

MerlinPlus User's Manual

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1 Introduction

This chapter provides an introduction to MerlinPlus.

In this chapter:

Overview Installation Selecting the Device Number Viewing the Firmware Revision

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

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 Setting Global Options for BC/Concurrent RT Mode Defining Messages Adding/Duplicating a Message in the Message List Clearing Messages Using Minor Frames Using Error Injection Setting Retries Saving/Loading the BC/Concurrent RT Mode Configuration Starting/Stopping BC/Concurrent RT Mode Viewing Message Details Restarting the Module .

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.

%	🐒 4000PCI: BC/Concurrent RT mode - Module/Bank0 (1760) — 🗆 🗙													
File	File Run Help													
Defi	Define Messages Global Setup													
No.	Gap (microsec)	From	To	CW	CW2	WC	Bus	Retries	Err Inj	Msg/Err Cnt	Chk Sum	^		
1	200	BC	RT0,2	0041		1	В							
2	470	BC	RT2,2	1042		2	A							
3	680	RT1 Mod	BC	0C06		MC-6	A							
4	790	RT1,2	BC	0C41		1	В							
5	889	BC	RT3,3	1863		3	A							
6	1097	RT4,4	BC	2481		1	В							
7	319	BC	RT5,5	28A0		32	A							
8	1367	RT6,6	BC	34C2		2	В							
9	947	RT21,21	BC	AEB5		21	A							
10	120	BT7,7	BC	3CE 3		3	В							
11	120	RT8 Mod	BC	4410		MC-16	A							
12	120	RT9,9	BC	4D20		32	В							
13	120	RT1,2	RT21,21	AABF	0C5F	31	A							
14	120	RT10,10	RT11,12	598B	554B	11	В							
15	120	RT21 Mod	BC	AFF0		MC-16	А					¥		
Board	oard is idle													

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.
То	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:

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

The BC/Concurrent RT Mode screen is displayed.

%	🐒 4000PCI: BC/Concurrent RT mode - Module/Bank0 (1760) - 🗆 🗙											×		
File	File Run Help													
Define Messages Global Setup														
No.	Gap (microsec)	From	To	CW	CW2	WC	Bus	Retries	Err Inj	Msg/Err Cnt	Chk Sum	^		
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15												×		
Board	d is idle											_//		

Figure 2-2 BC/Concurrent RT Mode Screen

2. Click the Global Setup tab.

🐒 4000PCI File Run	l: BC/Co Help	ncurre	nt RT n	node -	Modul	e/Banl	0 (MN	ISI)				_		×
Define <u>M</u> essa	ages [G	obal Se	tup											
Frame Time: 50000 microsec Type Of Run 1760 Header Word Option Bit Count Error: 0 Image: Continuous 0 Image: Continuous 0 BC Response Time: 5 Image: Continuous Image: Continuous)ptions e the Featu der Words	re		
	0	1	2	3	4	5	6	7				CLin	k mode	
	8	9	10	11	12	13	14	15		All Active		O Spe	ec mode	
	16	17	18	19	20	21	22	23				SRQ P	rocessing	
	24	25	26	27	28	29	30	31		No Active		⊙ Dis ⊖ Ena	able able	
pard is idle														



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, <i>MerlinPlus</i> waits until the end of the frame time to transmit them again. If <i>MerlinPlus</i> 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 <i>MerlinPlus</i> 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 $(+3 \text{ to } -3)$.
Output Amplitude	Output amplitude in milliVolts peak-to-peak (1000–7500, default 7500).
BC Response Time	Bus Controller response time in μ secs (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).

Field	Description
Minor Frame Time	Amount of time in μ secs 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:

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

The BC/Concurrent RT Mode screen is displayed.

%	🐒 4000PCI: BC/Concurrent RT mode - Module/Bank0 (1760) — 🗆 🗙												
File	File Run Help												
Define Messages Global Setup													
No.	Gap (microsec)	From	To	CW	CW2	WC	Bus	Retries	Err Inj	Msg/Err Cnt	Chk Sum	^	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15												¥	
Board	d is idle												

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.

