XI XI AU AU AU AU	XALT ALT XALT	XALT XALT XALT			XII XII XII XXII XXII XXII XXII XXII X					XF XF Lu	Xf Xf Sf	XII XII XII XII		XII	XALT XALT XALT XALT	XII XII XII XII XII	
X ALT ALT			alt X alt Alt			Ex La	cal boi	X libu rato	rAr ory T	nal Too	ysis Is						ALT ALT
X X X X X X			X ALT ALT X ALT	X alt Alt X alt Alt	ALT ALT ALT ALT				tart.	Su Gu	ide X	Xalt Xalt Xalt	XII ALT ALT XII			ALT ALT ALT ALT	Xalt Alt Alt Alt
ALT ALT			X alt Alt Alt X alt	X alt Alt X alt X alt	X alt Alt Alt Alt	Xatt Xatt Xatt	ALT ALT ALT	XII XII XII XII		ALT ALT ALT				CAI			

311 Meacham Ave 

Elmont 
NY 11003 
tel. (516) 327-0000 
fax (516) 327-4645
website: www.mil-1553.com

# **Table of Contents**

Starting Exalt Plus	3
Verifying that Your Excalibur Board is Installed Properly	4
Verifying that <i>Exalt Plus</i> is Detecting Traffic on the Bus	4
Recording and Replaying Data	6
Displaying the Data in a User-friendly Format	8
1553, MMSI and H009 Configuration	8
ARINC 429 Configuration.	12
ARINC 708 Configuration.	13
	15
Creating Derived EUs.	16
Creating Graphs	18
Simulating Bus Messages	21
1553, MMSI and H009 Simulation	22
ARINC 429 Simulation	28
Discrete Simulation	33
Saving Your Exalt Plus Configuration	35

Table of Contents

## Starting Exalt Plus

To start *Exalt Plus*, select Start | All Programs | Excalibur | Exalt | Exalt from the Windows Taskbar. The *Exalt Plus* Main Screen is displayed.

	EXALT PLUS: Excalibur Analysis	s Laboratory Tools - Ver	sion 4:3:0:2							
ſ	Status Lab	Define Show	Prefs Load					Message	Board	
		<u>_</u>	<u>_</u>		- <u>I</u>		MONITORIN	IG TRANSMITTING	Help	
Menu /		System M	odule	Reset			Msgs/Errs	15670	Time 01:27:14.29 01:10 PM	Message
Zone							Resources	Good Condition	Package a1	Board
						FILE	Triggers	None	Record None	
Ć							Gaps		Simulation 1553_demo	
	Access Board					WorkPa	d			
	System	Status Mode > De	efine > System							
	Dev0_Mod0_MuxBus     Dev0 Mod1 429	Device: 4000	PCI	Device ID:						
			Madula Nama	Madula Turca	Enabled	Cimulato	Madula Statua			
	Virtual Modules	Modulo 0		MuxBus			Working	Settings		
		Module 1	Dev0_Mod1_429	429	~		Working	Settings		
Access		Module 2	Dev0_Mod2_708	708	>		Working			
Board	Dev25_Mod3_Discrete     Multiplex	Module 3	Dev0_Mod3_MMSI	MMSI	<b>v</b>		Working	Settings		
Dourd										
		Virtual Modules:								
			Module Name	Module Type	Enabled	Simulate	Module Status	1		
			Dev25_Mod0_429	429	<b>×</b>		Unmapped	Settings		
			Dev25_Mod1_MuxBus	MuxBus	~		Unmapped	Settings		
			Dev25_Mod3_Discrete	Discrete	· ·		Unmanned	Settings		
			Multiplex	Multiplex			Unmapped			

#### Figure 1 Exalt Plus Main Screen

- *For* Exalt Plus *installation instruction, refer to the* Exalt Plus User's Guide.
- The areas of the Main Screen can be resized by dragging the lines in between the areas.

*Exalt Plus* has two main modes: **Status Mode** and **Lab Mode**. You can switch between modes by clicking on one of the mode buttons at the top-left of the main screen. Each mode has a set of tabs and subtabs. *Exalt Plus* features are activated by clicking on a mode button, a tab, and a subtab, or by clicking an icon on the toolbar below the subtabs.

