MerlinPlus
User's Manual

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1 Introduction

This chapter provides an introduction to *MerlinPlus*.

In this chapter:

Overview

MerlinPlus is a Windows based GUI test and simulation program for MIL-STD-1553, MIL-STD-1760 and MMSI data buses. *MerlinPlus* supports BC/Concurrent RT, Remote Terminal and Sequential Monitor modes. Error injection and error detection are also supported.

If you have more than one 1553/1760/MMSI module, you can run each module in a different mode simultaneously. So you can send data from one module, and view the data being received on the other module in real time.

MerlinPlus is built around the *1553Px Family Software Tools,* enabling the use of a single executable for multiple boards and operating systems.

Installation

MerlinPlus is installed together with the all the necessary DLLs for the appropriate boards. At the end of the *MerlinPlus* installation, ExcConfig is run. Use ExcConfig to assign a device number to the board. For instructions, see **Assigning a Device Number to the Board** in **Installation Instructions.pdf**. This file is located in the root folder of the installation CD.

Selecting the Device Number

To select your device number:

1. From the Windows Start menu, select **MerlinPlus**. The *MerlinPlus* main screen is displayed.

Figure 1-1 MerlinPlus Main Screen

2. From the main screen menu bar, select **Setup**, select your **board type > Device #**. The Select device number dialog box is displayed.

Figure 1-2 Select Device Number Dialog Box

3. In the **Device** field, type the **device number** of your board. (This is the device number that was assigned to the board using the ExcConfig utility.)
4. Click **OK**.

   The status bar indicates (1) the board initialization status, (2) the number of modules detected, (3) the firmware revision number of each module, (4) the board type and (5) the device number of the board.

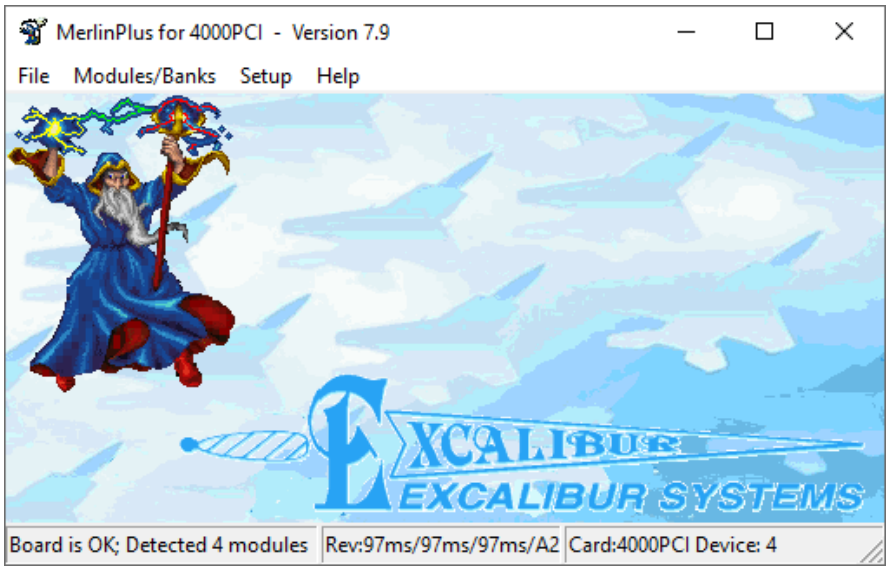


Figure 1-3 MerlinPlus Main Screen with Board Loaded

Viewing the Firmware Revision

To view the firmware revision:

- From the main screen menu bar, select **File > Firmware Revision Information**. The firmware information is displayed.

2 Bus Controller/Concurrent RT Mode

In Bus Controller/Concurrent RT Mode, the module simulates the Bus Controller and up to 32 Remote Terminals. (On single function *PxS* modules, RT simulation is not available.)

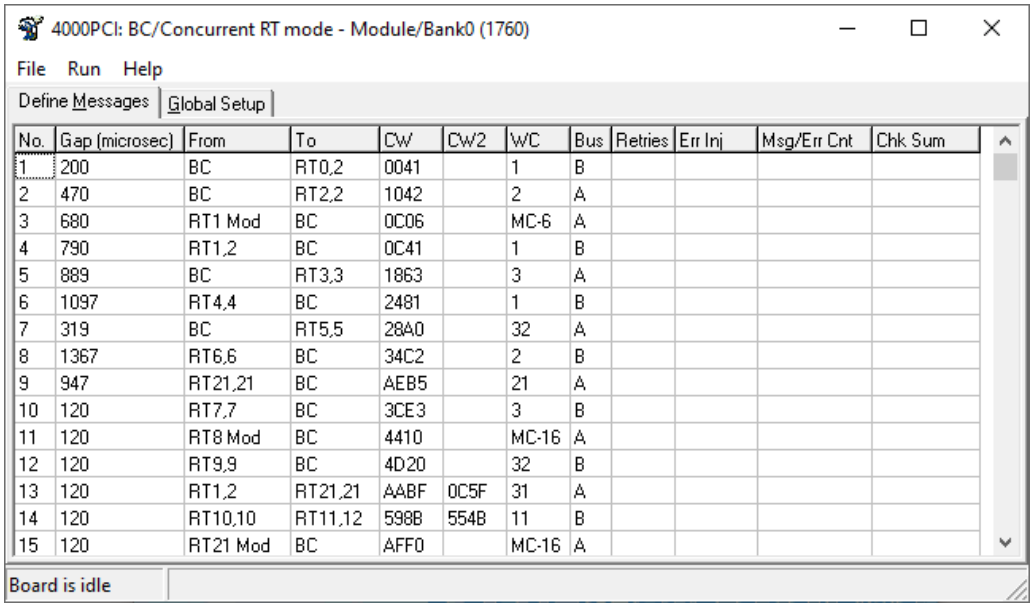
In this chapter:

The BC/Concurrent RT Mode Screen

To open the BC/Concurrent RT Mode screen:

- From the main screen menu bar, select **Modules/Banks > Module/Bank # > BC/Concurrent RT Mode**.

  The BC/Concurrent RT Mode screen is displayed. The Define Messages tab shows the currently defined messages (if any). The fields are described in Table 2-1.



No.	Gap (microsec)	From	To	CW	CW2	WC	Bus	Retries	Err Inj	Msg/Err Cnt	Chk Sum
1	200	BC	RT0,2	0041		1	B				
2	470	BC	RT2,2	1042		2	A				
3	680	RT1 Mod	BC	0C06		MC-6	A				
4	790	RT1,2	BC	0C41		1	B				
5	889	BC	RT3,3	1863		3	A				
6	1097	RT4,4	BC	2481		1	B				
7	319	BC	RT5,5	28A0		32	A				
8	1367	RT6,6	BC	34C2		2	B				
9	947	RT21,21	BC	AEB5		21	A				
10	120	RT7,7	BC	3CE3		3	B				
11	120	RT8 Mod	BC	4410		MC-16	A				
12	120	RT9,9	BC	4D20		32	B				
13	120	RT1,2	RT21,21	AABF	0C5F	31	A				
14	120	RT10,10	RT11,12	598B	554B	11	B				
15	120	RT21 Mod	BC	AFF0		MC-16	A				

Figure 2-1 BC/Concurrent RT Mode Screen

Field	Description
No.	Message number.
Gap (microsec)	Intermessage gap in µsec (minimum 4 µsec).
From	Message from either BC or RT/subaddress.
To	Message to either BC or RT/subaddress.
CW	Command Word of the message.
CW2	Second Command Word of the message for RT to RT message.
WC	Word Count. Number of Data Words in the message.
Bus (not for MMSI)	Bus on which to transmit.
Retries	Number of times to resend the message in the event that the RT does not respond without the timeout period. See **Setting Retries** on page **2-15**.

Table 2-1 BC/Concurrent RT Mode Screen

Field	Description
Err Inj	Type of error injection selected. See **Using Error Injection** on page **2-15**.
Msg/Err Cnt	Running count of messages and errors.
Chk Sum (1760 and MMSI only)	Whether the last Data Word of the message is a checksum.

Table 2-1 BC/Concurrent RT Mode Screen (Continued)

Setting Global Options for BC/Concurrent RT Mode

The Global Setup tab of the BC/Concurrent RT Mode screen contains general option in BC/Concurrent RT Mode.

To set global options for BC/Concurrent RT Mode:

1. From the main screen menu bar, select **Modules/Banks > Module/Bank # > BC/Concurrent RT Mode**.

   The BC/Concurrent RT Mode screen is displayed.

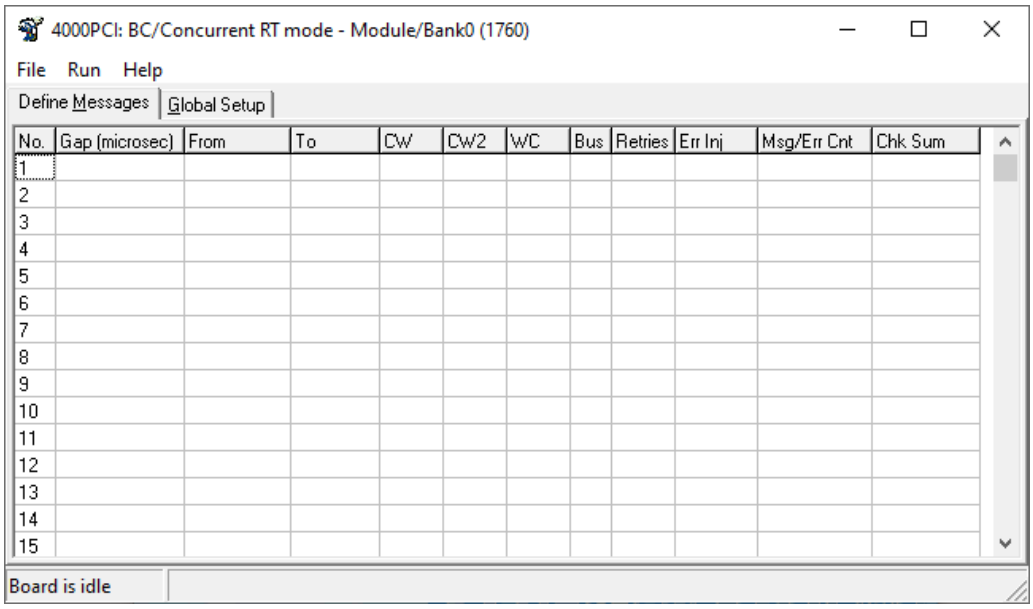


Figure 2-2 BC/Concurrent RT Mode Screen

2. Click the **Global Setup** tab.

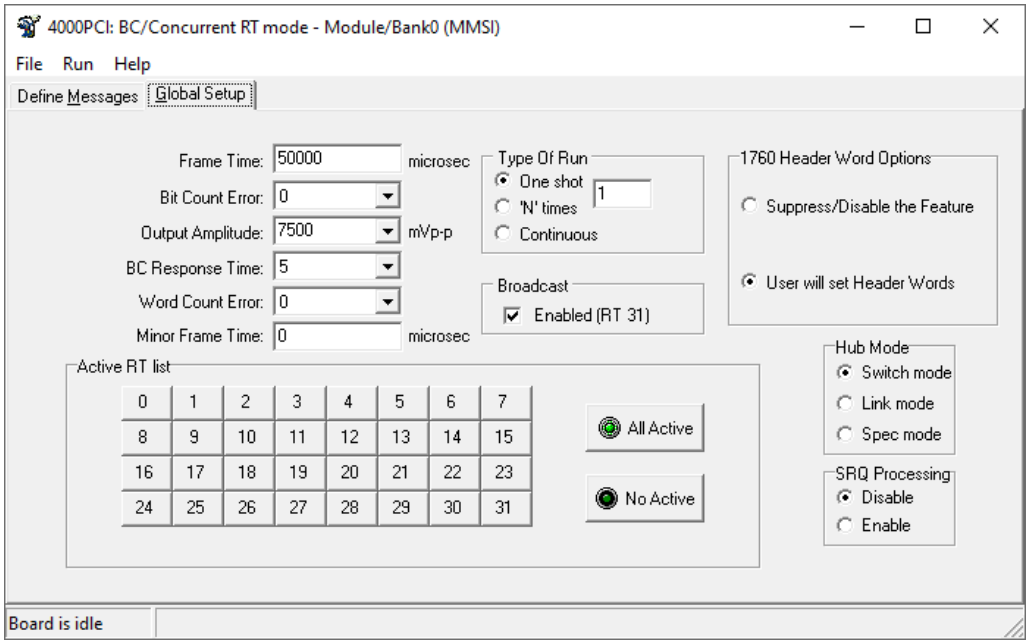


Figure 2-3 BC/Concurrent RT Mode Screen – Global Setup Tab

3. Complete the fields, as described in Table 2-2.

Field	Description
Frame Time	Amount of time in µsecs between the start of the transmission of a frame and the next transmission of this frame. A frame is the entire list of messages that are defined on the Define Messages tab of the BC/Concurrent RT Mode screen (Figure 2-1). When all the messages in the frame are transmitted, *MerlinPlus* waits until the end of the frame time to transmit them again. If *MerlinPlus* is set to transmit only once, this field is not relevant. See **Type of Run**. **Note:** When using minor frames, you usually want to enter a lower value for Frame Time than the Minor Frame Time, so that the Minor Frame Time controls all the timing, and *MerlinPlus* does not wait after the last minor frame before transmitting again.
Bit Count Error	Number of bits to add to or subtract from the Command Word or the data, when using Incorrect Bit Count as Error Injection (+3 to –3).
Output Amplitude	Output amplitude in milliVolts peak-to-peak (1000–7500, default 7500).
BC Response Time	Bus Controller response time in µsecs (4–32, default 14). This is the maximum wait time until an RT's status response is considered invalid by the BC.
Word Count Error	Number of words to add to or subtract from the Word Count, when using Incorrect Word Count as Error Injection (+3 to –3).

Table 2-2 BC/Concurrent RT Mode Screen – Global Setup Tab

Field	Description
Minor Frame Time	Amount of time in µsecs between the start of the transmission of one minor frame and the start of the transmission of the next minor frame. A minor frame is the list of messages that follow a minor frame row on the Define Messages tab of the BC/Concurrent RT Mode screen. See **Using Minor Frames** on page **2-14**.
Active RT list	Select which RTs to activate by clicking the desired RT numbers or by clicking **All Active**. To deselect all RTs, click **No Active**.
Type of Run	Type of transmission: • **One shot** – transmit the message list once. • **'N' times** – transmit x times; type the number of times in the text box (1–255). • **Continuous** – continue transmitting in a loop until selecting **Run > Stop**.
Broadcast Enabled (RT 31)	Whether to enable broadcast on RT 31.
1760 Header Word Options (1760 and MMSI only)	Whether messages will have a 1760 Header Word: • **Suppress/Disable the Feature** • **User will set Header Word**
Hub Mode (MMSI only)	Type of Hub Mode: • **Switch mode** • **Link mode** • **Spec mode**
SRQ Processing	Whether to enable SRQ processing.

Table 2-2 BC/Concurrent RT Mode Screen – Global Setup Tab (Continued)

Defining Messages

To define a message:

1. From the main screen menu bar, select **Modules/Banks > Module/Bank # > BC/Concurrent RT Mode**.
   The BC/Concurrent RT Mode screen is displayed.