🐒 Define Message	2		_		×
BC->RT RT->BC RT->RT Mode Code Minor Frame	BC	Destination RT 0 ▼ Sub 1 ▼		<u>O</u> K Data	
	Gap (microsec) 1000 Bus C A C B	Word Count		<u>H</u> elp	

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.

🐒 Define Message	2		_		×
BC->RT RT->BC RT->RT Mode Code Minor Frame	BC	Destination RT 0 - Sub 1 -		<u>D</u> ata Cance	
	Gap (microsec) 1000 Bus C A C B	Word Count			

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**.

Ent	er/Modify Dat	a (Hex values)					ОК
00	0					07	
08						15	<u> 7 H</u> elp
16						23	🖓 Load
24						31	対 Save
Da	ta Generator	Clea	i ne	Default	1 -> Al	i	Random

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.

)ata Generator		>
	Data Word: 0	
Disable Disable	C Enable	ОК
 Increment 	C Decrement	
		<u>R</u> eset
Increment By :	decimal	<u>C</u> lear
Start Value :	O	<u>H</u> elp
End Value :	0	Cancel
	decimal	



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.
ок	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 Co	norator Dialog Pox

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**.

🐒 Define Mess	age		_		×
BC->RT RT->BC RT->RT Mode Code Minor Frame	Source RT 0 ▼ Sub 1 ▼ Gap (microsec) 1000 Bus • A ○ B	Destination BC Word Count 1 Checksum © Off © On		<u>O</u> K Data <u>C</u> ance <u>H</u> elp	



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 2-6BC to RT Message

RT to RT Messages

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

🐒 Define Messa	ige		_		×
BC>RT RT->BC RT->RT Mode Code Minor Frame	Source RT 0 • SA 1 •	Destination RT 0 • SA 1 •		<u>D</u> ata <u>D</u> ata	
	Gap (microsec) 1000 Bus (* A (* B	Word Count		<u>H</u> elp	



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 2-7BC to RT Message

Mode Code Messages

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

🐒 Define Messag	ge		_		×
BC->RT RT->BC RT->RT Mode Code Minor Frame	Source RT O Mode Code Designal All 0's Mode Command Dynamic Bus Control	tion C All 1's (0)		<u>D</u> ata Data	
	Gap (microsec) 1000 Bus © A © B	Word Count	_	<u>H</u> elp	

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 2-8BC 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:

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

The BC/Concurrent RT Mode screen is displayed.

%	🐒 4000PCI: BC/Concurrent RT mode - Module/Bank0 (1760) — 🗆 🗙												
File	Run Help												
Defir	ne <u>M</u> essages 🛛 <u>G</u>	lobal Setup											
No.	Gap (microsec)	From	To	CW	CW2	WC	Bus	Retries	Err Inj	Msg/Err	Cnt	Chk Sum	<u>^</u>
1	200	BC	RT0,2	0041		1	В						
2	470	BC	RT2,2	1042		2	A						
3	680	RT1 Mod	BC	0006		MC-6	A						
4	790	RT1,2	BC	0C41		1	В						
5	889	BC	RT3,3	1863		3	A						
6	1097	RT4,4	BC	2481		1	В						
7	319	BC	RT5,5	28A0		32	A						
8	1367	RT6,6	BC	34C2		2	В						
9	947	RT21,21	BC	AEB5		21	A						
10	120	BT7,7	BC	3CE3		3	В						
11	120	RT8 Mod	BC	4410		MC-16	A						
12	120	RT9,9	BC	4D20		32	В						
13	120	BT1,2	RT21,21	AABF	0C5F	31	А						
14	120	RT10,10	BT11,12	598B	554B	11	В						
15	120	RT21 Mod	BC	AFF0		MC-16	А						×
Board	l is idle												

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:

 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:

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

The BC/Concurrent RT Mode screen is displayed.

%	4000PCI: BC/Co	ncurrent RT	mode - M	odule/Ba	ank0 (17	60)				_		Х
File	Run Help											
Defir	ne <u>M</u> essages <u>G</u>	lobal Setup										
No.	Gap (microsec)	From	To	CW	CW2	WC	Bus	Retries	Err Inj	Msg/Err Cnt	Chk Sum	^
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												×
Board	l is idle											11.

Figure 2-13 BC/Concurrent RT Mode Screen

- 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.