# Verifying that Your Excalibur Board is Installed Properly

When you start *Exalt Plus* for the first time, the **Status Mode | Define | System** screen is displayed (see **Figure 1**). *Exalt Plus* automatically detects the carrier boards and modules on your system and displays them on the **WorkPad** area of the **Status Mode | Define | System** screen. Check that it says **Working** next to each module. If not, make sure your carrier board is installed properly. For more information, see the **readme.pdf** file on the root folder of the *Exalt Plus CD* and the *Excalibur Installation CD* that came with your carrier board.

# Verifying that Exalt Plus is Detecting Traffic on the Bus

To Verify that Exalt Plus is Detecting Traffic on the Bus:

1. Make sure that the Excalibur carrier board is connected to a bus on which communication is currently being transmitted.

When your board is not connected to a bus, you can still monitor data by using **simulation** to transmit data over the bus. When using simulation to transmit data from 1553 and MMSI modules, you can immediately monitor that data in *Exalt Plus* due to the Internal Concurrent Monitor built into these modules. For H009, 429 and Discrete modules, a loopback cable is required to monitor the data that you are transmitting. For information on simulation, see **Simulating Bus Messages** on page 23.

- Message Board Status Lab Show NOT MONITORING System Reset Msgs/Errs 0 / 0 Resources Good Condition Triggers None - EU 19 Access Board WorkPad Status Mode > Show > Bus Activity Overview 4000PCI Dev0\_Mod0\_MuxBus Modules Load [%] Message Frrors Dev0\_Mod1\_429 Dev0\_Mod0\_MuxBus 0 + Dev0\_Mod2\_708 Dev0\_Mod1\_429 n п П E Dev0\_Mod3\_MMSI Dev0 Mod2 708 0 0 0 Virtual Modules Dev0\_Mod3\_MMSI 0 0 0 Dev25\_Mod0\_429 Dev25\_Mod1\_MuxBus Dev25\_Mod2\_MuxBus - Dev25\_Mod3\_Discrete Multiplex
- 2. In the Menu Zone of Exalt Plus (see Figure 1), select Status Mode | Show tab | System subtab.

Figure 2 Status Mode | Show | System Screen

3. Click the Start icon we to start monitoring bus communications. The number of messages that *Exalt Plus* has monitored is displayed in the Messages column of the WorkPad.

(Status) (Lab)	Define Show Prefs System Bus Activity	Load		Message Board MONITORING TRANSMIT Msgs/Errs 176 / 0
				Resources Good Condition Triggers None
Access Board		WorkPad		
System	Status Mode > Show > Bus Activit			
4000PCI     Dev0 Mod0 MuvBus	Modules	Messages	Errors	Load (%)
Dev0_Mod1_429	Dev0_Mod0_MuxBus	176	0	0
Dev0_Mod2_708	Dev0_Mod1_429	0	0	0
Tevu_Mod3_MM51     F- Virtual Modules	Dev0_Mod2_708	0	0	0
Dev25_Mod0_429	Dev0_Mod3_MMSI	0	0	0
Dev25_Mod1_MuxBus				
Dev25_Mod2_MuxBus     Dev25_Mod3_Discrete				
Multiplex				

Figure 3 Monitoring Bus Activity

4. Select Lab Mode | Analyze tab to view the raw data being transmitted over the bus. The Lab Mode | Analyze screen is displayed. The data is displayed in the WorkPad in hexadecimal format.



Figure 4 Lab Mode | Analyze Screen

# **Recording and Replaying Data**

To record bus transmission data:

- 1. Click the **Record** icon and select **Record checked items**. The **Save As** dialog box is displayed.
- 2. Type a name for the file.
- 3. Click Save. *Exalt Plus* starts recording bus transmission data. The data is saved in a Replay file (\*.rpf).
- 4. Click the Record icon again to stop recording.

To replay recorded data:

- 1. Click the **Replay** icon **E**. The **Load** dialog box is displayed.
- 2. Select a file and click OK. The Replay file is loaded and a new row of icons appears in the Menu Zone.
- 3. Click the Start icon to start the Replay file. The data is displayed in the WorkPad.

- 4. Click the **Stop** icon **to** stop playing the Replay file.
- 5. Click the Exit Replay Mode icon to return to real-time monitoring.

# **Displaying the Data in a User-friendly Format**

The next step is to define data units to allow you to display data in a more user-friendly format. *Exalt Plus* data units are called Engineering Units (EUs). An EU is set of bits within a message that represents a specific measured item. For example, an EU can represent the engine temperature or the altitude. EUs are defined in Lab Mode, on the System tab of the Access Board.