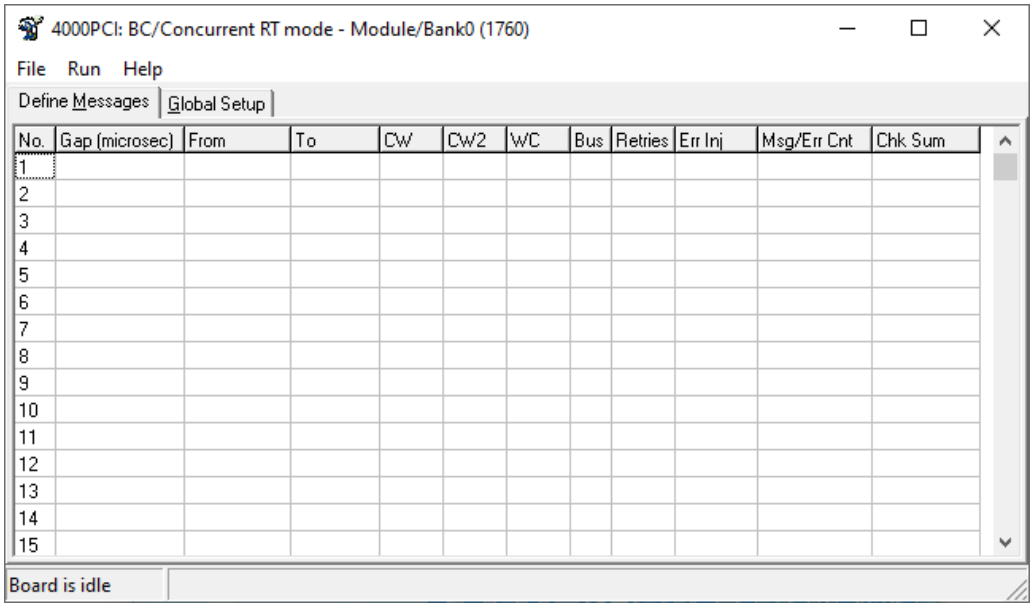


Figure 2-4 BC/Concurrent RT Mode Screen

2. Double-click the **first blank row** (or any defined message) in the columns **Gap, From, To, CW, CW2, WC** or **Bus.**
   The Define Message dialog box is displayed.

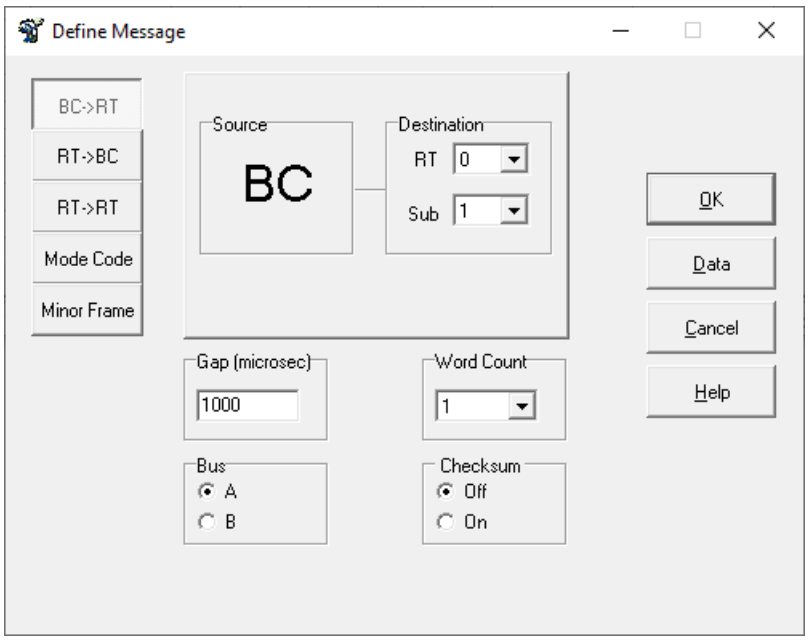


Figure 2-5 Define Message Dialog Box

3. On the left side, select the message type (**BC > RT**, **RT > BC**, **RT > RT**, **Mode** (Mode Codes), or **Minor Frame**), then complete the fields, as described below.

   Continue with the desired message type:

   - **BC to RT Messages** on page **2-7**
   - **RT to BC Messages** on page **2-10**
   - **RT to RT Messages** on page **2-11**
   - **Mode Code Messages** on page **2-12**

BC to RT Messages

a. Complete the fields, as described in Table 2-3.

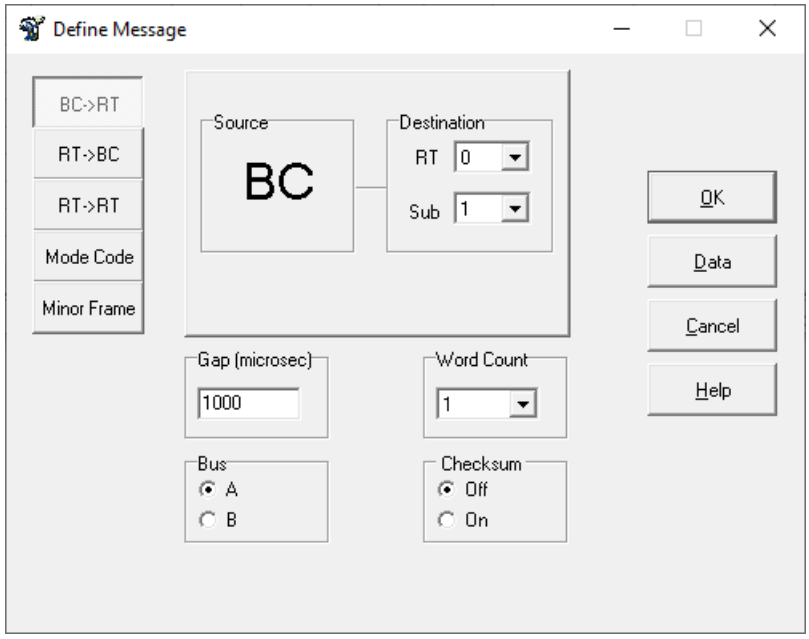


Figure 2-6 Define Message Dialog Box – BC to RT Message

Field	Description
Destination RT	Destination RT number.
Destination Sub	Destination subaddress.
Gap (microsec)	Intermessage gap in µsec (minimum 4 µsec).
Word Count	Number of Data Words in the message.
Bus (not for MMSI)	Bus on which to transmit.
Checksum (1760 and MMSI only)	Whether the last Data Word of the message is a checksum.

Table 2-3 Define Message Dialog Box – BC to RT Message

b. To set the message data, click **Data**.

The Define/Modify Data dialog box is displayed.

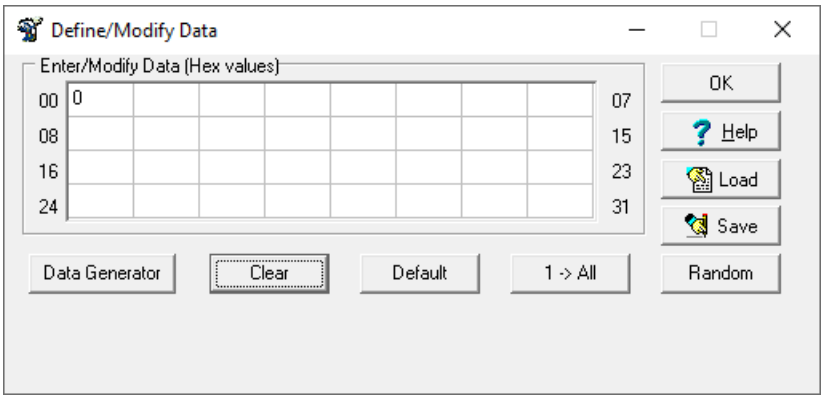


Figure 2-7 Define/Modify Data Dialog Box

c. You can enter **hex data** for each Data Word, up to the amount of words specified in the Word Count field on the previous dialog box.
– OR **–**
You can also use the options described in Table 2-4.

Button	Description
Data Generator	Opens the Data Generator dialog box, to define dynamic data for the selected Data Word. When using the Data Generator, different data is transmitted each time this Data Word is transmitted. See Step d on page 2-9. **Note:** When Data Generator is enabled, the Data Word is gray. If there is a value in that Data Word, it will be ignored.
Clear	Clears the data of all Data Words.
Default	Enters values for all Data Words starting from 0 and incrementing each Data Word by 1.
1 > All	Copies the value of the first Data Word to all other Data Words.
Load	Loads previously saved values.
Save	Saves the values of all Data Words for later use.
Random	Enters random values for all Data Words.

Table 2-4 Define/Modify Data Buttons

d. (Optional) To use the Data Generator, click **Data Generator**. The Data Generator dialog box is displayed.

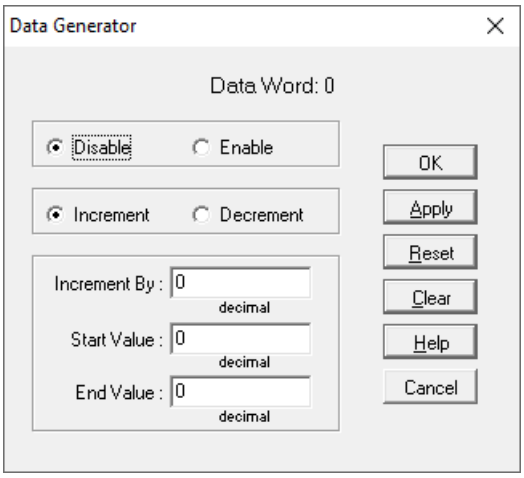


Figure 2-8 Data Generator Dialog Box

e. Complete the fields, as described in Table 2-5, then click **OK**.

Field	Description
Disable / Enable	Enables or disables the Data Generator.
Increment / Decrement	Whether to increment or decrement the value with each transmission of the Data Word.
Increment by	Value in decimal to increment or decrement by.
Start Value	Starting value in decimal.
End Value	Ending value in decimal. When the data reaches the end value, it loops back to the start value.
OK	Saves the data and returns to the **Define/Modify Data** dialog box.
Apply	Saves the data and remains in the **Data Generator** dialog box.
Reset	Restores the values to the values at the time the **Data Generator** was opened.
Clear	Restores all values to their defaults.

Table 2-5 Data Generator Dialog Box

f. Click **OK** in the Define/Modify Data dialog box.

g. Click **OK** in the Define Message dialog box.

RT to BC Messages

- Complete the fields, as described in Table 2-6, then click **OK**.

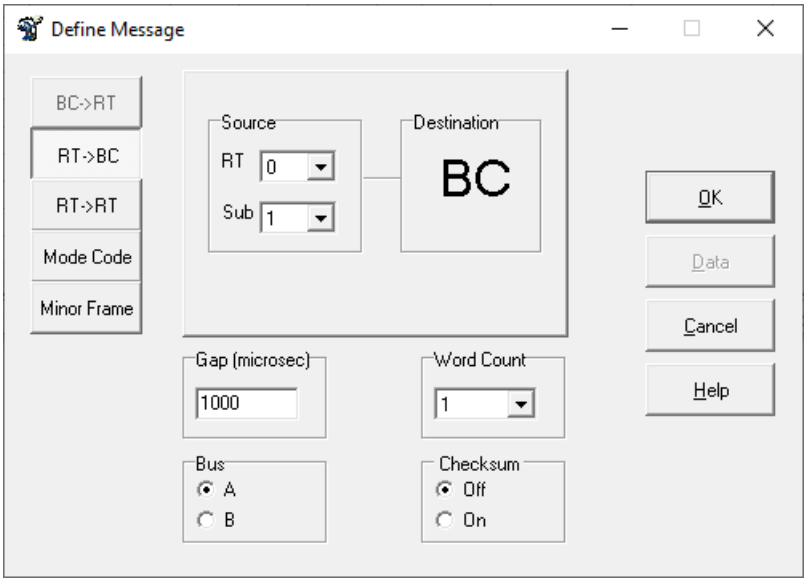


Figure 2-9 Define Message Dialog Box – RT to BC Message

Field	Description
Source RT	Source RT number.
Source Sub	Source subaddress.
Gap (microsec)	Intermessage gap in µsec (minimum 4 µsec).
Word Count	Number of Data Words in the message.
Bus (not for MMSI)	Bus on which to transmit.
Checksum (1760 and MMSI only)	Whether the last Data Word of the message is a checksum.

Table 2-6 BC to RT Message

RT to RT Messages

- Complete the fields, as described in Table 2-7, then click **OK**.

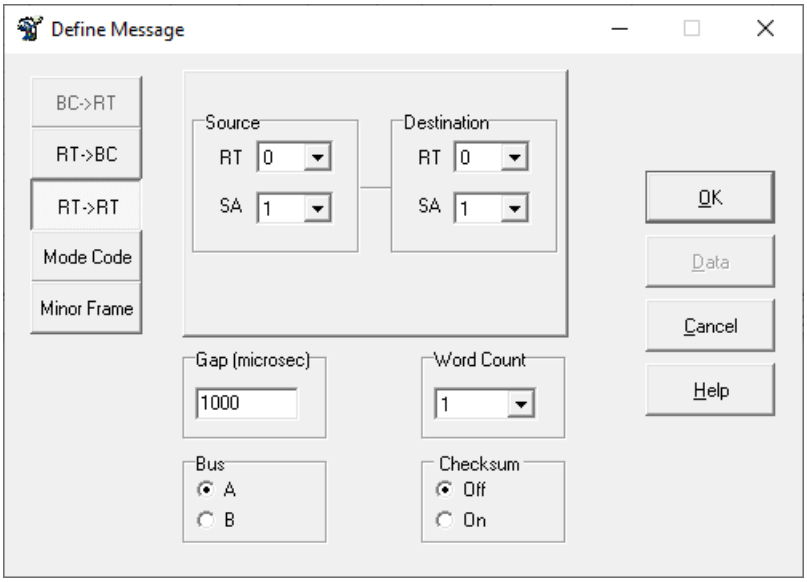


Figure 2-10 Define Message Dialog Box – RT to RT Message

Field	Description
Source RT	Source RT number.
Source SA	Source subaddress.
Destination RT	Destination RT number.
Destination SA	Destination subaddress.
Gap (microsec)	Intermessage gap in µsec (minimum 4 µsec).
Word Count	Number of Data Words in the message.
Bus (not for MMSI)	Bus on which to transmit.
Checksum (1760 and MMSI only)	Whether the last Data Word of the message is a checksum.

Table 2-7 BC to RT Message

Mode Code Messages

- Complete the fields, as described in Table 2-8, then click **OK**.

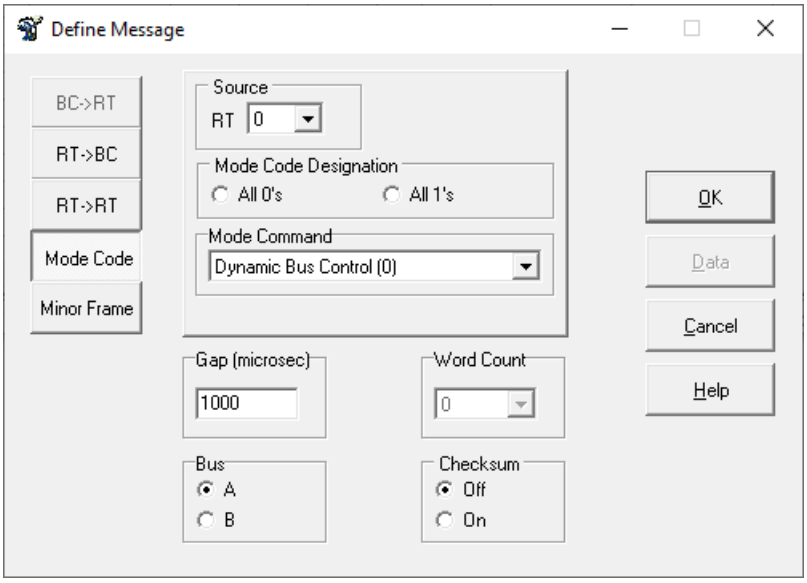


Figure 2-11 Define Message Dialog Box – RT to BC Message

Field	Description
Source RT (not for Mode Codes 17, 20 or 21)	Source RT number.
Destination RT (for Mode Codes 17, 20 and 21 only)	Destination RT number.
Mode Code Designation	Bit sequence in a subaddress that indicates that the message is a mode code: • **All 0's** – All 0's specifies a mode code • **All 1's** – All 1's specifies a mode code
Mode Command	The selected Mode Code (0-8,16-21)
Gap (microsec)	Intermessage gap in µsec (minimum 4 µsec).
Word Count	Number of Data Words in the message.
Bus (not for MMSI)	Bus on which to transmit.
Checksum (1760 and MMSI only)	Whether the last Data Word of the message is a checksum.