🐒 Save BC Messages				\times			
Save in: 🔛 Documents		• 🗢 💽	È 💣 📰 •				
Name	Date	Туре	Size	^			
429RTx throughput t	28-Jun-21	File folder					
708 screen shots	28-Jun-21	File folder					
1553Px demo_alter	12-Aug-21	File folder					
4000 demo progra	28-Feb-22	File folder					
Altera Quartus scree	28-Jun-21	File folder		Υ.			
<			>				
File <u>n</u> ame: *.mmf			<u>S</u> ave				
Save as type: Merlin Message Files Cancel							

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.
- 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.

Coad BC Messages				×	
M				~	
Look in: 🖺 Documents		(• 🖬 📩		
Name	Date	Туре	Size	^	
429RTx throughput t	28-Jun-21	File folder			
708 screen shots	28-Jun-21	File folder			
1553Px demo_alter	12-Aug-21	12-Aug-21 File folder			
4000 demo progra	28-Feb-22	File folder			
Altera Quartus scree	28-Jun-21	File folder		~	
<			>		
File <u>n</u> ame: xbrtest-1760.n	ımf		<u>O</u> pen		
Files of type: Merlin Messag	je File	•	Cancel		

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.

BU -> R15,5 CW = 28A(SW = 000(Word Loun Command Wo D	rd(s) and Statu	s Word(s)		OK
]	Mes	sage Data			
00:000C 04:0011 08:0013 12:0016 16:001C 20:0014 24:0005 28:000A	01:000D 05:0011 09:0014 13:0019 17:001C 21:0001 25:0006 29:000B	02:000E 06:0011 10:0015 14:001A 18:001E 22:0001 26:0007 30:000C	03:000F 07:0011 11:0016 15:001B 19:001F 23:0003 27:0008 31:000C		Next
	Mes	sage Errors			
Message s No respon	status word nse from R	d is 0x820: r	1	^	

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 Setting Global Options for RT Mode Setting Per RT Options Saving/Loading the RT Mode Configuration Starting/Stopping RT Mode Viewing Message Details Viewing the Message and Error Count (RT Summary) Clearing Messages Restarting the Module

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.

File Ru	ın Setup Help								
<u>M</u> essage	ଃ <u>G</u> lobal RT <u>P</u> er RT	R <u>I</u> Summary							
Num	Time (microsec)	From	To	CW	CW2	WC	Bus	Error	^
1	454969260	27, RT27	BC	DF7B		27	A		
2	454969972	RT31 ,31	BC	FFE3		MC-3	A	Broadcast	
3	454970116	BT1,1	RT30,30	F3C1	0C21	1	В		
4	455072820	BC	BT1,1	0821		1	В		
5	455073088	BC	RT2,2	1042		2	A		
6	455073648	RT1 ,0	BC	0C06		MC-6	A		
7	455074376	BT1,1	BC	0C21		1	В		
8	455075236	BC	RT3,3	1863		3	A		
9	455076236	RT4 ,4	BC	2481		1	В		
10	455077404	BC	RT5,5	28A0		32	A		
11	455078412	RT6,6	BC	34C2		2	В		
12	455079868	RT21 ,21	BC	AEB5		21	A		-
13	455081284	RT7,7	BC	3CE3		3	В		-
14	455081512	RT8,0	BC	4410		MC-16	A		
15	455081704	RT9,9	BC	4D20		32	В		
16	455082512	BT1,1	RT21,21	AABF	0C3F	31	A		
17	455083344	RT10,10	BT11,11	596B	554B	11	В		
18	455083780	RT21 ,31	BC	AFF0		MC-16	A		-
19	455083968	RT12,12	RT13,13	69A1	6581	1	A		-
20	455084204	BT14,14	RT15,15	79E2	75C2	2	В		~

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:

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

The RT Mode screen is displayed.