- For 1553, MMSI and H009 modules, continue with **1553**, **MMSI** and **H009** Configuration on page 10.
- For ARINC 429 modules, continue with **ARINC 429 Configuration** on page 14.
- For ARINC 708 modules, continue with **ARINC 708 Configuration** on page 15.
- For Discrete modules, continue with Discrete Configuration on page 17.

### 1553, MMSI and H009 Configuration

For 1553, MMSI and H009, you must first define a Message Type, then you can define one or more EUs under the Message Type. You can specify which bits to use within the message for each EU.

To configure a 1553, MMSI or H009 module:

- 1. Select Lab Mode.
- 2. In the System tab of the Access Board, expand a carrier board, a module, an RT, then an SA (or PU and CF for H009).
- 3. Right-click a message direction (Rcv or Tx), and select Add Message Type. The Define Message Type dialog box appears.



Figure 5 Define Message Type Dialog Box

4. Complete the fields, as described in the following table.

Field Name	Description
Name	Name of the Message Type.
Description	[Optional] Description of the EU.
Multiplexing Enabled	[Optional] Select this checkbox to enable multiplexing. For information on multiplexing, refer to the <i>Exalt Plus User's Guide</i> .

- 5. Click **OK**. The Message Type is displayed in the Access Board.
- 6. In the System tab of the Access Board, right-click a Message Type, and select Add EU. The Define EU dialog box appears.

Ev0_Mod	0_MuxBus > RT-0 > 9	SA-0 > 0 > Engine		×
Name	EU100			
Description				
Туре	Integer 🗾	Scale	1	
Word	0 🗾	Offset	0	
Bit	0 💌	Base Unit	Units	-
Length	16 🗨	Display Unit		-
Radix	decimal 📃	Value/Discrete	Value	-
		Primary Visual	Graphic Time Plot	-
Γ <sup>Display</sup>	Range ————			1
	0	Low D		
Low	0	High 🛛		
High	10000	Түре N	one	
Г	οκ	Discretes	Cancel	

Figure 6 Define EU Dialog Box

7. Complete the fields, as described in the following table. For additional information, refer to the *Exalt Plus User's Guide*.

Field Name	Description		
Name	Name of the EU. Each EU within a Message Type must have a unique name.		
Description	[Optional] Description of the EU.		
Туре	Value type. Available options are: Integer, Unsigned, Sign & magnitude, BCD (Binary Coded Decimal), Floating Point IEEE, String, Discrete 1 Bit, and Discrete 2 Bit.		
Word	This field determines in which word of the message the EU begins (0–31 or 1–32). An EU can span two words.		
Bit This field determines in which bit of the word, the EU begins (0–15).			
Length Length of the EU in bits. The available lengths vary depending on the selection in the <b>Type</b> field.			
Radix Numeric base value. Available options are: decimal, hex, binary, octal.			
Scale	[Optional] Raw data is multiplied by this number before displaying the EU value.		
Offset	[Optional] This number is added to the raw data before displaying the EU value.		
Base Unit	[Optional] Unit of the raw data, for example, Feet.		
Display Unit	[Optional] Unit for display purposes, for example, Meters.		
Value/Discrete	Whether the data is a value or a discrete. A discrete is a name for a value or range of values. To configure discrete ranges, click <b>Discrete</b> . Available options are: Value and Discrete.		
Primary Visual	Default graph type for this EU.		
Display Range			
Low	Lowest value to display on graphs.		
High	Highest value to display on graphs.		

Field Name	Description
Alarm	
Low	[Optional] Low value for alarm.
High	[Optional] High value for alarm.
Type[Optional] This field determines whether the alarm values are within the Low and High outside of these values. Available options are: Within Limits and Out of Limits.	

8. To define discretes for value range, click Discretes. For more information, refer to the Exalt Plus User's Guide.

9. Click  $\mathbf{OK}$ . The EU is created.

10. Select Lab Mode | Watch tab.

11. Click the Start icon 🕨 to start monitoring bus communications. The values of the defined EUs are displayed in the WorkPad.

### **ARINC 429 Configuration**

For ARINC 429 modules, EUs are created under labels.

To configure an ARINC 429 module:

- 1. Select Lab Mode.
- 2. In the System tab of the Access Board, expand a carrier board and a module.
- 3. Right-click a channel and select Update Channel. The Update Channel dialog box appears.

