors correspond to the cable A and cable B selections available in the bus state analyzer configuration window. The Connector Information section includes pinout information for both logic clip connectors.

If you need only one logic cable assembly, connect it to either pod A or pod B. Orient the cable connector so that its pin 1 connects to pin 1 of the pod, according to the keyed plastic. Connect the other end of the logic cable assembly to an external target point. Optionally, connect the probe tips to the ball clips that come with the cable assembly, then connect the ball clips to appropriate external test points.

NOTE Always connect the black (ground) probe tip to an appropriate target-system ground point before connecting other clips to target points. The pod A white probe is the external clock input for the emulator; the pod B white probe of pod B is the external clock input for the analyzer.

If you need the second logic cable assembly, connect it in the same way to the remaining pod connector of the station module. Make target-system connections as for the first cable.

2.5.3 Target Cable Connection

To connect the MMDS to a target system, you must use a target cable assembly: a target cable and a target head.

NOTE Press only on the rigid plastic terminators of the cable. Pressing on the flexible part of the cable can damage the cable.

Follow these instructions:

1. Make sure that station module power is off; make sure that power is *not* applied to the target system.
2. Remove the MMDS access panel, for access to the EM.
3. The EM has one or two target connectors, on its right side. Connect the target cable's emulator terminal to the EM target connectors.
4. Connect the target cable's head terminator to the appropriate target head adapter.

NOTE The EM user's manual should identify the target head adapter appropriate for your target system. Make sure that the adapter and the target cable mate correctly.

5. Plug the target head adapter into the MCU socket (or surface-mount adapter) of the target system.
6. Replace the access panel. (The target cable must run through the slit in the station-module enclosure.)

2.5.4 Power Connection

The final MMDS connection is line power. The MMDS power switch is the rocker switch on the left side of the station module. Set the power switch to OFF.

Insert the female end of the power cord into the power cord socket. Then plug the other end of the cord into a line-power outlet and set the power switch to ON. The green LED on the front of the station module lights to confirm system power.

3

Connector Information

3.1 Introduction

This section provides pin assignments and signal descriptions for connectors common to all MMDS systems. For similar information about EM connectors, see the corresponding EM user's manual.

Additionally, this section explains the reset switch, and fuse replacement.

3.2 Reset Switch

RS-232 handshake signals control MMDS resets. A reset initializes the control board from its startup point. If the host serial port does not implement handshaking, you must reset the MMDS manually.

To do so, find the reset switch, which is recessed behind the small hole in the front of the station module. Insert a probe or stiff wire into the reset switch hole. Press gently to trip the switch.

3.3 RS232 Serial Connector

The diagram Figure 3.1 shows pin numbering for the MMDS serial connector. Table 3.1 lists the signals transmitted on the 9-lead serial cable.

Figure 3.1 RS232 Serial Connector

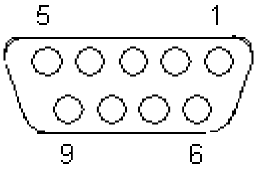


Table 3.1 . Serial Connector and Cable Pin Assignments

Connector Pin	Mnemonic	Signal
1	DCD	DATA CARRIER DETECT — Output signal that indicates detection of an acceptable carrier signal.
2	RX	RECEIVE DATA — Serial data output line.
3	TX	TRANSMIT DATA — Serial data input line.
4	DTR	DATA TERMINAL READY — Input signal that indicates on-line/in-line/active status.
5	GND	GROUND
6	DSR	DATA SET READY — Output signal that indicates on-line/in-line service/active status.
7	RTS	REQUEST TO SEND — Input signal that requests permission to transfer data.
8	CTS	CLEAR TO SEND — Output signal that indicates a ready-to-transfer data status.

3.4 Logic Cables and Connectors

The diagram below shows the pin numbering for both pod A and pod B logic cable connectors. Table 3.2 lists the pin assignments.

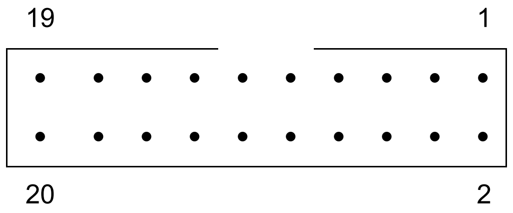


Table 3.2 . Pod and Logic Cable Pin Assignments

Pod Pin	Pod A Signal	Pod B Signal	Probe Color
1	LC0	LC8	Brown (BRN)
2	GND	GND	
3	LC1	LC9	Red (RED)
4	GND	GND	
5	LC2	LC10	Orange (ORG)
6	GND	GND	
7	LC3	LC11	Yellow (YEL)
8	GND	GND	
9	LC4	LC12	Green (GRN)
10	GND	GND	
11	LC5	LC13	Blue (BLU)
12	GND	GND	
13	LC6	LC14	Purple (PUR)
14	GND	GND	
15	LC7	LC15	Gray (GRY)
16	GND	GND	
17	EXT_OSC	TT_OSC	White
18	GND	GND	
19	GND	GND	Black
20	GND	GND	

Note these points:

- Pins 19 of both pods provide connection to an external ground.
- Pod A pin 17 is the external clock input for the emulator. To use this source, make the desired clock connection to the white probe tip, then use the OSC command to select an external source.

- Pod B pin 17 is the external timetag input for the bus state analyzer. To use this source, make the desired clock connection to the white probe tip, then use the TIMETAG command to select an external time tag source for the analyzer.

3.5 Power Supply Fuse Replacement

The station module power switch/connector assembly contains a standard 1/4 x 1 1/4 inch, 1.6-ampere, 250-volt ceramic, time-delay fuse. Figure 3.2 shows this assembly with its door open (for fuse replacement).

Figure 3.2 Power Switch/Connector Assembly

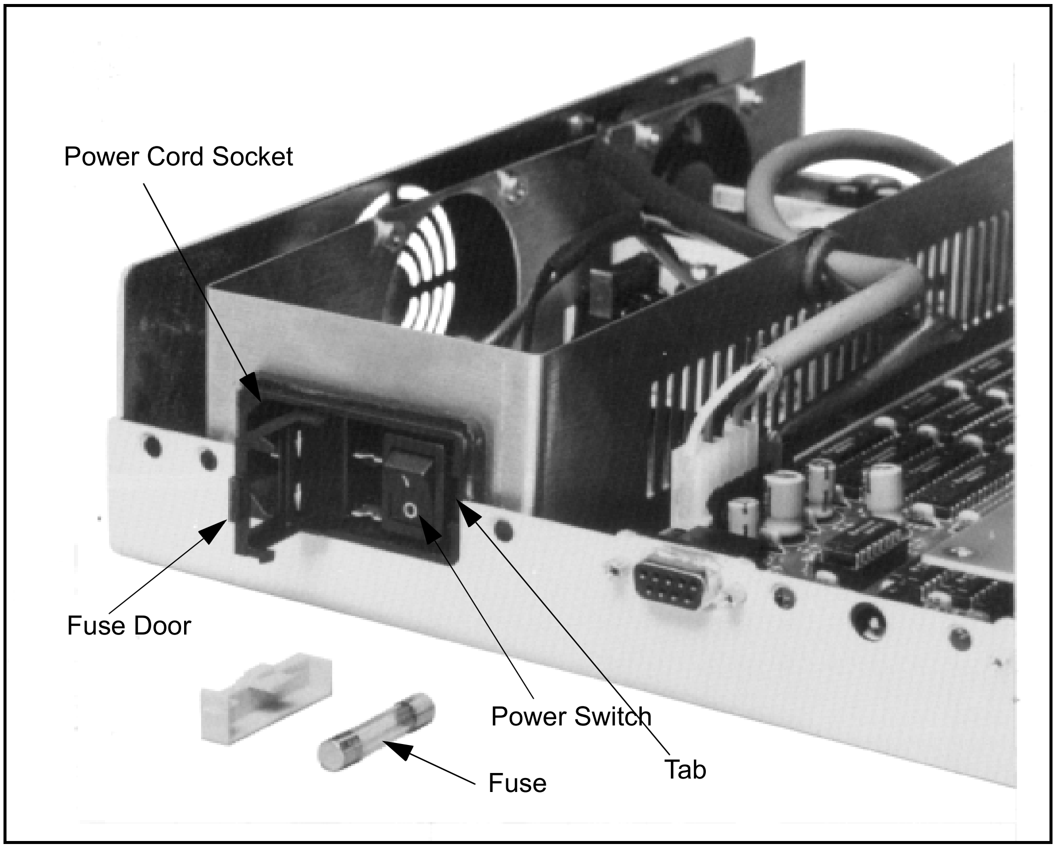


Figure 1. Power Switch/Connector Assembly

To replace the fuse, follow these steps:

1. Press the power switch OFF and disconnect the power cord.

2. Insert a small screwdriver at the tab on the right edge of the switch/connector assembly. (Figure 1 shows where to insert the screwdriver.) Gently pry open the assembly door, which swings open to the left.
3. Remove the fuse holder from the switch/connector assembly. Remove the fuse from the holder.
4. Insert the replacement fuse into the holder. Then re-install the holder in the switch/connector assembly. Make sure that the fuse holder arrow points down. Close the assembly door.
5. Reconnect the power cord. This completes fuse replacement.

4

MMDS Target Component

4.1 Introduction

An advanced feature of the debugger for the embedded systems development world is the ability to load different target components, which implement the interface with target systems. This document introduces the MMDS0508 Modular Development System for the MC68HC05 and MC68HC08 MCU families.

The MMDS is a Motorola interface that the debugger uses to communicate with an external system (also called a *target system*).

This chapter describes MMDS0508 features, including memory mapping and the bus analyzer.

With this interface, you can download an executable program from the debugger environment. The destination of this program is an external target system, based on a Motorola MCU, that executes the program. The debugger receives feedback of real target-system behavior.

The debugger fully supervises and monitors the target-system MCU. That is, the debugger controls the CPU execution. You can read and write in internal or external memory (even when the CPU is running); you can single-step, run, or stop processes in the CPU.

NOTE Uninvolved Components As an external MCU executes the code, the MMDS target component cannot provide memory statistics. This means that you cannot use the MMDS target component for profiling, coverage analyzing, watchpoints, or I/O Simulation.

4.2 General

This chapter describes the specific features of the MMDS0508, including emulation memory mapping, as well as the function and purpose of the bus analyzer. The explanations of windows and dialog boxes are with the explanations of corresponding MMDS0508 features.

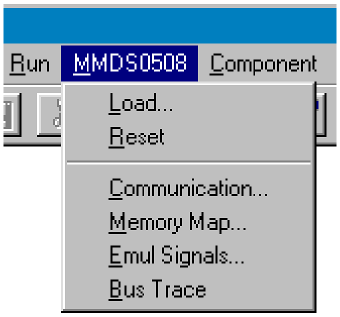
4.2.1 MMDS0508

The MMDS0508 is an emulator system, for CPU05 or CPU08 MCUs, that provides emulation memory and a bus state analyzer.

4.2.2 Configuration

The functions above are specific for the MMDS0508, so are available only with this emulator component. To use these features select the corresponding menu commands shown in Figure 4.1, such as **MMDS0508 > ...**

Figure 4.1 MMDS0508 Menu



These functions are part of the MMDS0508 Motorola Modular Development System. Their supporting libraries consist of dialog boxes and routines to interface the debugger and the hardware.

4.3 Definitions, Acronyms and Abbreviations

4.3.1 DLL

Dynamic Link Library: A Microsoft Windows library file for dynamic linking.

4.3.2 Dynamic Linking

Dynamic Linking: A Windows process that links a function call in one module to the actual function (in the library module), at run time.

4.3.3 MMDS0508 Server

The MMDS hardware access library that interfaces across the RS-232 port to the MMDS0508 station.

4.3.4 Modal Dialog

A dialog that requires a response before you can continue.

4.3.5 MCU

Micro Controller Unit

4.3.6 EM

Emulation Module

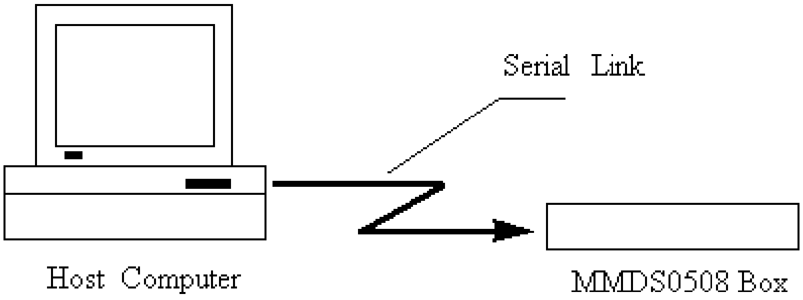
4.4 Interfacing Your System and the Target

The MMDS0508 box connects to an RS-232 serial port of your system.

4.4.1 Hardware Connection

Use the cables that came with the MMDS0508 to connect the host computer to the MMDS0508 box (the diagram below depicts this connection). Configure the host computer to be a data terminal, so that it sends data on the TxD lead and receives data on the RxD lead (as shown in Figure 4.2 and as the MMDS0508 hardware manual explains).

Figure 4.2 Hardware connection

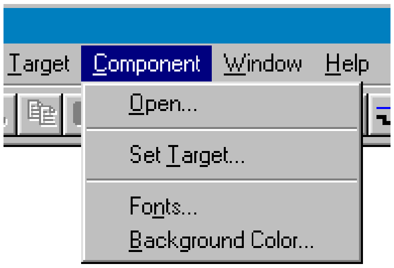


4.5 Loading the MMDS0508 Target

Usually, the `PROJECT.INI` file specifies the target. To make the MMDS the target, change the file's “`Target=`” line to “`Target=Motosil`”. The MotoSIL driver automatically detects the MMDS. However, if the driver detects nothing, an error message informs you that the target is not connected to the expected port. Additionally, the *Communications Device Specification* dialog box appears, so that you can set the correct baud-rate and communication-port parameter values. See the *Communication Configuration* section of this document for more details.