Table 2-8 BC to RT Message

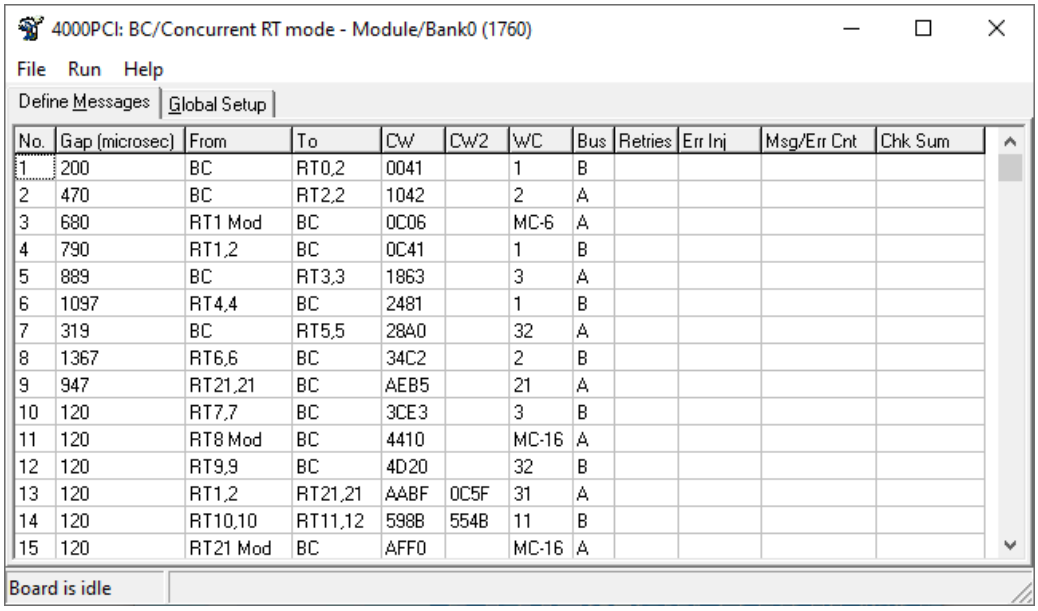
Adding/Duplicating a Message in the Message List

You can add a new message or a minor frame in middle of the list of messages. When you add a message, the selected message is duplicated. Then you can edit it, change the type of message or make it a minor frame.

To add a message in middle of the list:

1. From the main screen menu bar, select **Modules/Banks > Module/Bank # > BC/Concurrent RT Mode**.

   The BC/Concurrent RT Mode screen is displayed.



No.	Gap (microsec)	From	To	CW	CW2	WC	Bus	Retries	Err Inj	Msg/Err Cnt	Chk Sum
1	200	BC	RT0,2	0041		1	B				
2	470	BC	RT2,2	1042		2	A				
3	680	RT1 Mod	BC	0C06		MC-6	A				
4	790	RT1,2	BC	0C41		1	B				
5	889	BC	RT3,3	1863		3	A				
6	1097	RT4,4	BC	2481		1	B				
7	319	BC	RT5,5	28A0		32	A				
8	1367	RT6,6	BC	34C2		2	B				
9	947	RT21,21	BC	AEB5		21	A				
10	120	RT7,7	BC	3CE3		3	B				
11	120	RT8 Mod	BC	4410		MC-16	A				
12	120	RT9,9	BC	4D20		32	B				
13	120	RT1,2	RT21,21	AABF	0C5F	31	A				
14	120	RT10,10	RT11,12	598B	554B	11	B				
15	120	RT21 Mod	BC	AFF0		MC-16	A				

Figure 2-12 BC/Concurrent RT Mode Screen

2. Double-click a **message number** in the left-hand column, then click **Add Row**.

   The message is duplicated.

3. Edit the new message. See **Defining Messages** on page **2-6**.

Clearing Messages

To delete a single message from the list:

- On the Define Messages tab of the BC/Concurrent RT Mode screen (Figure 2-1), double-click a **message number** in the left-hand column, then click **Delete Row**.

  The message is deleted.

To delete all messages:

1. On the BC/Concurrent RT Mode screen (Figure 2-1), select **Run > Stop** (or press **F4**).

   MerlinPlus stops transmitting messages.

2. Select **File > Clear Screen**.
   All messages are deleted. These messages are only cleared on the screen, but are not cleared from the memory of the board. New messages will be entered into the memory of the board when you select **Run > Start**.

Using Minor Frames

Use minor frame messages to group messages – one before the start of each new group – to ensure that the next group of messages will not start transmission until the full minor frame time has elapsed. The minor frame time is set on the Global Setup tab (see Figure 2-3).

When using minor frames, the first message must be a minor frame message, and the last message should not be a minor frame message.

To add a minor frame:

1. From the main screen menu bar, select **Modules/Banks > Module/Bank # > BC/Concurrent RT Mode**.
   The BC/Concurrent RT Mode screen is displayed.

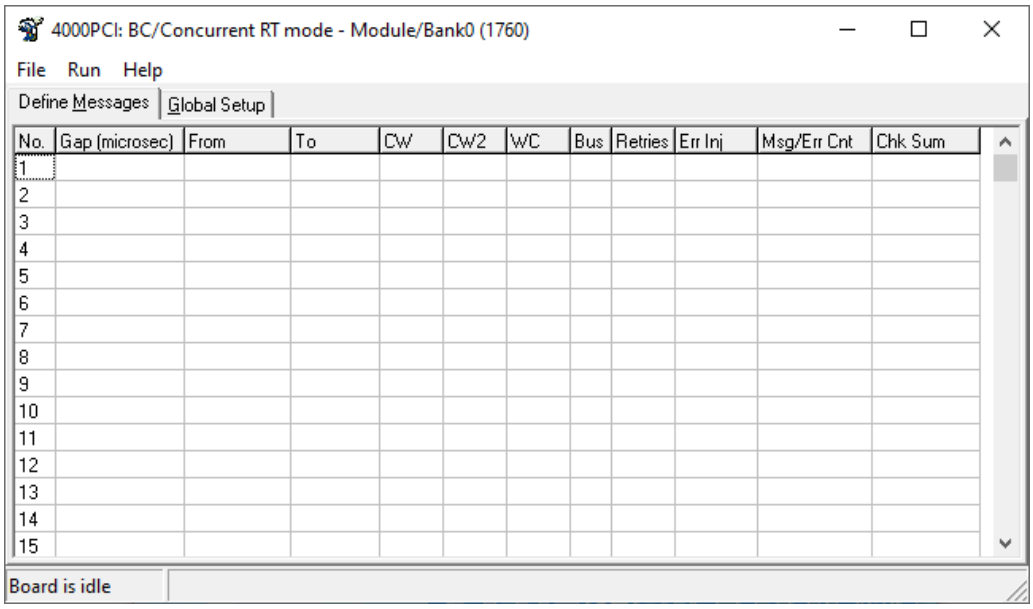


Figure 2-13 BC/Concurrent RT Mode Screen

2. Double-click the **first blank row**.
   The Define Message dialog box is displayed (Figure 2-5).
3. Click **Minor Frame**, then click **OK**.
   The minor frame is added to the list of messages on the BC/Concurrent RT Mode screen. The messages that follow the minor frame are part of the minor frame, until the next minor frame message or until the end of the bus list.

Using Error Injection

Note: Error injection is not available for single function *PxS* modules.

To use error injection:

- On the Define Messages tab of the BC/Concurrent RT Mode screen (Figure 2-1), right-click the **row of the desired message**, select **Error Injection**, then select the desired **error type**.

  The selected error injection type is displayed in the Err Inj column.

Setting Retries

You can set retries for a message. When you set retries, *MerlinPlus* will resend the message in the event that the RT does not respond within the timeout period specified in the BC Response Time field on the Global Setup tab of the BC/Concurrent RT Mode screen (Figure 2-3). You can set up to 3 retries, and specify whether the retires should be on the same bus or to alternate between buses with each retry.

To set retries:

- On the Define Messages tab of the BC/Concurrent RT Mode screen (Figure 2-1), right-click the **row of the desired message**, select **Retries**, then select the desired **number and type** of retries.

  The selected number of retries is displayed in the Retries column. When you select retries on alternate buses, the number is displayed as a negative number.

Saving/Loading the BC/Concurrent RT Mode Configuration

You can save the BC/Concurrent RT Mode configuration to a file and load the file later. The file includes all defined messages and the settings defined on the Global Setup tab of the BC/Concurrent RT Mode screen (Figure 2-3).

To save the BC/Concurrent RT Mode configuration:

1. On the BC/Concurrent RT Mode screen (Figure 2-1), select **File > Save Parameters**.

   The Save BC Messages dialog box is displayed.

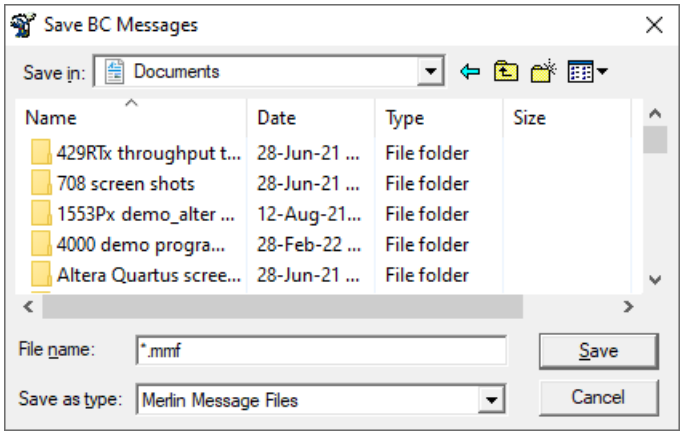


Figure 2-14 Save BC Messages Dialog Box

2. Select a **location** to save the file.
3. In the **File name** field, type a **name** for the file.
4. Click **Save**.
   The message file is saved.

To load a BC/Concurrent RT Mode configuration file:

1. On the BC/Concurrent RT Mode screen (Figure 2-1), select **File > Load Parameters**.
   The Load BC Messages dialog box is displayed.

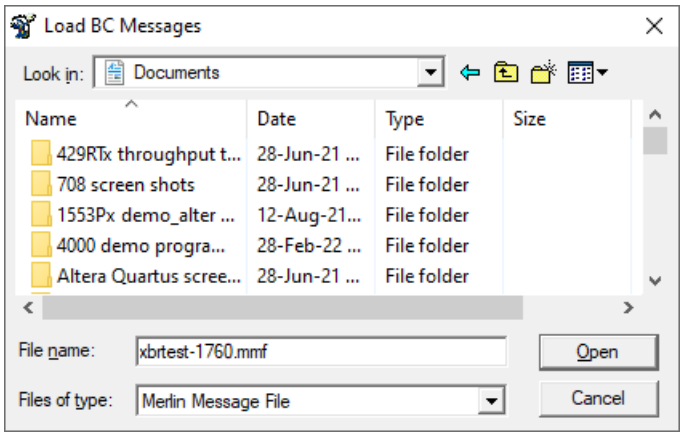


Figure 2-15 Load BC Messages Dialog Box

2. Select an **MMF file**, then click **Open**.
   The messages are displayed file on the Define Messages tab of the BC/Concurrent RT Mode screen (Figure 2-1).

Starting/Stopping BC/Concurrent RT Mode

You can start/stop BC/Concurrent RT simulation at any time. When you start BC/Concurrent RT simulation, the messages that you defined are transmitted over the bus.

To start message transmission:

- On the BC/Concurrent RT Mode screen (Figure 2-1), select **Run > Start** (or press **F9**).
  MerlinPlus starts transmitting messages.

To stop message transmission:

- On the BC/Concurrent RT Mode screen (Figure 2-1), select **Run > Stop** (or press **F4**).
  MerlinPlus stops transmitting messages.

Viewing Message Details

You can view messages in real time.

To view message details:

- On the Define Messages tab of the BC/Concurrent RT Mode screen (Figure 2-1), double-click a **message** in the **Msg/Err Cnt** column.
  The BC Message Information dialog box is displayed.

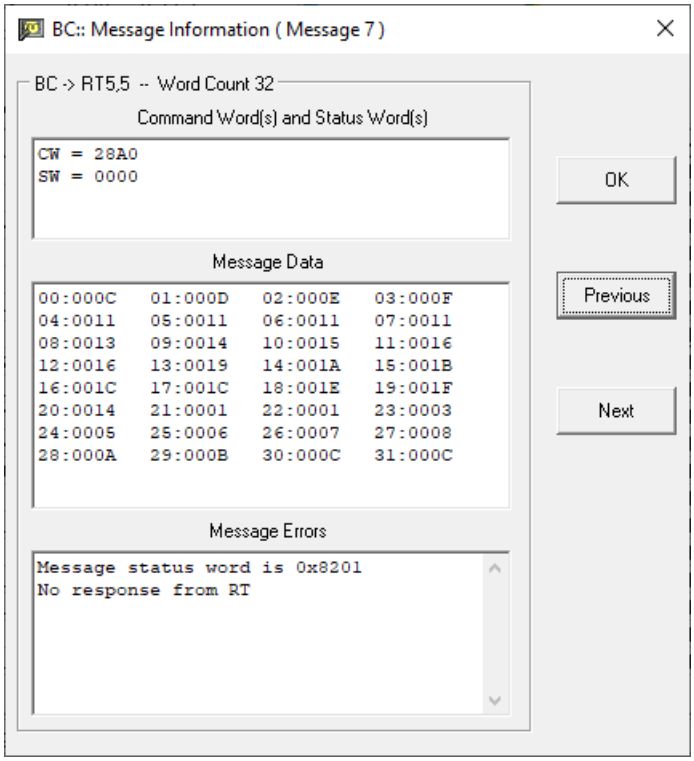


Figure 2-16 BC Message Information Dialog Box

The Message Information screen shows the details of the message in the selected row on the Define Messages tab of the BC/Concurrent RT Mode screen. In BC/Concurrent RT Mode, the Message Information screen always shows details about the same message, but it is updated in real time each time the module transmits the message.

The top part of the screen displays the Command Word(s) and RT Status Word(s) of the completed message. The middle part displays the data. And the bottom part displays the Message Status Word that Excalibur stores for each message.

The Message Status Word contains information about the completed message, including error information. The bits of the Message Status Word vary depending on the mode (BC/RT, RT or Sequential Monitor). For details on the Message Status Word in BC/Concurrent RT Mode, see **Get_Msgentry_Status_Px** in the *1553Px Family Software Tools Programmer's Reference*.

You can click **Previous** or **Next** to view the previous or next message. When there is no previous or next message, clicking these buttons closes the dialog box.