% 4000	🐒 4000PCI: RT mode - Module/Bank1 (1760) - 🗆 🗙											
File Ru	File Run Setup Help											
<u>M</u> essage	Messages Global RT Per RT RI Summary											
Num	Time (microsec)	From	To	CW	CW2	WC	Bus	Error	^			
									~			
Board is i	Board is idle Msg count is: 0 Error count is: 0											

Figure 3-2 RT Mode Screen

2. Click the Global RT tab.

🐒 4000PCI File Run	l: RT mode - I Setup Hel	Module, p	/Bank1	(MMS	I)							-		×
Messages	<u>G</u> lobal RT P	er RT	R <u>T</u> Sur	nmary										
	⊂ Active RT list										1760	Header W	/ord Optio	ns
	0	1	2	3	4	5	6	7						
	8	9	10	11	12	13	14	15		All Active	C S	uppress/D	isable	
	16	17	18	19	20	21	22	23		-				
	24	25	26	27	28	29	30	31		No Active	(o u	ser will sel	Header V	Words
		-												
	Errors to inje	ect									1			
	Bi No St Di Di Di	: Count E on-contig atus Pari atus Syn ata Parity ata Sync	Error Juous W ity Error CError Error Error	/ords		Bit	Count E Dutput / Respo	irror Valu Amplitud	ie: -3 e: 7500 e: 0	▼ mVp-p				
	Mode Code	Design and 1's	ation —	C	All O's		· 		° All 1's]] [Hub Mode Switch Link m	e n mode node	
	🔽 Enable	:d (RT 3	1)									⊖ Spec	mode	
Board is idle														

Figure 3-3 RT Mode Screen – Global RT Tab

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 Data Sync Error – the sync pattern of a Data Word set incorrectly Mote: 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 $(+3 \text{ to } -3)$.
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 μ secs 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

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

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:

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

The RT Mode screen is displayed.

🐒 400	0PCI: RT mode - Modul	e/Bank1 (1760))					- 0	×		
File R	un Setup Help										
<u>M</u> essag	Messages Global RT Per RT RI Summary										
Num	Time (microsec)	From	To	CW	CW2	WC	Bus	Error	^		
II									_		
									_		
	-								-		
									×		
Board is	idle Msg count i	s: 0 Error cou	nt is: 0						11.		

Figure 3-4 RT Mode Screen

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

🐒 4000PCI: RT mode - Module/Bank0 (1760)	_	×
File Run Setup Help		
Messages Global RT Per RT RI Summary		
RT Parameters RT Status RT Address (returned) O Message Error Service Request Dynamic Bus Broadcast Busy		
Assign Blocks		
Click to assign a data block to the selected Sub Address		
0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7		
8 9 10 11 12 13 14 15 8 9 10 11 12 13 14 15		
16 17 18 19 20 21 22 23 16 17 18 19 20 21 22 23		
24 25 26 27 28 29 30 31 24 25 26 27 28 29 30 31		
Receive Sub Addresses Transmit Sub Addresses Available Blocks: 199		
Board is idle		

Figure 3-5 RT Mode Screen – Per RT Tab

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 $(+3 \text{ to } -3)$.
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 block assigned, the data is taken from data block 0.

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

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.

🐒 Define/Modify Data -	- 🗆 X
Enter/Modify Data (Hex values)	OK 1
00 0 0 07	
08 15	<u>? H</u> elp
16 23	🖓 Load
24 31	対 Save
Data Generator Clear Default 1 -> All	Random



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.
ок	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 Ge	perator Dialog Box

 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:

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

🐒 Save RT Parameters				Х
Look in: Documents		• •	• •	
Name	Date	Туре	Size	^
429RTx throughput t	28-Jun-21	File folder		
708 screen shots	28-Jun-21	File folder		
1553Px demo_alter	12-Aug-21	File folder		
4000 demo progra	28-Feb-22	File folder		
Altera Quartus scree	28-Jun-21	File folder		v .
<			>	
File <u>n</u> ame: *.rtp			<u>O</u> pen	
Files of type: RT Parameter	s (*.rtp)	•	Cancel	

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:

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

Toad RT Parameters ×	<
Look in: 📄 Documents 🗾 🗢 🛍 📸 📰 🔻	
Name Date Type Size ^	
429RTx throughput t 28-Jun-21 File folder	1
708 screen shots 28-Jun-21 File folder	
1553Px demo_alter 12-Aug-21 File folder	
4000 demo progra 28-Feb-22 File folder	
Altera Quartus scree 28-Jun-21 File folder	/
< >>	
File name: *.rtp Open	
Files of type: RT Parameters (*.rtp)	1

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.