Another way to load the MMDS0508 target is selecting **Set Target...** from the *Component* Menu (below) as shown in Figure 4.3, then choosing ***`MotoSIL`*** from the list of possible targets.

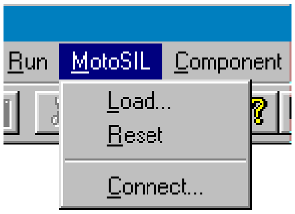
Figure 4.3 Set Target



The MotoSIL driver automatically tries to find the MMDS target, behaving as text above explains.

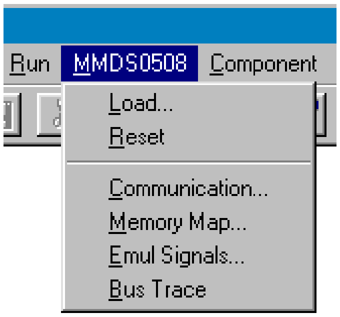
If MotoSIL does not detect a target, the *MotoSIL* item remains in the main menu bar as shown in Figure 4.4:

Figure 4.4 Loading MotoSIL Target



But after successful target loading, the *MMDS0508* menu replaces the *Target* or *MotoSIL* menu in the main menu bar as show in Figure 4.5.

Figure 4.5 Loading MMDS Target

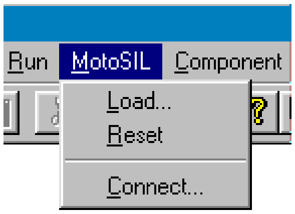


4.6 Communication Configuration

In most situations, the debugger uses its default values to set communication with the MMDS automatically. In case of any problems, the dialog box show in Figure 4.6 appears, so that you can correct settings.

NOTE Another way to open this dialog box is selecting **MotoSIL > Connect...** from the menu bar. This method is appropriate if previous connection attempts failed and MotoSIL still is in the main menu.

Figure 4.6 MotoSIL Communication Configuration

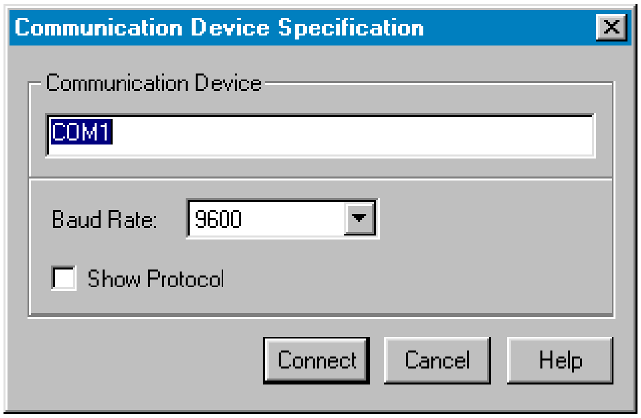


Make sure that host-computer parameter values are correct; make sure that the serial-communication setting is correct. Otherwise, communication between the debugger and the target is not possible.

4.6.1 Communication Device Specification

If the host and target are not connected, or if the communication device is not properly indicated, the *Communications Device Specification* dialog box appears as shown in Figure 4.7 :

Figure 4.7 Communication Device Specification



Communication Device Specification

Communication Device: COM1

Baud Rate: 9600

□ Show Protocol

Type the name of an available communication device in the *Communication Device* edit box, use the drop-down control to set the baud rate, then click *Connect*. (The default communication device is COM1.)

Once connection succeeds, the debugger saves the settings as defaults for later debug sessions. Should the connection fail, a message box so informs you, so that you can define a new communication device. To quit the dialog box and the environment, click *Cancel*.

NOTE Saving the communication device and the baud rate through this dialog box overrides environment variables BAUDRATE and COMDEV of the default.env file.

4.6.2 Data Format

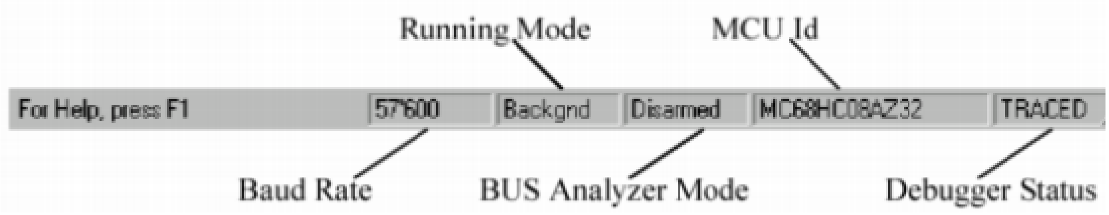
The MMDS0508 data format is 8 data bits, 1 stop bit, no parity, and a variable baud rate. The default speed is 9600 baud, unless you change this default via the menu selection **MMDS0508>Communication...**.

Communication speeds of 1200 through 115200 baud are available, depending on the host-computer hardware.

4.7 The Debugger Status Bar for the MMDS

Once you have loaded the MMDS Target Component, the debugger status bar gives specific information as shown in Figure 4.8:

Figure 4.8 The Debugger Status Bar

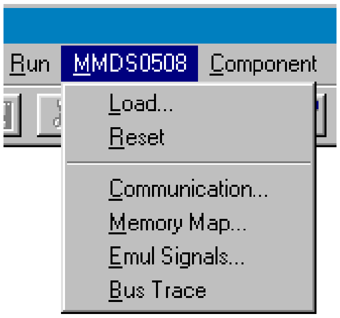


From left to right, this information is: the serial-communication baud rate, the debugger running mode, the BUS analyzer mode, the MCU name (depending on the MCU-Id), and the debugger status.

4.8 MMDS0508 Menu Entries

The Figure 4.9 show the MMDS0508 Menu Entries:

Figure 4.9 MMDS Menu Entries



4.8.1 Communication Baud Rate

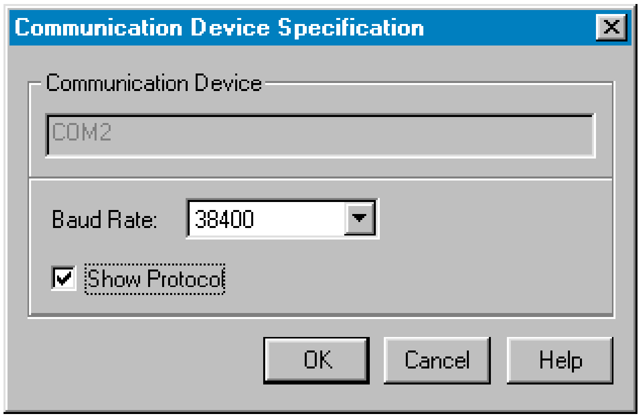
You should specify the baud rate for host-computer-to-MMDS0508 communication early in a session. The system operates most efficiently at the maximum baud rate that the host computer supports.

You can modify this baud rate, as text below explains.

4.8.1.1 Communication

Select **MMDS0508>Communication...** to display the *Communication Device Specification* dialog box as shown in Figure 4.10. Use the drop-down control to specify the maximum value (115200 baud), or to specify the maximum rate your host supports. If communication fails, the debugger reverts to the previous successful baud rate.

Figure 4.10 Communication


Communication Device Specification

Communication Device

COM2

Baud Rate: 38400

☑ Show Protocol

4.8.1.2 Maximum Baud Rate

The maximum baud rate depends on the speed and interrupt load of the host computer. For slow

book computers, or for computers running in a network, the maximum baud rate may be as low as 19200. A buffered I/O card may allow the maximum rate of 115200 for any host computer. The default value is 9600.

4.8.1.3 Show Protocol

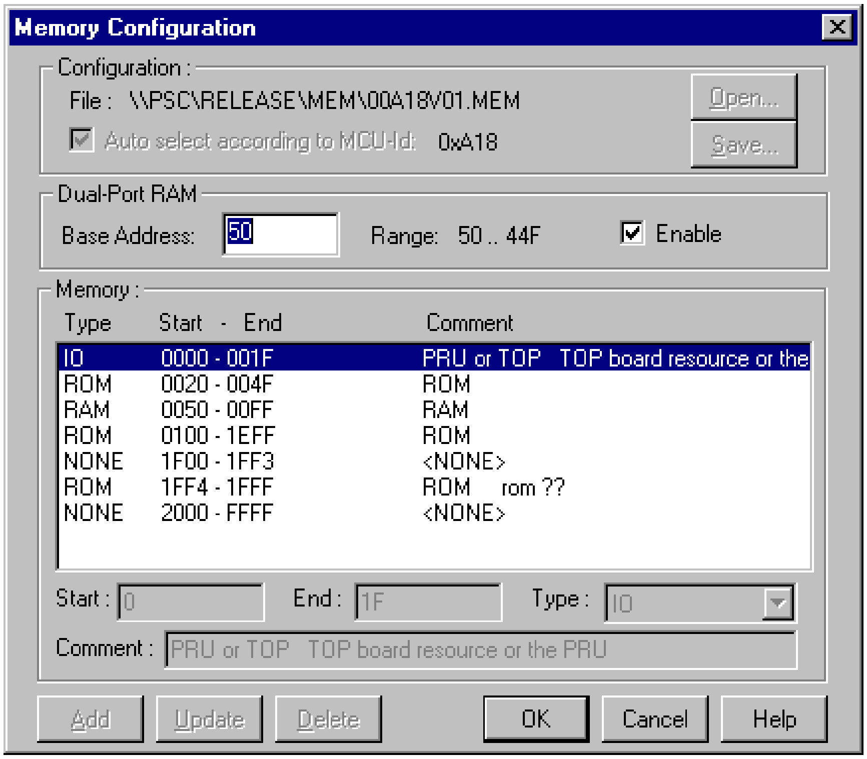
If you check the *Show Protocol* checkbox, the system reports all commands and responses in the command line window.

NOTE Motorola or Hiware support personnel use this feature.

4.8.2 Memory Configuration

To view the memory layout, choose **MMDS0508 > Memory Map...** This opens the *Memory Configuration* dialog box shown in Figure 4.11.

Figure 4.11 Memory Configuration



Configuration :

File : \\PSC\RELEASE\MEM\00A18V01.MEM

☑ Auto select according to MCU-Id: 0xA18

Dual-Port RAM

Base Address: 50 Range: 50 .. 44F ☑ Enable

Memory :

Type	Start - End	Comment
IO	0000 - 001F	PRU or TOP TOP board resource or the
ROM	0020 - 004F	ROM
RAM	0050 - 00FF	RAM
ROM	0100 - 1EFF	ROM
NONE	1F00 - 1FF3	<NONE>
ROM	1FF4 - 1FFF	ROM rom ??
NONE	2000 - FFFF	<NONE>

Start : 0 End : 1F Type : IO

Comment : PRU or TOP TOP board resource or the PRU

This dialog box shows the target's memory setup. The system automatically loads this setup if you check the *Auto select according to MCU-Id* checkbox. The debugger identifies and sets the memory map through the processor MCU-Id. To open another configuration, click the *Open* button. To save modifications to the current configuration, click the **Save...** button.

4.8.3 Personality (.MEM) Files

For proper operation, the Motosil target must load the personality file (`.MEM` file) that matches the connected Emulation Module (EM).

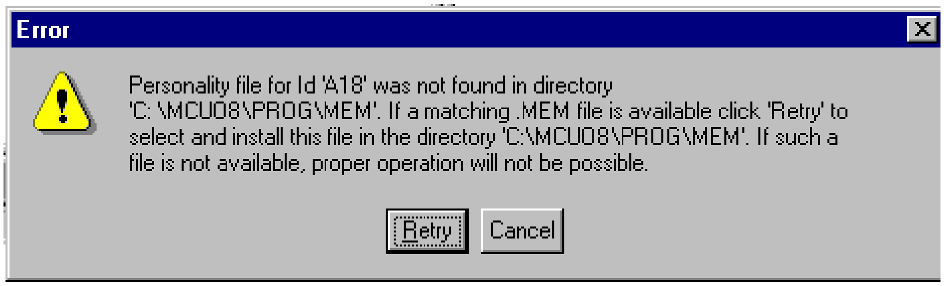
The `.MEM` file filename format is:

`0nnnnVxx.MEM`

where '**`nnnn`**' is the four-digit, hexadecimal 'MCU-Id' number of the MCU, and '**`xx`**' is a two-digit version number.

If the target cannot find this file, or if the file is not valid, the *Error* message box appears as shown in Figure 4.12:

Figure 4.12 Error Message

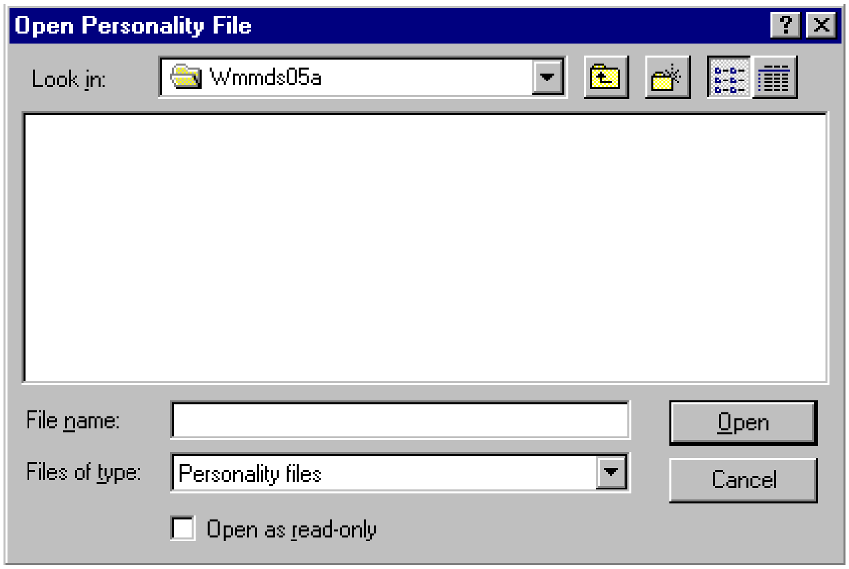


Personality file for Id 'A18' was not found in directory 'C: \MCU08\PROG\MEM'. If a matching .MEM file is available click 'Retry' to select and install this file in the directory 'C:\MCU08\PROG\MEM'. If such a file is not available, proper operation will not be possible.

