MerlinMCH
Software Manual

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Table of Contents

1 Introduction

MerlinMCH is a Windows based GUI test and simulation program for MIL-STD-1553 bus communications data. The program enables avionics equipment testers to send/receive messages in Bus Controller, Remote Terminal and Sequential Monitor modes by defining raw data. In Sequential Monitor mode the user has the additional option of defining data with engineering units.

Excalibur's powerful MIL-STD-1553 line of products include the following boards and modules:

EXC-1553PC/MCH	*EXC-PCMCIA1553*
EXC-1553PCI/MCH	*M4K1553MCH* module for the EXC-4000 family of carrier board

For the most up-to-date list of Excalibur products, check our website at www.mil-1553.com.

Overview of *MerlinMCH*

Excalibur's 1553 boards provides the user compatibility with MIL-STD-1553A and MIL-STD-1553B protocols, including the McAir and F-16 derivative.

The GUI software is built around Excalibur's *MCH Software Tools* drivers. These drivers are delivered in the form of DLLs, enabling the use of a single executable for multiple boards and operating systems. *MerlinMCH* should always be downloaded with the drivers for the appropriate board.

MerlinMCH supports Bus Controller, Remote Terminal and Bus Monitor modes. On MCH boards and modules each channel can be a BC, RT, or BM, and function independently.

Getting Started

To Install *MerlinMCH*

1. Install *MCH Software Tools* either from the *Excalibur Installation CD* or download the software from our website: www.mil-1553.com
2. Run the **`ExcConfig`** utility program as described in the instructions for *MCH Software Tools*. The installer ensures that the Borland DLL is placed in the Windows System directory. If any changes are made to the DLL, the new DLL must be included either in the Windows System directory or in the same directory as *MerlinMCH*.

   Note: *MerlinMCH* uses the *MCH Software Tools* DLL for Borland.
3. Install *MerlinMCH* either from:
   - the *Excalibur Installation CD* or
   - download the software from our website www.mil-1553.com, unzip the file and run **`Setup.exe`**.

If *MerlinMCH* does not come up on your screen or if you have problems while working with the software see **Chapter 5 Troubleshooting: Installation Problems,** page 5-1.

To Start Working with *MerlinMCH*

1. From the Windows **Start** menu:
   - If *MerlinMCH* was installed from the *Excalibur Installation CD*, click **Programs > Excalibur > *MerlinMCH***
   - If *MerlinMCH* was downloaded from the Excalibur website, click **Programs > Excalibur *MerlinMCH***

The main *MerlinMCH* screen is displayed.

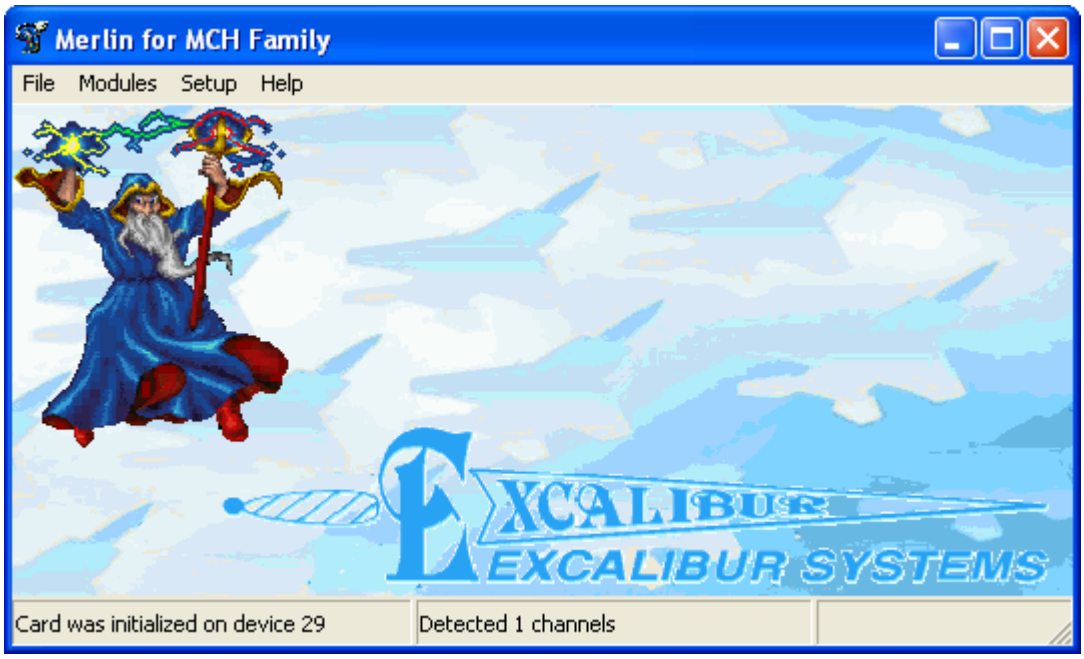


Figure 1-1 Main *MerlinMCH* Screen

2. From the **Menu bar**, click **Setup**. A Drop-down menu of Excalibur boards is displayed.

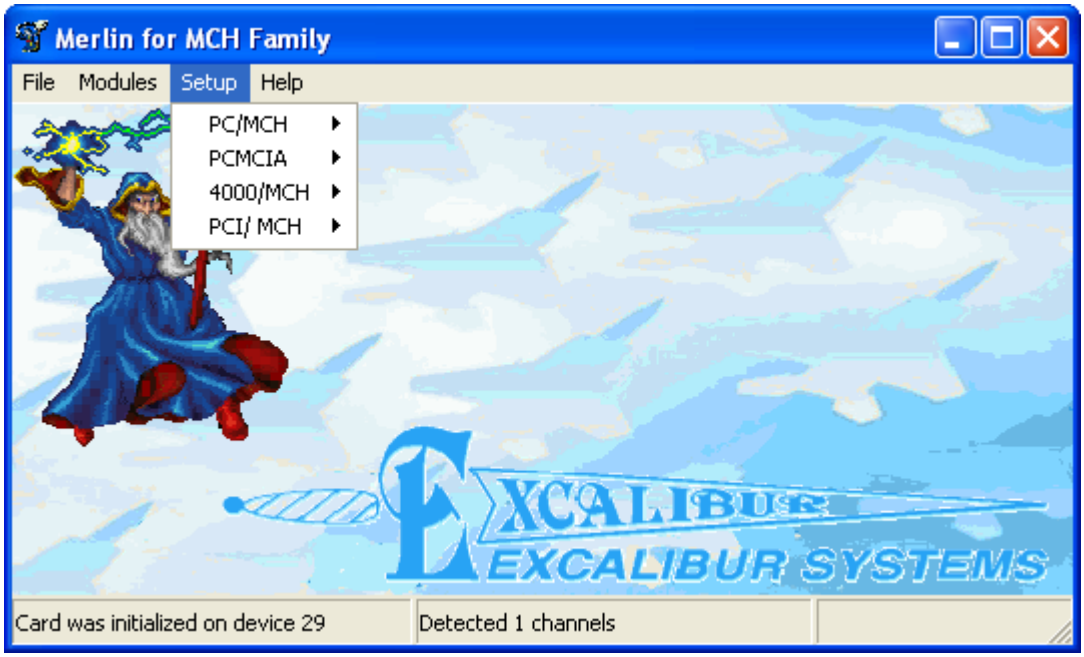


Figure 1-2 Board/Module Drop-down menu

3. From the Drop-down menu, select the board/module to be tested. A board or **Device Number Submenu** is displayed.

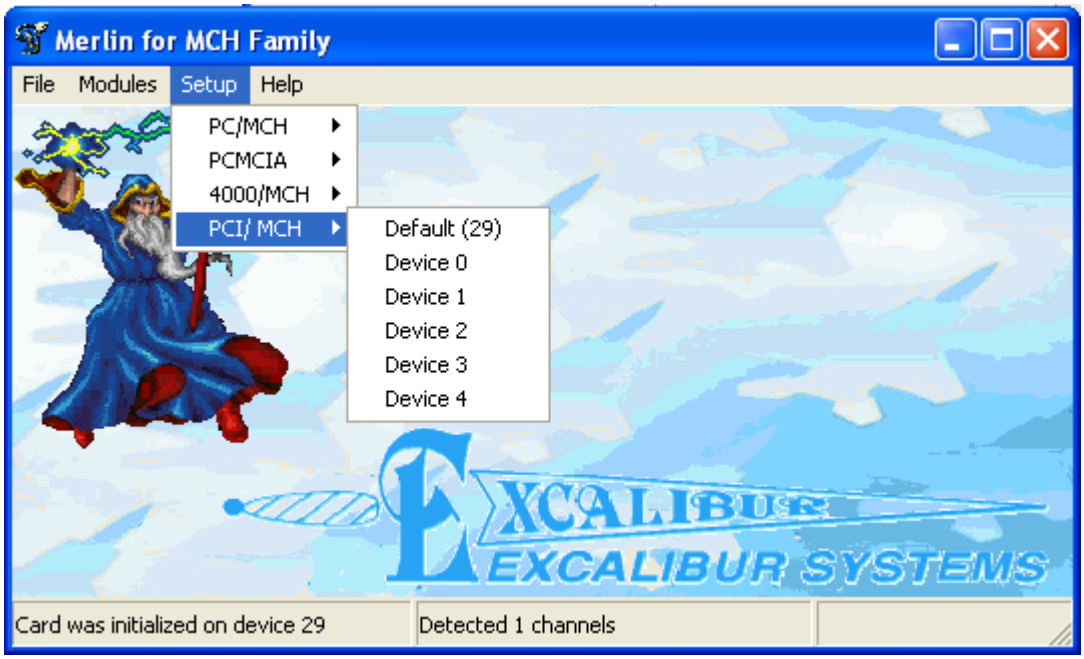


Figure 1-3 Device Number Submenu

4. After selecting a device number, the **Status bar** indicates that board/module was initialized for the device selected and the number of channels detected.

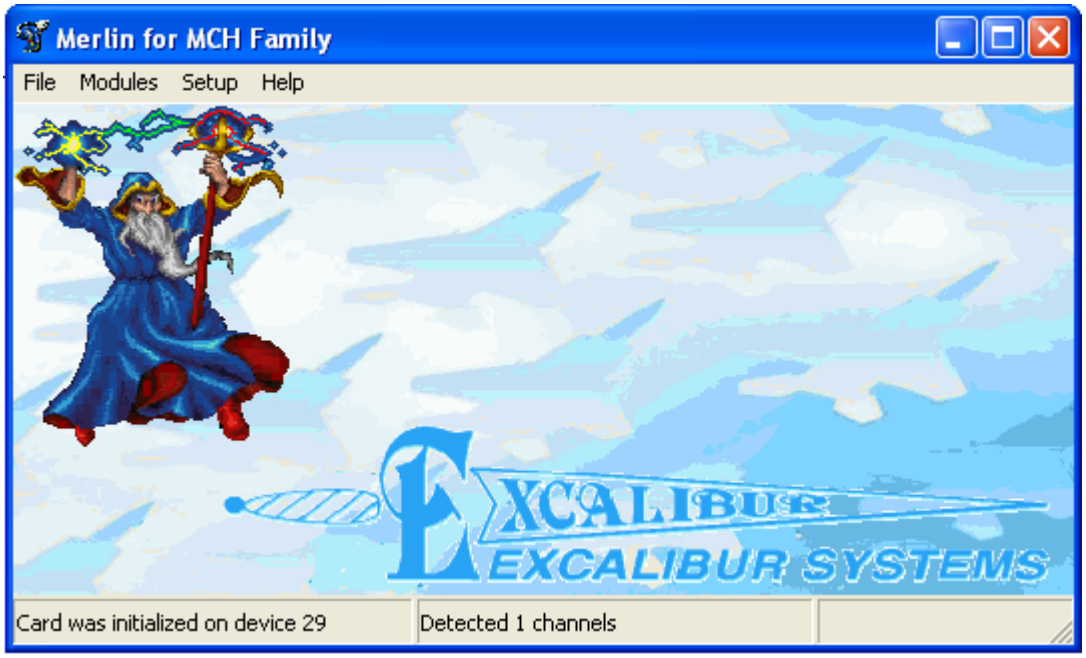


Figure 1-4 Board/Module Initialization OK

Selecting a Mode of Operation:

1. From the Main screen, select **Modules**. A **Modules Drop-down** menu is displayed.

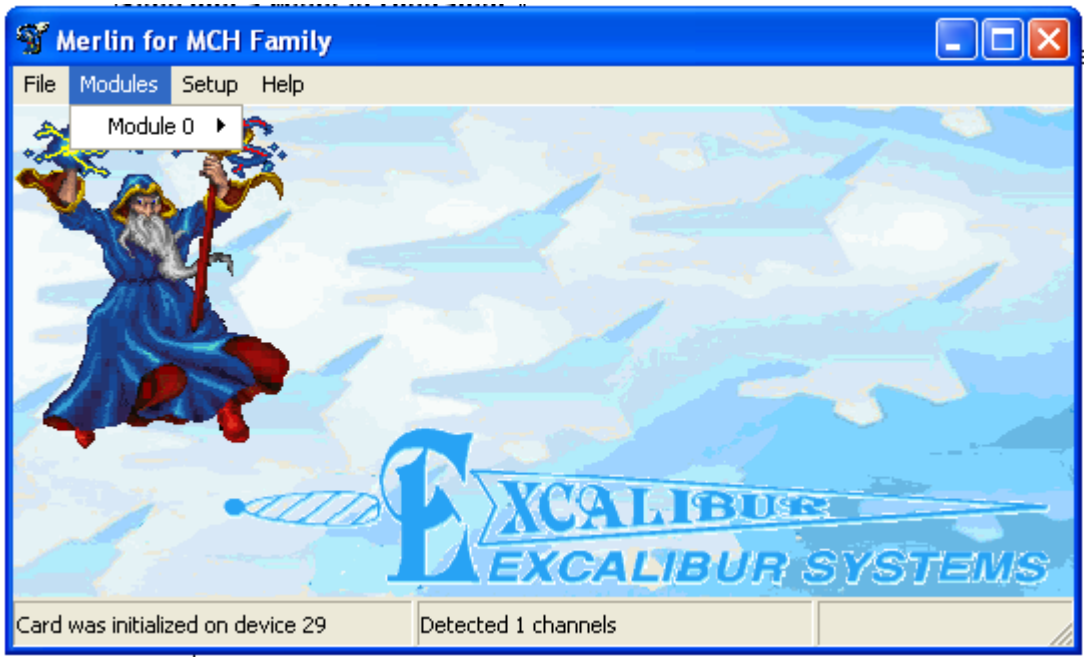


Figure 1-5 Modules Drop-down menu

2. From the Module Drop-down menu select a module. A **Modes Submenu** is displayed.

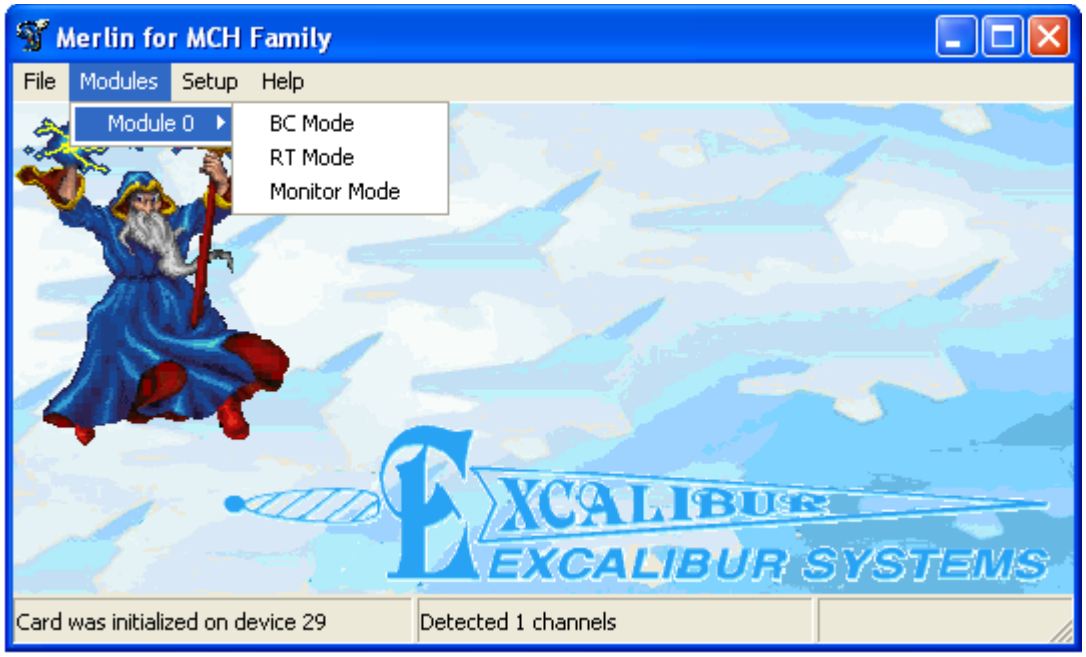


Figure 1-6 Modes Drop-down menu

3. Select a mode from the Submenu.

You are now ready to set parameters and define data in the selected mode.

2 Bus Controller Mode

In Bus Controller mode, *MerlinMCH* emulates the Bus Controller. The user can send up to 200 messages on the bus either in one-shot or continuous mode.

MerlinMCH Bus Controller Mode operations can be performed from a single screen which controls defining messages and global setup options.

Defining Messages to:

- Design a 1553 message
- Run one time or continuously
- Enter data
- Select which bus to send messages on
- View the Status of the message
- Select Error Injections
- Retries

Global Setup Options to define board options in BC mode.

Running BC/Concurrent-RT Mode

To display the BC mode screen, from the *MerlinMCH* main screen select **Modules>BC Mode**. (See *To Start Working with MerlinMCH* on page 1-3.)

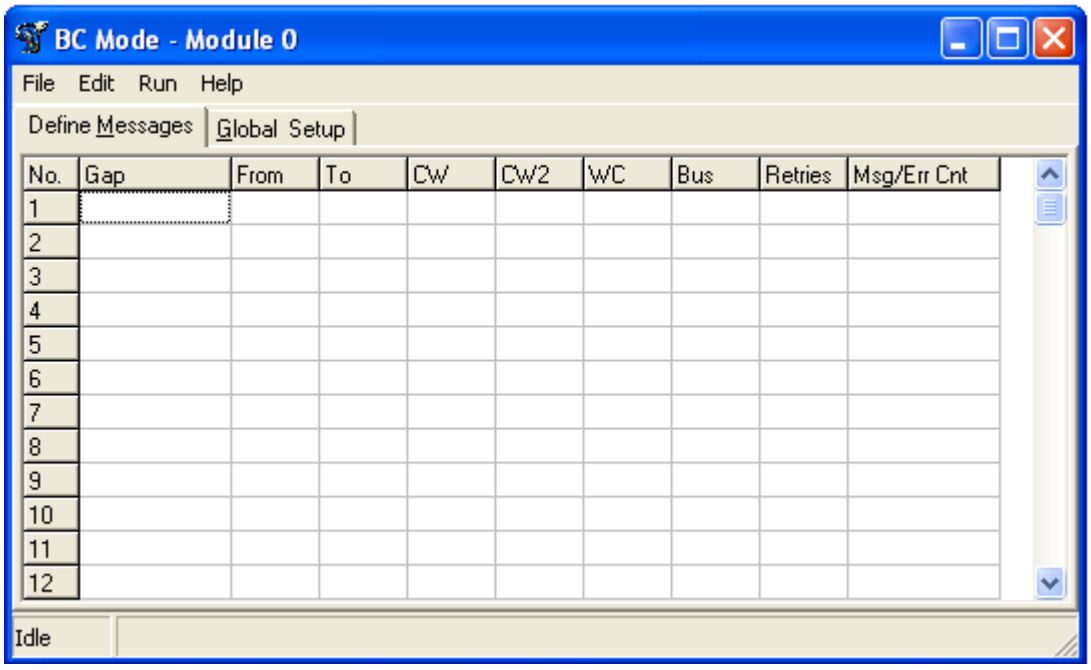


Figure 2-1 BC Mode screen

From the **BC Mode** main screen menu bar:

Select:		To:
File	**New**	Clear all messages which were previously defined. These messages are cleared only on the screen, not in the memory of the board. New messages will be entered into the memory of the board when the user selects **Start**.
	Open	Load previously defined BC **`*.mmf`** [*MerlinMCH* Message file] message file
	Save	Save defined BC messages and global setup information as **`*.mmf`** file
	Exit	Close the BC Mode window, return to *MerlinMCH* main screen
Edit	**Cut Row [Ctrl+x]**	To cut a message
	Copy Row [Ctrl+c]	To copy a message
	Paste Row [Ctrl+v]	To paste a message which was **cut** or **copied**
	Clear Msg/Err Count [Ctrl+Alt+c]	To clear the Message or Error count
Run	**Start [F9]**	To start board/module operation
	Stop	To stop board/module operation

Defining Messages

To enter or edit a 1553 Message:

1. Double-click in any of the first 7 columns (**Gap, From, To, CW, CW2, WC, BUS**), in a defined message or the next available blank line, in the Define Messages grid, to display the **Define Message Dialog Box**.

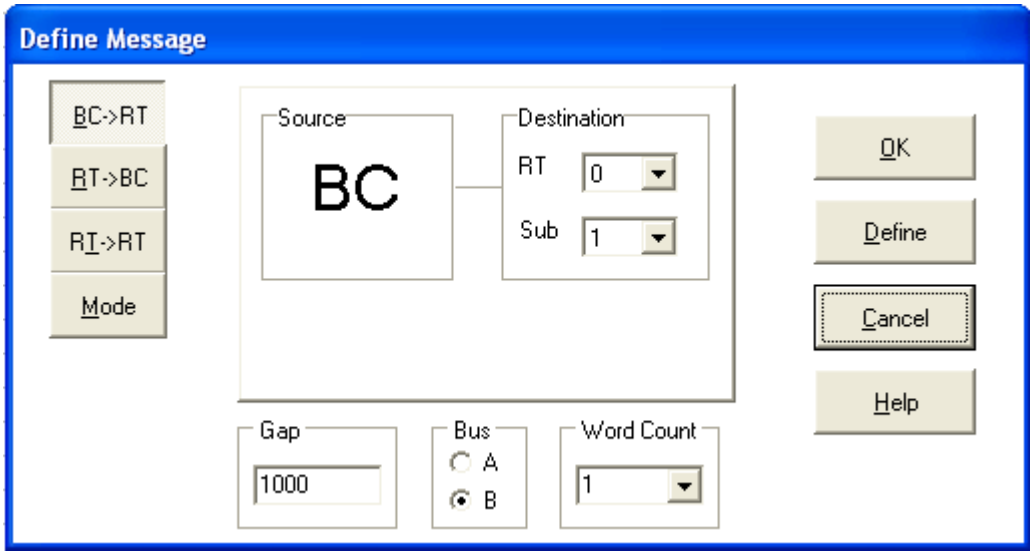
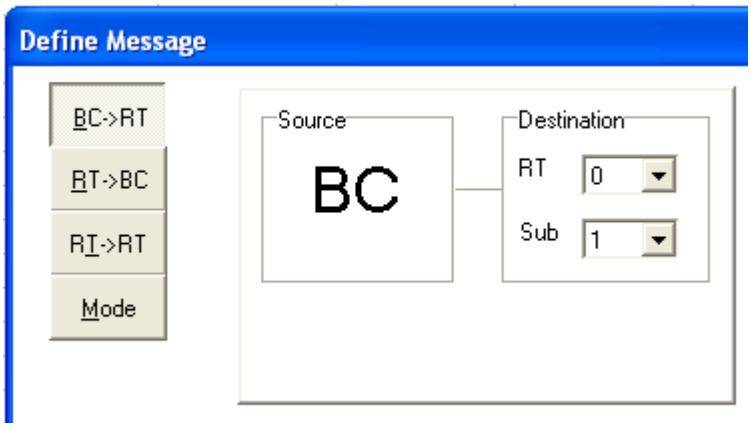


Figure 2-2 Define Message Dialog Box

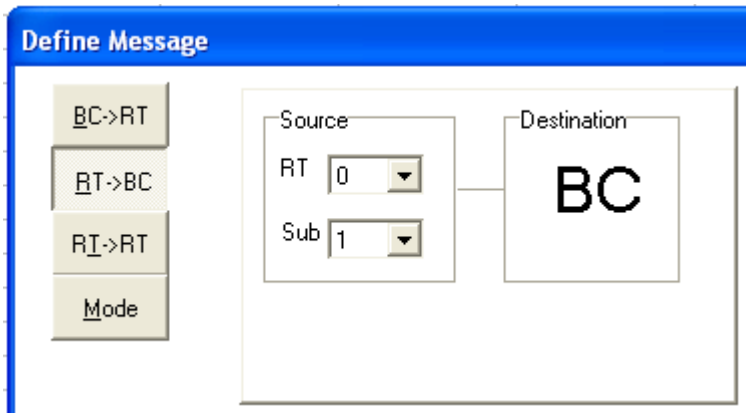
2. Click a Command button to select the type of message to send.

   a/ For a **BC > RT** message, select the destination RT and Subaddress (SA):

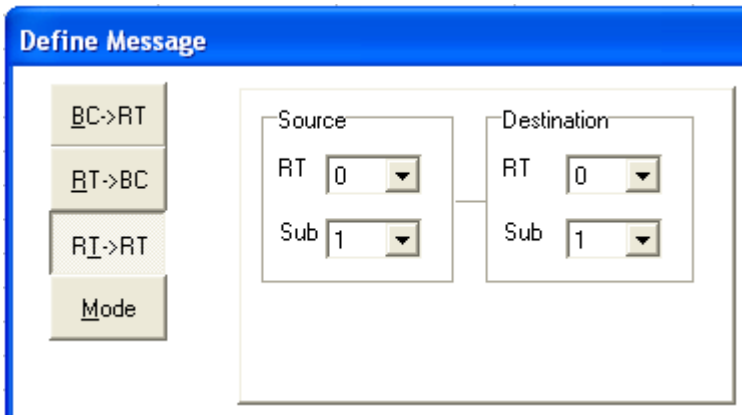


   RT: Allowed values 0–31
   SA: Allowed values 0–31

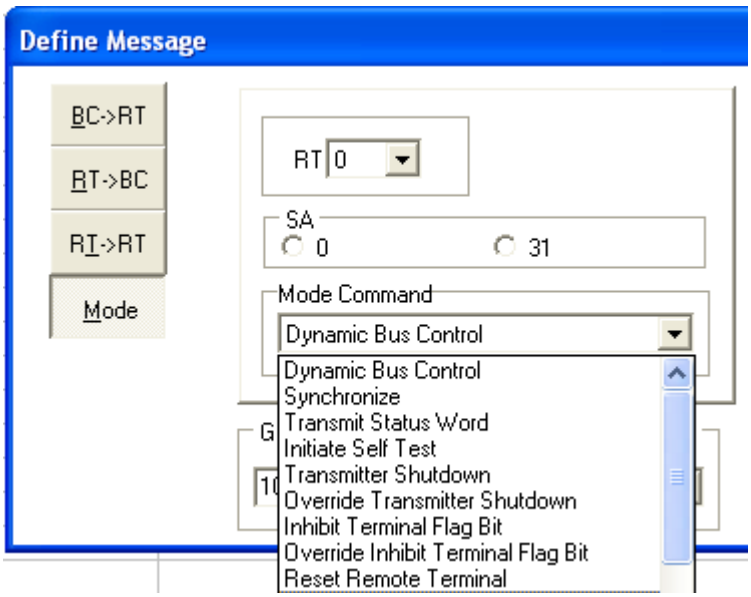
b/ For an **RT > BC** message, select the source RT and Subaddress:



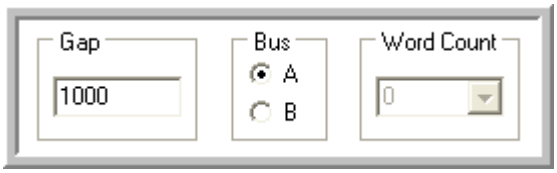
c/ For an **RT > RT** message, select the source RT and Subaddress and the destination RT and Subaddress:



d/ For a **Mode Command**, select the target RT, the Subaddress that identifies this as a Mode Code and the Mode Code type:



3. Select the Intermessage Gap time between this message and the next one. Gap time is in microseconds. The minimum Gap time is 4 µsecs. This option may be ignored, if this is the last message in the list.