🐒 4000	PCI: RT mode - Modul	e/Bank0 (1553))					- 🗆	×
File Ru	ın Setup Help								
<u>M</u> essage	s <u>G</u> lobal RT <u>P</u> er RT	R <u>T</u> Summary							
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	BT1,1	RT30,30	F3C1	0C21	1	В		
4	455072820	BC	BT1,1	0821		1	В		
5	455073088	BC	RT2,2	1042		2	A		
6	455073648	RT1,0	BC	0C06		MC-6	A		
7	455074376	BT1,1	BC	0C21		1	В		
8	455075236	BC	RT3,3	1863		3	A		
9	455076236	RT4 ,4	BC	2481		1	В		
10	455077404	BC	RT5 ,5	28A0		32	A		
11	455078412	RT6,6	BC	34C2		2	В		
12	455079868	RT21 ,21	BC	AEB5		21	A		
13	455081284	BT7,7	BC	3CE3		3	В		
14	455081512	RT8,0	BC	4410		MC-16	A		
15	455081704	RT9,9	BC	4D20		32	В		
16	455082512	BT1,1	RT21 ,21	AABF	0C3F	31	A		
17	455083344	RT10,10	BT11,11	596B	554B	11	В		
18	455083780	RT21 ,31	BC	AFF0		MC-16	A		
19	455083968	RT12,12	RT13,13	69A1	6581	1	A		
20	455084204	BT14,14	RT15,15	79E2	75C2	2	В		~
Board is r	unning Msg count is	: 13257 Error	count is: 0						

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.
То	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.

🐒 4000PC	🕈 4000PCI: RT mode - Module/Bank0 (1760) — 🗆 🗙							
File Run	Setup Help							
<u>M</u> essages	<u>G</u> lobal RT <u>P</u> er RT	R <u>T</u> Summary	y					
RTO-		BT1 -		RT2 -		RT3 -		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
RT4 -		RT5 -		RT6-		BT7 -		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
RT8-		RT9-		RT10.		RT11 ·		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
RT12·		RT13-		RT14 ·		RT15-		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
RT16·		BT17 -		RT18 -		RT19-		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
RT20-		RT21 -		RT22 ·		RT23 -		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
RT24 -		RT25 -		RT26 -		RT27 -		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
RT28-		RT29 -		RT30-		RT31 -		
Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	Msgs-0	Errs-0	
Board is idle								

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:

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

RT Summary Define			×
RT 0 :	RT 8 :	RT 16 :	RT 24 :
RT 1 :	RT 9 :	RT 17:	RT 25 :
RT 2 :	RT 10 :	RT 18 :	RT 26 :
RT 3:	RT 11 :	RT 19:	RT 27 :
RT 4 :	RT 12 :	RT 20 :	RT 28 :
RT 5 :	RT 13 :	RT 21 :	RT 29 :
RT 6 :	RT 14 :	RT 22 :	RT 30:
RT 7 :	RT 15 :	RT 23 :	RT 31 :
	OK <u>Apply</u>	Cancel <u>H</u> e	lp

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 Setting Options for Sequential Monitor Mode (Properties Tab) Defining Triggers to Display/Store Messages (Properties Tab) Saving/Loading the Sequential Monitor Mode Configuration Starting/Stopping Sequential Monitor Mode Viewing Message Details Viewing the Message and Error Count (RT Summary) Clearing Messages Loading a Message File Converting the Message File From Binary to ASCII Restarting the Module

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.