Click *Cancel* to open the *Communication Device Specification* dialog box, instead of establishing the connection.

Click *Retry* to bring up the *Open Personality File* dialog box show in Figure 4.13:

Figure 4.13 Open Personality File



Look in: Wmmds05a

File name:

Files of type: Personality files

□ Open as read-only

This dialog box lets you browse to find and open the necessary `.MEM` file.

If you select another invalid `.MEM` file, the error message box and the *Configuration Device Specification* dialog box reappear.

If the `.MEM` file is valid, the target loads the file, copying it into the `\PROG\MEM` directory, with ‘`V00`’ as the version number (for example, `00A18V00.MEM`).

Note that the *Memory Configuration* dialog box displays the current memory map.

When starting the debugger:

If you have checked the *Auto Select according MCU-ID* checkbox, the system automatically loads the default personality file for the MCU-ID. If this checkbox is clear, the system automatically loads the most recently opened or saved memory map file.

You can use the *Memory Configuration* dialog box to modify the memory configuration, then save this new configuration into a memory configuration file. (Click the *Save* button.)

You can use the *Memory Configuration* dialog box to load a different memory configuration file (one that you previously defined and saved). (Click the *Open* button.)

Another way to load personality files (or any memory configuration files) is to enter the **`LOADMAP`** command in the command line.

4.8.3.1 Dual-Port RAM

The *Dual-Port RAM* area lets you specify the base address and enable “Real-Time Memory”.

To specify the base address, enter the desired value in the *Base Address* edit box. To Enable the “Real-Time Memory”, check the *Enable* checkbox. The size of the “Real-Time Memory” is frozen at 1 kilobyte.

Also see the *M68MMDS05/08, Motorola Modular Development System, User's Manual* for further information.

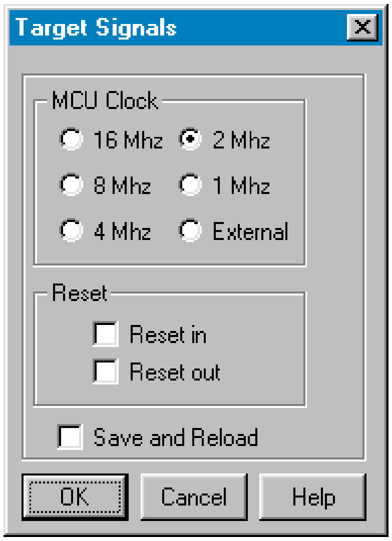
4.8.3.2 Memory

The *Memory* area lets you specify the “Real-Time Memory”. For the MMDS0508, this is dual-ported memory that you can assigned to any valid RAM or ROM address. While the MMDS0508 is running, the debugger can display and modify this “Real-Time Memory.” However, if a portion of this memory overlays internal MCU I/O, RAM, or EEPROM, the *Memory Configuration* dialog box can only display, not monitor, that memory portion.

4.8.4 Signals Emulation

To specify MMDS0508 emulator signals, choose the **MMDS0508>Emul Signals...** menu selection. This opens the *Target Signals* dialog box show in Figure 4.14.

Figure 4.14 Target Signals



Target Signals

MCU Clock

○ 16 Mhz ● 2 Mhz
○ 8 Mhz ○ 1 Mhz
○ 4 Mhz ○ External

Reset

□ Reset in
□ Reset out

□ Save and Reload

This dialog box lets you specify the MCU clock and the reset signal connection. Warning: in order to use any of these clock signals, you must configure EM jumper headers correctly.

This dialog box displays settings that the system reads from the MMDS0508. Click *Ok* to close the dialog box, and to write values back to the MMDS0508. Check the *Save and Reload* checkbox to have the system save the configuration, then reload this configuration the next time you start the debugger.

4.8.4.1 MCU Clock

The *MCU Clock* area lets you specify a different MCU clock, provided that the EM configuration is correct.

4.8.4.2 Reset

The *Reset* area lets you specify the reset-signal connection with the target system.

4.8.5 Bus Tracing

To run the Bus Analyser, choose the **MMDS0508>Bus Trace** menu selection. Please see the *Bus Analyser* section of this document for details.

4.9 Default Target Setup

As with any target, you can use the *Target* menu to load the MMDS target component, or you can set the MMDS target component as a default in the `PROJECT.INI` file. This file should be in the project directory .

Example of `PROJECT.INI` file.

```
[DEFAULTS]
Window0=Source      0   0  50  40
Window1=Assembly   50   0  50  40
Window2=Register   50  40  50  30
Window3=Memory     50  70  50  30
Window4=Data        0  40  50  25
Window5=Command     0  65  50  20
Window6=Module      0  85  50  15
Target=Motosil

[Motorola ESL]
COMDEV=COM2
BAUDRATE=57600
SHOWPROT=1
```

NOTE For more information about the PROJECT.INI file, please see the debugger manual.

4.9.1 Motorola ESL Parameters

In normal use, you set these parameters in the `project.ini` file once, interactively, during installation. You use these parameter values in subsequent debugging sessions.

4.9.1.1 COMDEV

This parameter specifies the host-computer communication port. COM1 is the default communication device for PCs. The default for UNIX systems is `/dev/ttya`.

For a PC: Any valid communication device (`COM1,COM2,etc.).`

Example:`COMDEV=COM2`

For SUN:Any valid communication device (`/dev/ttya, etc.).`

Example:`comdev=/dev/ttyb`

4.9.1.2 BAUDRATE

This parameter specifies the communication baud rate between the host computer and the target system. The debugger default is 9600 baud, but you may set any of these baud rates:

```
1200, 2400, 4800, 9600, 19200, 28800,
38400, 57600, 115200.
```

Example:`BAUDRAUTE=19200`

4.9.1.3 SHOWPROT

This parameter specifies whether to report commands and responses in the command line window. To have the system report the commands and responses, give this parameter the value 1. To have the system *not* do this reporting, give this parameter the value 0. (Another way to specify reporting is checking the *Show Protocol* checkbox of the *Communication Device Specification* dialog box.)

Please see the section *Communication Configuration, Communication Device Specification.*

4.10 Bus Analyzer

4.10.1 Introduction to the Bus Analyzer

Except for emulating the target-system MCU, the most important feature that a microcontroller development tool can offer is analyzing program execution activities on the target MCU bus. This analysis lets you determine what is occurring in a system, without actually affecting the system.

NOTE The MMDS0508 bus analyzer shows the logical state of the MCU bus. It does not show signal hold or setup times.

4.10.1.1 Watchpoints

The MMDS0508 automatically maps available watchpoints to a proper bus analyzer trigger pattern. You may use the bus analyzer to implement watchpoints. If you do, however, you should not use the bus analyzer for other purposes!

4.10.1.2 Trace Modes

To gather pertinent bus data, you can operate the bus analyzer in different modes. The various trace modes let you choose appropriate actions to take when a certain pattern (event), or sequence of patterns, appears on the bus. To trigger the Bus analyzer, define specific bus states as terms, and select a sequence of terms as a trigger event.

4.10.1.3 Trace Buffer

The trace buffer consists of 8,192 entries (or frames), each of which stores 96 bits. When the bus analyzer is active and the emulator is running, the system strobes a frame of the selected type into the trace buffer for each bus cycle. When trigger events occur in a specified sequence, the system stores only the specified number of additional frames.

4.10.1.4 Textual or Graphical

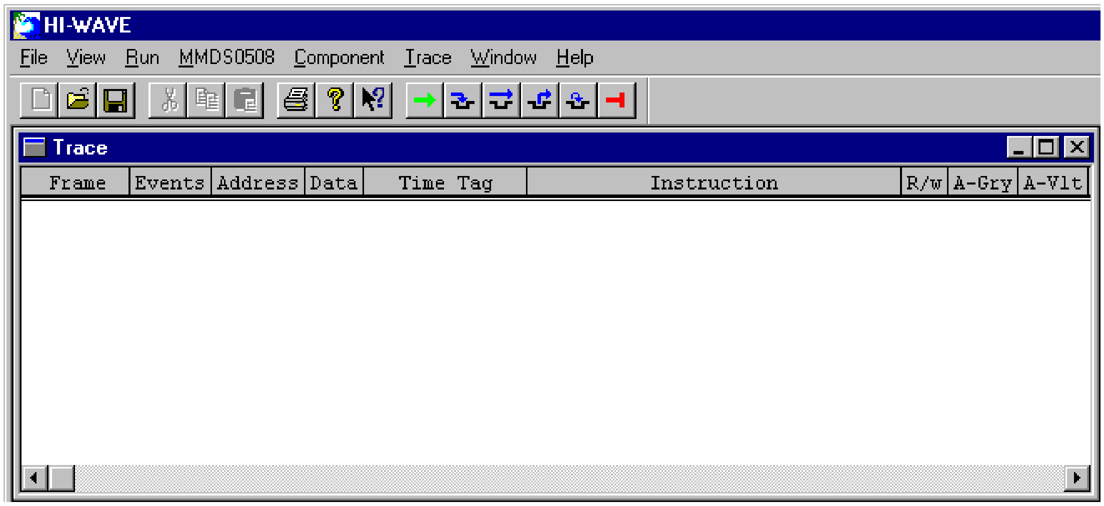
The bus analyzer displays data either textually or graphically. Use the horizontal and vertical scroll bars, as in other Windows applications, to move around the displays.

4.10.2 Using the Bus Analyzer

The bus analyzer functions like any debugger component, and has its own menu to control the features of the MMDS0508 Bus analyzer hardware. Another name for the Bus Analyzer window is the Trace window. This is because the bus analyzer corresponds to the trace component; you can load the bus analyzer by choosing **Open...** *Trace* from the *Component* menu. Choose the *MMDS0508* menu, then select *Bus Trace* to open the Trace window (show in Figure 4.16) or the Bus Analyzer (shown in Figure 4.15).

The three steps to using the Bus analyzer are: defining the data collection parameters, collecting the specified bus data (running the program), and viewing the collected data.

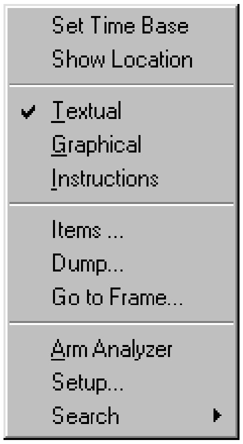
Figure 4.15 Bus Analyzer



Frame	Events	Address	Data	Time Tag	Instruction	R/w	A-Gry	A-Vlt

4.10.2.1 The *Trace* window popup menu

Figure 4.16 Trace Window popup



The bus analyzer has setup pages for these functions:

- Triggers
- Search pattern
- Sequencer
- Clock timing

These tabbed setup pages are part of the *Bus Analyzer Configuration* dialog box.

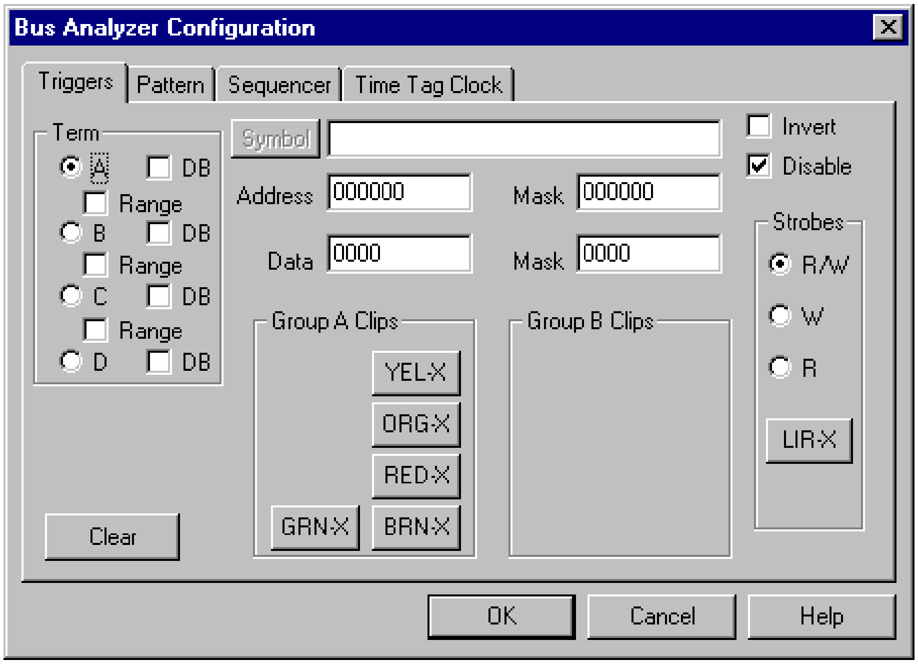
The *Bus Analyzer Configuration* dialog box lets you define symbolic names for address values. When you change setup pages in the dialog box, the address and symbolic name values must match. If there is an inconsistency, the system prompts you to:

- Use the address and remove the symbol.
- Replace address with the symbol address.
- Fix the inconsistency by returning to the dialog box and clicking the symbol button.

4.10.2.2 Trigger Setup

The sequencer mode requires one or more terms to define the trigger events. To define these events (triggers) select **Trace>Setup....** This opens the *Bus Analyzer Configuration* dialog box as shown in Figure 4.17 .

Figure 4.17 Bus Analyzer Trigger Setup



Bus Analyzer Configuration

Triggers | Pattern | Sequencer | Time Tag Clock

Term:
● A □ DB
□ Range
○ B □ DB
□ Range
○ C □ DB
□ Range
○ D □ DB

Symbol:
Address: 000000 Mask: 000000
Data: 0000 Mask: 0000

□ Invert
☑ Disable

Strobes:
● R/W
○ W
○ R

Use the *Triggers* page to define a trigger in terms of one, two, three, or four events. For each term, define the read-write actions and clips.

These terms can be ranged or non-ranged triggers. For ranges, you can use A and B together, and C and D together (two different ranges), or you can use B and C together (one range).