4. Select Bus **A** or **B** on which the message will be transmitted. Bus A is the default value.

5. To define, view or modify data of the message defined or received, click the **Define command button** in the **Define Message Dialog Box**. The **Define/Modify Data** dialog box is displayed.

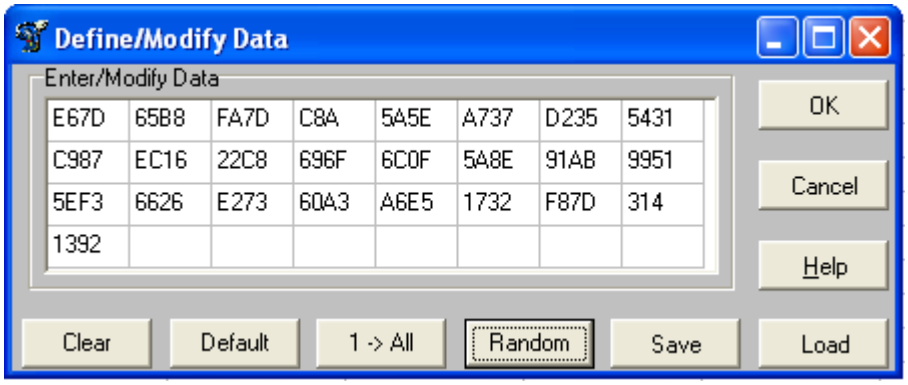


Figure 2-3 Define/Modify Data Dialog Box

In the **Define/Modify Data** dialog box:

Click:	To:
Clear	Clear all the data in the grid, to enter new data.
Default	Starting with 0, fill all the cells with data according to the hexadecimal number of the cell.
1 > All	Copy the first Word to all the cells in the grid.
Random	Fill all cells with random data.
Save	Save data for later use.
Load	Load previously saved ***.mdb** [*MerlinMCH* data file] from the disk.

Note:

a Each message contains up to 32 Words of data.
b Enter hexadecimal values *only*.
c The number of words in a message *cannot* be more than the word count. For example: if word count = 5, up to 5 words can be entered into a message.

6. Click **OK**, to return to the **Define Message Dialog Box**.
7. Click **OK**, to return to the **BC Mode Message** grid.

8. To enter the number of **Retries**, double-click the Retries column, the **Retries popup menu** is displayed. Select the number of retries. The default setting is **No retries**.

9. To view the **Message and Error Information**, double-click the Msg/ErrCnt Column. The **Message Information Properties Box** is displayed.

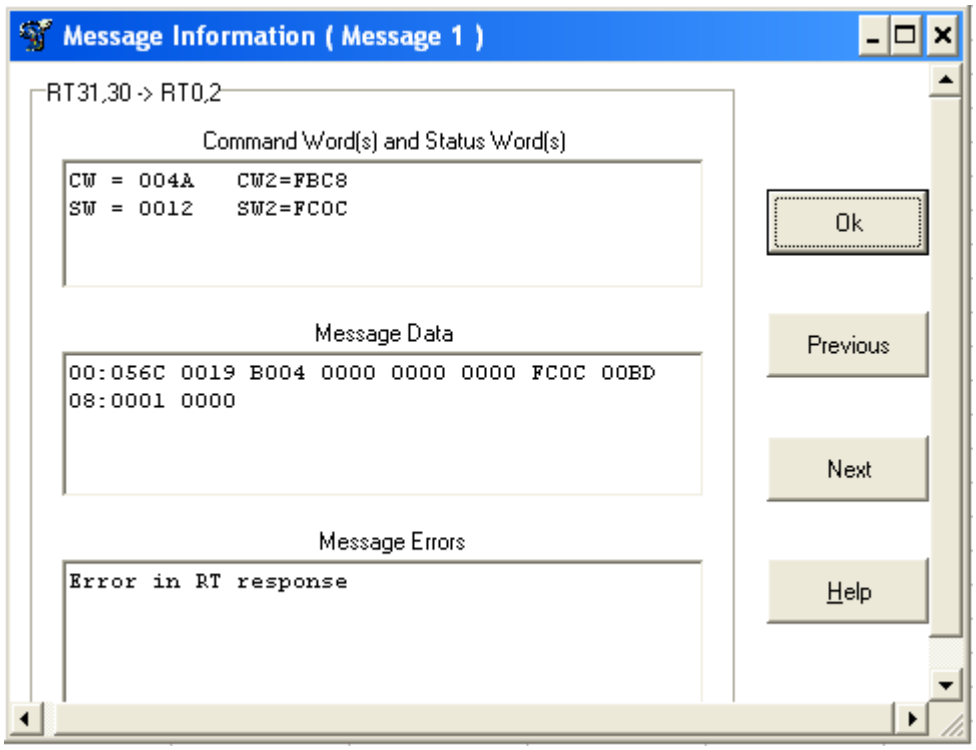


Figure 2-4 Message Information Properties Box

Global Setup Options

To define global options for BC, select the **Global Setup tab** from the BC mode main screen.

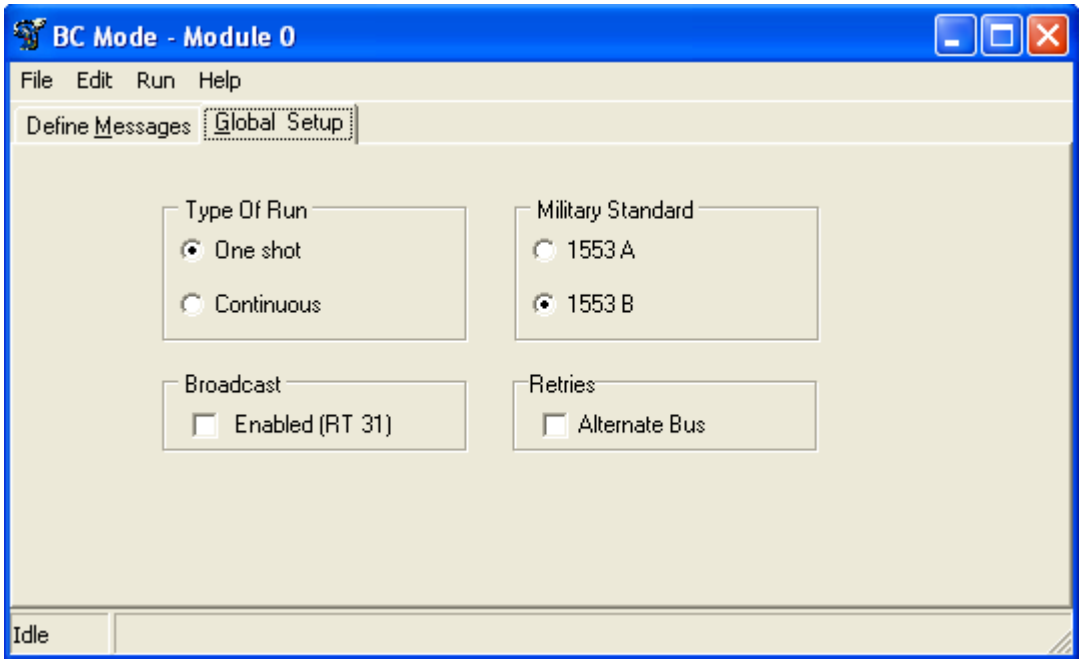


Figure 2-5 Global Setup Options

In the **Global Setup dialog box:**

1. Select a **Type of Run:**

   One Shot Run *one time only* all messages defined on the BC mode screen

   Continuous Run *continuously* all messages defined on the BC mode screen

2. To enable RT31 to function as the **Broadcast RT**, select the **Enabled (RT 31)** checkbox.
3. Select **Military Standard**:

   1553A MIL-STD-1553A

   1553B MIL-STD-1553B

4. For **Retries** to operate on the Alternative Bus, select **Alternate Bus**:

   B instead of A, then

   A instead of B, then

   B instead of A

Testing Data

To **Start** test data, from the BC mode screen, select **Run > Start** or click **F9**.

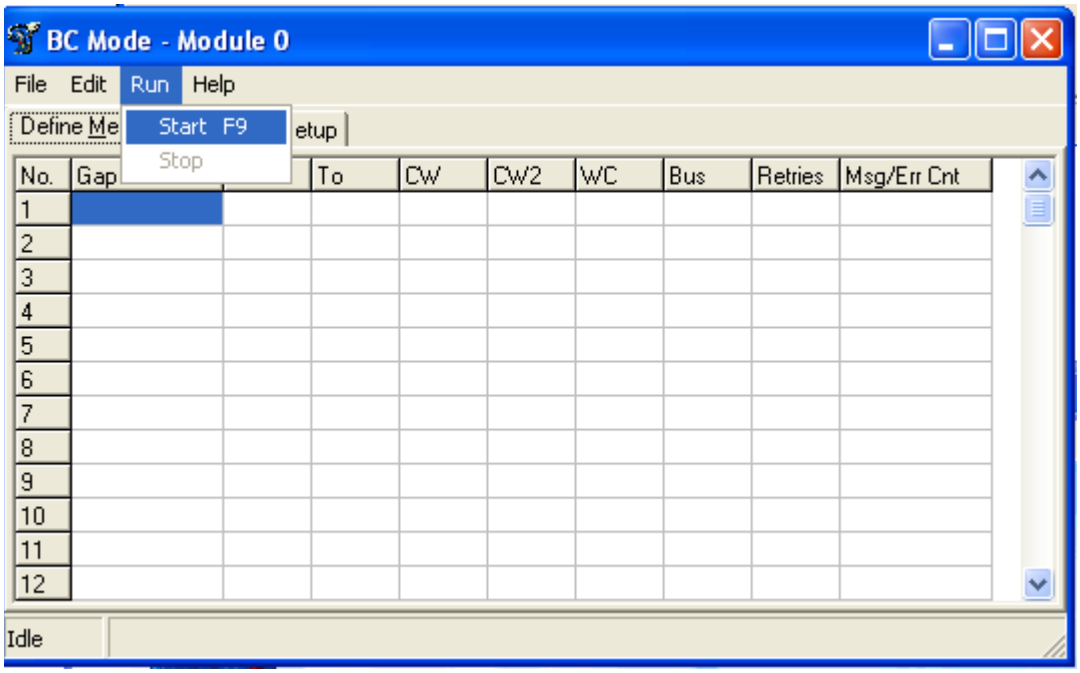


Figure 2-6 BC Mode Testing Data

To **Stop** testing, select **Run > Stop**.

3 Remote Terminal Mode

In Remote Terminal (RT) Mode, *MerlinMCH* enables the user to:

- Simulate one RT
- Define data blocks and bind them to any RT id.
- Enter and view data in data blocks

Running RT Mode

To display the RT mode screen, from the *MerlinMCH* main screen select **Modules>RT Mode**. (See *To Start Working with MerlinMCH* on page 1-3.)

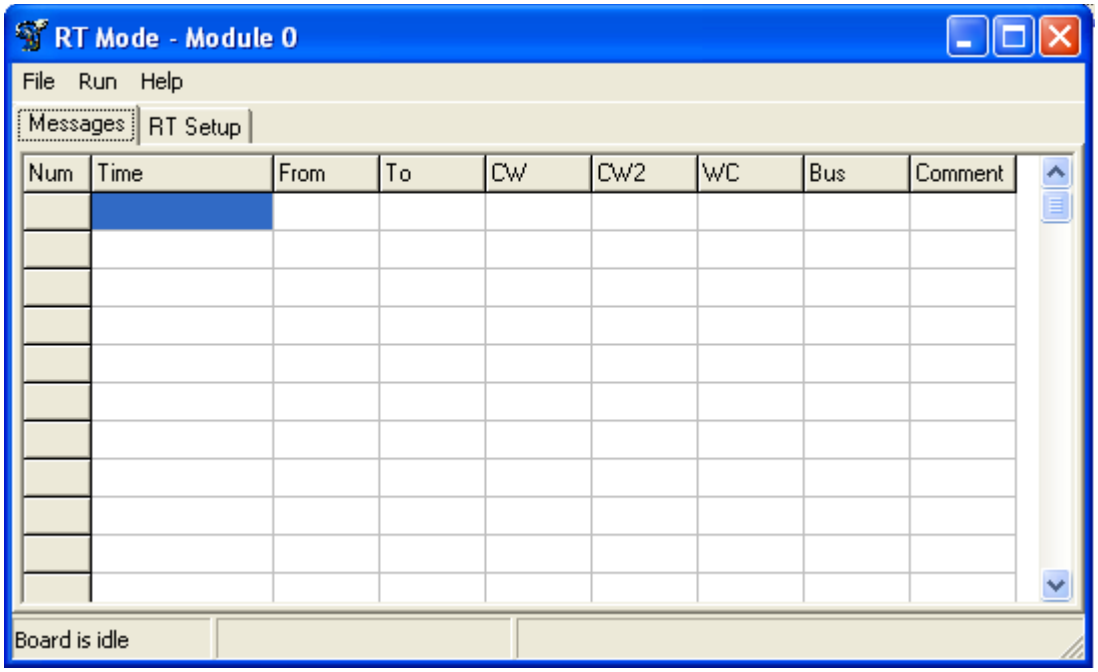


Figure 3-1 Remote Terminal Mode Messages Grid

The **RT Messages Grid**, shown in Figure 3-1, displays a list, in chronological order, of received messages. Each line shows the type of message, RT number, subaddress and Word count associated with the message, along with a time stamp, a primary/ secondary bus indicator and an error status if applicable.

From the **RT Mode** main screen Menu bar:

Select:		To:
File	**Clear Screen**	Clear all received messages
	Load Parameters	Load RT mode setup **`*.rtp`** file – includes all defined RT parameters
	Save Parameters	Save current RT setup as **`*.rtp`** file
	Exit	Close the RT mode window, return to *MerlinMCH* main screen
Run	**Start**	Run the board in RT mode
	Stop	Stop the board operation

View Status of Messages

To see a message in greater detail, double-click any column. The **Message Information Properties** box is displayed.