% 4	000PCI: Sequential N	Ionitor - Modu	le/Bank2 (1553	5)				- 🗆	\times
File	Run Options Se	tup Help							
<u>M</u> essa	ges Re <u>a</u> l Time RT	S <u>u</u> mmary <u>P</u> rope	erties						
Num	Time (microsec)	From	To	CW	CW2	WC	Bus	Error	^
1	449810772	BC	RT1 ,31	0BF1		MC-17	A		
2	449810960	RT22,22	BC	B6D6		22	В		
3	449811568	BC	RT23,23	BAEB		11	A		
4	449811960	RT25,25	BT1,1	0839	CF39	25	В		
5	449812672	RT27 ,27	BC	DF7B		27	A		
6	449813380	RT31,31	BC	FFE3		MC-3	A	Broadcast	
7	449813524	BT1,1	RT30,30	F3C1	0C21	1	В		
8	449916228	BC	BT1,1	0821		1	В		
9	449916500	BC	RT2,2	1042		2	A		
10	449917056	RT1,0	BC	0C06		MC-6	A		
11	449917788	BT1,1	BC	0C21		1	В		
12	449918648	BC	RT3,3	1863		3	A		
13	449919648	BT4 ,4	BC	2481		1	В		
14	449920812	BC	RT5 ,5	28A0		32	A		
15	449921820	RT6,6	BC	34C2		2	В		
16	449923276	RT21,21	BC	AEB5		21	A		
17	449924692	BT7,7	BC	3CE3		3	В		
18	449924924	RT8,0	BC	4410		MC-16	A		
19	449925112	RT9,9	BC	4D20		32	В		
20	449925924	BT1,1	RT21 ,21	AABF	0C3F	31	A		
21	449926756	RT10,10	BT11,11	596B	554B	11	В		
22	449927188	RT21,31	BC	AFF0		MC-16	A		
23	449927380	RT12.12	RT13.13	69A1	6581	1	A		×
Board	is running Read fr	om 1553 bus	Screen Display	ONLY		M	sg count is: 1	4437 Error count is	s: 0 //

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.

% 40	000PCI: Sequential I	Monitor - Modu	ıle/Bank2 (155	3)				- 0	×
File	Run Options S	etup Help							
<u>M</u> essa	ges Re <u>a</u> lTime RT	Summary Prop	erties						
Num	Time (microsec)	From	To	CW	CW2	WC	Bus	Error	^
1	449810772	BC	RT1,31	0BF1		MC-17	A		
2	449810960	22, RT22	BC	B6D6		22	В		
3	449811568	BC	RT23,23	BAEB		11	A		
4	449811960	25, RT25	BT1,1	0839	CF39	25	В		
5	449812672	27, RT27	BC	DF7B		27	A		
6	449813380	RT31 ,31	BC	FFE3		MC-3	A	Broadcast	
7	449813524	BT1,1	RT30,30	F3C1	0C21	1	В		
8	449916228	BC	BT1,1	0821		1	В		
9	449916500	BC	RT2,2	1042		2	A		
10	449917056	RT1,0	BC	0C06		MC-6	A		
11	449917788	BT1,1	BC	0C21		1	В		
12	449918648	BC	RT3,3	1863		3	A		
13	449919648	BT4 ,4	BC	2481		1	В		
14	449920812	BC	RT5,5	28A0		32	A		
15	449921820	RT6,6	BC	34C2		2	В		
16	449923276	RT21 ,21	BC	AEB5		21	A		
17	449924692	BT7,7	BC	3CE3		3	В		
18	449924924	RT8,0	BC	4410		MC-16	A		
19	449925112	RT9,9	BC	4D20		32	В		
20	449925924	BT1,1	RT21 ,21	AABF	0C3F	31	A		
21	449926756	RT10,10	BT11,11	596B	554B	11	В		
22	449927188	RT21 ,31	BC	AFF0		MC-16	A		
23	449927380	BT12.12	RT13.13	69A1	6581	1	A		×
Board i	is running Read f	rom 1553 bus	- Screen Displa	y ONLY		M	sg count is: 1	4437 Error count i	s: 0

Figure 4-2 Sequential Monitor Mode Screen

2. Click the **Properties** tab.

Triggers Trigger Status Triggers 1 2 RT address bit 5 RT address bit 4 X RT address bit 3 X RT address bit 1 X RT address bit 5 X RT address bit 1 X RT address bit 2 X RT address bit 3 X RT address bit 4 X RT address bit 5 X Subaddress bit 5 X Subaddress bit 4 X Subaddress bit 3 X Subaddress bit 4 X Subaddress bit 2 X	Mode Code Designation Both 0's and 1's All 0's All 1's Independent Monitor Non Independent Monitor Independent Monitor Froadcast Enabled (RT 31) Save to Sorreen Only Screen Only Screen and File (select file name in the box below)
Word count bit 5 X X Word count bit 4 X X Word count bit 3 X X Word count bit 2 X X Word count bit 1 X X Inforce/Check for Header Words Inforce/Check for Header Words	File Only (select file name in the box below) File Name to Save Data D:\MerlinPlus ParameterFiles\MPdumpForDR.dmp Change Monitor Response Time Response Time: 14



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 μ secs 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.