You can edit the address masks and data masks for a “don’t care” qualifier on any address or data signal. For example, if you set a trigger for address 0x1000, but the corresponding mask is 0xFFFE, then either address 0x1000 or 0x1001 will trip the trigger.

4.10.2.2.1 Term

Use this area to specify the term displayed for editing. The term identifies an event; that is, an event is a frame that satisfies the term.

4.10.2.2.2 Address

In this edit box, specify the address to which the system writes data or from which the system reads data.

4.10.2.2.3 Data

In this edit box, specify the data that the system is to read or write.

4.10.2.2.4 Strobes

Use this area to specify the read/write state on which to trigger.

4.10.2.2.5 Group A & B Clips

Use this area's toggle controls to specify each logic clip as High, Low, or Don't Care.

The clips buttons show the Group A logic clips with their respective colors.

You use logic clips to trace the signals of your target system as it runs under software control. When a trigger occurs, a breakpoint shows you the states of significant logic signals before, at, and after the trigger.

4.10.2.2.6 Invert

To specify term triggering *outside*, not inside, a defined range, check the *Invert* checkbox.

4.10.2.2.7 Disable

To disable the trigger for a specific term, check the *Disable* checkbox.

4.10.2.2.8 Clear

To clear all the changes in the *Bus Analyzer Configuration* dialog box, click the *Clear* button.

To save your trigger settings and close the dialog box, click the *OK* button.

4.10.2.3 Sequencer Setup

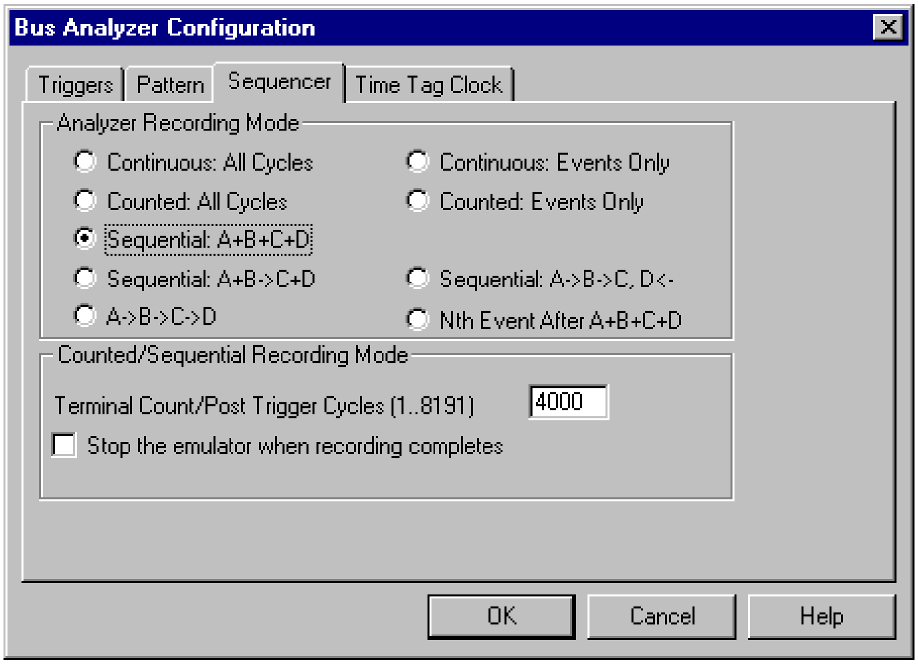
To choose the recording mode, select the menu item **Trace>Setup...** to open the *Bus Analyzer Configuration* dialog box as shown in Figure 4.18. Then click on the *Sequencer* tab (see the figure below).

In non-triggered (continuous and counted) modes, data collection continues until you stop the analyzer.

In triggered modes, the analyzer uses your term definitions to track the occurrence of events, then stop data collection according to some combination of the events. Each term has an associated Pre Event count that counts events for that term. The sequencer condition includes that term, once the count reaches the pre-event count.

An event is a pattern of bus signals (which can include address and data values) that logic clips and miscellaneous MCU signals connect to the analyzer. Alternatively, an event can be the negation of a defined pattern. You can define each signal to be asserted, negated, or ignored (don't care).

Figure 4.18 Bus Analyzer Sequence Setup



Analyzer Recording Mode

○ Continuous: All Cycles
○ Continuous: Events Only
○ Counted: All Cycles
○ Counted: Events Only
● Sequential: A+B+C+D
○ Sequential: A+B->C+D
○ Sequential: A->B->C, D<-
○ A->B->C->D
○ Nth Event After A+B+C+D

Counted/Sequential Recording Mode

Terminal Count/Post Trigger Cycles (1..8191) 4000

□ Stop the emulator when recording completes

Click on one of the nine option buttons to select the recording mode.

4.10.2.4 Non-Triggered Modes

In non-triggered modes, data collection continues until you stop the analyzer.

4.10.2.4.1 Continuous: All Cycles

Provides a real-time, non-invasive trace of MCU bus activities. The bus analyzer stores all cycles, continuously recording bus data in the trace buffer during any emulation of the user target system. This mode does not let you define qualifications for triggering or halting data collection.

4.10.2.4.2 Continuous: Events Only

Stores all the events that you defined in the Triggers page.

4.10.2.5 Counted Modes

In counted modes, data collection stops when the analyzer collects the specified number of frames.

4.10.2.5.1 Counted: All Cycles

Records a specified number of cycles; you can trace that many cycles, of all types.

4.10.2.5.2 Counted: Events Only

Stores all events until it reaches the specified count. Then data collection stops.

4.10.2.6 Triggered Modes/Sequential Event Mode

In triggered modes, the analyzer uses term definitions to track event occurrence, then stop data collection according to some combination of the events. Each term has an associated Pre Event count that counts events for that term. The sequencer condition includes that term, once the count reaches the pre-event count.

The sequencer trigger includes as many as four events, in one of four sequences. Each event has a specified count; each trigger requires that specified count for each event. Each count is a minimum: the event can occur additional times. An event is a pattern of bus signals (which can include address and data values) that logic clips and miscellaneous MCU signals connect to the analyzer. Alternatively, an event can be the negation of a defined pattern. You can define each signal to be asserted, negated, or ignored (don't care).

The sequences are:

4.10.2.6.1 Sequential: A + B + C + D

Select this option to start bus-analyser recording after any event occurs: A, B, C, or D. Data storage ends after the specified number of post-trigger cycles.

4.10.2.6.2 Sequential: A -> B -> C, D<-

Select this option to start bus-analyser recording as soon as events A, B, and C occur, *in that order*. But if event D occurs before event C, the analyzer must start the whole sequence again with event A. Data storage ends after the specified number of post-trigger cycles. This mode is a simple, three-event sequence, if you do not define an event D.

4.10.2.6.3 Sequential: A + B -> C + D

Select this option to start bus-analyser recording when either of two sequences occurs: (1) event A, followed by either event C or event D, or (2) event B, followed by either event C or event D. Data storage ends after the specified number of post-trigger cycles. You can simplify this sequence by leaving an event undefined.

4.10.2.6.4 Sequential: A -> B -> C-> D

Select this option to start bus-analyser recording as soon as events A, B, C, and D occur, *in that order*. Data storage ends after the specified number of post-trigger cycles.

4.10.2.6.5 Nth Event After A+B+C+D

Select this option to start bus-analyser storage of data that matches events A, B, C, and D, until the analyzer stores the Nth event. Then, the analyzer stores as well the next 4096 cycles. The maximum N value is 4096, so this mode lets you store as many as 4096 events, followed by 4096 cycles.

4.10.2.7 Counted/Sequential Recording Mode

This paragraph explains how to switch beetween Counted and Sequential Recording Mode.

4.10.2.7.1 Terminal Count/Post Trigger Cycles (1..8191)

For a counted mode, this edit box specifies the number of bus cycles that the analyzer traces. For a sequential mode, this edit box specifies the number of post-trigger cycles that the analyzer traces. The value range for this edit box is 1 through 8191. (For a continuous modes, the analyzer ignores this value.)

4.10.2.7.2 Stop the emulator when recording completes

Check this checkbox to stop emulation as soon as the analyzer stops tracing bus cycles. If this checkbox is clear, emulation continues, even after analyzer data storage ends.

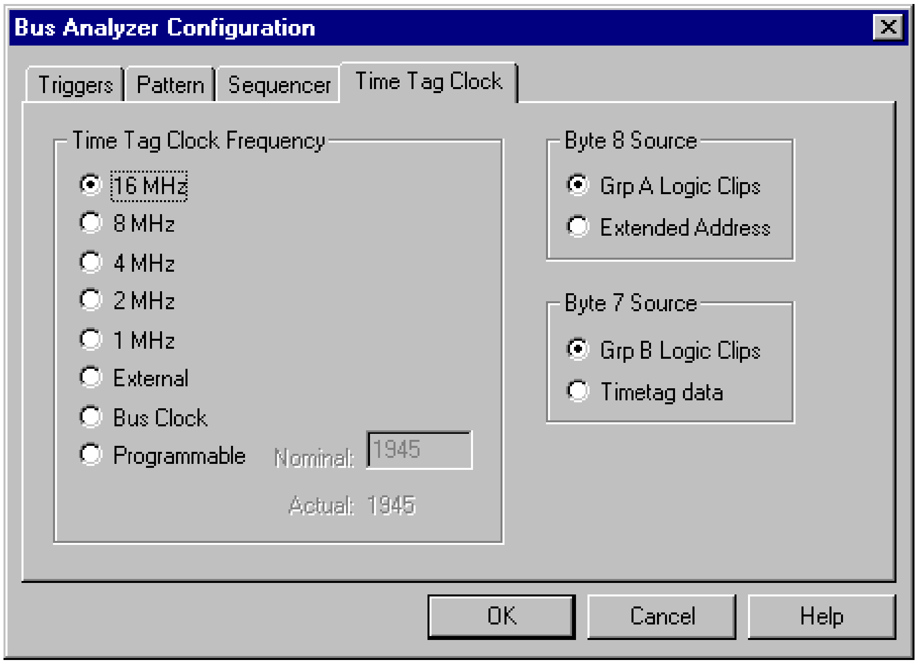
NOTE The terminal count/post trigger cycles value applies only to counted or sequential modes. For a counted mode, it is the number of cycles the analyzer stores. For a sequential mode, it is the number of cycles the analyzer stores after the trigger sequence occurs.

To save your sequencer settings and close the dialog box, click the *OK* button.

4.10.2.8 Time Tag Clock Setup

Each frame of the trace buffer includes a time reference value, or *time tag*. You can specify the clock signal that the analyzer uses for these time tags. To do so, choose the **Trace>Setup...** menu selection, to open the *Bus Analyzer Configuration* dialog box as shown in Figure 4.19. Then click on the *Time Tag Clock* tab.

Figure 4.19 Bus Analyze Time Clock Setup



Bus Analyzer Configuration

Triggers | Pattern | Sequencer | Time Tag Clock

Time Tag Clock Frequency
- ● 16 MHz
- ○ 8 MHz
- ○ 4 MHz
- ○ 2 MHz
- ○ 1 MHz
- ○ External
- ○ Bus Clock
- ○ Programmable Nominal: 1945

Actual: 1945

Byte 8 Source
- ● Grp A Logic Clips
- ○ Extended Address

Byte 7 Source
- ● Grp B Logic Clips
- ○ Timetag data

4.10.2.8.1 Clock Frequency

In the Time Tag Clock Frequency area, select the clock-frequency source: an internal oscillator at 16, 8, 4, 2, or 1 Mhz; an external clock; a bus clock; or a programmable clock. In general, the faster clock rates provide higher resolution, so are appropriate for faster emulator clock rates.

If you specify a programmable clock, you must enter the Hz frequency, 50 to 50,000, in the edit box. If you specify a *Nominal* value, the analyzer uses the closest, *Actual* frequency value. (A nominal value is a non-integer quotient of dividing 500,000 Hz by an integer. An actual value is an integer quotient of dividing 500,000 Hz by an integer. For example, suppose that you specify 986 in the edit box. 500,000 divided by the integer 507 yields the non-integer quotient 986.193. If you specify a nominal value, the analyzer rounds this value up to 1000, which is the integer quotient of 500,000 divided by 500.)

To save your time tag clock settings, and close the dialog box, click the *OK* button.

4.10.3 Collecting Data

When your have initialized the emulator and the bus analyzer have been initialized, and when you have connected any logic clips that you defined, emulation can begin.

4.10.3.1 Arming the Analyzer

Before you can start data collection, you must arm the bus analyzer. To do so, choose the **MMDS0508>Bus Trace>Arm Analyzer** menu selection. The status bar shows *Armed* status for the bus state analyzer, and the menu selection changes to *Disarm Analyzer*.

4.10.3.2 Disarming the Analyzer

To stop the analyzer, choose the **MMDS0508>Bus Trace>Disarm Analyzer** menu selection. The status bar shows *Disarmed* status for the bus state analyzer, and the menu selection changes to *Arm Analyzer*.

4.10.3.3 Start Emulation

To begin emulation, choose the debugger **Run>Continue** menu selection, or enter any other command that starts program execution. Emulation continues until a breakpoint, a watchpoint, the bus analyzer, or you stop the emulation. When emulation stops, the system updates data in the Bus Analyzer window (see below).

4.10.3.4 Status Bar

The debugger status bar shows the status of the bus analyzer. Before you arm the analyzer, the status is *Disarmed*: not ready to collect data. After you arm the analyzer, the status is *Armed*: ready to collect data. When emulation begins, the status is *Running*: the analyzer is monitoring events. When the analyzer collects data, the status is *Analyzing*.

4.10.3.5 Halt Data Collection

To halt data collection manually, choose the **MMDS0508>Bus Trace>Disarm Analyzer** menu selection. This stops data collection, but does not stop emulation.

4.10.3.6 Halt Emulation

Stopping emulation also stops data collection, but leaves the analyzer armed. Data collection resumes when emulation starts again.