K Update Chann	el: O						×	
Equipment Name:	Not used	•	Parity: Speed:	•	Even 12.5 kHz	💿 Odd 💿 100 kHz	None Programmable	
Equipment ID:	Equipment ID: 000 🔽							
<	Label	>	<		EU		2 🔺	
#	Name	Туре	Туре	Bit	Len	Set	Min/ScaleMax/Off	
							<b>•</b>	
	Customize		Save		Cano	cel		

Figure 7 Update Channel Dialog Box

4. Complete the fields, as described in the following table. For additional information, refer to the Exalt Plus User's Guide.

Field Name	Description			
Equipment Name	Name of the channel. Each equipment name contains a set of labels. Each label contains one or more EUs. When you first run <i>Exalt Plus</i> , all the equipment names in the list are <b>Spec</b> . That is, they are predefined according to ARINC 429 specifications.			
Equipment ID	ID number of the equipment name. The equipment ID is selected automatically based on the equipment name.			
Parity	Available options are: Even, Odd and None			
Speed	Speed of communication. Available options are: 12.5 kHz, 100 kHz, Programmable.			

5. Click Save. The equipment name is added the Access Board.

- 6. Select Lab Mode | Watch tab.
- 7. Click the Start icon was to start monitoring bus communications. The values of the defined EUs are displayed in the WorkPad.

### **ARINC 708 Configuration**

For ARINC 708 modules, each of the two channels has a Message Type. The ARINC 708 Specification Word bits are designated as EUs under the Message Type.

To add or modify an ARINC 708 EU:

- 1. Select Lab Mode.
- 2. In the System tab of the Access Board, expand a carrier board, a module, a channel, then a Message Type.

- 3. Do of the following:
  - a. To add an EU, right-click a Message Type, and select Add EU.
  - b. To modify an existing EU, right-click an EU, and select Update. The Define EU dialog box appears.

Dev0_Mod	2_708 > Channel 0 >	708 Message (0) >	> Altitude Fault	×
Name	Altitude Fault			
Description				
Туре	Unsigned 🗾	Scale	1	
Word	1 💌	Offset	0	
Bit	5 💌	Base Unit		-
Length	1	Display Unit		-
Radix	hex 💌	Value/Discrete	Value	-
		Primary Visual	Graphic ReadOut	-
[ □ Display	Range			1
1	-2	Low 1		
LOW	2	High 2		
High	2	Type N	one 👤	
				Ľ
	ок	Discretes	Cancel	

#### Figure 8 Define EU Dialog Box

- 4. Complete the fields, as described in 1553, MMSI and H009 Configuration. See page 10.
- 5. To define discretes for value range, click Discretes. For more information, refer to the Exalt Plus User's Guide.
- 6. Click **OK**. The EU is added/modified.
- 7. Select Lab Mode | Watch tab.
- 8. Click the Start icon it to start monitoring bus communications. The values of the defined EUs are displayed in the WorkPad.

### **Discrete Configuration**

For Discrete modules, each channel is an EU.

To configure a Discrete module:

- 1. Select Lab Mode.
- 2. In the System or Groups tab of the Access Board, expand a carrier board and a module.
- 3. Right-click Discrete Message and select Update discrete channels. The Discrete Value Definitions dialog box is displayed.

X	X Discrete Value Definitions						
ľ	#	EU Name	0 - Discrete Name	1 - Discrete Name			
	0	Channel 0					
	1	Channel 1					
	2	Channel 2					
	3	Channel 3					
	4	Channel 4					
	5	Channel 5					
	6	Channel 6					
	7	Channel 7					
	8	Channel 8					
	9	Channel 9					
	10	Channel 10					
	11	Channel 11					
	12	Channel 12					
	13	Channel 13					
	14	Channel 14					
	15	Channel 15					
	16	Channel 16					
	17	Channel 17					
	18	Channel 18					
	19	Channel 19					
		ОК	Cancel				

### Figure 9 Discrete Value Definitions Dialog Box

- 4. For each discrete channel that you want to name, type a name for the channel and its values.
- 5. Click **OK**. The discrete channels are configured.
- 6. Select Lab Mode | Watch tab.
- 7. Click the **Start** icon **b** to start monitoring bus communications. The values of the defined EUs are displayed in the **WorkPad**.

### **Creating Derived EUs**

A derived EU is an EU that is derived from a function of two or more EUs, or one EU augmented by a function.