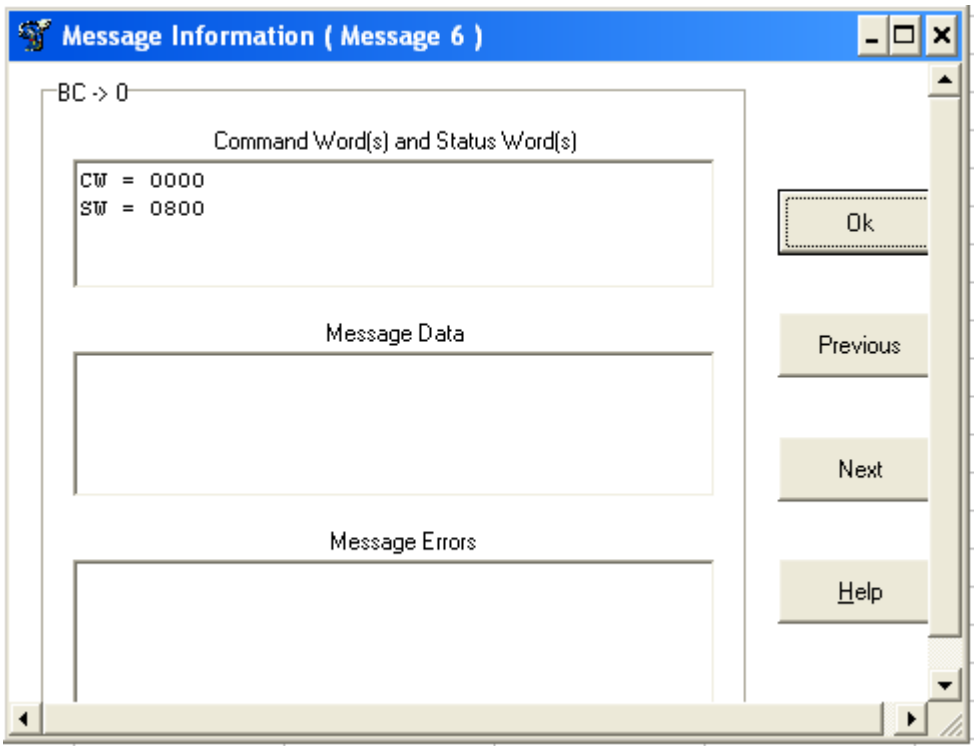


Figure 3-2 Message Information Properties Box

RT Setup

To set up an RT:

1. In **RT Mode**, click the **RT Setup** tab, to display the **RT Setup Properties box**.

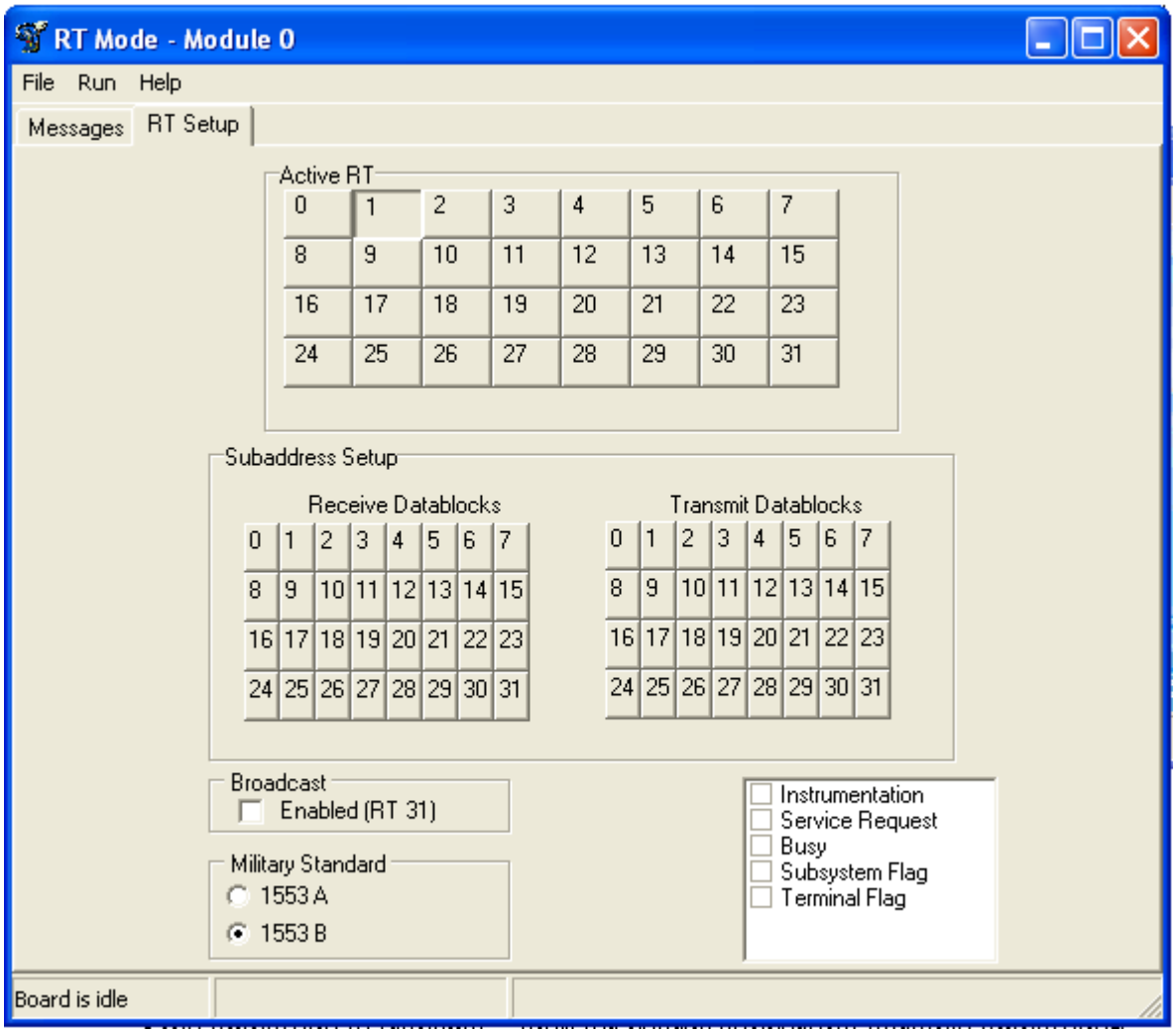


Figure 3-3 RT Setup Properties Box

2. Activate an RT in the **Active RT grid**. Click any RT button.
3. Assign a data block to the selected Subaddress in the **Subaddress Setup grid**.
   a **Receive Subaddresses**: left-click a button to select or deselect a receive subaddress.

b **Transmit Subaddresses:** left-click a button to select or deselect a Transmit Subaddress. *After selecting a transmit subaddress,* right-clicking the button displays a **Define/Modify Data dialog box** that permits the user to select and modify the data that should be sent in response to an RT to BC command directed to that subaddress.

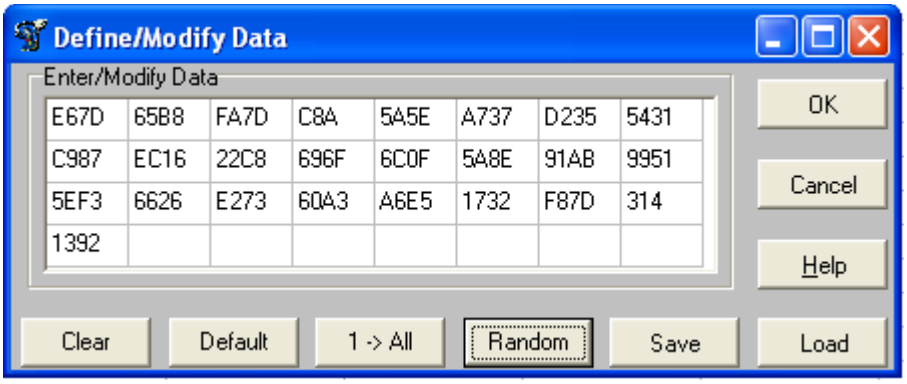


Figure 3-4 Define/Modify Data Properties Box

Click:	To:
Clear	Clear all the data in the grid, to enter new data.
Default	Starting with 0, fill all the cells with data according to the hexadecimal number of the cell.
1 > All	Copy the first Word to all the cells in the grid.
Random	Fills all cells with random data.
Save	Save data for later use.
Load	Load previously saved **`*.rtf`** [*MerlinMCH* data file] from disk.

Note:

a Each message contains up to 32 Words of data.

b Enter hexadecimal values *only*.

4. To enable RT31 to function as the **Broadcast RT**, select the **Enabled (RT 31)** checkbox.
5. Select either **1553A** or **1553B**, to designate a **Military Standard** protocol.
6. Check zero or more information bits to be included in the RT message Status Word.

See **MIL-STD-1553 Word Formats** on page A-1.

Testing Data

To receive test data, select **Run > Start,** from the **RT mode** screen.

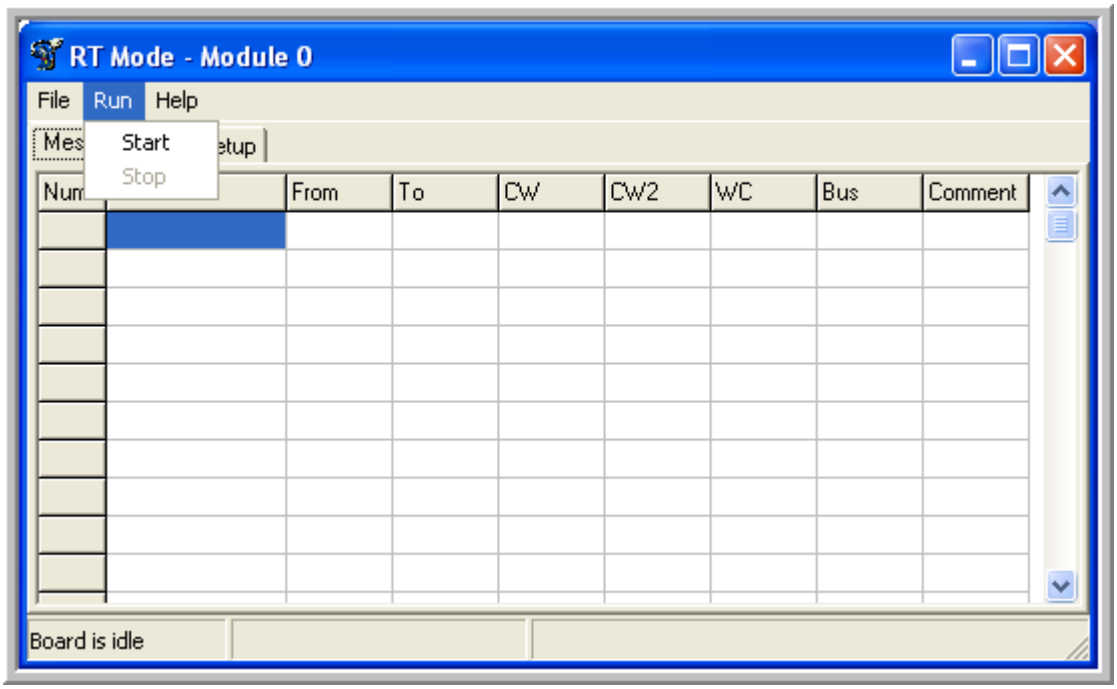


Figure 3-5 RT Mode Testing Data

To **Stop** receiving data, select **Run > Stop**.

4 Sequential Monitoring Mode

In Sequential Monitor Mode, *MerlinMCH* enables the user to observe activity on the 1553 bus. Data can be viewed using the **Standard Monitor Mode Screen** or the **Engineering Units Monitor Mode Screen**.

Standard Monitor Mode Screen observes transmissions on the data bus. Standard mode displays message direction, Command words and Word Count.

Engineering Units Monitor Mode Screen displays data elements which were previously defined in a database. The user selects which elements to display and in what order to display them on the screen. The values may be displayed in hexadecimal, binary or decimal selectable in realtime.

Running Sequential Monitor Mode

To display the **Sequential Monitor mode** screen, from the *MerlinMCH* main screen select **Modules>Monitor Mode**. (See *To Start Working with MerlinMCH* on page 1-3.)

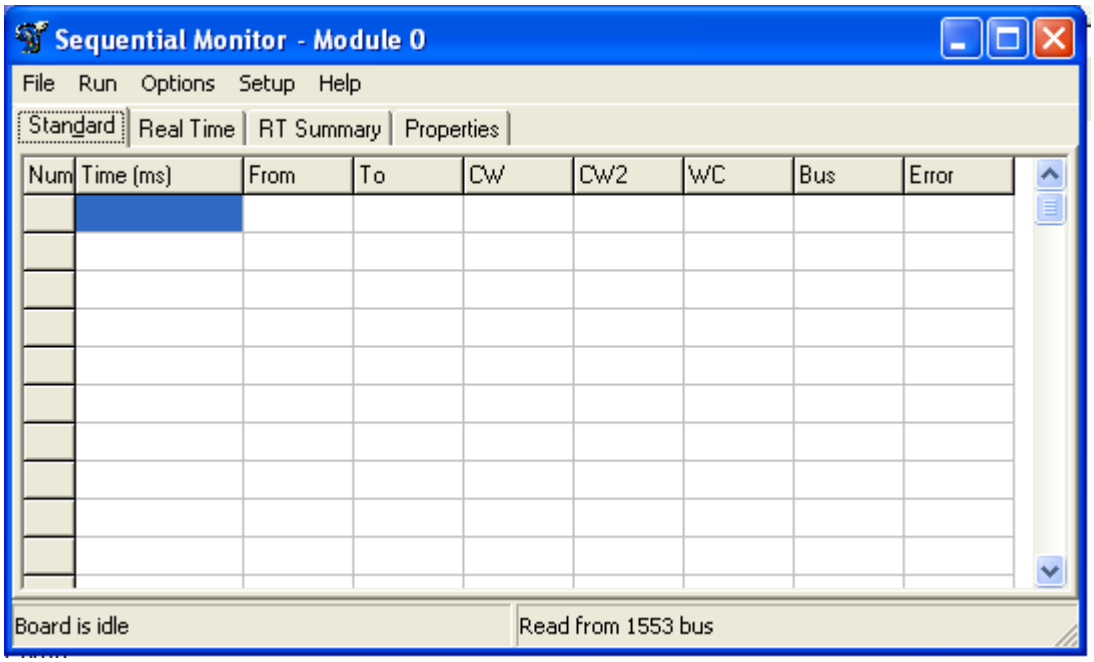


Figure 4-1 Sequential Monitor Mode Grid Screen

The **Standard Sequential Monitor mode** is the default screen.