4.10.3.7 Recording Bus Data

When data collection begins, the bus analyzer starts recording bus data into the buffer. When it reaches the end of the buffer, the Bus analyzer wraps around to the first buffer frame and continues recording. This process continues until you disarm the analyzer, until the analyzer records the specified number of frames, or until the analyzer records the specified number of post-trigger cycles following the trigger event.

4.10.3.8 Trigger Event

When the analyzer detects a trigger event, it latches the event cycle into the buffer and continues recording data until it collects the specified number of post-trigger cycles. Then the bus analyzer stops collecting data, and its status changes to *Disarmed*.

At the same time the analyzer records the first post-trigger cycle, it automatically begins searching for the next trigger event.

Subsequent events can occur while the bus analyzer collects post-trigger cycles for the first event. In such a case, the analyzer continues collecting post-trigger cycles, but marks the cycles for the subsequent events.

4.10.4 Viewing Collected Data

4.10.4.1 View Cycles

The bus analyzer provides several views of the collected cycles. At the end of cycle collection, the trace buffer contains as many as 8192 of the most recently stored frames. Those that have the highest numbers usually are the post-trigger frames. Those that have the lowest numbers are the frames stored before the trigger occurred, if any.

When the bus analyzer is not in the *Analyzing* state, it displays data in the *Trace* window.

4.10.4.2 Textual, Graphical or Instructions

To specify the type of bus-data display, select *Textual*, *Graphical*, or *Instructions* from the *Trace* popup menu.

NOTE If the sequencer did not specify collection of all frames (for example, if it specified an events-only mode) the menu may not include the Instructions selection.

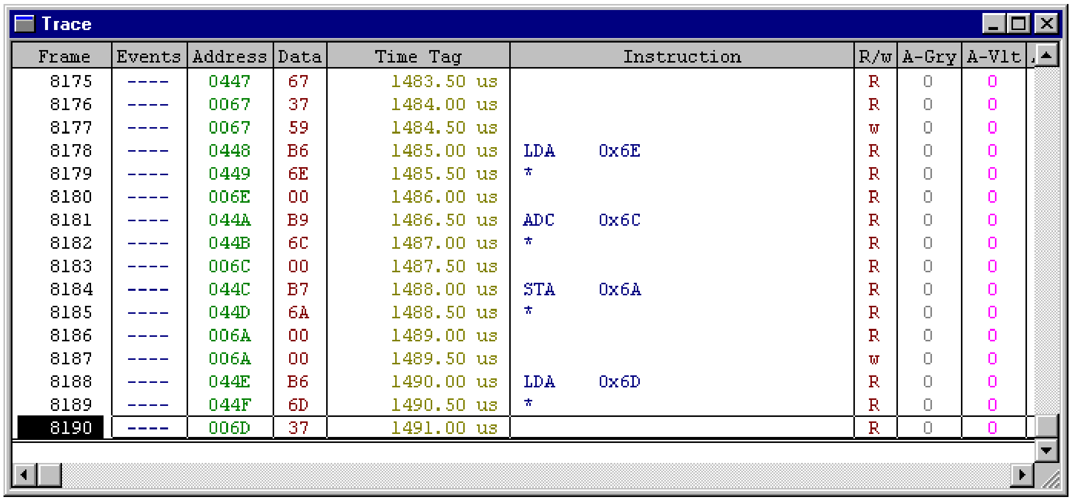
The analyzer can display its contents as text or as a graphic. You can have a textual display of all frames, or a textual display of only instruction-start frames. Additionally, you can choose the **Trace>Items...** menu selection to specify items for display.

4.10.4.3 Textual Display

If you choose the *Textual* format, the software displays all the frames of the trace buffer contents, in a textual form, as shown in Figure 4.20. Use the vertical scroll bar to scroll to other frames. Use the horizontal scroll bar to scroll to other signals.

Each display line gives the data of one frame: text below explains these data items. You can add or remove data items. (Please see the section *Adding / Removing Items in the Trace Window*.) The marker consists of two horizontal lines, which facilitate reading the data items for a specific frame; the analyzer highlights the number of the marked frame.

Figure 4.20 Trace Textual Format Display



Frame	Events	Address	Data	Time Tag	Instruction	R/w	A-Gry	A-Vlt
8175	----	0447	67	1483.50 us		R	0	0
8176	----	0067	37	1484.00 us		R	0	0
8177	----	0067	59	1484.50 us		w	0	0
8178	----	0448	B6	1485.00 us	LDA 0x6E	R	0	0
8179	----	0449	6E	1485.50 us	*	R	0	0
8180	----	006E	00	1486.00 us		R	0	0
8181	----	044A	B9	1486.50 us	ADC 0x6C	R	0	0
8182	----	044B	6C	1487.00 us	*	R	0	0
8183	----	006C	00	1487.50 us		R	0	0
8184	----	044C	B7	1488.00 us	STA 0x6A	R	0	0
8185	----	044D	6A	1488.50 us	*	R	0	0
8186	----	006A	00	1489.00 us		R	0	0
8187	----	006A	00	1489.50 us		w	0	0
8188	----	044E	B6	1490.00 us	LDA 0x6D	R	0	0
8189	----	044F	6D	1490.50 us	*	R	0	0
8190	----	006D	37	1491.00 us		R	0	0

Frame This column lists the cycle (or frame) number of each frame: identifying integers, from 1 to 8191. The most recently stored frame has number 8191 (or the highest number all the frames stored).

4.10.4.3.1 Events

This column lists identifiers of matching events. That is, if frame data matches any event data definitions, the analyzer displays the event identifiers (A, B, C, or D) in this column.

4.10.4.3.2 Address

This column lists frame address bus values, as four hexadecimal digits. Each value is the address on the address bus at the time the analyzer strobed the frame into the trace buffer.

4.10.4.3.3 Data

This column lists frame data bus values, as two hexadecimal digits. Each value is the values on the data bus at the time the analyzer strobed the frame into the trace buffer.

4.10.4.3.4 Time Tag

This column lists representations of the time tag count, stored when the analyzer strobed each frame into the trace buffer. If the time tag clock was the bus clock, this column shows the number of time-tag-clock cycles. If the time tag clock was a different clock, this column shows a number of seconds (or fractions of seconds).

4.10.4.3.5 Time Measuring

To assign the time-tag value 0 to a frame, position your mouse cursor over the frame entry and click the right mouse button. The *Trace* menu appears; select *Set Time Base*. The analyzer re-displays all time-tag values relative to the bus cycle of the frame you specified.

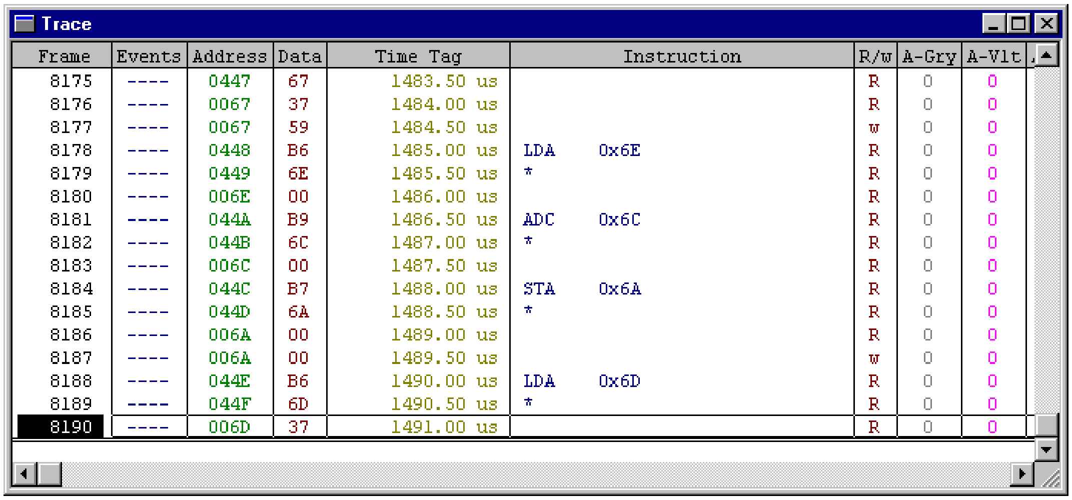
4.10.4.3.6 Control Signals

The remaining columns of the *Trace* dialog box show the values of control signals or of logic clips.

4.10.4.4 Instructions Only Display

If you choose the *Instructions* format, the software displays only the frames where instructions start as show in Figure 4.21. (The *Instructions* format is not available for an *Events Only* recording mode.)

Figure 4.21 Trace Instructions Only Format Display



Frame	Events	Address	Data	Time Tag	Instruction	R/w	A-Gry	A-Vlt
8175	----	0447	67	1483.50 us		R	0	0
8176	----	0067	37	1484.00 us		R	0	0
8177	----	0067	59	1484.50 us		w	0	0
8178	----	0448	B6	1485.00 us	LDA 0x6E	R	0	0
8179	----	0449	6E	1485.50 us	*	R	0	0
8180	----	006E	00	1486.00 us		R	0	0
8181	----	044A	B9	1486.50 us	ADC 0x6C	R	0	0
8182	----	044B	6C	1487.00 us	*	R	0	0
8183	----	006C	00	1487.50 us		R	0	0
8184	----	044C	B7	1488.00 us	STA 0x6A	R	0	0
8185	----	044D	6A	1488.50 us	*	R	0	0
8186	----	006A	00	1489.00 us		R	0	0
8187	----	006A	00	1489.50 us		w	0	0
8188	----	044E	B6	1490.00 us	LDA 0x6D	R	0	0
8189	----	044F	6D	1490.50 us	*	R	0	0
8190	----	006D	37	1491.00 us		R	0	0

4.10.4.5 Graphical Display

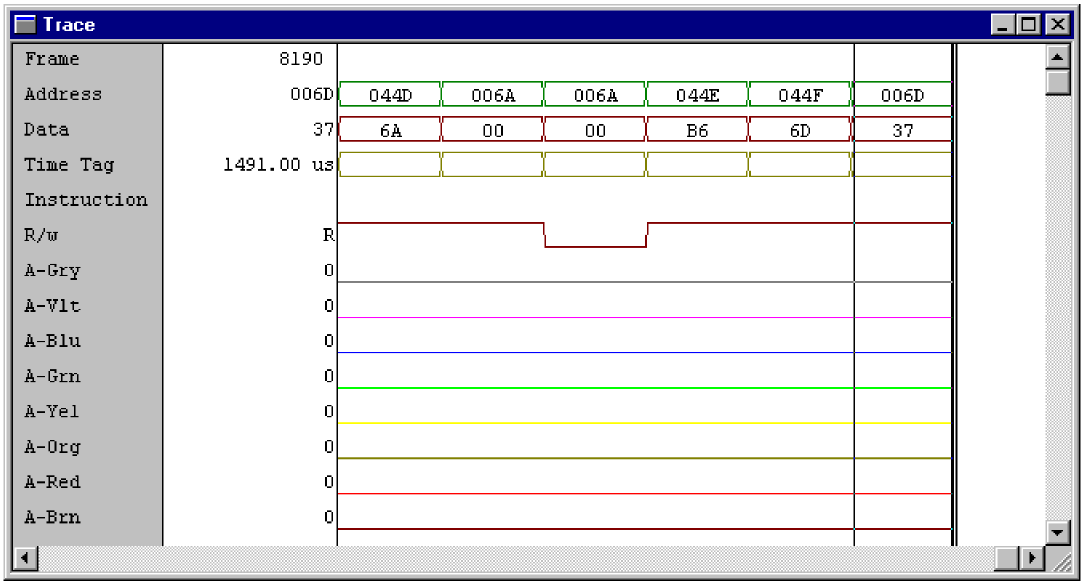
The figure below shows the graphical display of bus analyzer data. Selections of the *Trace* menu let you switch between formats easily, at any time. The left column lists data items. The next column lists the data values for the current frame. The rest of the display presents those data values graphically, or with greater resolution. In a graphical display, the marker consists of two vertical bars that enclose the information of the current frame.

4.10.4.5.1 Zoom In or Out

The graphical display shown in Figure 4.22 lets you zoom in, to see more details, or zoom out, for a better general view. *Zoom in* and *Zoom out* are selections of the *Trace* popup menu.

Other ways to zoom in are choosing the **Trace>Zoom In** menu selection or pressing the 'I' key of the keyboard.

Figure 4.22 Trace Zoom Display

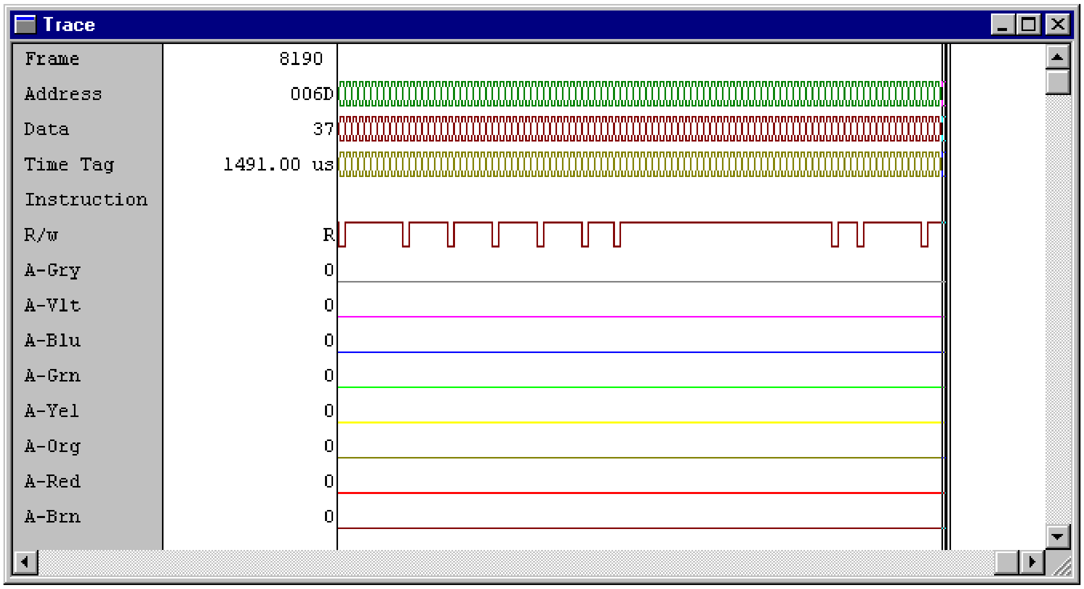


```
Frame                 8190
Address               006D
Data                    37
Time Tag       1491.00 us
Instruction
R/w                      R
A-Gry                    0
A-Vlt                    0
A-Blu                    0
A-Grn                    0
A-Yel                    0
A-Org                    0
A-Red                    0
A-Brn                    0
```

The figure above is a zoomed-in graphical display.