 4000PCI: Sequential Monitor - Module/Bank0 (1760) Eila Rup Ontions Seture Hole 	– 🗆 X
Manager Bast Time DT Comments	
Messages Regi Time RT Summary Properties Triggers 1 2 RT address bit 5 X X RT address bit 4 X X RT address bit 3 X X RT address bit 1 X X RT address bit 1 X X RT address bit 1 X X Subaddress bit 5 X X Subaddress bit 5 X X Subaddress bit 1 X X Subaddress bit 1 X X Subaddress bit 1 X X Word count bit 5 X X Word count bit 5 X X Word count bit 1 X X Word count bit 2 X X Word count bit 1 X X Word count bit 1 X X Monitor Res Response T © Suppress/Disable the Feature © Enforce/Check for Header Words Defines Enforce/Check for Header Words	Designation and 1's t Monitor pendent Monitor dent Monitor d (RT 31) Dnly and File (select file name in the box below) (select file name in the box below) o Save Data s ParameterFiles\MPdumpForDR.dmp Change ponse Time ime: 14
poard is fulle	

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:

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

The Sequential Mode Parameters dialog box is displayed.

🐒 Sequentual Mode Parame	ters			×
Save in: Documents		- 🗢 🗈	≠≣ *	
Name	Date	Туре	Size	^
429RTx throughput test	28-Jun-21	File folder		
708 screen shots	28-Jun-21	File folder		
1553Px demo_alter scr	12-Aug-21	File folder		
4000 demo programs s	28-Feb-22	File folder		
Altera Quartus screen s	28-Jun-21	File folder		Υ.
<			>	
File name: *.smp			<u>Save</u>	
Save as type: Sequentual Monit	tor Parameters	•	Cancel	

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.

🐒 Load Sequentual Mode Pa	arameters			×
Look in: Documents		- 🗧 🗈	📸 🎫	
Name	Date	Туре	Size	^
429RTx throughput test	28-Jun-21	File folder		
708 screen shots	28-Jun-21	File folder		
1553Px demo_alter scr	12-Aug-21	File folder		
4000 demo programs s	28-Feb-22	File folder		
Altera Quartus screen s	28-Jun-21	File folder		Υ.
<			>	
File <u>n</u> ame: DynamicRT Test	.smp		<u>O</u> pen	
Files of type: Sequentual Moni	tor Parameters	•	Cancel	

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.

% 40	00PCI: Sequential	Monitor - Modu	le/Bank2 (1553)				- 🗆	×
File	Run Options S	etup Help							
<u>M</u> essa	ges Re <u>a</u> l Time RT	Summary Prop	erties						
Num	Time (microsec)	From	To	CW	CW2	WC	Bus	Error	^
1	449810772	BC	RT1 ,31	0BF1		MC-17	A		
2	449810960	RT22,22	BC	B6D6		22	В		
3	449811568	BC	RT23,23	BAEB		11	A		
4	449811960	25, RT25	RT1,1	0839	CF39	25	В		
5	449812672	27, RT27	BC	DF7B		27	A		
6	449813380	RT31 ,31	BC	FFE3		MC-3	A	Broadcast	
7	449813524	BT1,1	RT30,30	F3C1	0C21	1	В		
8	449916228	BC	RT1,1	0821		1	В		
9	449916500	BC	RT2,2	1042		2	A		
10	449917056	RT1,0	BC	0C06		MC-6	A		
11	449917788	BT1,1	BC	0C21		1	В		
12	449918648	BC	RT3,3	1863		3	A		
13	449919648	BT4,4	BC	2481		1	В		
14	449920812	BC	RT5,5	28A0		32	A		
15	449921820	RT6,6	BC	34C2		2	В		
16	449923276	RT21 ,21	BC	AEB5		21	A		
17	449924692	BT7,7	BC	3CE3		3	В		
18	449924924	RT8,0	BC	4410		MC-16	A		
19	449925112	RT9,9	BC	4D20		32	В		
20	449925924	BT1,1	RT21 ,21	AABF	0C3F	31	A		
21	449926756	RT10,10	BT11,11	596B	554B	11	В		
22	449927188	RT21 ,31	BC	AFF0		MC-16	A		
23	449927380	BT12.12	RT13.13	69A1	6581	1	A		×
Board i	s running Read f	rom 1553 bus	Screen Display	ONLY		M	sg count is: 14	4437 Error count is	s: 0