Restarting the Module

To restart the module:

- On the BC/Concurrent RT Mode screen (Figure 2-1), select **Run > Restart** (or press **F3**).

  The module is stopped and restarted, and all message and error counts are set to 0.

3 Remote Terminal Mode

In Remote Terminal (RT) Mode, the module simulates up to 32 RTs. (For single function *PxS* modules, only one RT can be simulated at a time.) You can define each RTs response to BC commands, inject errors and load data for RT to BC and RT to RT messages. You can also view messages received by the RTs.

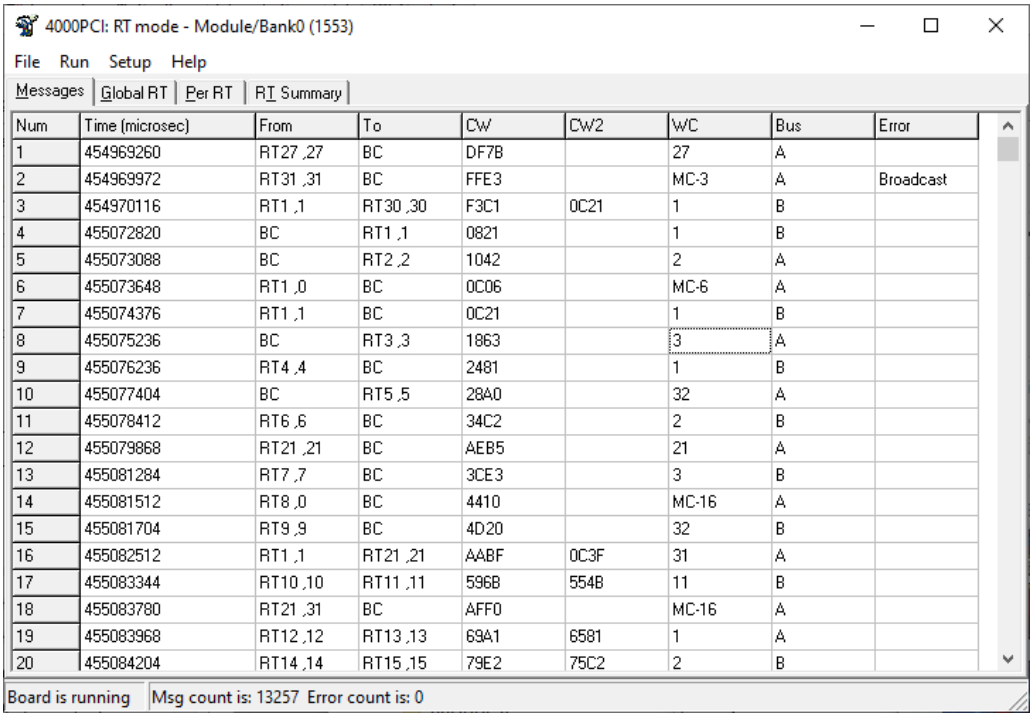
In this chapter:

The RT Mode Screen

To open the RT Mode screen:

- From the main screen menu bar, select **Modules/Banks > Module/Bank # > RT Mode**.

  The RT Mode screen is displayed. When RT Mode is running, the Messages tab shows the messages received over the bus. Messages are updated in real time. The fields are described in Table 3-5. The Messages tab holds up to 199 messages. Older messages are overwritten as new messages are received.



Num	Time (microsec)	From	To	CW	CW2	WC	Bus	Error
1	454969260	RT27 ,27	BC	DF7B		27	A	
2	454969972	RT31 ,31	BC	FFE3		MC-3	A	Broadcast
3	454970116	RT1 ,1	RT30 ,30	F3C1	0C21	1	B	
4	455072820	BC	RT1 ,1	0821		1	B	
5	455073088	BC	RT2 ,2	1042		2	A	
6	455073648	RT1 ,0	BC	0C06		MC-6	A	
7	455074376	RT1 ,1	BC	0C21		1	B	
8	455075236	BC	RT3 ,3	1863		3	A	
9	455076236	RT4 ,4	BC	2481		1	B	
10	455077404	BC	RT5 ,5	28A0		32	A	
11	455078412	RT6 ,6	BC	34C2		2	B	
12	455079868	RT21 ,21	BC	AEB5		21	A	
13	455081284	RT7 ,7	BC	3CE3		3	B	
14	455081512	RT8 ,0	BC	4410		MC-16	A	
15	455081704	RT9 ,9	BC	4D20		32	B	
16	455082512	RT1 ,1	RT21 ,21	AABF	0C3F	31	A	
17	455083344	RT10 ,10	RT11 ,11	596B	554B	11	B	
18	455083780	RT21 ,31	BC	AFF0		MC-16	A	
19	455083968	RT12 ,12	RT13 ,13	69A1	6581	1	A	
20	455084204	RT14 ,14	RT15 ,15	79E2	75C2	2	B	

Figure 3-1 RT Mode Screen

Setting Global Options for RT Mode

The Global RT tab of the RT Mode screen contains general option for RT Mode, that apply to all RTs.

To set global options for RT Mode:

1. From the main screen menu bar, select **Modules/Banks > Module/Bank # > RT Mode**.

   The RT Mode screen is displayed.

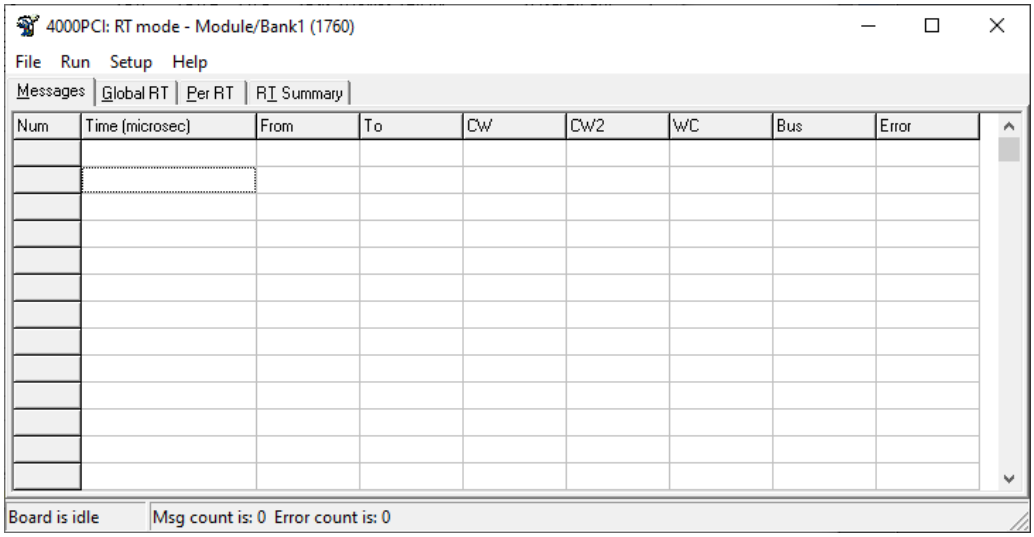


Figure 3-2 RT Mode Screen

2. Click the **Global RT** tab.

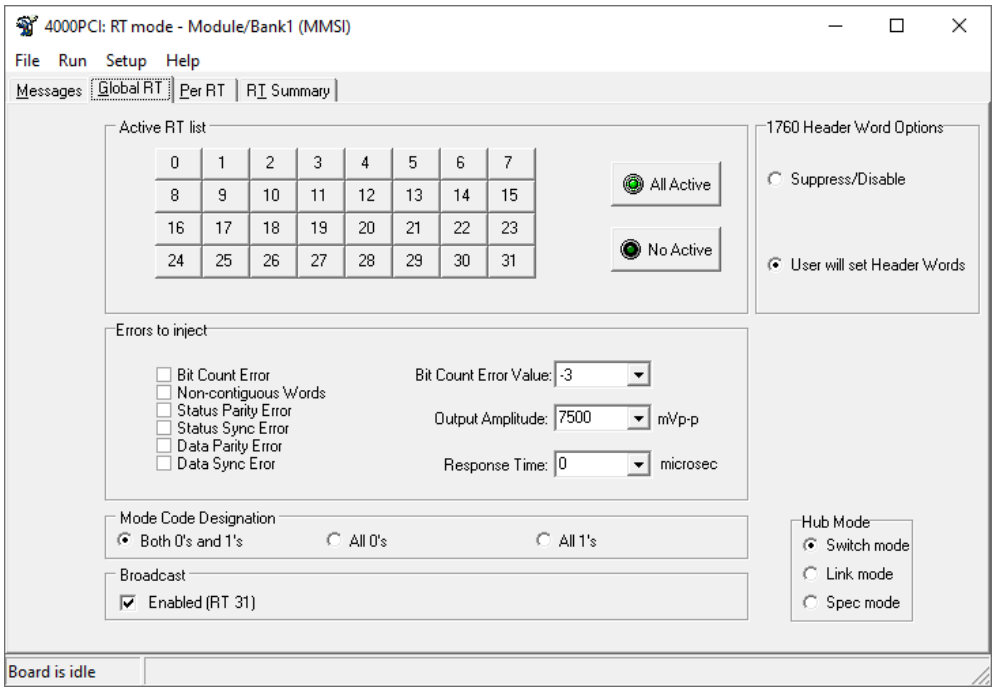


Figure 3-3 RT Mode Screen – Global RT Tab

3. Complete the fields, as described in Table 3-1.

Field	Description
Active RT list	Select which RTs to activate by clicking the desired RT numbers or by clicking **All Active**. To deselect all RTs, click **No Active**.
Errors to inject	Errors to inject into the messages: • **Bit Count Error** – incorrect bit count in the Data Words • **Non-contiguous Words** – gap added between Data Words • **Status Parity Error** – parity bit for the RT Status Word set incorrectly • **Status Sync Error** – the sync pattern of the RT Status Word set incorrectly • **Data Parity Error** – the parity bit for a Data Word set incorrectly • **Data Sync Error** – the sync pattern of a Data Word set incorrectly **Note:** Word Count Error is on the Per RT tab. See **Setting Per RT Options** on page 3-5.
Bit Count Error Value	Number of bits to add to or subtract from the standard 16-bit Data Word, when using Incorrect Bit Count as Error Injection (+3 to –3).
Output Amplitude	Amplitude in millivolts peak-to-peak with which the RT will transmit Data and Status Words (1000–7500, default 7500).
Response Time	Time in µsecs after which the RT will send a response (4–32).
Mode Code Designation	Bit sequence in a subaddress that indicates that the message is a mode code: • **Both 0's and 1's** – All 0's or all 1's specifies a mode code • **All 0's** – All 0's specifies a mode code • **All 1's** – All 1's specifies a mode code
Broadcast Enabled (RT 31)	Whether to enable broadcast on RT 31.
1760 Header Word Options (1760 and MMSI only)	Whether messages will have a 1760 Header Word: • **Suppress/Disable the Feature** • **User will set Header Words**
Hub Mode (MMSI only)	Type of Hub Mode: • **Switch mode** • **Link mode** • **Spec mode**

Table 3-1 RT Mode Screen – Global RT Tab

Setting Per RT Options

The Per RT tab of the RT Mode screen contains options that apply to specific RTs.

To set Per RT options:

1. From the main screen menu bar, select **Modules/Banks > Module/Bank # > RT Mode**.
   The RT Mode screen is displayed.

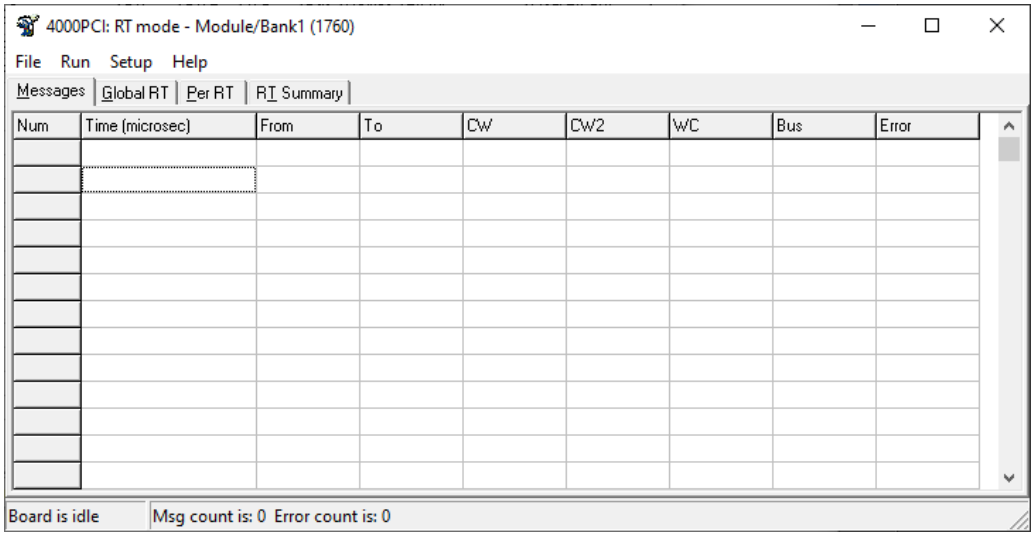


Figure 3-4 RT Mode Screen

2. Click the **Per RT** tab.

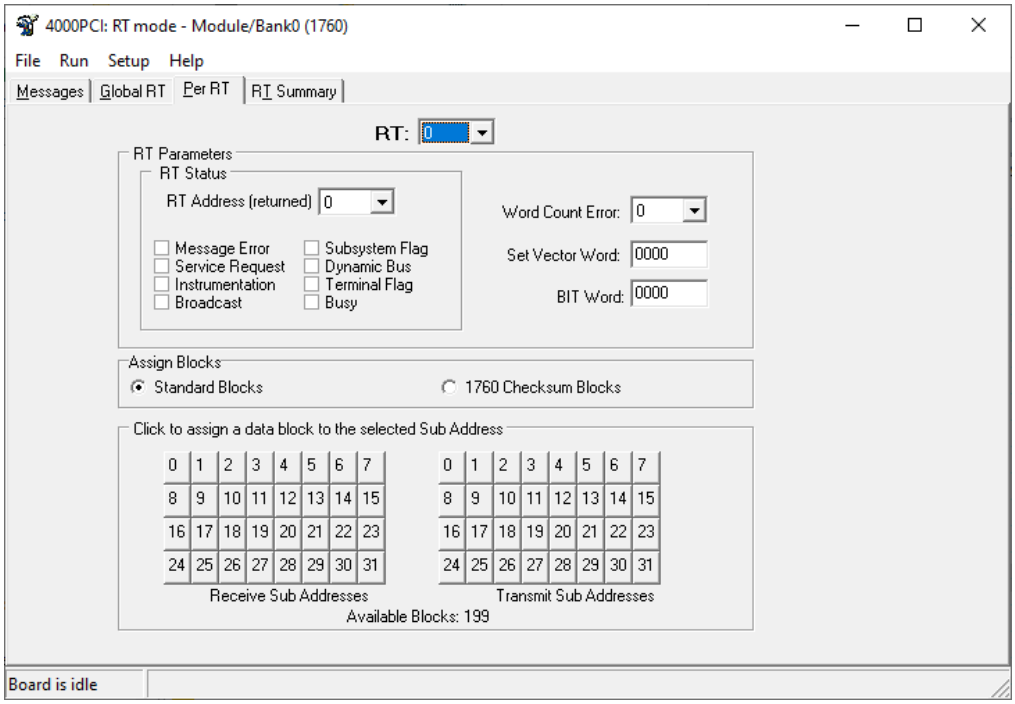


Figure 3-5 RT Mode Screen – Per RT Tab

3. Complete the fields, as described in Table 3-2.

Field	Description
RT	Select the RT number to modify.
RT Status	**RT Address (returned)** – RT number to return in the RT Status Word. By default, this is the same as the responding RT, selected in the RT drop-down box. Bits to set in the RT Status Word: • **Message Error** • **Service Request** • **Instrumentation** • **Broadcast** • **Subsystem Flag** • **Dynamic Bus** • **Terminal Flag** • **Busy**
Word Count Error	Number of words to add to or subtract from the word count (+3 to –3).
Set Vector Word	Value to return in response to the transmitted Transmit Vector Word Mode command for the given RT.
BIT Word	Value to return in response to the transmitted Built-in-Test (BIT) Word Mode command for the given RT.
Assign Blocks (1760 and MMSI only)	Type of data blocks to assign: • **Standard Blocks** – no checksum • **1760 Checksum Blocks** – data blocks with checksum
Click to assign data blocks to the selected Sub Address	Select each subaddress for which you would like to assign a specific data block. (A data block is a 32-word block of memory associated with one RT-subaddress-direction.) When you specify a data block for a receive subaddress, data sent to the selected subaddress (on the currently selected RT) will be saved in that data block. When you specify a data block for a transmit subaddress, the data to be transmitted from that subaddress will be taken from that data block. When data is received at a subaddress that does not have a data block assigned, the data is stored in data block 0. Likewise, when data is transmitted from a subaddress that does not have a data block assigned, the data is taken from data block 0. You can define up to 199 data blocks.