To zoom out, choose the **Trace>Zoom Out** menu selection, or press the *O* key of the keyboard. The Figure 4.23 show below is a zoomed-out graphical display.

Figure 4.23 Trace Zoom In Display



```
Frame                 8190
Address               006D
Data                    37
Time Tag       1491.00 us
Instruction
R/w                      R
A-Gry                    0
A-Vlt                    0
A-Blu                    0
A-Grn                    0
A-Yel                    0
A-Org                    0
A-Red                    0
A-Brn                    0
```

Dragging the marker over a bus analyzer display may also generate updates in component windows, such as the source and assembly windows. In other words, moving the marker over a bus analyzer textual or graphical display lets you view and thoroughly examine data in continually updated windows.

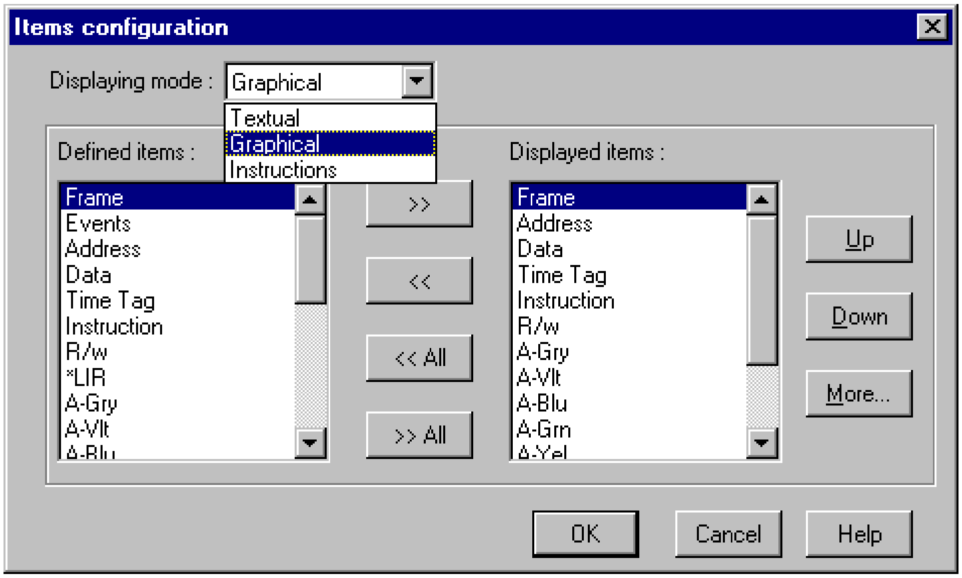
4.10.4.5.2 ShowLocation

To activate the *ShowLocation* selection for a frame, select the frame, click the right mouse button to activate the **Trace** menu, then select *ShowLocation*. Use a left mouse click to position the marker. This automatically updates the source and assembly windows.

4.10.4.5.3 Add / Remove Items in the *Trace* Window

You can add new items to the *Trace* window. The default items are: *Frame*, *Events*, *Address*, *Data*, *Time Tag*, *Instruction* and *R/W* but you can add any other items of the *Items configuration* dialog box. This same dialog box shown in Figure 4.24 lets you remove items from the *Trace* window. You can even drag items into the window.

Figure 4.24 Items Configuration



Items configuration

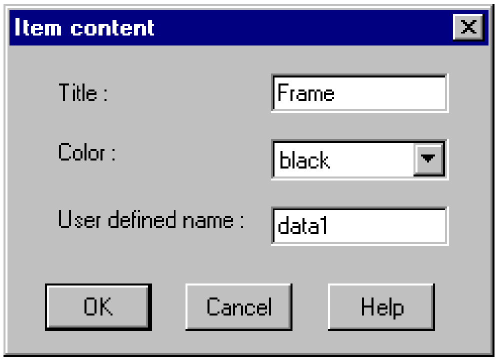
Displaying mode : Graphical

Defined items :
Frame
Events
Address
Data
Time Tag
Instruction
R/w
*LIR
A-Gry
A-Vlt
A-Blu

Displayed items :
Frame
Address
Data
Time Tag
Instruction
R/w
A-Gry
A-Vlt
A-Blu
A-Grn
A-Yel

To edit an item, change its color, or assign a specific name, click the *More* button. This opens the *Item content* dialog box shown in Figure 4.25:

Figure 4.25 Item Content



Title : Frame

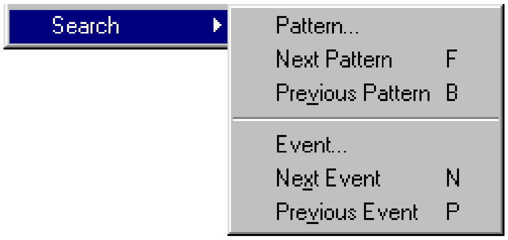
Color : black

User defined name : data1

4.10.5 Scrolling the Display

You can use display scrollbars as you would those of other Windows applications, or you can scroll to a specific trace buffer frame. It is also possible to search for one or more trigger events, or to search for a specific pattern, as the Figure 4.26 illustration below indicates.

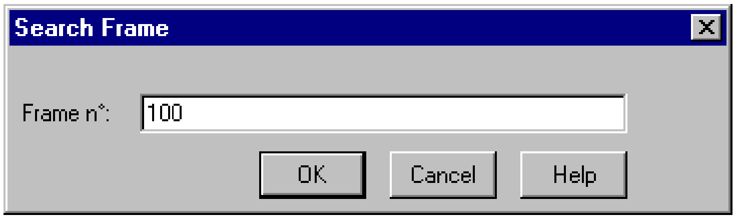
Figure 4.26 Search Menu



4.10.5.1 Search for a Frame

To search for a frame, choose the **Trace>Go to Frame...** menu selection to open the dialog shown in Figure 4.27, then enter the frame number. The marker moves to the frame. If necessary, the system scrolls the bus analyzer window to make the frame visible. If the system cannot find the specified frame, an error message reports that fact.

Figure 4.27 Search Frame

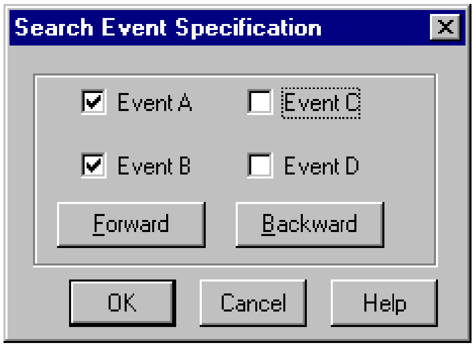

Search Frame

Frame n°: 100

4.10.5.2 Search for Events

To search for an event occurrence, choose the **Trace>Search>Event...** menu selection. This opens the *Search Event Specification* dialog box as shown in Figure 4.28. Check the checkboxes of one or more events.

Figure 4.28 Search Events


Search Event Specification

☑ Event A ☐ Event C

☑ Event B ☐ Event D

4.10.5.2.1 OK Button

To store your specification of events (not searching immediately), click *OK*.

4.10.5.2.2 Forward

To search forward for the next frame that matches your event specification, click *Forward*.

4.10.5.2.3 Backward

To search backward for the next frame that matches your event specification, click *Backward*.

4.10.5.2.4 Next Event

To search for the next occurrence of the specified event, choose the **Trace>Search>Next Event...** menu selection. The analyzer searches forward from the selected frame to find the next frame that matches your event specification. (Pressing the keyboard *N* key is another way to activate this search.) If this search finds a matching frame, the marker moves to the frame. If necessary, the system scrolls the bus analyzer window to make the frame visible. If the search does not find a matching frame, an error message reports that fact.

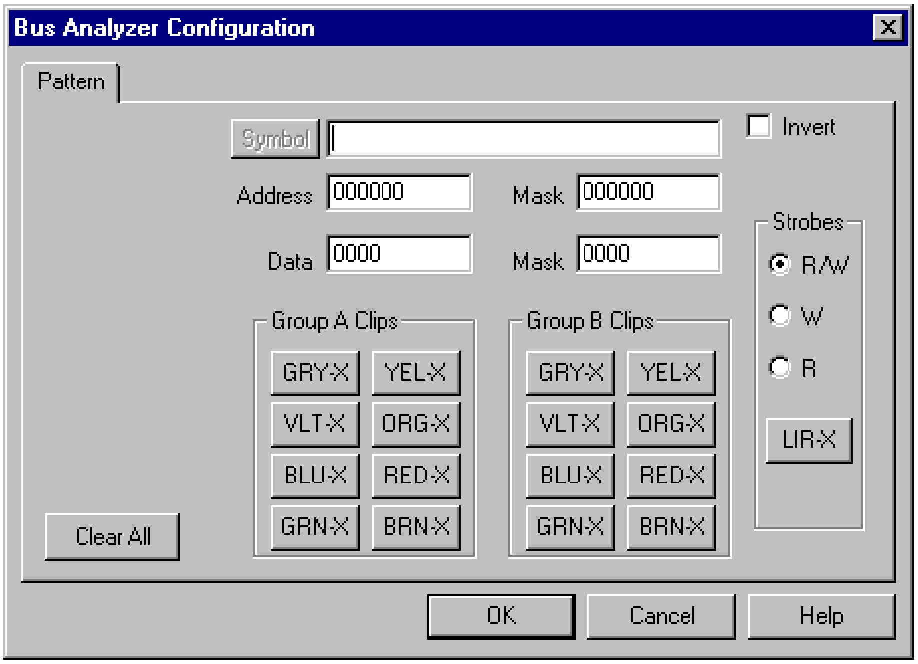
4.10.5.2.5 Previous Event

To search for the previous occurrence of the specified event, choose the **Trace>Search >Previous Event** menu selection. The analyzer searches backwards from the selected frame to find the previous frame that matches your event specification. (Pressing the keyboard P key, without activating the Trace menu, is another way to activate this search.) If this search finds a matching frame, the marker moves to the frame. If necessary, the system scrolls the bus analyzer window, to make the frame visible. If the search does not find a matching frame, an error message reports that fact.

4.10.5.3 Search for a Pattern

To search for a frame that matches a pattern, you must define the search pattern (an address, a data word, logic clips, and four miscellaneous signals). To do so, choose the **Trace>Search>Pattern...** menu selection. This opens the *Pattern* page of the *Bus Analyzer Configuration* dialog box as shown in Figure 4.29:

Figure 4.29 Search Pattern



Bus Analyzer Configuration

Pattern

Symbol

□ Invert

Address 000000 Mask 000000

Data 0000 Mask 0000

Strobes
● R/W
○ W
○ R

Use this page to define the search pattern, in the same way you completed the Triggers page.

The bus analyzer will look at specific collected cycles, match the frame that shows the pattern, then display this frame in the debugger window.

4.10.5.3.1 Address

In this edit box, specify the *Address* to be matched.

4.10.5.3.2 Data

In this edit box, specify the *Data* value to be matched.

4.10.5.3.3 Strobes

Use this area to specify the *R/W* and *LIR-X* states to be matched.

4.10.5.3.4 Group A & B Clips

Use these areas' toggle controls to specify each logic clip as *High (H)*, *Low (L)* or *Don't Care (X)*.

The clips buttons show the Group A and B logic clips with their respective colors.

You use logic clips to trace the signals of your target system as it runs under software control. When a trigger occurs, a breakpoint shows you the states of significant logic signals before, at, and after the trigger. Such states can be a search pattern to be matched.

4.10.5.3.5 Invert

To specify matching any frame *without* the defined pattern, check the *Invert* checkbox.

4.10.5.3.6 OK Button

To save your pattern values and close the dialog box, click *OK*.

4.10.5.3.7 Cancel Button

To close the dialog box without changing any parameter values, click *Cancel*.

4.10.5.3.8 Next Pattern

To search for the next occurrence of the pattern, choose the **Trace>Search>Next Pattern** menu selection. If the search does not find a matching pattern, an error message reports that fact.

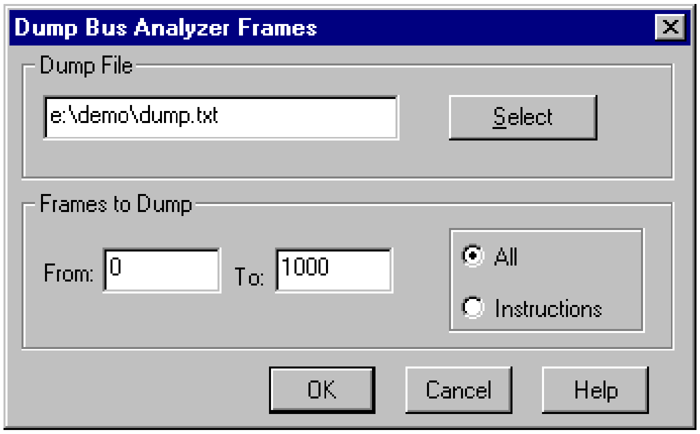
4.10.5.3.9 Previous Pattern

To search for the previous occurrence of the pattern, choose the **Trace>Search>Previous Pattern** menu selection. If the search does not find a matching pattern, an error message reports that fact.

4.10.6 Dumping the Bus analyzer data to a file

To dump the Bus analyzer data to a file, choose the **Trace>Dump...** menu selection. This opens the *Dump Bus Analyzer Frames* dialog box as shown in Figure 4.30.