Figure 4-7 Sequential Monitor Mode Screen – Messages Tab

Field	Description
Num	Message number.
Time (microsec)	Timestamp of the message in μ sec from the start of the module.
From	Message from either BC or RT/subaddress.
То	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.

Message Data	
00:0016 01:0017 02:0019 03	B:001A Previou
04:001B 05:001C 06:001C 07	7:001D
08:001E 09:001F 10:0015 11	1:0001
12:0002 13:0003 14:0005 15	5:0006
16:0007 17:0008 18:000A 19	9:000B
20:000C 21:000C 22:000D 23	B:000E Next
24:000F 25:0011 26:0011 27	7:0012
28:0013 29:0014 30:0015 31	1:0016
Message Errors	
Manager and the second day 0,0100	~
message status word is 0x8100	

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.

🐒 4000PCI: Sequential Moni	itor - Module/Bank	0 (1760)					_		×
File Run Options Setup	Help								
Messages Real Time RT Sur	mmary Properties								
								-1	
RT:1 / SA:1 / Receive -								Real	
								Ting	
Select Msg CW: Tin	meTag:	sw:	WC:	Errors: 0	Count: 0	Status:		- <u>-</u>	
								Ra	
RT:2 / SA:2 / Receive -								기를)	
								Ň	
Select Msg CW: Tir	meTag:	sw:	WC:	Errors: 0	Count: 0	Status:			
								-	
RT:1 / SA:1 / Receive -									
Select Msg CW: Tir	meTag:	sw:	WC:	Errors: 0	Count: 0	Status:			
RT:0 / SA:0 / Receive -									
Select Msg CW: Tir	meTag:	sw:	WC:	Errors: 0	Count: 0	Status:			
HI:U / SA:0 / Receive -									
								i	
Select Msg CW: Tir	meTag:	SW:	WC:	Errors: 0	Count: 0	Status:			
					-				
Board is idle Read from	File P:\Asher\from	Ephraim\1553	_demo.dmp	o : One Shot	- Scree				- //.

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.

Define CW	×
RT: 0 💌	Direction • Receive • Transmit
SA: 0 💌	
OK	Cancel

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 4-4Define 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:

 On the Sequential Monitor Mode screen (Figure 4-1), select Setup > Read from File.

The Open Binary File dialog box is displayed.

🐒 Open Binary File				×
Look in: Documents		- 🗢 🗈	📸 🎫	
Name	Date	Туре	Size	^
429RTx throughput test	28-Jun-21	File folder		
708 screen shots	28-Jun-21	File folder		
1553Px demo_alter scr	12-Aug-21	File folder		
4000 demo programs s	28-Feb-22	File folder		
Altera Quartus screen s	28-Jun-21	File folder		Υ.
<			>	
File <u>n</u> ame: .dmp			<u>O</u> pen	
Files of type: Binary File		•	Cancel	

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.

Convert To ASCII	×
Binary File Name:	
ASCII File Name:	
Messages Converted:	
	Write data as Hexadecimal
	C Write data as Decimal
<u>C</u> onvert	Help Cancel

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.
Туре	Message type: • BC to RT • RT to BC • RT to RT
Timetag	Timestamp of the message in μ sec 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 <i>1553Px Family Software</i> <i>Tools Programmer's Reference</i> .
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



Intermessage Gap time

The information contained in this document is believed to be accurate. However, no responsibility is assumed by Excalibur Systems, Inc. for its use and no license or rights are granted by implication or otherwise in connection therewith. Specifications are subject to change without notice.

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