From the **Sequential Monitor Screen Menu Bar:**

Select:		To:
Standard Monitor and Engineering Units mode screen:		
File	**Clear**	Clear all previously received messages from the Standard mode grid.
	Load Parameters	Load previously saved Trigger Setup parameters from a file. The **Load Sequential Mode Parameter** dialog box is displayed.
	Save Parameters	Save parameters from **[Trigger/Properties] screen.** The **[Save] Sequential Mode Parameters** dialog box is displayed. Enter a file name: **`*.smp`** (Sequential Monitor parameters default extension).
	Exit	Exit the Sequential Monitor mode, return to the *MerlinMCH* main screen.
For Engineering Units Mode Screen only		
	New Database	Displays the **New** dialog box. Enter a name and path to create a new Engineering Units database.
	Open Database	Displays the **Open Microsoft Database File dialog box.** Select an existing Engineering Units database.
	Save Database As	Displays the **Save as Microsoft Database File dialog box. Save** or **Create** the current database with a different name and /or path. **Note:** This option will not change the current database.
Run	**Start**	Run the board in Sequential Monitor Mode.
	Stop	Stop the board operation.
Options	**Standard Monitor**	View message activity on the 1553 bus in Standard mode.
	Engineering Units Monitor	View messages in Engineering Units mode. If a message word is defined in the Engineering Unit database, the raw data is converted into an engineering unit.
	Read from 1553 bus	Read message directly from the bus.
	Read from File	Reads messages from a file either **One-Shot** *or* **Continuous.** See **Transferring Messages One-Shot or Continuous** on page 4-5.
	Convert Binary → ASCII	Converts a *MerlinMCH* monitor file from binary to ASCII. **Converting Binary Files to ASCII Files** on page 4-4.

Select:		To:
For Engineering Units Mode Screen only		
	Display Rate	Displays the **Display Rate** dialog box. The display rate may be defined in milliseconds.
Setup	**Edit Database**	Displays the **Engineering Units – Data Entry** tables where updates may be made to Devices and Elements. See **Selecting Devices and Elements** on page 4-14.
	Edit Display	Displays the **Order** dialog box, to change the order of data elements displayed in the Engineering Units screen. See **Ordering the Data** on page 4-17.
Setup	**Read File**	Displays the **Open Binary File** dialog box, to select a file from which to read saved messages.
	RT Summary	Displays the **RT Summary Define** dialog box, to designate user-friendly names to RTs displayed in the **RT Summary screen**. See **Displaying the System Status** on page 4-8.

Converting Binary Files to ASCII Files

MerlinMCH allows the user to save messages in binary format and later convert the file to ASCII format. The *MerlinMCH* ASCII file is:

- Delimited with commas between fields
- Formatted windows (ANSI)
- First row – header with field names

The ASCII file may be imported into *Microsoft Excel*™ and *Access*™.

To convert binary files to ASCII files

1. From the **Sequential Monitor Mode Menu Bar**, select **Options > Convert Binary→ ASCII**, to display the **Convert to ASCII** dialog box.

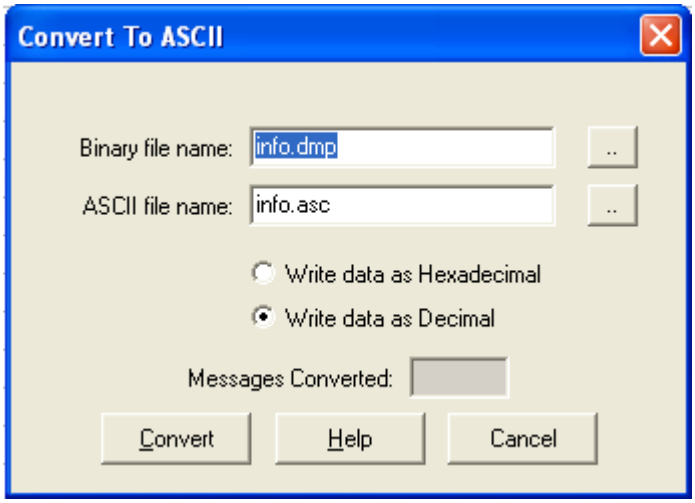


Figure 4-2 Convert to ASCII Dialog Box

2. To select a particular binary file to convert *either*:
   In the **Binary file name** text box, type the complete **`path\filename`** of the binary file.
   or
   Click the browse button, to display the **Open Binary file** dialog box. Select the binary file to convert. Click **OK**, to return to the Binary file name text box.
3. To name the ASCII file, repeat step 2 using the **ASCII file name** text box.
4. The data may be saved either in hexadecimal or decimal format. Select *either*:
   Write data as hexadecimal to save in hexadecimal format,
   or
   Write data as decimal to save in decimal format.
5. To implement the conversion, select **Convert**. The number of messages converted is displayed in the **Messages Converted** text box.
6. To return to the Sequential Monitor screen, click the **Cancel** button.

The converted ASCII file includes a header row with the following order and names:

Label	Content	Label	Content
No	Message number	**Bus**	A or B
Type	Type of message	**CW2**	Command word 2
Gap	Gap Time	**SW2**	Status word 2
CW1	Command word 1	**WC2**	Word count 2
SW1	Status word 1	**RT2**	Remote terminal 2
WC1	Word count 1	**SA2**	Subaddress 2
RT1	Remote terminal 1	**Data(0–31)**	Data Words 0 through 31
SA1	Subaddress 1		

A comma separates each field. Every message is written on a separate line.

Transferring Messages One-Shot or Continuous

MerlinMCH reads data from a file either in:

One-shot Mode: *MerlinMCH* reads the file once, until the end and stops,
or
Continuous Mode: After reading the file, *MerlinMCH* loops back to the beginning and is continuously looped until the user stops the reading.

To select One-shot mode or Continuous Loop Mode:

1. From the **Sequential Monitor Screen Menu Bar**, select **Options > Read From File > [One-shot/ Continuous]:**

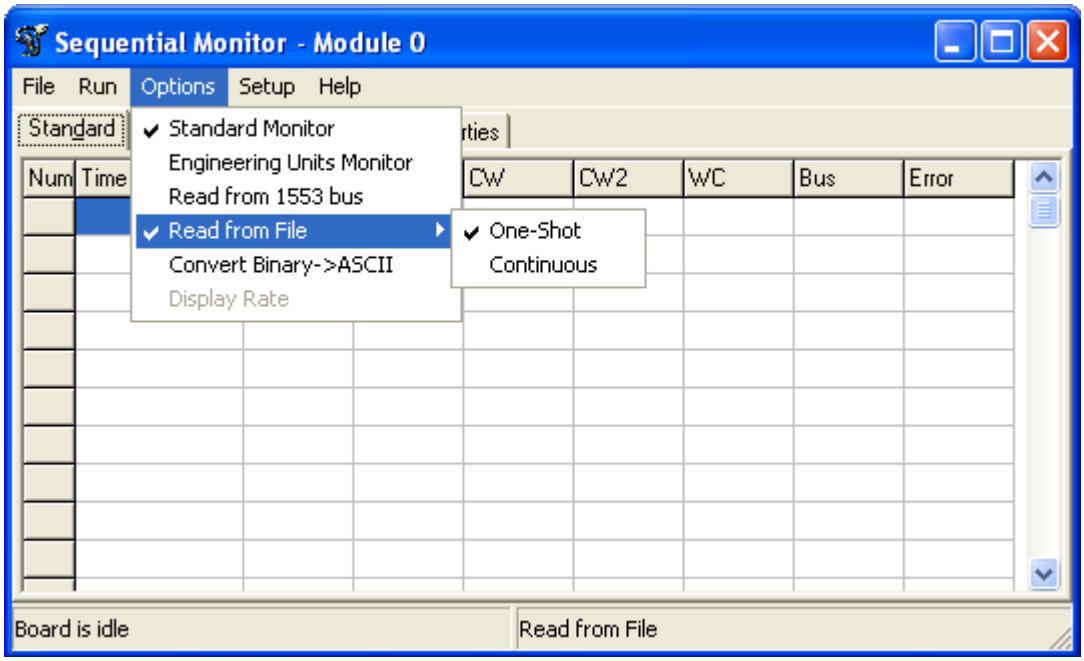


Figure 4-3 One-Shot or Continuous Message Transfer

Standard Sequential Monitor Mode

In Sequential Monitor mode, the default mode is Standard Sequential Monitor mode. The monitor shows a screen containing one line per received message in the order they arrive.

To display the **Sequential Monitor mode** screen, from the *MerlinMCH* main screen select **Modules>Monitor Mode**. (See *To Start Working with MerlinMCH* on page 1-3.)

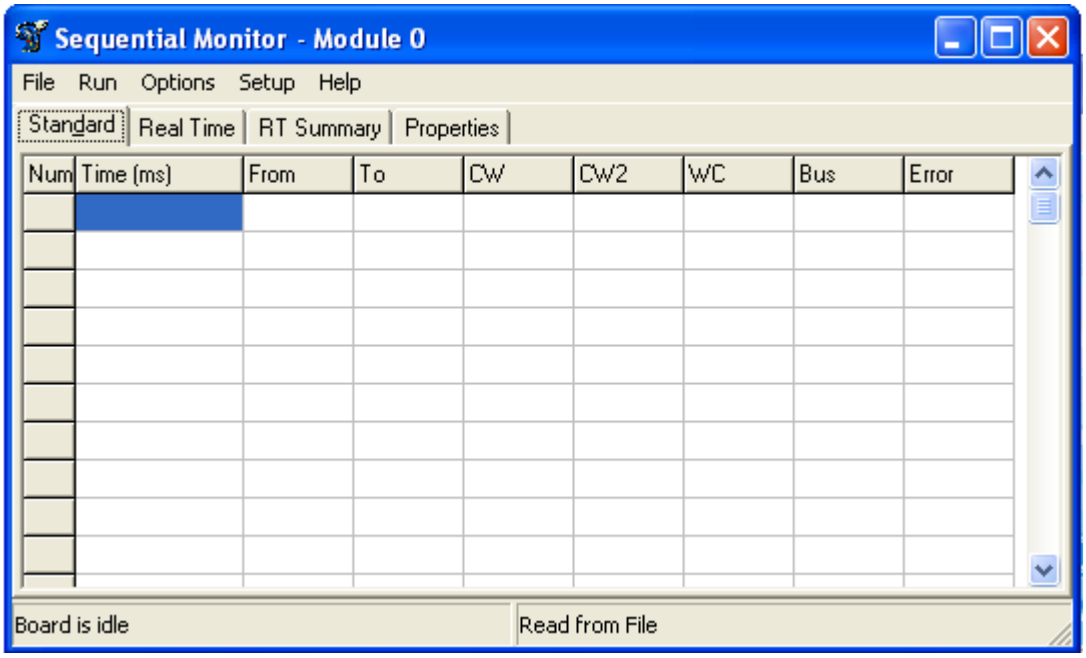


Figure 4-4 Standard Sequential Monitor mode

Two additional methods to display message are:

- **Realtime Updates**: displays up to ten messages with the message data in realtime. See **Displaying Messages in Realtime** on page 4-7
- **System Status**: displays a running count of messages received as well as errors encountered for each RT. See **Displaying Messages in Realtime** on page 4-7

To setup 1553 messages to be received by the monitor, see **Sequential Monitor Properties** on page 4-10.

Displaying Messages in Realtime

To display messages in realtime:

1. From the **Sequential Monitor Screen Menu Bar**, select the **Real Time Tab**, to display the **Realtime screen**.

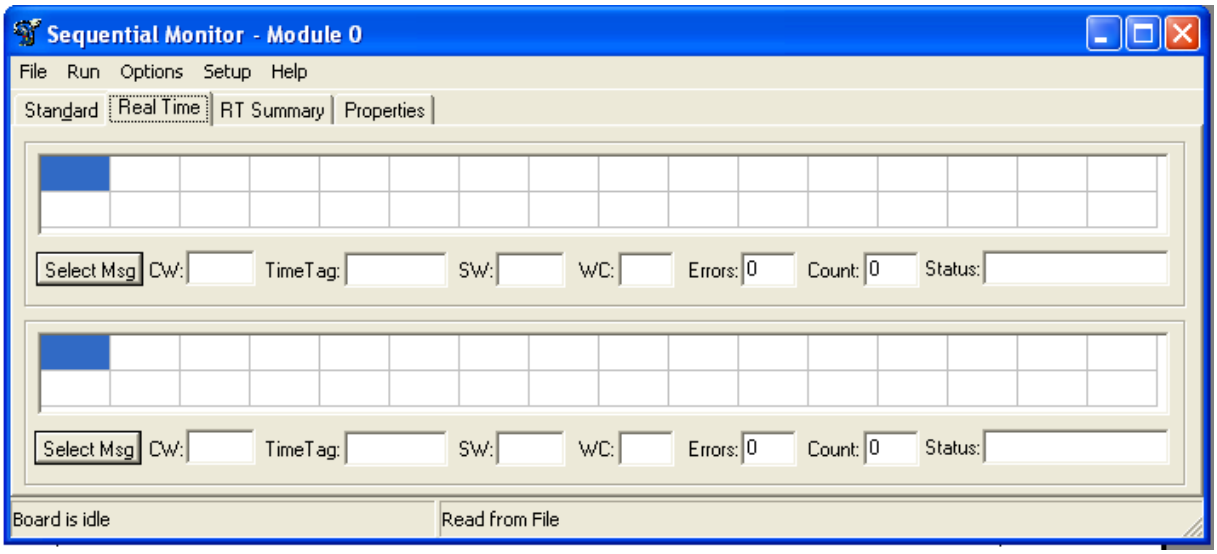


Figure 4-5 Realtime Screen

2. Click **Select Msg**, to display the **Define CW dialog box**.

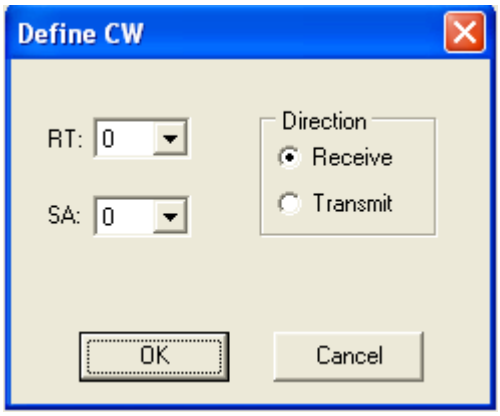


Figure 4-6 Define CW dialog box

3. From the **RT combo box**, select a Remote terminal.
4. From the **SA combo box**, select a Subaddress.
5. Select a **Direction**, Receive or Transmit.
6. Click **OK**, to return to the **Realtime** screen.
7. Repeat steps 2 – 6 for each message.