To create a derived EU:

1. Select Lab Mode | Watch tab | Derived EU subtab. The Define Derived EU dialog box is displayed.

Define Deriv	red EU			×
Name	Derived3			
Description:				
Base Units:	Units 🗾	Display Radix:	decimal	•
Display Units:				
Low High	Range 0 10000	Alarm Low 0 High 0 Type N	one _	
OK	Functions	Operators	Cance	:

### Figure 10 Define Derived EU Dialog Box

2. Expand the items on the Access Board until the desired EUs are displayed.

3. Complete the fields, as described in the following table. For additional information, refer to the *Exalt Plus User's Guide*.

Field Name	Description
Expression	Drag one or more EUs to the Expression box. Click <b>Functions</b> and <b>Operators</b> to add functions and operators to the expression.
Name	Name of the derived EU.
Description	[Optional] Description of the derived EU.
Base Units	[Optional] Unit of the raw data, for example, Feet.
Display Units	[Optional] Unit for display purposes, for example, Meters.
Display Radix	Numeric base value. Available options are: decimal, hex, binary, octal.
Display Range	
Low	Lowest value to display on graphs.
High	Highest value to display on graphs.
Alarm	
Low	[Optional] Low value for alarm.
High	[Optional] High value for alarm.
Туре	<i>[Optional]</i> This field determines whether the alarm values are within the Low and High values, or outside of these values. Available options are: Within Limits and Out of Limits.

4. Click  $\mathbf{OK}.$  The derived EU is added at the bottom of the Access Board.

# **Creating Graphs**

**X** Alt The instruction in this section are for 1553 modules using Graphic Time Plot. Instructions for other modules and other graphs may vary.

To create a graph:

- 1. Select Lab Mode | Watch tab.
- 2. In the **System** or **Groups tab** of the **Access Board**, expand a carrier board, a module, an RT, an SA, then a direction (Message Type). The list of configured EUs is displayed under the Message Type.
- 3. Right-click an EU, and select Graphic Time Plot. The Graphic Time Plot is displayed.

X Oi	il Level	[Engine]					- 🗆 🗙
Π	۲ 🎽	30			01:27	7:42.430138	3
100	000 <del>1</del>						
80	000						
. <u></u> ≌ <sup>60</sup>	000						
5 4(	000						
20	000						
	∘-↓						~
		01:27:4	Đ	Time	01:27:45		
_							- +

Figure 11 Graphic Time Plot

- 4. Drag another EU from the Access Board onto the graph. Both EUs are displayed on the graph.
- 5. Click the Graph Parameters icon **2**. The Graph Parameters dialog box is displayed.

Graph Parameters-Multiple EUs	×
Oil Level range <u>Min</u> <u>Max</u> Range <u>10000</u> Alarm 20 <u>90</u> Out of Limits <b>v</b> Update EU's ranges to be same as graph's.	Temperature range Min Max Range 0 10000 Alarm 50 150 Out of Limits 💌
Seconds Displayed on X Axis: Alarms — Alarms — Octor OK Color Color © Color Band	Titles — Plot — Points © Points © Lines ☐ Scope mode

### Figure 12 Graph Parameters Dialog Box

6. Complete the fields, as described in the following table.

Field Name	Description
Range Min	Lowest value to display on this graph.
Range Max	Highest value to display on this graph.
Seconds Displayed on X Axis	Number of seconds to display on the graph.
Alarms	
Color	Line colors reflect whether the current value is within the alarm range.
Color Band	Color bands mark the alarm range.

Field Name	Description
Titles	
Display time tag	Display the Time tag at the top-right of the graph.
Display value	Display the current EU value at the top-left of the graph.
X/Y Captions	Display the names of the X and Y axes.
Plot	
Points	Plot graph using dots.
Lines	Plot graph using lines.
Scope mode	Display each graph screen overlapping the previous one, similar to an oscilloscope.

- 7. To update the EU's range and alarm properties to match this graph's, click Update EU's ranges to be same as graph's.
- 8. Click **OK**. The settings are applied to the graph.
- 9. Click the Start icon in the Menu Zone. The graph data is displayed.



### Figure 13 Graphic Time Plot with Data

- 10. To remove an EU from the graph, right-click an EU at the top of the graph and select **Delete from graph**.
- 11. Graphs are floating by default. That is, they are displayed on all tabs of the WorkPad. (The tabs appear at the bottom of the WorkPad.) To dock the graph to a new tabbed page, right-click the graph and select Dock to new page.

All graphs are saved with the *Exalt Plus* package file. For more information, see Saving Your Exalt Plus Configuration on page 37.