Table 3-2 RT Mode Screen – Per RT Tab

4. After selecting a data block for a transmit subaddress, right click on the **subaddress** to set the data.
The Define/Modify Data dialog box is displayed.

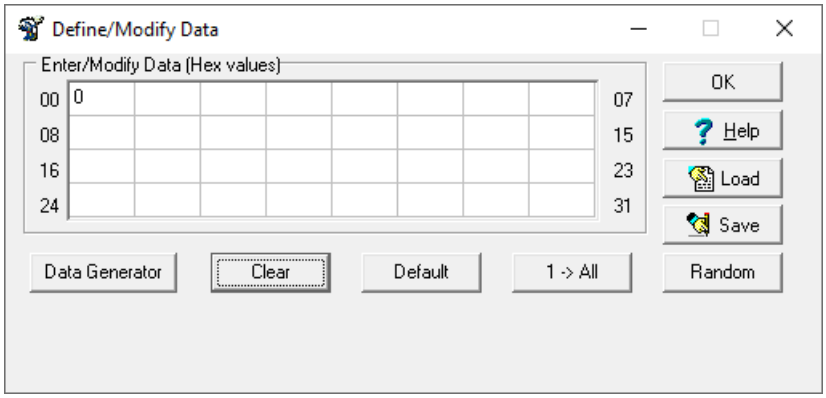


Figure 3-6 Define/Modify Data Dialog Box

5. You can enter **hex data** for each Data Word, up to the number of words specified in the Word Count field on the previous dialog box.
– OR **–**

You can also use the options described in Table 3-3.

Button	Description
Data Generator	Opens the Data Generator dialog box, to define dynamic data for the selected Data Word. When using the Data Generator, different data is transmitted each time this Data Word is transmitted. See Step 6 on page 3-8. **Note:** When Data Generator is enabled, the Data Word is gray. If there is a value in that Data Word, it will be ignored.
Clear	Clears the data of all Data Words.
Default	Enters values for all Data Words starting from 0 and incrementing each Data Word by 1.
1 > All	Copies the value of the first Data Word to all other Data Words.
Load	Loads previously saved values.
Save	Saves the values of all Data Words for later use.
Random	Enters random values for all Data Words.

Table 3-3 Define/Modify Data Buttons

6. (Optional) To use the Data Generator, click **Data Generator**. The Data Generator dialog box is displayed.

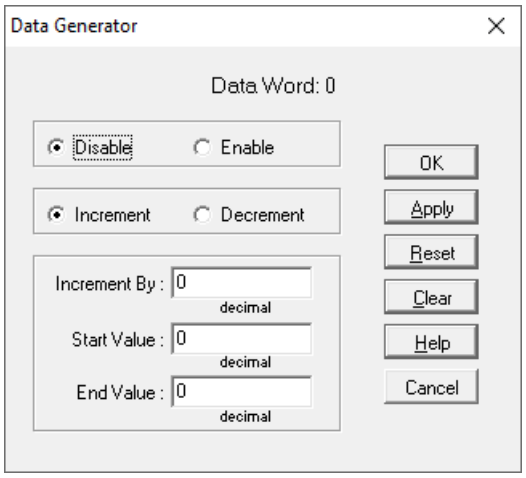


Figure 3-7 Data Generator Dialog Box

7. Complete the fields, as described in Table 3-4, then click **OK**.

Field	Description
Disable / Enable	Enables or disables the Data Generator.
Increment / Decrement	Whether to increment or decrement the value with each transmission of the Data Word.
Increment by	Value in decimal to increment or decrement by.
Start Value	Starting value in decimal.
End Value	Ending value in decimal. When the data reaches the end value, it loops back to the start value.
OK	Saves the data and returns to the Define/ Modify Data dialog box.
Apply	Saves the data and remains in the Data Generator dialog box.
Reset	Restores the values to the values at the time the Data Generator was opened.
Clear	Restores all values to their defaults.

Table 3-4 Data Generator Dialog Box

8. Click **OK** in the Define/Modify Data dialog box.

Saving/Loading the RT Mode Configuration

You can save the RT Mode configuration to a file and load the file later. The file includes the settings defined on all the tabs of the RT Mode screen, and the data defined for each RT-subaddress-direction.

To save the RT Mode configuration:

1. On the RT Mode screen (Figure 3-1), select **File > Save Parameters**.
   The Save RT Parameters dialog box is displayed.

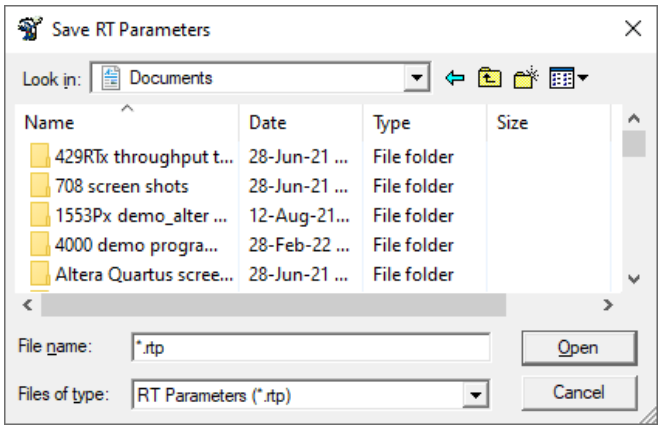


Figure 3-8 Save RT Parameters Dialog Box

2. Select a **location** to save the file.
3. In the **File name** field, type a name for the file.
4. Click **Save**.
   The message file is saved.

To load an RT Mode configuration file:

1. On the RT Mode screen (Figure 3-1), select **File > Load Parameters**.
   The Load RT Parameters dialog box is displayed.

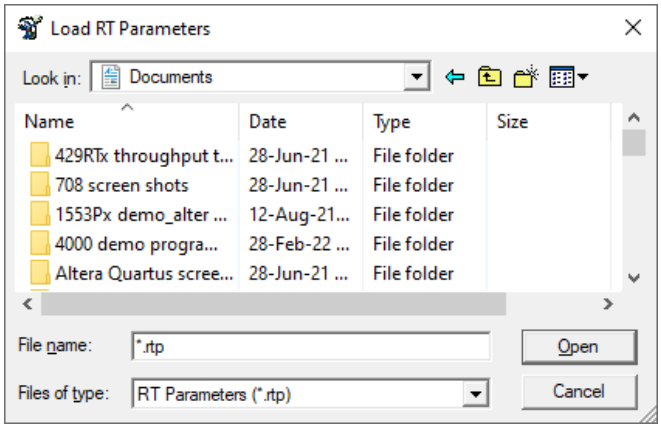


Figure 3-9 Load RT Parameters Dialog Box

2. Select an **RTP file**, then click **Open**.
   The RT parameters are loaded.

Starting/Stopping RT Mode

You can start/stop RT simulation at any time. When you start RT simulation, the RTs that you activated on the module appear on the bus and respond to messages. When you stop RT simulation, the RTs that are defined in the module do not appear on the bus and any messages sent to those RT will result in errors.

To start RT Mode:

- On the RT Mode screen (Figure 3-1), select **Run > Start** (or press **F9**). *MerlinPlus* starts running RT Mode.

To stop RT Mode:

- On the RT Mode screen (Figure 3-1), select **Run > Stop** (or press **F4**). *MerlinPlus* stops running RT Mode.

Viewing Message Details

You can view messages details in real time.

To view messages:

1. On the RT Mode screen (Figure 3-1), click the **Messages** tab.

   The RT Mode screen is displayed. When RT Mode is running, the Messages tab shows the messages received over the bus. Messages are updated in real time. The fields are described in Table 3-5.

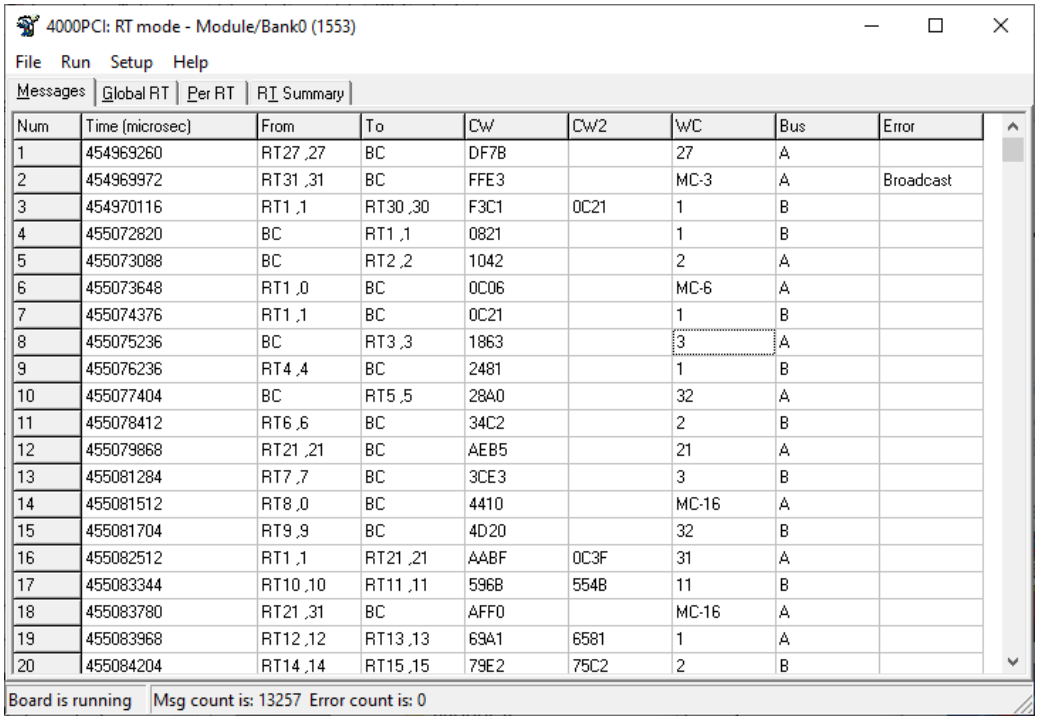


Figure 3-10 RT Mode Screen – Messages Tab

Field	Description
Num	Message number.
Time (microsec)	Timestamp of the message in µsec from the start of the module.
From	Message from either BC or RT/subaddress.
To	Message to either BC or RT/subaddress.
CW	Command Word of the message.
CW2	Second Command Word of the message for RT to RT message.
WC	Word Count. Number of Data Words in the message.
Bus (not for MMSI)	Bus on which the message was transmitted.
Error	Error status of the message.

Table 3-5 RT Mode Screen

2. To view message details, double-click a **message** in the **Error** column. The Message Information screen is displayed.

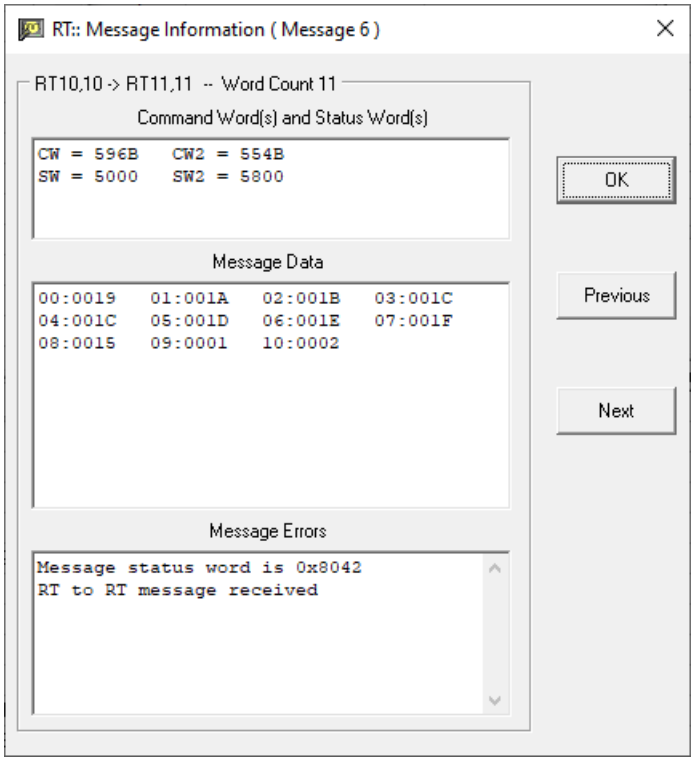


Figure 3-11 RT Message Information Screen

The Message Information screen shows the details of the message in the selected row on the Messages tab of the RT Mode screen. The Message Information screen is updated in real time as new messages are received.

The top part of the screen displays the Command Word(s) and RT Status Word(s) of the completed message. The middle part displays the data. And the bottom part displays the Message Status Word that Excalibur stores for each message.

The Message Status Word contains information about the completed message, including error information. The bits of the Message Status Word vary depending on the mode (BC/RT, RT or Sequential Monitor). For details on the Message Status Word in RT Mode, see **Get_RT_Message_Px** in the *1553Px Family Software Tools Programmer's Reference*.

You can click **Previous** or **Next** to view the previous or next message. When there is no previous or next message, clicking these buttons closes the dialog box.

Viewing the Message and Error Count (RT Summary)

The RT Summary tab of the RT Mode screen shows the message and error count of all the RTs. You can set a name for each RT on the RT Summary Define screen. See **Setting RT Names** on page 3-13.