Displaying the System Status

From the **Sequential Monitor Screen Menu Bar**, select the **RT Summary Tab**, to display the **RT Summary screen**.

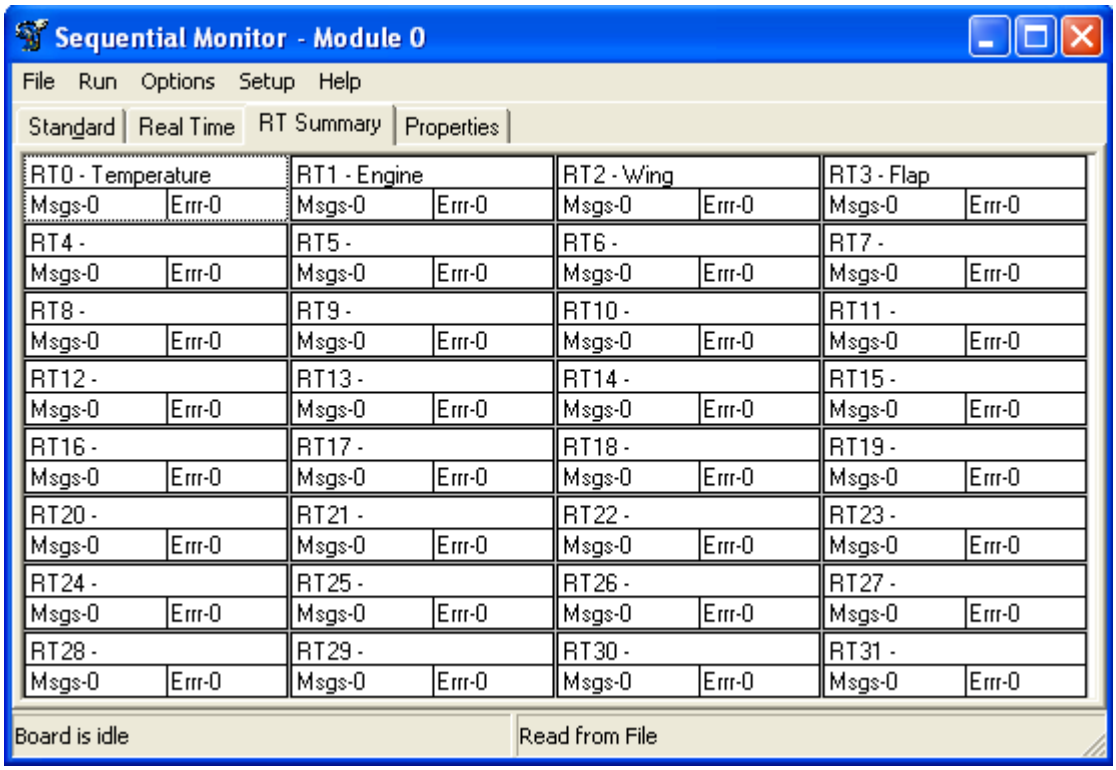


Figure 4-7 RT Summary screen

The RT Summary screen displays a running count of messages received and errors encountered for each RT. Each cell represents one RT displaying the RT number, a designated name, the total number of messages received by the RT and the total number of errors.

To designate names in the RT summary screen:

1. From the **Sequential Monitor Screen** menu bar, select **Setup > RT Summary**, to display the **RT Summary Define text box**.

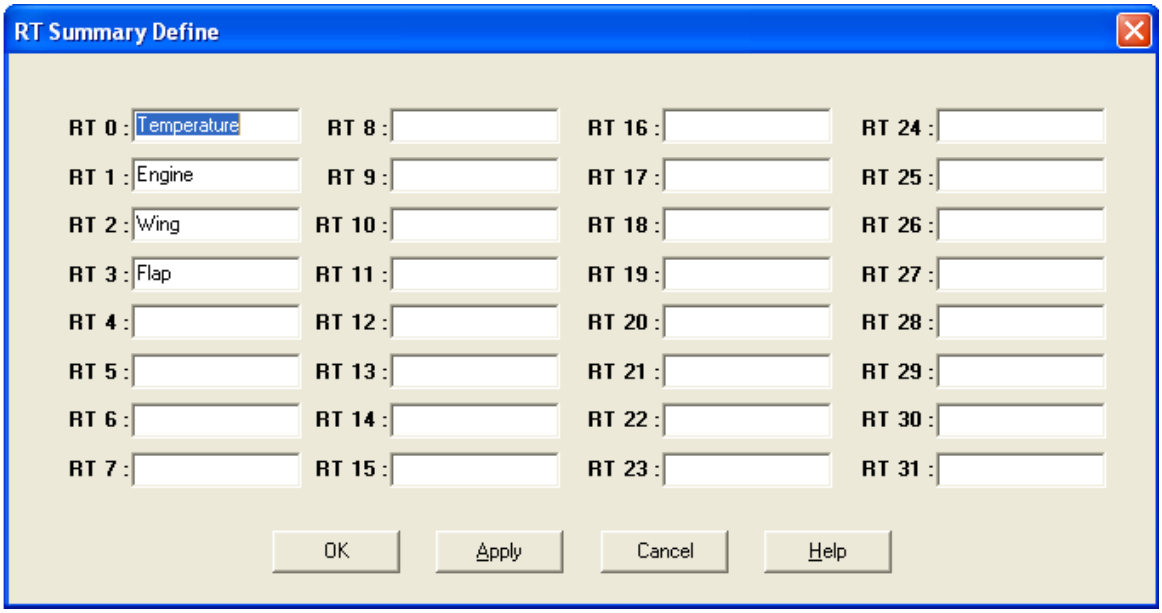


Figure 4-8 RT Summary Define Text Box

2. To name an RT:

   a. Type a meaningful name in an **RT Text box.**

   b. Click **Apply**, to save the data and remain in the **RT Summary Define dialog box,** *or*
   Click **OK**, to save the data and return to the **RT Summary screen**.

Sequential Monitor Properties

1. From the **Sequential Monitor Screen Menu Bar**, select the **Properties Tab**, to display the **Properties dialog box**.

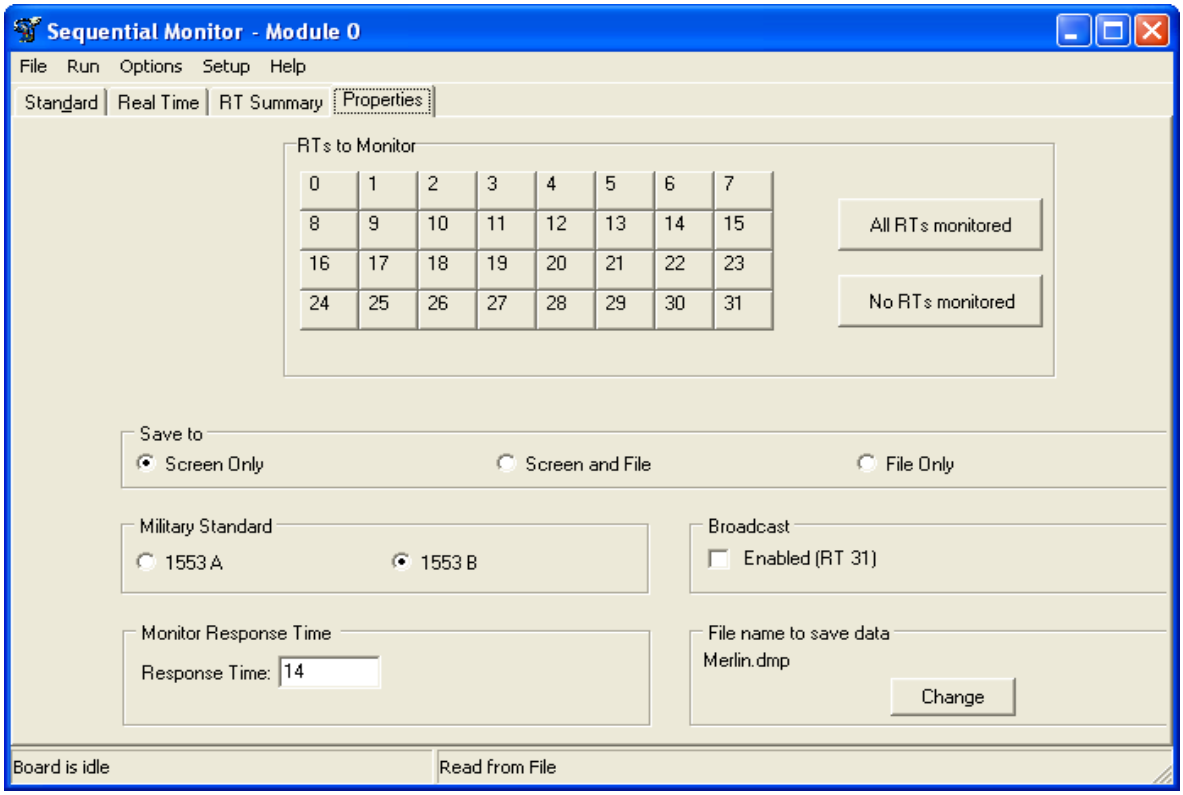


Figure 4-9 Sequential Monitor Properties Dialog Box

2. Select **RTs to Monitor**.
   a. To monitor individual RTs, click the **RT number** for each RT. To deselect, click the **RT number** again.
   b. To monitor all the RTs, click the **All RTs monitored** command button.
   c. To deselect all the RTs, click the **No RTs monitored** command button.
3. Select **Save to**:

Screen Only	Displays messages on the screen.
Screen and File	Displays messages on the screen and writes to a file.
File Only	Save data to file. To save the data to a file: a. Click the **Change** command button in the **File name to save box**. The **Save as** dialog box is displayed. b. Enter a *new* file name in the **File name** text box. c. Click **Save**, to return to the **Properties screen**.

4. Select either **1553A** or **1553B**, to designate a Military Standard protocol.
5. To enable RT31 to function as the **Broadcast RT**, select the **Enabled (RT 31)** checkbox.
6. Insert the **Monitor Response Time** in the **Response Time Text box** (in microseconds). The default is 14 µsec.

Engineering Units Monitoring Mode

The Engineering Units Monitor Mode screen displays messages which were previously defined in a database. The user selects which units to display and in what order to display them on the screen.

To display the **Engineering Units Monitor mode**, from the **Sequential Monitor Screen Menu Bar**, select **Options > Engineering Units Monitor**.

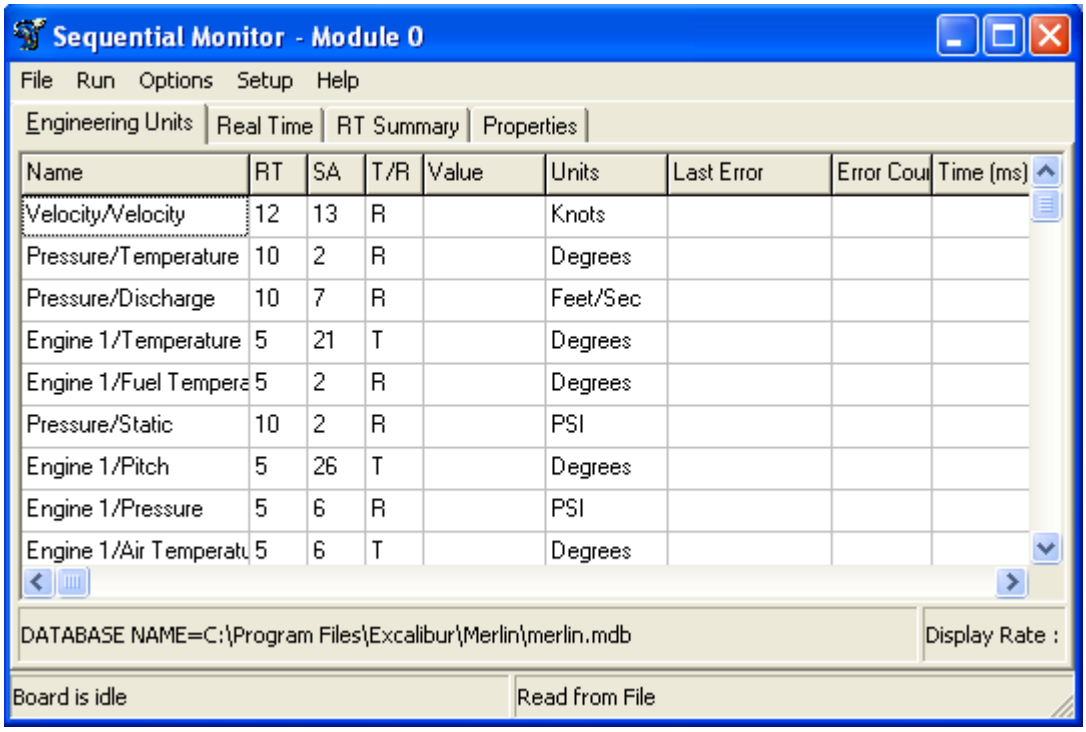


Figure 4-10 Engineering Units Monitor Mode Screen

Two additional methods to display message are:

- **Realtime Updates**: displays ten messages with the message data in realtime. See **Displaying Messages in Realtime** on page 4-7
- **System Status**: displays a running count of messages received as well as errors encountered for each RT. See **Displaying the System Status** on page 4-8

To specify which 1553 messages will be received by the monitor, see **Sequential Monitor Properties** on page 4-10.

Changing the Display Type

In the Engineering Units Mode Screen values may be displayed in hexadecimal, binary or decimal, selectable in realtime. The user may also select values for each element: legitimate values (values within the selected bounds) are shown in blue; values outside these bounds are displayed in red. See **Enter a Valid Range** on page 4-16.