Figure 4.30 Dump Bus Analyzer Frames



Dump File: e:\demo\dump.txt

Frames to Dump

From: 0 To: 1000

● All

○ Instructions

4.10.6.1 Dump File

This dialog box lets you specify frames in the bus analyzer window, then dump those frames to a file.

In the *Dump File* edit box, enter the name of the file that will receive the dumped frames.

4.10.6.1.1 Select

Click the *Select* button to open a standard file-select dialog box. You can use this dialog box to specify the filename value for the *Dump File* edit box.

4.10.6.1.2 Frames to Dump

Use this area’s edit boxes to define the range of frames to be dumped to the file.

4.10.6.1.3 All

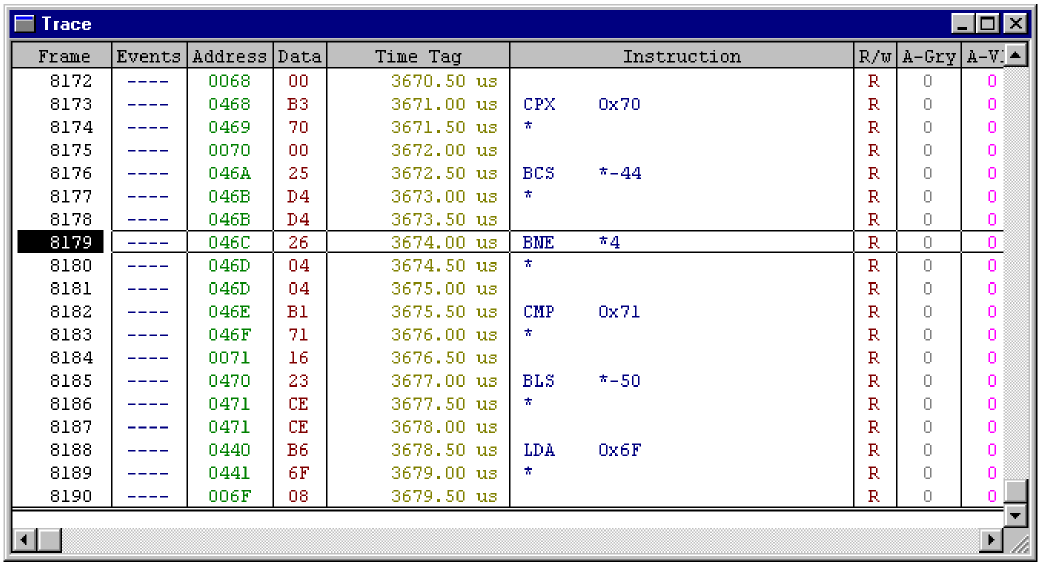
To have the analyzer dump all frames of the range, select the *All* option button.

4.10.6.1.4 Instructions

To have the analyzer dump only frames in which an instruction starts (that is, an instruction also in the defined range), select the **Instructions** option button.

The trace dialog box display only frame as shown in Figure 4.31.

Figure 4.31 Analyzer Dump Only Frame



Frame	Events	Address	Data	Time Tag	Instruction	R/w	A-Gry	A-V.
8172	----	0068	00	3670.50 us		R	0	0
8173	----	0468	B3	3671.00 us	CPX 0x70	R	0	0
8174	----	0469	70	3671.50 us	*	R	0	0
8175	----	0070	00	3672.00 us		R	0	0
8176	----	046A	25	3672.50 us	BCS *-44	R	0	0
8177	----	046B	D4	3673.00 us	*	R	0	0
8178	----	046B	D4	3673.50 us		R	0	0
8179	----	046C	26	3674.00 us	BNE *4	R	0	0
8180	----	046D	04	3674.50 us	*	R	0	0
8181	----	046D	04	3675.00 us		R	0	0
8182	----	046E	B1	3675.50 us	CMP 0x71	R	0	0
8183	----	046F	71	3676.00 us	*	R	0	0
8184	----	0071	16	3676.50 us		R	0	0
8185	----	0470	23	3677.00 us	BLS *-50	R	0	0
8186	----	0471	CE	3677.50 us	*	R	0	0
8187	----	0471	CE	3678.00 us		R	0	0
8188	----	0440	B6	3678.50 us	LDA 0x6F	R	0	0
8189	----	0441	6F	3679.00 us	*	R	0	0
8190	----	006F	08	3679.50 us		R	0	0

4.10.6.1.5 OK Button

Click the *OK* button to close the dialog box and dump the bus analyzer data to the file.

4.10.6.1.6 Cancel Button

Click the Cancel button to close the dialog box without dumping any data.

A

Appendix

A.1 MMDS Commands

This section describes MMDS-specific commands.

Use MMDS-specific commands as you would any other commands, typing them in the Command Line component, or inserting them into a command file.

For further details about debugger commands, please see the debugger manual sections *Appendix*, *Debugger Commands* and *Command Line Component*.

A.1.1 Baud Rate Command

BAUD

A.1.1.1 Short Description

sets the communication baud rate.

A.1.1.2 Syntax

```
BAUD [rate]
```

`rate`: Specifies the new baud rate; must be one of these decimal integer constants:

1200, 2400, 4800, 9600, 19200, 28800, 38400, 57600, 115200.

A.1.1.3 Description

The **`BAUD`** command sets or displays the baud rate for communication between the system controller and the host computer. For maximum performance, the baud rate should be as high as the host computer can accommodate. The maximum rate is 115200; the default baud rate is 9600.

Without a rate value, the command displays the Communications Baud Rate Specification dialog box for interactive rate selection. If the system does not support the requested rate, the red message, “Error: <baud rate> is not a supported baud rate.” appears in the Command Line window.

Example:

```
BAUD 57600
```

Changes the Baud Rate Command to 57600.

A.1.2 Trigger Commands

CT

A.1.2.1 Short Description

clear triggers.

A.1.2.2 Syntax

CT `list |*`

`list`: A list of trigger identifiers (A, B, C, or D).

`*`: All triggers.

A.1.2.3 Description

The **`CT`** command clears definition values of specified bus analyzer triggers (events), A, B, C, or D. The command also disables these cleared triggers. Use the Set Trigger (**`ST`**) command, or the bus analyzer configuration dialog box, to set trigger values. windows. Triggers are enabled by Use the Trigger Enable (**`TE`**) and Trigger Disable (**`TD`**) commands to enable and disable triggers.

Example:

```
CT A B
```

Clears triggers A and B.

Example:

```
CT *
```

Clears all triggers.

This command clears both triggers of a range definition, even though just one of the triggers is a parameter value.

Example:

If triggers C and D define a range, **`CT C`** clears both the triggers.

ST

A.1.2.4 Short Description

set trigger.

A.1.2.5 Syntax

ST `[id [[`**!**`] [(address | address range | `**,**`) [(data | data range | ,) [(clips | ,)` [**LIR=** (**X** | **H** | **L**)]]]] [**;R** | **;W**| **;RW**] [**;D**]]]

A.1.2.6 Description

The `ST` command defines one of the four bus analyzer triggers. If this command includes only a value or id parameter value, the command interpreter opens the Trigger Specification dialog box. You can use the dialog box to set the trigger value interactively.

`id`: The id of the analyzer trigger: A, B, C, or D.

`!`: The inversion operator for the entire trigger definition. Specifying **`!`**, as well as an address, data value, and clip value, means that the trigger occurs when the address is not the specified value, or the data value is not the specified value, or the clip value s not the specified value. Specifying **`!`** with a range is specification means that the trigger occurs at values outside the range, and at the lowest value of the range.

`address`: Address that is to trip the trigger, specified with an address constant:

```
address[:mask]
```

If you include a mask value, the system comparison involves only the address bits that correspond to ones (1s) of the mask.

`address range`: A range of addresses to trip the trigger. To specify a range, use starting and ending constants, or use a starting address and a length value:

```
start-address[:mask][..end-address]
```

or

```
start-address[:mask][,length]
```

If you include a mask value, the system comparison involves only the address bits that correspond to ones (1s) of the mask. If you include a length and a mask, the system adds the length to the start address, then applies the mask to the start address and to the sum, to obtain the end address.

`,`: The comma directs the analyzer to *not* include an address, address range, data, data range, or clip value in the trigger definition.

`data:`

Data value that is to trip the trigger:

```
value[:mask]
```

If you include a mask value, the system comparison involves only the value bits that correspond to ones (1s) of the mask.

`data-range:`

A range of data values to trip the trigger. To specify a range, use start and end values, or use a starting value and a length:

```
start-value[:mask][..end-value]
```

or

```
start-value[:mask][::length]
```

If you include a mask value, the system comparison involves only the value bits that correspond to ones (1s) of the mask. If you include a length and a mask, the system adds the length to the start value, then applies the mask to the start value and to the sum, to obtain the end address.

`clips`

A 15-bit value that defines MMDS0508 analyzer logic clip signals for the trigger, specified as:

```
clips[:mask]
```

If you include a mask, the system comparison involves only the value bits that correspond to ones (1s) of the mask. For example, the code `0x1F:0x1F`, sets all clips of Term A to H. Without a mask, the ST command uses the unmasked value `0x1F` for the clips.

Each trigger clip line has three options:

H - High

L - Low

X - Don't Care

The bits of the clips and mask words are:

Bit:	Signal:
0	Group A- BRN
1	RED
2	ORG
3	YEL
4	GRN
6	LIR (active low)

`;R:` Trigger on a read bus cycle only.

`;W:` Trigger on a write bus cycle only.

`;RW:` Trigger on a read or write bus cycle.

`;D:` Disable trigger (set trigger value, but disable trigger).

`LIR:` Trigger on a specific value for LIR signal.

LIR=H triggers when LIR is high.

LIR=L triggers when LIR is low.

LIR=X triggers when LIR is high or low.

If either the address or the data value of this command is a range, the analyzer interprets both values as ranges. For example, the analyzer interprets the command `STC 8 20..40` as `STC 8.. 8 20..40`; it interprets the command `STC 8..9 20` as `STC 8..9 20..20`.

If the command lacks any `R`, `W`, or `RW` value, the trigger defaults to read/write.

You can set the LIR signal with the clips (bit 6) or the LIR option.

A bit set in both the clips and masks sets the trigger to high (-H). A bit clear in clips, but set in masks, sets the trigger to low (-L). A bit clear in a mask means that the trigger does not depend on the state of the clip.

Examples:

```
STA 0x1000
```

Sets analyzer trigger A to match accesses at address $1000.

```
STB , 4
```

Sets analyzer trigger B to match accesses with a value of 4, at any address.

```
STC 8 20..40
```

Sets analyzer triggers C and D to match accesses having a value from 20 to 40, at address 8.

```
STC 8..10 20
```

Sets analyzer triggers C and D to match accesses having the value 20, at any address from 8 to 10.

NOTE Mask bits that have the value 0 are "Don't Care" bits: for those positions of an address, data, or clip value, either a 0 or a 1 trips the trigger. Mask bits set to 1 identify positions whose values must match those of the specified address, data, or clip value. For Address 0xC000, Mask 0xFFFC, loading any of four values in the address bus would trip the trigger: 0xC000, 0xC001, 0xC002, or 0xC003. For Address 0x00B0, Mask 0xFFF0, any address in the range 0x00B0..0x00BF would trip the trigger.

TD

A.1.2.7 Short Description

trigger disable.

A.1.2.8 Syntax

TD `list |` *****

list: A list of trigger identifiers (A, B, C, or D), separated by comma or space characters.

*****: All triggers.

A.1.2.9 Description

The TD command disables specified triggers. Use the Set Trigger (ST) command to set triggers; use the Trigger Enable (TE) command to enable triggers. Use the Clear Triggers (CT) command to clear triggers.

Example:

```
TD A B
```

Disables triggers A and B.

Example:

```
TD *
```

Disables all triggers.

TE

A.1.2.10 Short Description

trigger enable.

A.1.2.11 Syntax

TE `list |*`

list: A list of trigger identifiers (A, B, C, or D), separated by comma or space characters.

*****: All triggers.

A.1.2.12 Description

The TE command enables specified triggers. Use the Set Trigger (ST) command to set triggers; use the Trigger Disable (TD) command to disable triggers. Use the Clear Triggers (CT) command to clear triggers.

Example:

```
TE A B
```

Enables triggers A and B.

Example:

```
TE *
```

Enables all triggers.

A.1.3 Bus Analyzer Commands

ARM

A.1.3.1 Short Description

arm bus analyser.

A.1.3.2 Syntax

ARM

A.1.3.3 Description

The **ARM** command arms the bus analyzer. When armed, the analyzer records bus cycles while the emulator is executing user code. Arming the analyzer clears the current contents of the trace buffer. Use the disarm analyzer (**DARM**) command to disarm the analyzer.

DARM

A.1.3.4 Short Description

disarm bus analyser.

A.1.3.5 Syntax

DARM

A.1.3.6 Description

The `DARM` command disarms the bus analyzer. When disarmed, the analyzer does not record bus cycles. If the bus analyzer is disarmed already, this command does nothing. `ARM` arms the analyzer

GE

A.1.3.7 Short Description

go to event.

A.1.3.8 Syntax

GE `list | ` **`*`** `[`**;B**`]`

`;B`: Specifies a backward search; without this option, the command directs a forward search.

`list:`A list of events (**`A`**, **`B`**, **`C`**, or **`D`**), separated by space or comma characters.

A.1.3.9 Description

The GE command searches in the analyzer trace buffer for a frame that matches the specified event. A forward search begins with the frame immediately following the current frame; a backward search begins at the frame immediately preceding the current frame.

Example:

```
GE A B
```

Moves the cursor to the next frame which contains the event A and/or B.

GF

A.1.3.10 Short Description

go to frame.

A.1.3.11 Syntax

GF frame

frame: Frame number, in the range 1..8191. This number must be decimal number, regardless of the current default number base.

A.1.3.12 Description

The GF command moves the cursor to a specified trace buffer frame. If the command's frame-number value is greater than the number of frames stored in the buffer, the command moves your display to the buffer's last frame.

Example:

```
GF 4096
```

Moves the cursor to frame 4096.