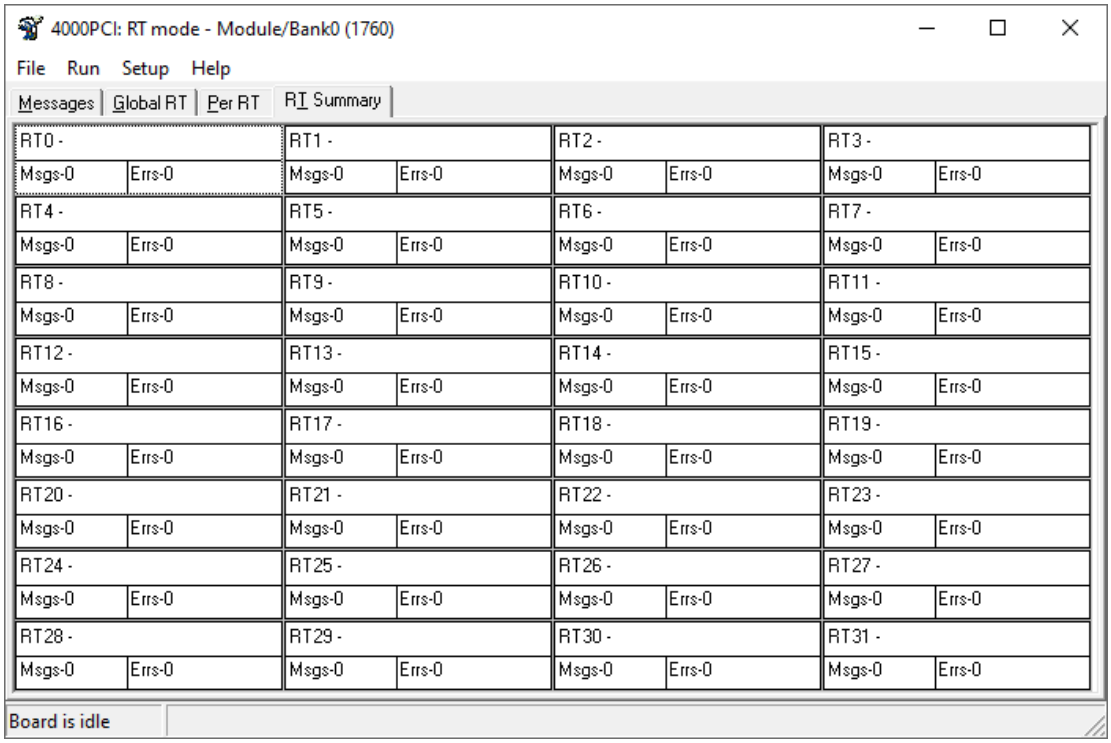


Figure 3-12 RT Summary Screen

Setting RT Names

You can set names for the RTs on the RT Summary tab.

To set RT names:

1. On the RT Mode screen (Figure 3-1), select **Setup > RT Summary Define**.
   The RT Summary Define dialog box is displayed.

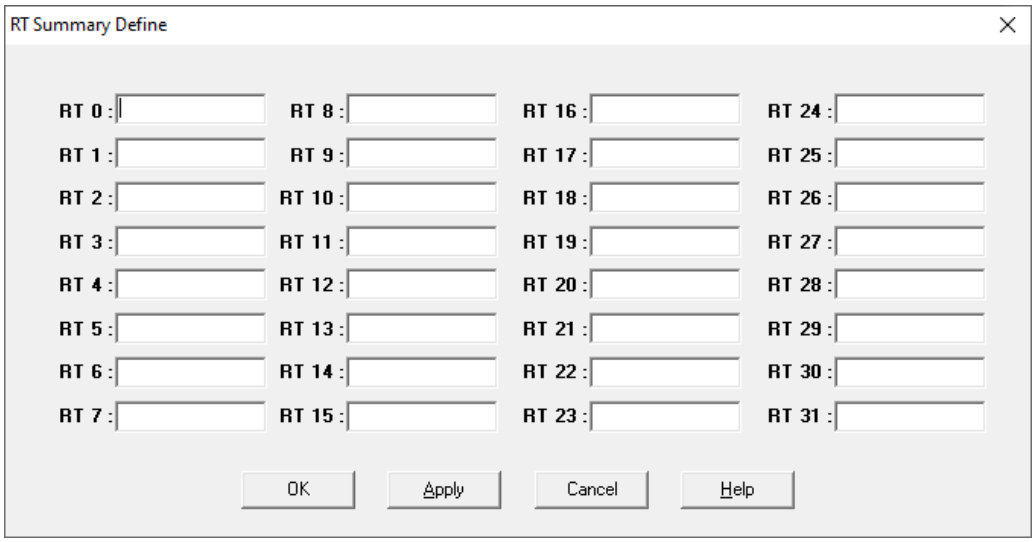


Figure 3-13 RT Summary Define Dialog Box

2. Type a name in each **RT number** field that you want to name.
3. Click **OK**.
   The names are displayed on the RT Summary tab.

Clearing Messages

To clear the list of received messages:

- On the RT Mode screen (Figure 3-1), select **File > Clear Screen**.
  All messages are cleared.

Restarting the Module

To restart the module:

- On the RT Mode screen (Figure 3-1), select **Run > Restart** (or press **F3**).
  The module is stopped and restarted, and the message and error counts at the bottom of the screen are set to 0.

4 Sequential Monitor Mode

In Sequential Monitor Mode, the module acts as a Bus Monitor.

In this chapter:

The Sequential Monitor Mode Screen

To open the Sequential Monitor Mode screen:

- From the main screen menu bar, select **Modules/Banks > Module/Bank # > Sequential Monitor Mode**.

  The Sequential Monitor Mode screen is displayed. When Sequential Monitor Mode is running, the Messages tab shows the messages received over the bus. Messages are updated in real time. The fields are described in Table 4-3. The Messages tab holds up to 199 messages. Older messages are overwritten as new messages are received.

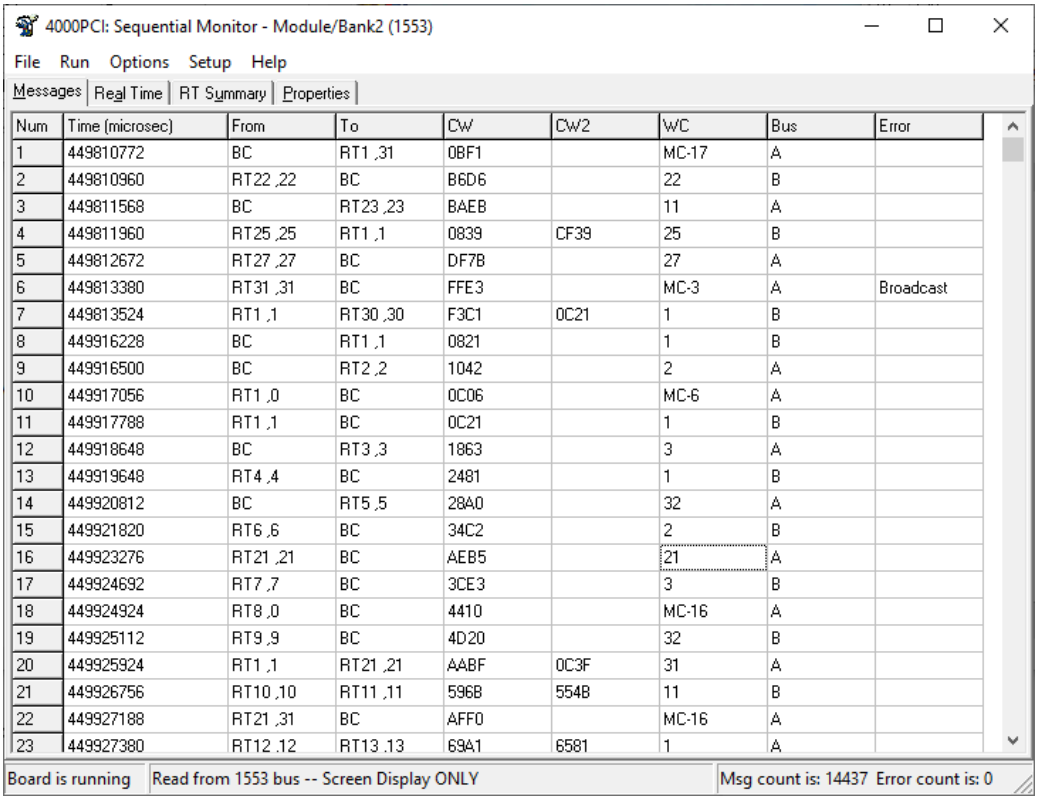


Figure 4-1 Sequential Monitor Mode Screen

Setting Options for Sequential Monitor Mode (Properties Tab)

Sequential Monitor Mode settings are defined on the Properties tab of the Sequential Monitor screen. This section discusses all options on the Properties tab except for Triggers, which are discussed in **Defining Triggers to Display/Store Messages (Properties Tab)** on page 4-5.

To set options for Sequential Monitor Mode:

1. From the main screen menu bar, select **Modules/Banks > Module/Bank # > Sequential Monitor Mode**.

   The Sequential Monitor Mode screen is displayed.

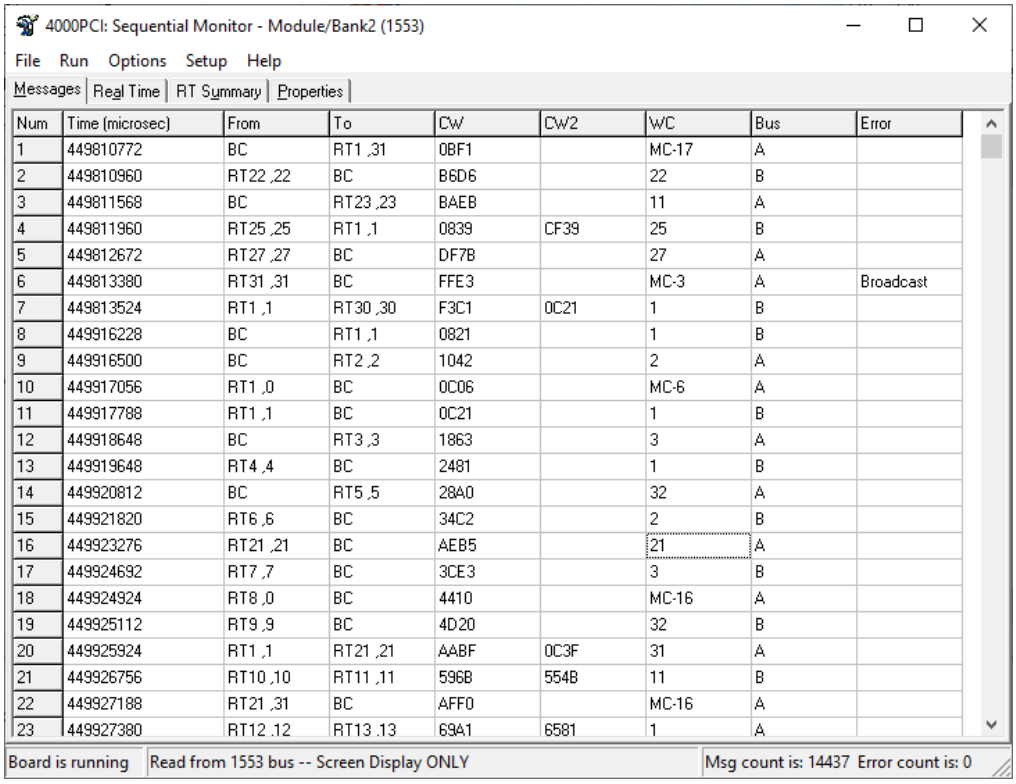


Figure 4-2 Sequential Monitor Mode Screen

2. Click the **Properties** tab.

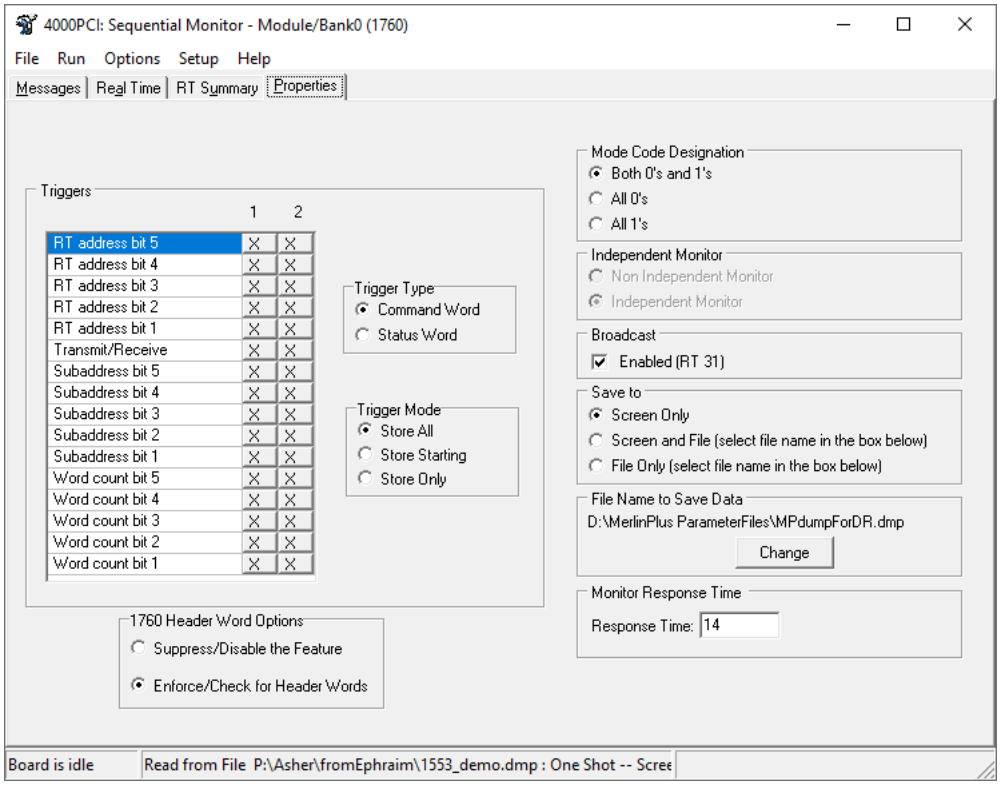


Figure 4-3 Sequential Monitor Mode Screen – Properties Tab

3. Complete the fields, as described in Table 4-1. (Triggers are described in **Defining Triggers to Display/Store Messages (Properties Tab)** on page 4-5.)

Field	Description
Mode Code Designation	Bit sequence in a subaddress that indicates that the message is a mode code: • **Both 0's and 1's** – All 0's or all 1's specifies a mode code • **All 0's** – All 0's specifies a mode code • **All 1's** – All 1's specifies a mode code
Independent Monitor	Not supported on newer boards.
Broadcast Enabled (RT 31)	Whether to enable broadcast on RT 31.
Save to	Whether to display the data on screen, save the data to a file or both. • **Screen Only** • **Screen and File** • **File Only**
File Name to Save Data	Click **Change** and select a **location** and **name** for the data file.
Monitor Response Time	Time in µsecs after which if the RT does not respond it will be considered an error (4–32, default 14).
1760 Header Word Options (1760 and MMSI only)	Whether messages will have a 1760 Header Word: • **Suppress/Disable the Feature** • **User will set Header Word**

Table 4-1 Sequential Monitor Mode Screen – Properties Tab

Defining Triggers to Display/Store Messages (Properties Tab)

You can define up to two triggers to display and/or store messages. A trigger is based on specific bits being either 0 or 1 within either the Command Word or RT Status Word. When *MerlinPlus* receives a message with the specified Command Word or RT Status Word, *MerlinPlus* will follow the trigger rules and display and store messages.