To change the numerical display type, right-click in the row to change. A **Popup menu** is displayed, select a display type.

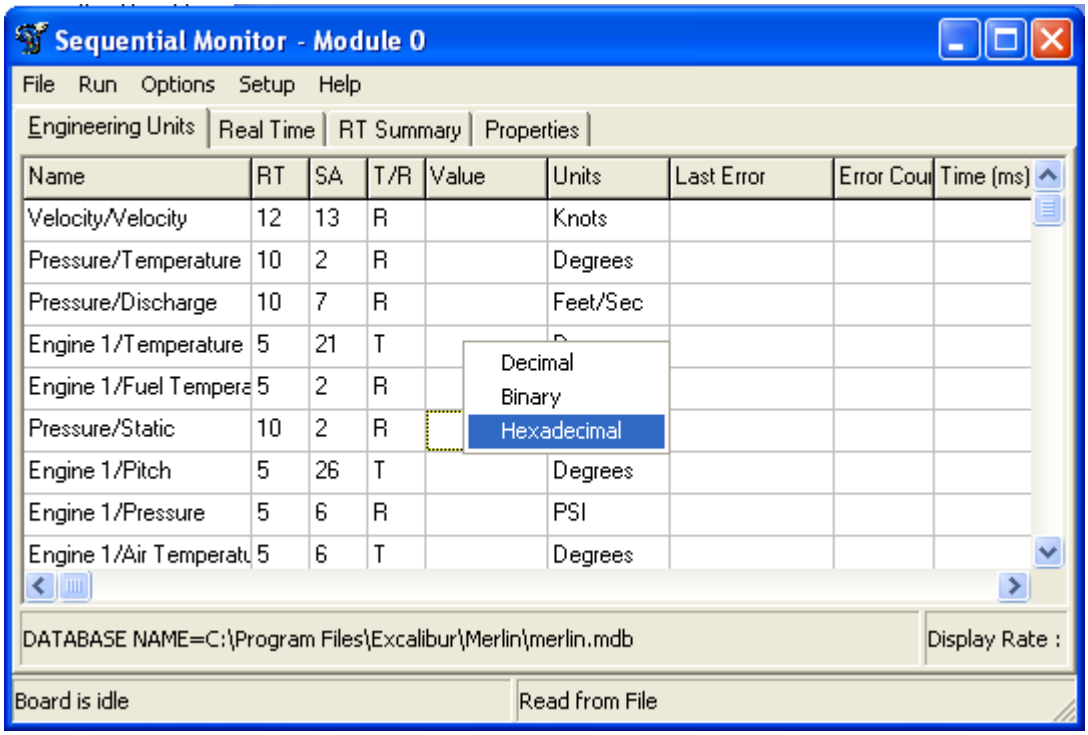


Figure 4-11 Numerical Display types

Setting the Display Rate

The **Display Rate** is the rate new messages are displayed on the screen. To select a **Display Rate**:

1. From the **Sequential Monitor Mode Screen Menu Bar**, select **Options > Engineering Units.**
2. From the menu bar, select **Options > Display Rate**, to display the **Display Rate Dialog Box.**

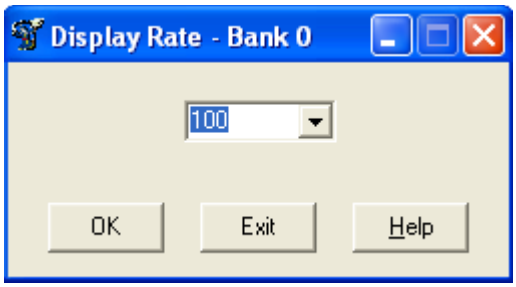


Figure 4-12 Display Rate Dialog Box

3. Select a value [100 – 5000] from the **Drop-down list**.
4. Click **OK**, to return to the **Engineering Unit Monitor Screen**.

Display Rate in Read from Bus

If a file is read from a bus, *MerlinMCH* will read all messages from the bus but *only* display the new message if the time elapsed since the last message is greater than or equal to the **Display Rate**. Messages that are not displayed are lost.

Example:

Last message time	39000
Current message time	39200
Display rate	100

If the Current message time minus the Last message time is greater than or equal to the Display Rate, new messages are displayed.

Display Rate in Read From File

If messages are read from File, *MerlinMCH* displays all the messages. The **Display Rate** represents the delay between displaying each message to the screen.

Selecting Devices and Elements

Each **Device** may have several **Elements** associated with it.

To select **Devices**:

1. From the **Sequential Monitor Mode Screen Menu Bar**, select **Options > Engineering Units.**
2. From the menu bar, select **Setup > Edit Database**.The **Engineering Units - Data Entry dialog box** is displayed.

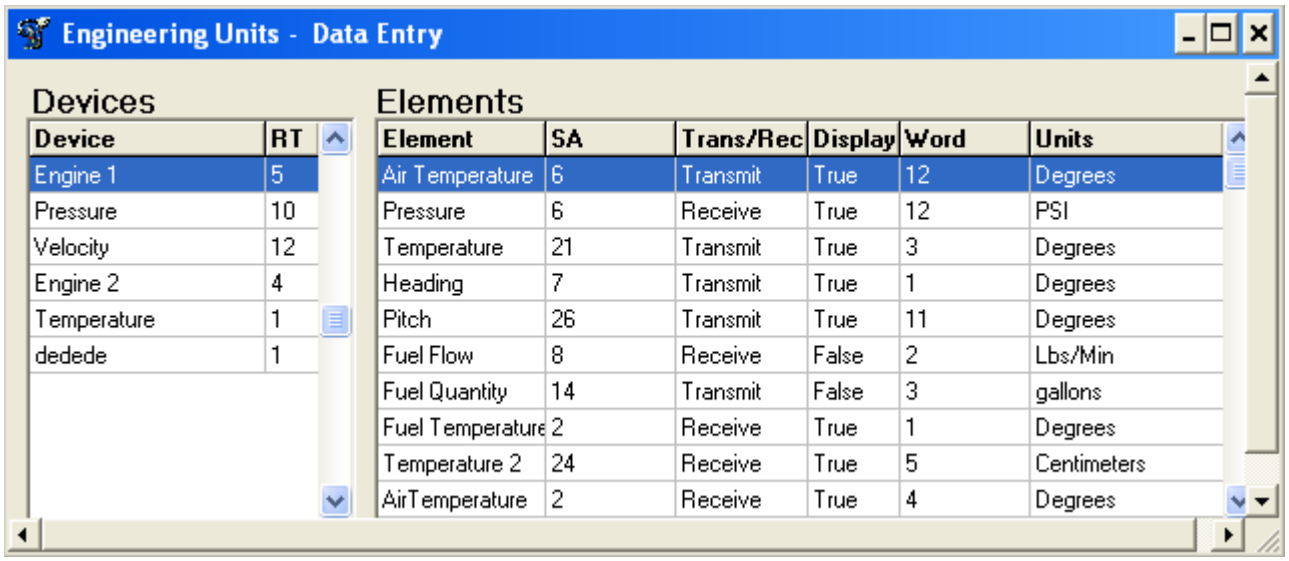


Figure 4-13 Engineering Units – Data Entry Properties Box

3. In the **Devices combo box**, double-click, the **Device Dialog box** is displayed:

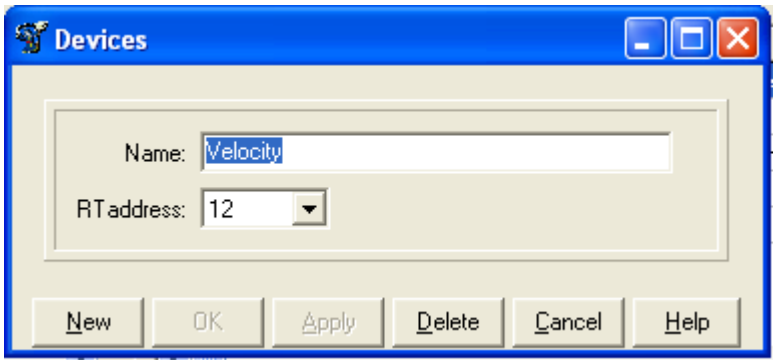


Figure 4-14 Devices Combo Box

4. Click **New**, to insert a new record.
5. Enter:
   a. a **Device name** [Velocity] in the **Name** text box.
   b. select an **RT address** [a value between 0 – 30] from the drop-down combo box.

   Note: RT Address 31 [11111] is reserved for the enable Broadcast option.
6. Click **OK** to save and exit the **Devices Combo Box**, or **Apply** to save and add more devices.
7. Repeat steps 4 – 6 to add more devices.

To enter **Elements**:

1. Double-click any row in the **Elements combo box** in the **Engineering Units – Data Entry Properties Box**, to display the **Elements Properties Box**.

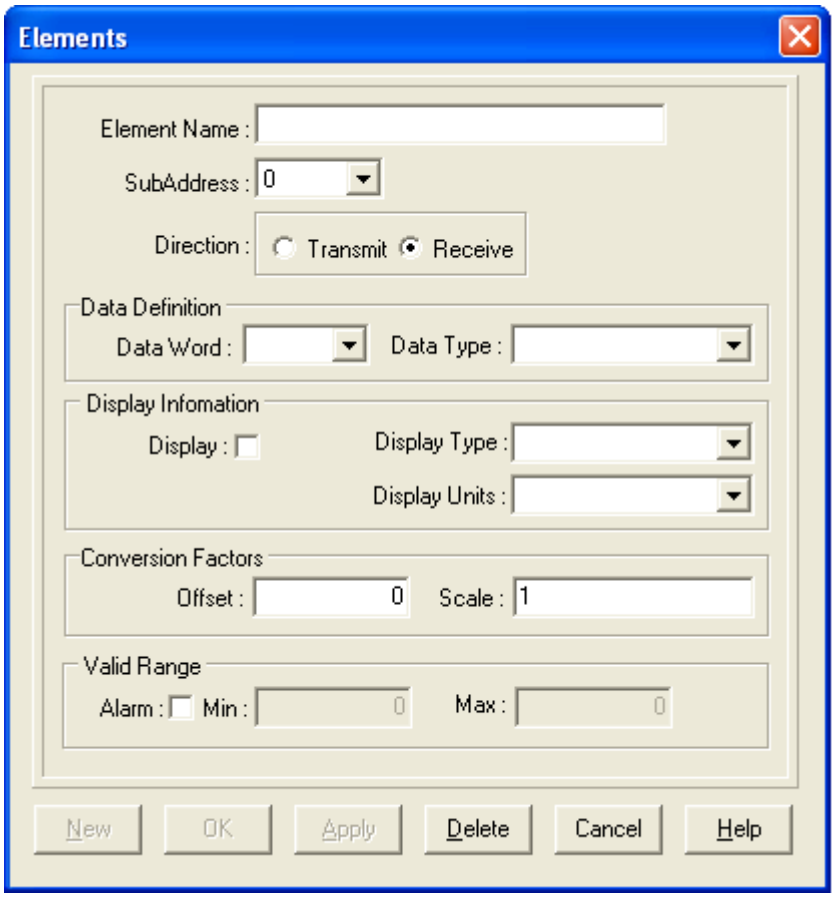


Figure 4-15 Elements Properties box

2. To enter a new record:

   a. (i) If this is an additional element click the **New** command button, a blank **Elements Properties box** is displayed. Proceed with steps a.(i) – g.

   a. (ii) If this is the *first* element enter a description of the element in the **Element Name text box**.

   b. Select a Subaddress [between 0 – 31] in the **Subaddress combo box**.

   c. Select a direction of the message: **Transmit** [RT-to-BC] or **Receive** [BC-to-RT and RT-to-RT]

   d. Select **Data Definition:**
      - Select a **Data Word** from the **Data Word combo box**
      - Select a **Data Type** from the **Data Type combo box**.

e. Select **Display Information**:
   - Select **Display**, to display the element on the **Engineering Units Monitor**;
   - Select a **Display Type**, to display the value in binary or decimal or hexadecimal;
   - Select a **Display Units** – centimeters, meters, knots, degrees, feet, miles/hour or any user-defined unit.

f. Enter **Conversion Factors**: If the raw data to be viewed needs to be manipulated, change the value using **Offset** and **Scale**.

   Example: To convert raw data received in Centigrade to an engineering unit in Fahrenheit: set **Offset** to 32 and **Scale** to 1.8

g. Enter a **Valid Range**
   - Select **Alarm**
   - Enter a minimum range in the **Min text box**;
   - Enter a maximum range in the **Max text box**.

   Values falling within the selected range are displayed in blue; values falling outside this range are displayed in red.

3. Click **OK** to save and exit the **Elements Properties Box**, or **Apply** to save and add more elements.
4. Repeat steps 1–3 to add more elements.
5. Click **OK**, to save and return to the **Engineering Units - Data Entry Properties box**.

Editing Devices and Elements

To change the values for **Devices** and **Element**:

1. From the **Sequential Monitor Mode Screen Menu bar**, select **Setup > Edit Database**, to display the **Engineering Units - Data Entry Properties box**. See Figure 4-13: **Engineering Units – Data Entry Properties Box**.
2. Double-click a **Device** or **Element**, to display the **Devices** or **Elements Properties boxes**.
3. Edit the data.
4. Click **OK**, to return to the **Engineering Units - Data Entry Dialog box.**

Ordering the Data

To arrange the order of the rows displayed in the **Engineering Units Monitor Screen**:

1. From the **Sequential Monitor Menu Bar**, select **Options > Engineering Units Monitor**.
2. From the menu bar, select **Setup > Edit Display**, to display the **Order Dialog Box**:

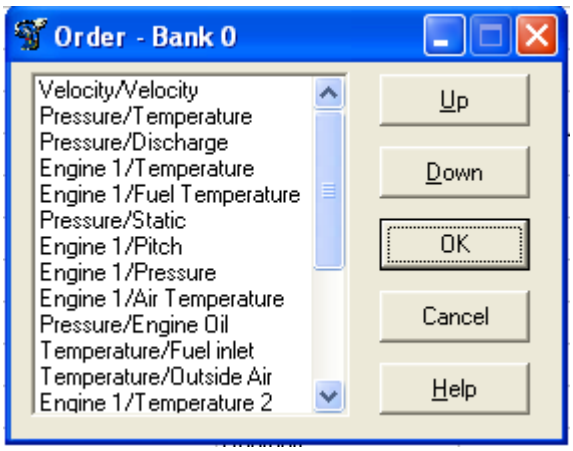


Figure 4-16 Order Dialog Box

3. Select a **Device/Element**, click the **Up / Down button**, to move the element the desired position.
4. Repeat step 3, until all the **Device/Elements** are in the desired order.
5. Click **OK**, to save and return to the **Engineering Units Monitor Screen.**

Testing Data

To **Start** testing data, from the **Standard/ Engineering Units Monitor** screen, select **Run > Start**.