Example:

```
GF 8191
```

Moves the cursor to the last frame in the buffer.

GP

A.1.3.13 Short Description

Go to Analyzer Search Pattern.

A.1.3.14 Syntax

GP [**;B**]

;B: Specifies a backward search; without this option, the command directs a forward search.

A.1.3.15 Description

The GP command searches the analyzer trace buffer for a frame that matches the defined search pattern. (Use the SP command to define the pattern.) A forward search begins at the frame immediately following the current frame. A backward search begins at the frame immediately preceding the current frame.

When the search finds a matching frame, the system positions the line cursor on the frame, in the center of the screen. If no frame matches the pattern, the line cursor does not move. If no search pattern is defined, this command searches for any pattern: that is, the line cursor moves to the next line (or preceding line).

Example:

```
GP
```

Searches forward for the next frame that matches the search pattern.

Example:

```
GP ;B
```

Searches backward for the previous frame that matches the search pattern.

LT

A.1.3.16 Short Description

log trace.

A.1.3.17 Syntax

LT [range]

range: The range of frames (decimal numbers) to be copied. Without a range value, this command copies all frames in the trace buffer.

A.1.3.18 Description

The LT command copies contents of the bus analyzer trace buffer to the log file, in the current view format. The target must be stopped to execute an LT command.

Example:

```
LF logfile
```

Open the logging file.

Example:

```
LT
```

Copy all the trace buffer to the logging file.

Example:

```
NOLF
```

Close the logging file.

SC

A.1.3.19 Short Description

set analyzer clock.

A.1.3.20 Syntax

SC [timetag [frequency]]

`timetag`: One of these values:

`OSC1MHZ` (1 Mhz oscillator)

`OSC2MHZ` (2 Mhz oscillator)

`OSC4MHZ` (4 Mhz oscillator)

`OSC8MHZ` (8 Mhz oscillator)

`OSC16MHZ` (16 Mhz oscillator)

`EXT` (external clock)

`BUS` (bus clock)

`PROGRAM` (programmable clock)

`frequency`: Time tag clock frequency for the programmable clock, 50 Hz to 50 kHz (enter a decimal hertz value). The programmable clock source has a fundamental frequency of 500,000 Hz; the actual frequency the system uses is the quotient of

500,000 Hz divided by an integer. Thus, 50000 is valid, but 49000 is not. (If you specify 49000, the system rounds the value up the the next higher valid frequency: 50000.)

A.1.3.21 Description

The `SC` command sets the source for the time tag clock, which increments the trace buffer time tag. If this command includes no parameter values, the command interpreter opens the Bus Analyzer Configuration dialog box. You can use the Time Tag Clock page to reach the Clock Specification dialog box, then set the clock sources interactively.

Example:

```
SC PROGRAM 100
```

Sets the programmable clock, running at 100Hz, as the time clock source.

Example:

```
SC OSC8MHZ
```

Sets the 8 Mhz oscillator as the time tag clock source.

SP

A.1.3.22 Short Description

set analyzer search pattern.

A.1.3.23 Description

The `SP` command defines a search pattern for the bus analyzer trace buffer. The go to pattern (`GP`) command starts the search for the pattern defined by the most recent `SP` command. If the SP command includes no parameter values, the command interpreter opens the Bus Analyzer Configuration dialog box. You can use the Pattern page to define the pattern interactively.

A.1.3.24 Syntax

SP `[!] [(<address> | ,) [(<data> | ,) [(<clips> | ,)`[**LIR = (X | L | H)**]]]] [**;R | ;W| ;RW**]

!:

The inversion operator, which applies to a single address or data value. Specifying **!**sets a pattern on addresses or data values *other* than the specified address or data value.

address:

Address part of the pattern, specified with an address constant:

```
address [:mask]
```

If you include a mask value, the system comparison involves only the address bits that correspond to ones (1s) of the mask.

,:

The comma directs the analyzer to *not* include an address, data, or clips value in the pattern definition. The omitted item matches any value of its type (so is a don't care entry).

data:

Data part of the pattern, specified as:

```
value [:mask]
```

If you include a mask value, the system comparison involves only the value bits that correspond to ones (1s) of the mask.

A 15-bit value that defines MMDS0508 analyzer logic clip signals for the trigger, specified as:

```
clips[:mask]
```

clips:

A 16-bit value that defines the logic clip signal values of the pattern, specified as:

```
clips [:mask]
```

If you include a mask, the system comparison involves only the value bits that correspond to ones (1s) of the mask.

The bits of the clips and mask words are:

Bit:		**Signal:**	**Bit:**		**Signal:**
0	Group A -	BRN	8	Group B -	BRN

Bit:	Signal:	Bit:	Signal:
1	RED	9	RED
2	ORG	10	ORG
3	YEL	11	YEL
4	GRN	12	GRN
5	BLU	13	BLU
6	LIR	14	VLT
7	GRY	15	GRY

;R: Search for a read bus cycle only.

;W : Search for a write bus cycle only.

;RW: Search for either a read or write bus cycle.

LIR: Search for a specific LIR-signal value:

LIR=H searches for LIR high.

LIR=L searches for LIR low.

LIR=X searches for LIR either high or low.

A bit set in both the clips and masks detects the pattern if the bit is high (-H). A bit is clear in clips but set in masks detects the pattern if the bit is low (-L). A bit clear in a mask means that pattern detection does not depend on the state of the clip.

Examples:

```
SP 0x1000
```

Sets accesses at address $1000 to be part of the analyzer search pattern.

```
SP , 4
```

Sets accesses with the data value 4, at any address, to be part of the analyzer search pattern.

```
SP 8 20
```

Sets accesses with the data value 20, at address 8, to be part of the analyzer search pattern.

NOTE Mask bits that have the value 0 are “Don’t Care” bits: for those positions of an address, data, or clips value, either a 0 or a 1 trips the trigger. Mask bits set to 1 identify positions whose values must match those of the specified address, data, or clip value. For Address 0xC000, Mask 0xFFFC, loading any of four values in the address bus would trip the trigger: 0xC000, 0xC001, 0xC002, or 0xC003. For Address 0x00B0, Mask 0xFFF0, any address in the range 0x00B0..0x00BF would trip the trigger.

SQ

A.1.3.25 Short Description

set sequencer.

A.1.3.26 Syntax

SQ `[mode [count] [;`**S**`] ]`

`mode`: One of these values:

`ALL` (records all bus cycles)

`EVENT` (records only events)

`SEQ0` (sequential A+B+C+D)

`SEQ1` (sequential A+B->C+D)

`SEQ2` (sequential A->B->C D<-)

`SEQ3` (sequential A->B->C->D)

`SEQ4` (nth event after A+B+C+D)

`count`: Terminal count for the **`ALL`** and **`EVENT`** modes (a decimal value). Directs recording of count frames (of the appropriate type). When the number of frames recorded reaches the count value, the analyzer stops recording and is disarmed. If this command has no count value, the analyzer records continuously whenever the emulator is running. For sequential modes, the count value is the decimal post-trigger count, directing recording of count bus cycles after the trigger point. The default count value is 1. If no count value follows the mode value **`ALL`**, the system records frames for all cycles. If no count value follows the mode value **`EVENT`**, the system records all the events.

`;S`: Specifies stopping the emulator when recording stops, letting you use the analyzer as a sequenced breakpoint machine.

A.1.3.27 Description

The **SQ** command sets the analyzer sequencer mode. If this command includes no parameter values, the command interpreter opens the Bus Analyzer Configuration dialog box: select the Sequencer Setup dialog box to program the sequencer interactively. Selecting from the Setup menu is another way to open the Sequencer Setup dialog box.

Example:

```
SQ ALL 100
```

Specifies 100 bus cycles. After 100 cycles, the analyzer disarms itself and stops recording.

Example:

```
SQ EVENT 10 ;S
```

Specifies recording 10 event cycles, then stopping the emulator.

TT

A.1.3.28 Short Description

display time tag difference.

A.1.3.29 Syntax

TT `[sframe [eframe]]`

`sframe`: The starting frame number.

`eframe`: The ending frame number; without this value, the system uses the end frame in the trace buffer to calculate the difference.

A.1.3.30 Description

The `TT` command displays the difference between the time tags in the two trace frames of the analyzer display. Without frame-number values, this command displays the difference between the beginning and ending frames

Example:

```
TT
```

Displays the difference between the beginning and ending frames in the trace buffer.

Example:

```
TT 80
```

Displays the difference between frame 80 and the ending frame in the trace buffer.

Example:

```
TT 10 40
```

Displays the difference between frames 10 and 40 in the trace buffer.

VA

A.1.3.31 Short Description

analyzer view.

A.1.3.32 Syntax

VA [**MODE=**(**MIX** | **INS** | **GRAPH**)]

MODE=: When followed by one of the three following keywords, specifies the mode of the bus analyzer window display.

MIX: Mixed view mode.

INS: Instruction view mode.

GRAPH: Graphical view mode.

A.1.3.33 Description

The VA command specifies the display format for the analyzer trace buffer. This command is valid only if the bus analyzer is open.

Example:

```
VA MODE=MIX
```

Selects mixed view mode.

A.1.4 Target Signal Emulation Commands

SIG

A.1.4.1 Short Description

set emulator signals.

A.1.4.2 Syntax

SIG `[ [`**ENABLE**`] signal {signal}] [ `**DISABLE**` signal {signal}]`

`signal`: The signal to be enabled or disabled: **`RESETIN`** or **`RESETOUT`**.

`ENABLE`: Connect the signal from the target system.

`DISABLE`: Disconnect the signal from the target system.

A.1.4.3 Description

The **`SIG`** command enables or disables control signals from the target MCU. If the command specifies any signals, but lacks either keyword **`ENABLE`** nor **`DISABLE`**, the command enables the signals.

Example:

```
SIG ENABLE RESETIN
```

Enables the “reset in” signal from the target system.

A.1.5 Reset Commands

RESET

A.1.5.1 Short Description

resets target MCU.

A.1.5.2 Syntax

RESET [GO|STOP]

`GO`: Resets the MCU and does a Go from Reset.

`STOP`: Resets the MCU and stops (default).

A.1.5.3 Description

The **`RESET`** command resets the target MCU.

Examples:

```
Reset Go
```

Resets the MCU and does a `GO` from Reset.

```
Reset
```

Resets the MCU and stops (default setting).

A.1.6 Other Commands

LOADMAP

A.1.6.1 Short Description

loads memory map.

A.1.6.2 Syntax

`LOADMAP` `fileName | MCUID`

`fileName`: a standard full path of a file that defines a memory map.

`MCUID`: the MCU identifier. If the command includes an MCUID value, the system loads a memory map from the file that matches this value.

A.1.6.3 Description

The LOADMAP command loads a memory map from a file. The file specification must be the full pathname. If the file is in the current directory, the characters “`.\`” must precede the name (for example: `LOADMAP .\00123V22.MEM`).

Example:

```
LOADMAP 0xC17
```

Loads a memory map from a file that matches this MCU identifier (68HC08AX48).

Note that the MCUID identifies an MCU, not an EM Board. The memory map filename has this format:

0nnnnVvv.MEM

where ‘nnnn’ is the four-digit, hexadecimal ‘MCU-ID’, and ‘vv’ is a two-digit version number.

MEM

A.1.6.4 Short Description

displays the memory map.

A.1.6.5 Syntax

```
MEM
```

A.1.6.6 Description

The **`MEM`** command displays the current memory map.

Example:

```
in>MEM
Type    Addresses   Comment
-------------------------------------------------------
IO          0..  3F  PRU or TOP   TOP board resource or the PRU
NONE       40..  4F  NONE
RAM        50.. 64F  RAM
NONE      650.. 7FF  NONE
EEPROM    800.. A7F  EEPROM
NONE      A80..3DFF  NONE
```

```
ROM     3E00..FDFF  ROM
IO      FE00..FE1F  PRU or TOP   TOP board resource or the PRU
NONE    FE20..FFDB  NONE
ROM     FFDC..FFFE  ROM
COP     FFFF..FFFF  special ram for cop
RT MEM     0.. 3FF  (disabled)
-------------------------------------------------------
```

OSC

A.1.6.7 Short Description

selects Emulator Clock Frequency command.

A.1.6.8 Syntax

OSC [rate|source]

A.1.6.9 Description

The **OSC** command selects the emulator clock frequency: one of five internally generated frequencies (16 Mhz, 8 Mhz, 4 Mhz, 2 Mhz, or 1 Mhz), or an external clock source. The firmware sets the default emulator clock rate, adapting it to the current frequency.

Entering this command without parameters opens the corresponding dialog box.

OSC [rate | source]

where rate is:	OSC1MHZ	Selects the 1 Mhz oscillator.
	OSC2MHZ	Selects the 2 Mhz oscillator.
	OSC4MHZ	Selects the 4 Mhz oscillator.
	OSC8MHZ	Selects the 8 Mhz oscillator.
	OSC16MHZ	Selects the 16 Mhz oscillator.
Where source is:	EXT	Selects an external clock source.

Example:

```
                OSC OSC8MHZ      // Use the 8 Mhz internal
  emulator clock.
```

PROTOCOL

A.1.6.10 Short Description

controls Show Protocol functionality.

A.1.6.11 Syntax

`PROTOCOL [ON | OFF]`

ON: Reports commands and responses in the command line window (default value for this command).

OFF: Does not report commands or responses in the command line window; does not log commands or responses in the log file.

A.1.6.12 Description

The **PROTOCOL** command controls reporting commands and responses in the command line window. Entering this command without a parameter value has the same effect as entering the command with the parameter value **ON**.

RTMEM

A.1.6.13 Short Description

configures real time memory.

A.1.6.14 Syntax

`RTMEM address [;E|;D]`

address: base address of a real time memory block (default is 0).

;E: Enables the real time memory block (the default for this command).

;D: Disables the real time memory block.

A.1.6.15 Description

The **RTMEM** command lets you enable or disable real time memory.

Example:

```
   RTMEM 0x1000 ;D
```

Disables the real time memory block at base address $1000.

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