To set triggers:

1. On the Sequential Monitor Mode screen, click the **Properties** tab.

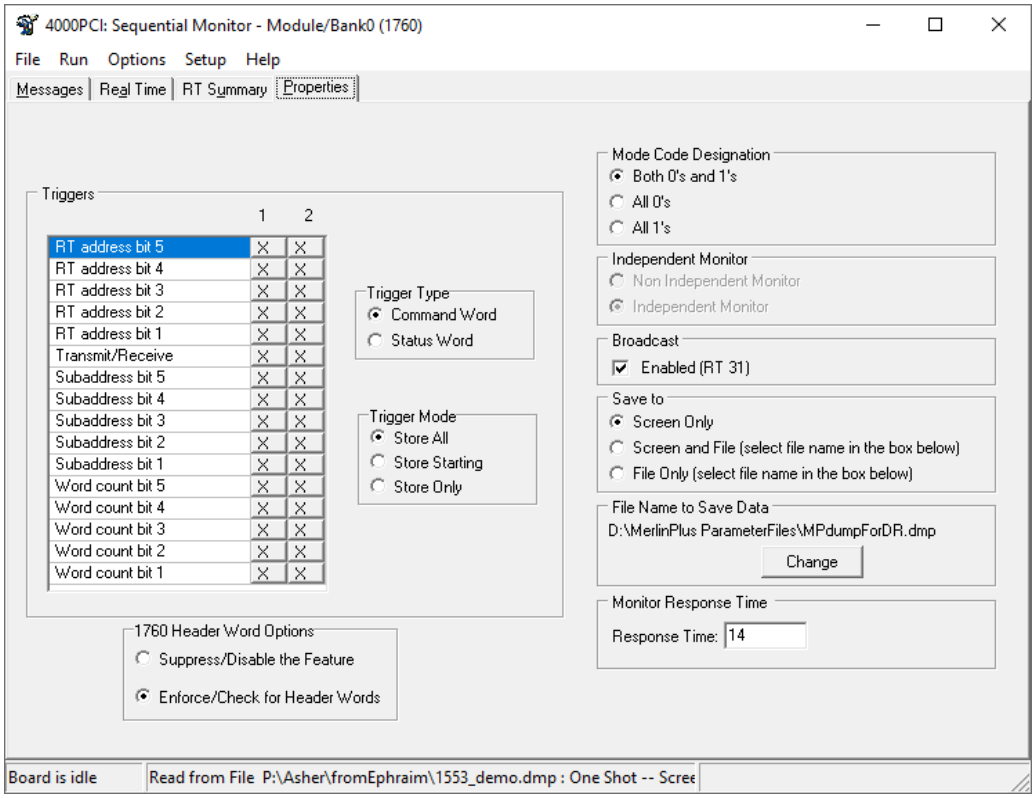


Figure 4-4 Sequential Monitor Mode Screen – Properties Tab

2. Complete the fields in the Triggers section of the Properties tab, as described in Table 4-2. (The other options on the Properties tab are described in **Setting Options for Sequential Monitor Mode (Properties Tab)** on page 4-2.)

Field	Description
Trigger Type	Trigger based on: • **Command Word** • **RT Status Word**
Trigger Mode	Action to perform when trigger is received: • **Store All** – display and/or store all messages; do not use triggers. • **Store Starting** – display and/or store the trigger message and all following messages. • **Store Only** – display and/or store only messages that match the triggers.

Table 4-2 Sequential Monitor Mode Screen – Triggers Section of Properties Tab

3. In the table on the left side of the screen, define up to two triggers. For each bit that you want to set, click the **X** one or more times to select 0 or 1. Bits that are left as X can be either 0 or 1.

Saving/Loading the Sequential Monitor Mode Configuration

You can save the Sequential Monitor Mode configuration to a file and load the file later. The file includes the settings defined on all the tabs of the Sequential Monitor Mode screen.

To save the Sequential Monitor Mode configuration:

1. On the Sequential Monitor Mode screen (Figure 4-1), select **File > Save Parameters**.

   The Sequential Mode Parameters dialog box is displayed.

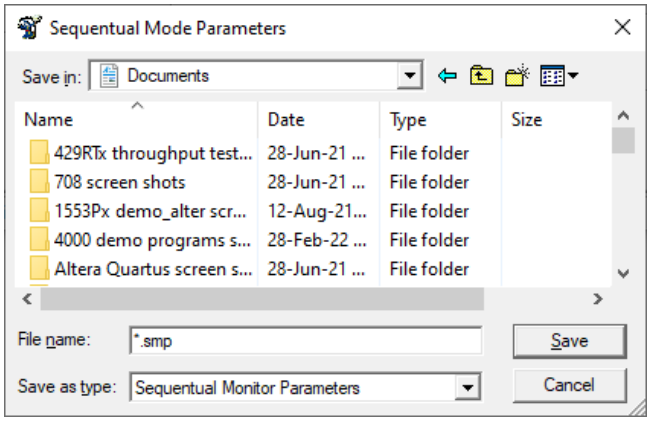


Figure 4-5 Sequential Mode Parameters Dialog Box

2. Select a **location** to save the file.
3. In the **File name** field, type a name for the file.

4. Click **Save**.
   The message file is saved.

To load a Sequential Monitor Mode configuration file:

1. On the Sequential Monitor Mode screen (Figure 4-1), select **File > Load Parameters**.
   The Load Sequential Mode Parameters dialog box is displayed.

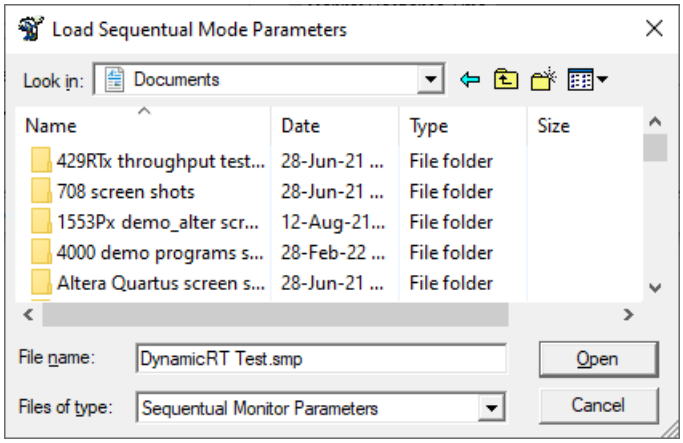


Figure 4-6 Load Sequential Mode Parameters Dialog Box

2. Select an **SMP file**, then click **Open**.
   The Sequential Monitor Mode Parameters are displayed on the Parameters tab of the Sequential Monitor Mode screen (Figure 4-3).

Starting/Stopping Sequential Monitor Mode

You can start/stop Sequential Monitor Mode at any time. When you start Sequential Monitor Mode, the module acts as a Bus Monitor, and displays and/or saves messages that were received over the bus, according to the options specified on the Properties tab. See **Setting Options for Sequential Monitor Mode (Properties Tab)** on page 4-2.

To start Sequential Monitor Mode:

- On the Sequential Monitor screen (Figure 4-1), select **Run > Start** (or press **F9**).
  MerlinPlus starts running Sequential Monitor Mode.

To stop Sequential Monitor Mode:

- On the Sequential Monitor Mode screen (Figure 4-1), select **Run > Stop** (or press **F4**).
  MerlinPlus stops running Sequential Monitor Mode.

Viewing Message Details

In Sequential Monitor Mode, there are three ways to view message details in real time: the Messages tab, the Message Information screen and the Real Time tab. The Messages tab shows basic information about each message on the bus. The Message Information screen shows the details of the message in the selected row on the Messages tab of the Sequential Monitor screen. The Real Time tab of the Sequential Monitor screen shows the details of up to 10 messages.

To view messages:

1. On the Sequential Monitor Mode screen (Figure 4-1), click the **Messages** tab.

   When Sequential Monitor Mode is running, the Messages tab shows the messages received over the bus. Messages are updated in real time. The fields are described in Table 4-3.

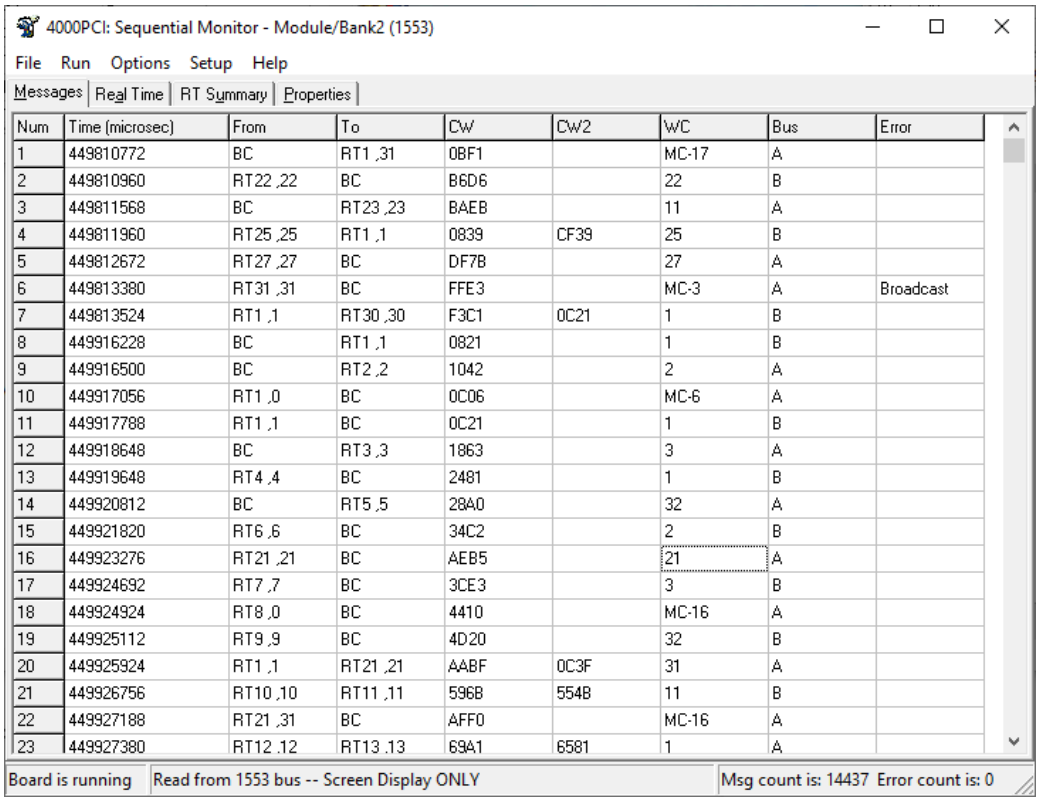


Figure 4-7 Sequential Monitor Mode Screen – Messages Tab

Field	Description
Num	Message number.
Time (microsec)	Timestamp of the message in µsec from the start of the module.
From	Message from either BC or RT/subaddress.
To	Message to either BC or RT/subaddress.
CW	Command Word of the message.
CW2	Second Command Word of the message for RT to RT message.
WC	Word Count. Number of Data Words in the message.
Bus (not for MMSI)	Bus on which the message was transmitted.
Error	Error status of the message.

Table 4-3 Sequential Monitor Mode Screen

2. To view message details, double-click a message in **Error** column. The Message Information screen is displayed.

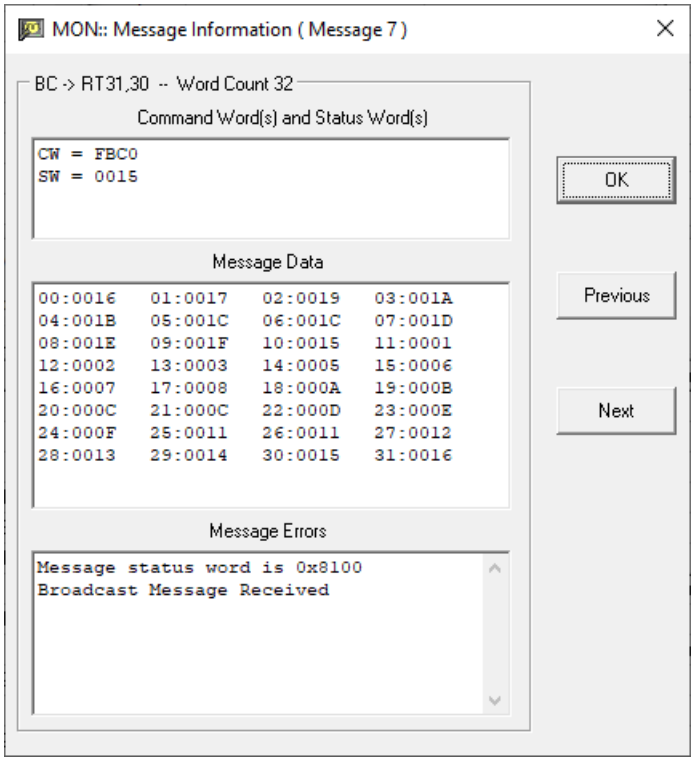


Figure 4-8 RT Message Information Screen

The Message Information screen shows the details of the message in the selected row on the Messages tab of the Sequential Monitor screen. The

Message Information screen is updated in real time as new messages are received.

The top part of the screen displays the Command Word(s) and RT Status Word(s) of the completed message. The middle part displays the data. And the bottom part displays the Message Status Word that Excalibur stores for each message.

The Message Status Word contains information about the completed message, including error information. The bits of the Message Status Word vary depending on the mode (BC/RT, RT or Sequential Monitor). For details on the Message Status Word in Sequential Monitor Mode, see **Get_Next_Message_Px** in the *1553Px Family Software Tools Programmer's Reference*.

You can click **Previous** or **Next** to view the previous or next message. When there is no previous or next message, clicking these buttons closes the dialog box.

Using the Real Time Tab

The Real Time tab of the Sequential Monitor screen shows the details of up to 10 BC to RT or RT to BC messages, five on each tab: Real Time 1 and Real Time 2. These tabs are located on the right side of the screen. (Note that RT to RT messages are not supported on the Real Time tab.)

You specify the messages that you want to display by providing the RT, subaddress and direction for each message. The Real Time tab is updated whenever the specified messages are received.

To view messages using the Real Time tab:

1. On the Sequential Monitor Mode screen (Figure 4-1), click the **Real Time** tab.

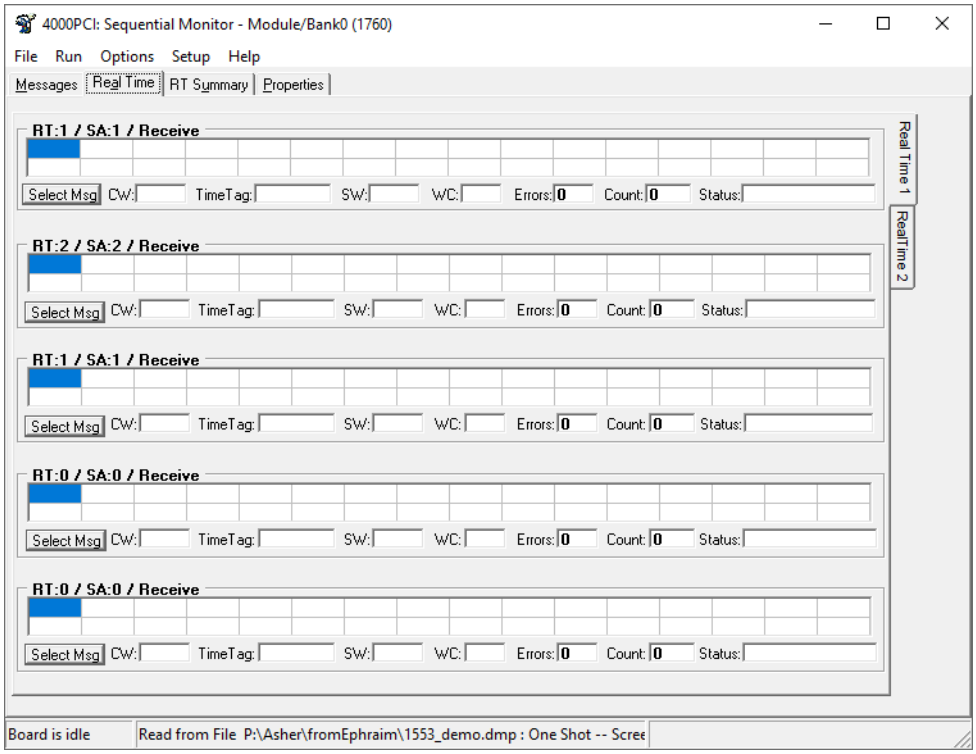


Figure 4-9 Sequential Monitor Mode Screen – Real Time Tab

2. On the right side of the screen, click the **Real Time 1** or **Real Time 2** tab.
3. Click **Select Msg**.
   The Define CW (Define Command Word) dialog box is displayed.