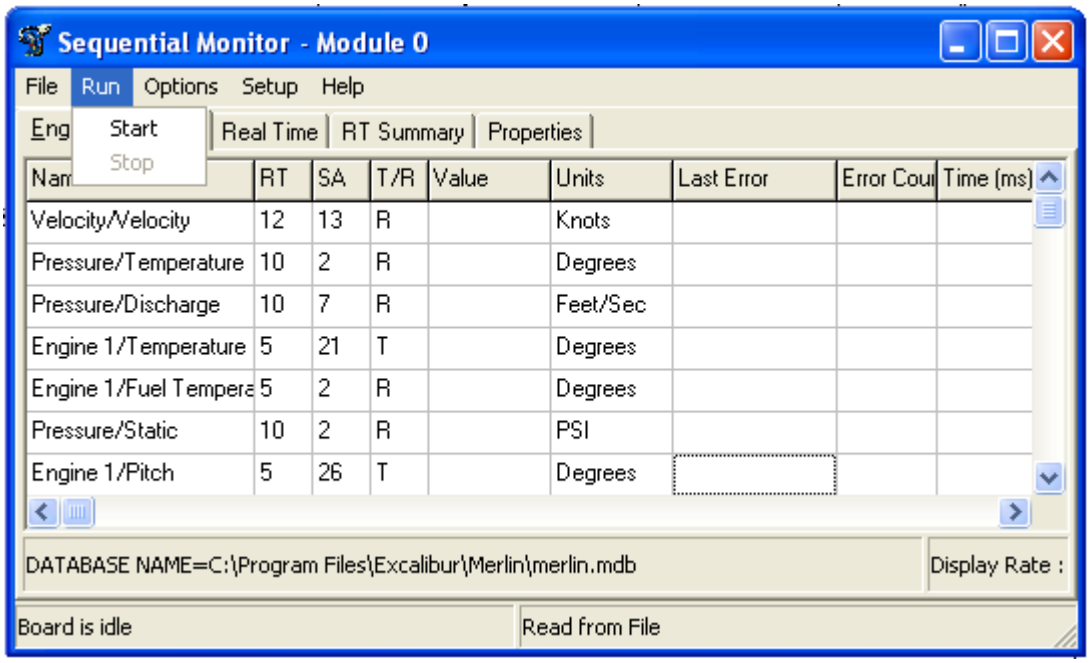


Figure 4-17 Engineering Units Testing Data

To **Stop** testing data, select **Run > Stop**.

5 Troubleshooting: Installation Problems

Before running *Merlin*, install *Software Tools* for the Excalibur 1553 Board you are using, and run **ExcConfig** as described in the installation instructions. Make sure the Borland DLL is in the Windows System folder for use by *Merlin*. If you make any changes to the DLL, check that the new version is either in the Windows System folder or in the same folder as *Merlin*.

Note
1. *Merlin* uses the DLL compiled under Borland C++.
2. *Merlin* is used as a generic term. It applies to both *MerlinMCH* and *MerlinPlus*.

Excalibur CD Installation Troubleshooting

If you install *Merlin* from the *Excalibur Installation CD*, you may encounter the following:

1. **Problem** Messages: **Rename File Failed** or **Copy File Failed**

   Explanation At the end of the installation, you may get a message that states **Rename File Failed**. This is normal behavior. This is a result of the method used when installing and configuring the **BDE** module for use with one of our *Merlin* products.

   By default, we install the **Borland Database Engine (BDE)** and set up a configuration file for *Merlin* (common to all *Merlin* programs). The **BDE** uses a default configuration file called either **idapi.cfg** or **idapi32.cfg**. These files are renamed, if they exist, (to **idapiOld.cfg** and **idapi32Old.cfg**) so that they can later be loaded into the **BDE** if they have been set up for other applications. A *Merlin* compatible configuration file is copied to both **idapi.cfg** and **idapi32.cfg**, and another copy is saved as **merlin.cfg**. This **merlin.cfg** configuration file is also stored in the folder **<INSTALLDIR>\Excalibur\Merlin**.

   If the **BDE** was not previously installed on your PC, the files that did not exist cannot be renamed, so this error **Rename File Failed** message can be ignored.

   If the **BDE** is already installed on your computer, you may get an additional message that **Copy File Failed.** This may cause problem #2 to occur. See below for a solution.

2. **Problem** Message: **Unknown database, Alias: DevDB_BDE** when first running a *Merlin*.

   Cause The configuration file was not properly copied to the **BDE** folder.

   Solution
   a. Select **Control Panel | BDE Administrator| Object | Open Configuration**, to display the **Open dialog box**.
   b. From the **Look in** drop-down list, locate the **<INSTALLDIR>\Excalibur\Merlin**, and select **merlin.cfg.**
   c. Exit the **BDE Administrator** and save this as your default configuration.

   The database file (**merlin.mdb**) must always be installed in the **<INSTALLDIR>\Excalibur\Merlin** folder.

Website Installation Troubleshooting

If you install *Merlin* from the ZIP file on the Excalibur website [www.mil-1553.com], you may encounter the following:

1. **Problem** During setup you will receive the following error: "**String variable is not large enough for string. Check the string declarations. Error 401**"

   Solution Ignore error; Press enter to continue.

2. **Problem** Error messages relating to:

   - Alias: DevDB_DBE
   - General SQL error
   - Alias *abc* not found
   - Key Violation

   Cause These errors are due to database files not found in the expected place.

   Solution
   a. Select **Control Panel | BDE Administrator| Object | Open Configuration**, to display the **Open dialog box**.
   b. From the **Look in** drop-down list, locate the **<INSTALLDIR>\Excalibur\Merlin**, and select **merlin.cfg.**
   c. Exit the **BDE Administrator** and save this as your default configuration.

   The database file (**merlin.mdb**) must always be installed in the **<INSTALLDIR>\Excalibur\Merlin** folder.

Appendix A MIL-STD-1553 Word Formats

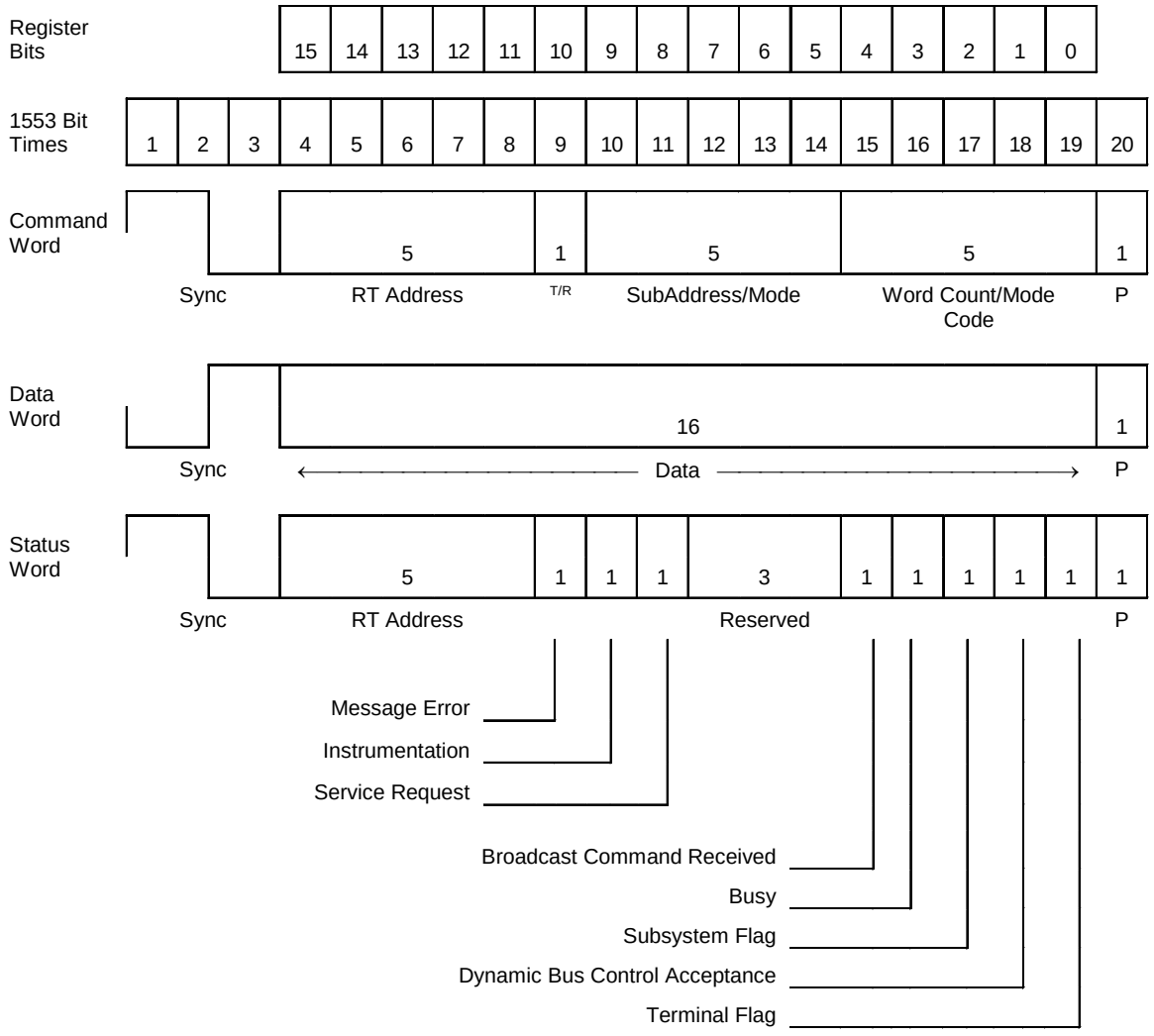


Figure A-1 MIL-STD-1553 Word Formats

Note: T/R = Transmit/Receive
P = Parity

Appendix B MIL-STD-1553 Message Formats

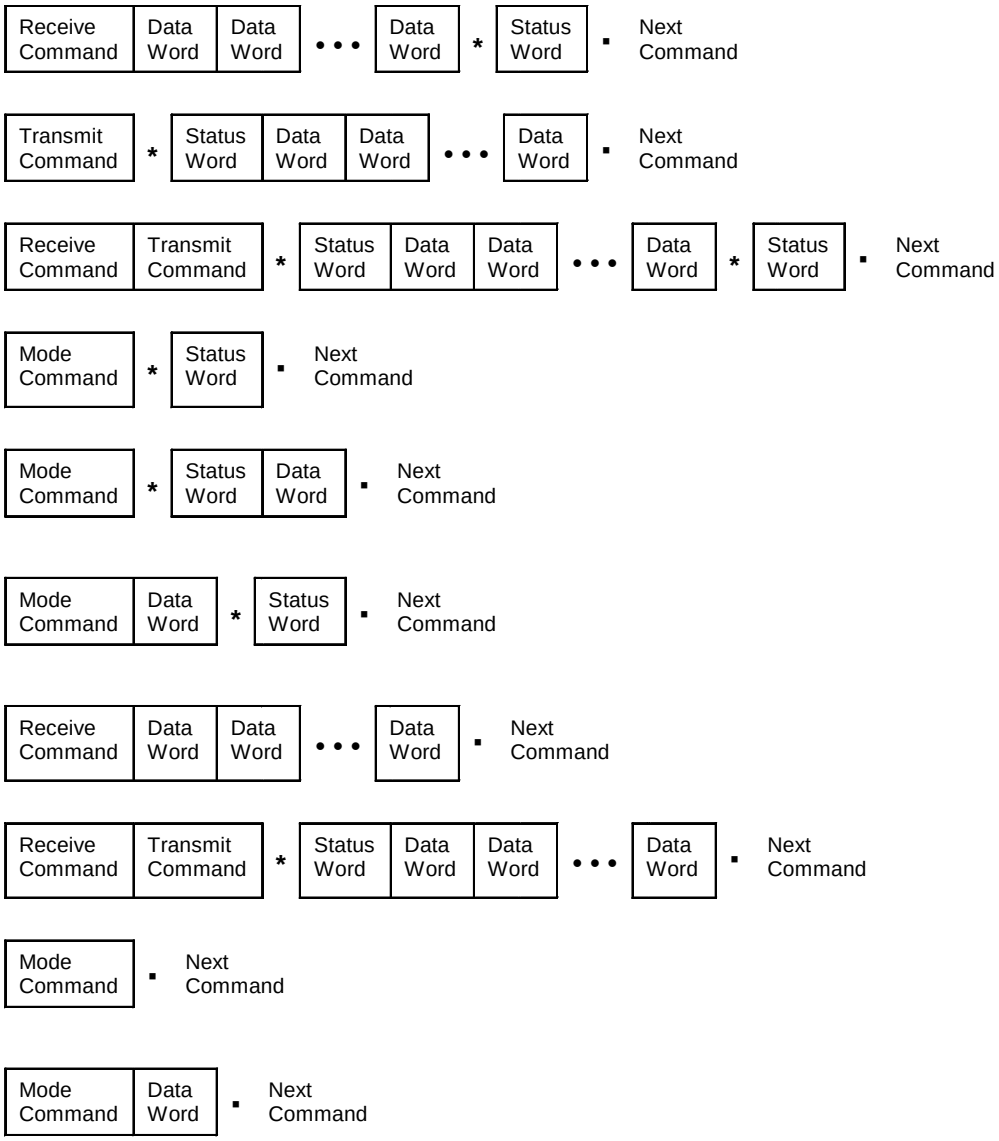


Figure B-1 MIL-STD-1553 Message Formats

Note: * = Response time
▪ = Intermessage Gap

April 2004, Rev A-2