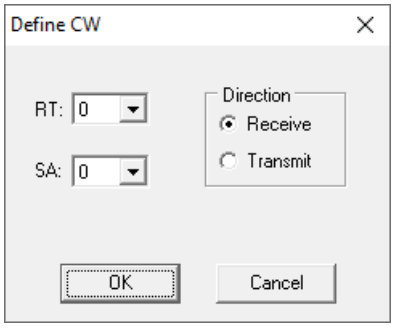


Figure 4-10 Define CW Dialog Box

4. Complete the fields to specify the desired message, as described in Table 4-4, then click **OK**.

Field	Description
RT	RT number.
SA	Subaddress number.
Direction	Direction of the message: • **Receive** • **Transmit**

Table 4-4 Define CW Dialog Box

5. Repeat these steps for each message that you want to view in real time.

The Real Time tab shows the messages received over the bus. Messages are updated in real time. The fields are described in Table 4-5.

Field	Description
CW	Command Word of the message.
Time Tag	Time stamp of the message in µsec from the start of the module.
SW	RT Status Word.
WC	Word Count. Number of Data Words in the message.
Errors	Number of messages with errors.
Count	Number of times this message was received.
Status	Error status of the message. Click in the **Status** field and use the Right Arrow key to see the entire list of errors.

Table 4-5 Sequential Monitor Mode Screen

Viewing the Message and Error Count (RT Summary)

This RT Summary tab works the same in Sequential Monitor Mode as it does in RT Mode. See **Viewing the Message and Error Count (RT Summary)** on page 3-12. You can also set names for the RTs on the RT Summary tab. See **Setting RT Names** on page 3-13.

Clearing Messages

To clear the list of received messages:

- On the Sequential Monitor Mode screen (Figure 4-1), select **File > Clear Screen**. All messages are cleared.

Loading a Message File

You can load previously saved messages that were saved by *MerlinPlus*. These messages were saved by selecting the save to file option on the Properties tab of the Sequential Monitor screen. See **Setting Options for Sequential Monitor Mode (Properties Tab)** on page 4-2.

To load messages from a file:

1. On the Sequential Monitor Mode screen (Figure 4-1), select **Setup > Read from File**.
   The Open Binary File dialog box is displayed.

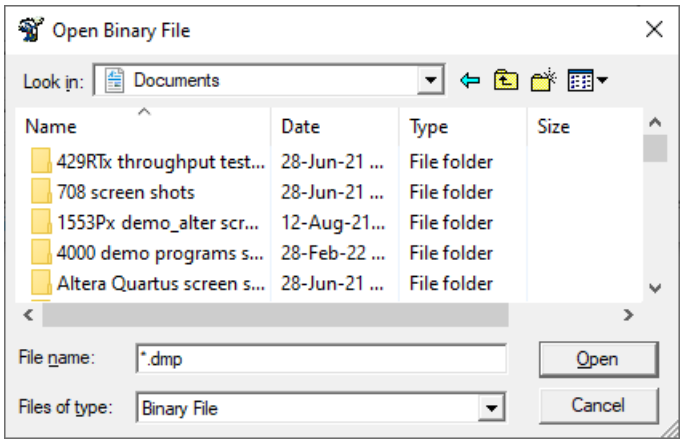


Figure 4-11 Open Binary File Dialog Box

2. Select a **DMP file**, then click **Open**.
3. Select **Options > Read from File > One-Shot** or **Continuous**.
4. Select **Run > Start** (or press **F9**).
   The messages are displayed on the Sequential Monitor Mode screen.

Converting the Message File From Binary to ASCII

You can convert the binary message file that was saved by *MerlinPlus* to a readable text file. The text file can be read in any text editor and can be opened in Excel by changing the file extension to CSV, then opening the file. The text file has a comma between each value and a header row.

To convert the message file to a text file:

1. On the Sequential Monitor Mode screen (Figure 4-1), select **Options > Convert Binary->ASCII**.
   The Convert To ASCII dialog box is displayed.

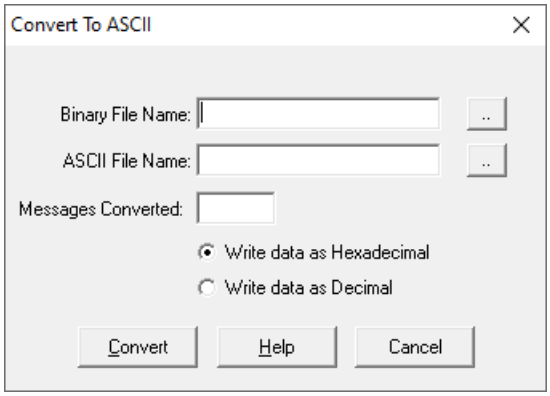


Figure 4-12 Convert To ASCII Dialog Box

2. Click the button next to the **Binary file name** field, then select the **DMP** file.
3. Click the button next to the **ASCII file name** field, then select a name and location for the output **ASC** file.
4. Select **Write data as Hexadecimal** or **Write data as Decimal**.
5. Click **Convert**.
   The ASCII file is saved. The fields of the ASCII file are described in Table 4-6.

Field	Description
No	Message number.
Type	Message type: • **BC to RT** • **RT to BC** • **RT to RT**
Timetag	Timestamp of the message in µsec from the start of the module.
MsgStatus	Message Status Word that Excalibur stores for each message. The Message Status Word contains information about the completed message, including error information. The bits of the Message Status Word vary depending on the mode (BC/RT, RT or Sequential Monitor). For details on the Message Status Word in Sequential Monitor Mode, see **Get_Next_Message_Px** in the *1553Px Family Software Tools Programmer's Reference*.
CW1	Command Word of the message. For RT to RT messages, this is the first Command Word.
SW1	RT Status Word. For RT to RT messages, this is the RT Status Word from the transmitting RT.
WC1	Word Count. Number of Data Words specified in the Command Word of the message. For RT to RT messages, this is the Word Count in the first Command Word.
RT1	RT number specified in the Command Word of the message.

Table 4-6 ASCII File Fields

Field	Description
SA1	Subaddress number specified in the Command Word of the message.
Bus (not for MMSI)	Bus on which the message was transmitted.
CW2 (for RT to RT messages only)	Second Command Word of the message (to the transmitting RT).
SW2 (for RT to RT messages only)	Second RT Status Word (from the receiving RT).
WC2 (for RT to RT messages only)	Second Word Count. Number of Data Words specified in the second Command Word.
RT2 (for RT to RT messages only)	RT number specified in the second Command Word of the message.
SA2 (for RT to RT messages only)	Subaddress number specified in the second Command Word of the message.
data0	Data Word 0.
data1	Data Word 1.
data2	Data Word 2.
⋮	
data31	Data Word 31.

Table 4-6 ASCII File Fields (Continued)

Restarting the Module

To restart the module:

- On the Sequential Monitor Mode screen (Figure 4-1), select **Run > Restart** (or press **F3**).
  The module is stopped and restarted, and the message and error counts at the bottom of the screen are set to 0.

Appendix A MIL-STD-1553 Word Formats

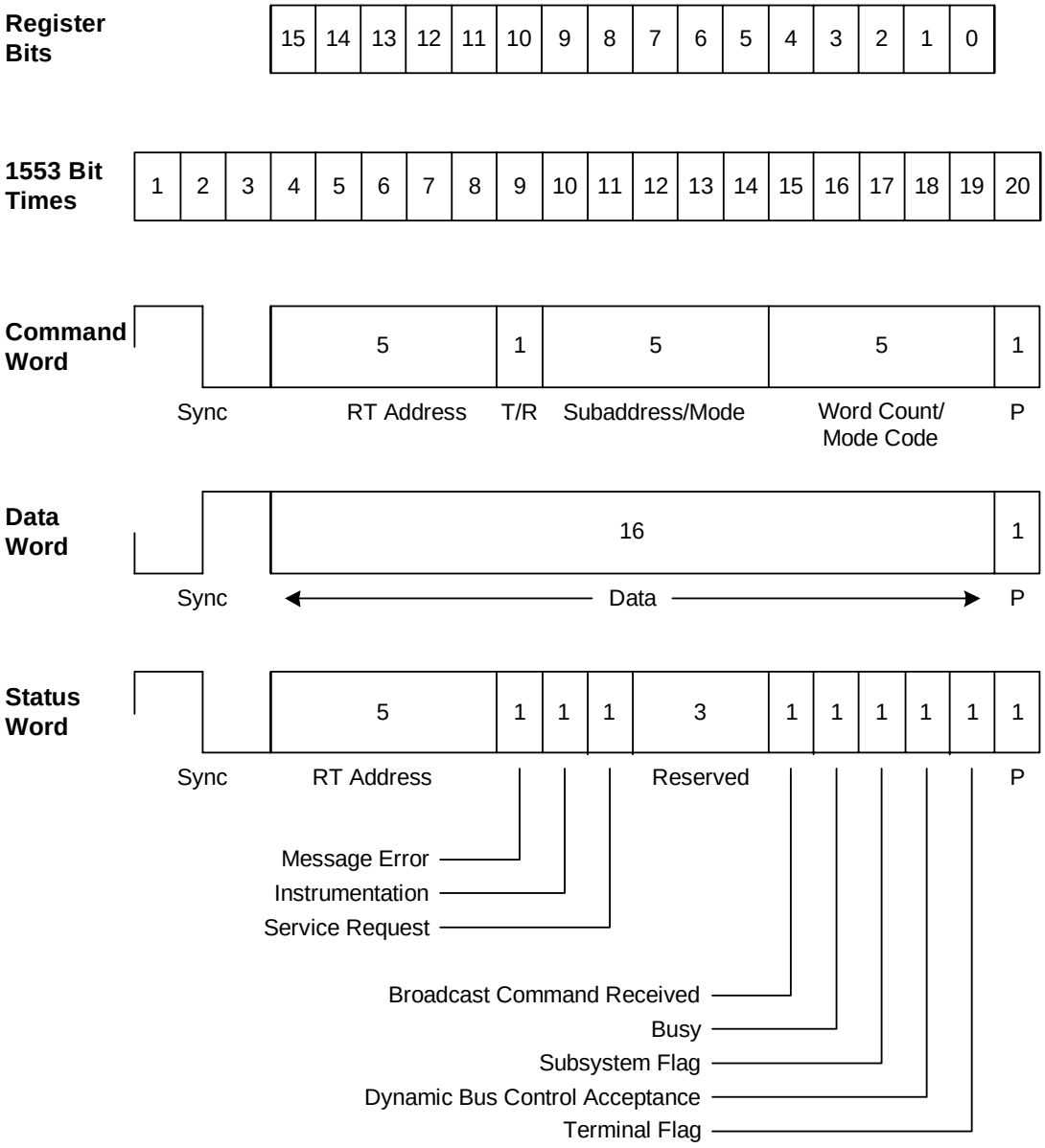


Figure A-1 MIL-STD-1553 Word Formats

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

Appendix B MIL-STD-1553 Message Formats

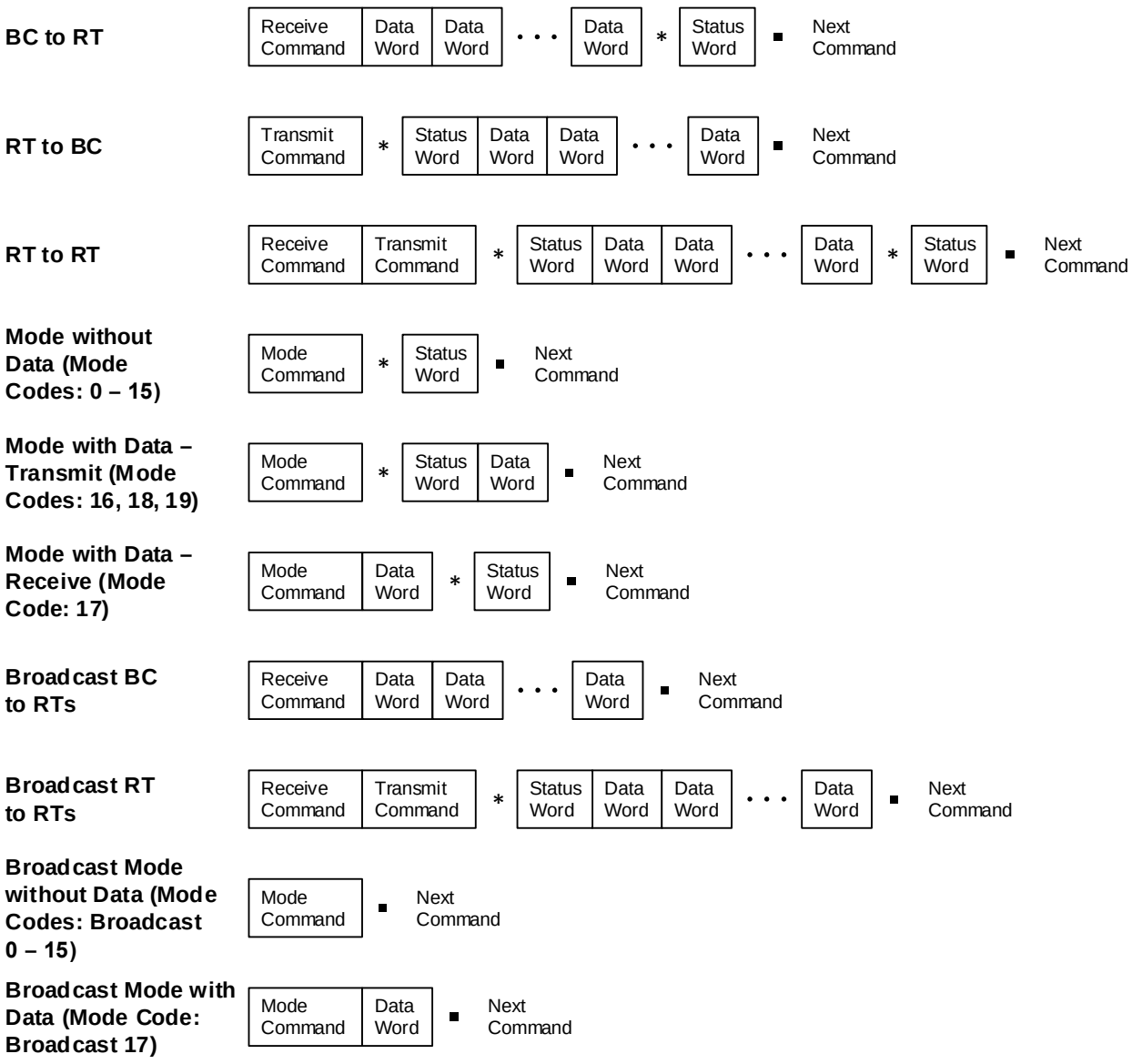


Figure B-1 MIL-STD-1553B Message Formats

Note: * = Response time
▪ = Intermessage Gap time

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