## Simulating Bus Messages

Simulation mode allows the avionics systems tester to transmit data over the bus.

- For 1553 and MMSI, this enables the tester to act as a Bus Controller and Concurrent Remote Terminal(s).
- For H009, this enables the tester to act as Peripheral Units and Control Fields.
- For 429, this enables the tester to act as a transmitter.
- For Discrete modules, this enables the tester to act as output (transmit) channel.

Simulation is configured on the Transmit tab in Lab Mode. The Transmit tab is displayed when at least one module or channel is designated for simulation, you can define the data to be transmitted over the bus. The set of data to be transmitted is called a simulation scenario. You can define and save several simulation scenarios. Each scenario is saved in a separate file (\*.scn).

The process for configuring simulation varies depending on the module:

- For 1553, MMSI and H009 modules, see 1553, MMSI and H009 Simulation on page 24.
- For ARINC 429 modules, see ARINC 429 Simulation on page 30.
- For Discrete modules, see Discrete Simulation on page 35.

### 1553, MMSI and H009 Simulation

To configure simulation for 1553, MMSI and H009 modules:

- 1. Select Lab Mode.
- 2. In the System or Groups tab of the Access Board, expand a carrier board.
- 3. Right-click a module, and select Use this module for simulation. The Transmit tab is added to the Menu Zone. The module name is displayed in mauve on the Access Board to indicate that it is being used for simulation.
- 4. Select the Transmit tab. The Simulation Scenario area is displayed in the WorkPad.

	WorkPad											
Laborat	ory Mode >	Transmit >	Dev0_Mod0_l	MuxBus	_	_						
Scenario1	Other											
Simulation	Settings											
Var Amp 7500	BC Resp T 14000	ime WCEI 3	r Bit Count E	rror Emulate	2 3 18 19	4 5 20 2	All 6 7 8 9 1 22 23 24 25	None 10 11 26 27	12 13 14 15 28 29 30 31	Remove	Simulation	
Simulation	Scenario											
Frame Time	e: 10000	μs		Transmissi	on Typ	)e:	Continuous	• 🔘 s	iingle 💿 N	Times 26		
Bus List	Asynch Fi	rame										
Frame#	Link Source	e>Destination	Name	Gap (µs)	WC	Bus	Retries/Update	e (ms)	CW	Errors	Data For	
•	_	_	_	_	-	-	_	-				•
	Move 🕹	Move		Delete				lew Sc	enario Sa	ave Scenario		

Figure 14 Simulation Scenario Bus List

Field Name	Description
Scenario Settings	
Var Amp	Set the variable amplitude. Available values are: 0–7,500 milliVolts/peak
BC Resp Time	Set the Bus Controller response time. Available values are: For M4K1553PxII: 2000–32,000 nSec For M4KMMSI: 2000–12,000 nSec
WC Err	Transmits a the wrong number of words (Word Count Error). Available values are: +3 to -3
Bit Count Error	Transmits a Bit Count Error. This number of bits is added or subtracted from the usual 16 bits of a Command Word. Available values are: +3 to -3
Emulate RT	To send messages to an RT that is not connected to the bus, create a virtual RT by clicking an RT number. Click <b>All</b> to emulate all RTs. Click <b>None</b> to remove emulation from all RTs.
Simulation Scenario	
Frame Time	Total amount of time in microseconds ( $\mu$ s) to send all messages in the simulation scenario. After this time period, the messages are resent (according to the amount of times configured in the <b>Transmission Type</b> field). This allows you to configure a gap time after sending all messages in the simulation scenario. The maximum value is 660,000,000 $\mu$ s.
	When using multiple frames within a simulation scenario, this value is the total amount of time in microseconds ( $\mu$ s) to send all messages within each frame. After this time period, the next frame is sent. This allows you to configure a gap time between frames. The maximum value per frame is 800,000 $\mu$ s.
Transmission Type	Define how many times to transmit this simulation scenario. Available values are: Continuous, Single (once) and N-Times.

5. Complete the fields, as described in the following table. For additional information, refer to the Exalt Plus User's Guide.

- 6. Add one or more messages to the scenario. Do one of the following:
  - a. To add a Quick Message to the simulation scenario, double-click a blank row in the bus list area. The **Define Quick Message** dialog box is displayed.



Figure 15 Define Quick Message Dialog Box

- b. Complete the fields in the **Define Quick Message** dialog box. The fields in this dialog box are similar to the fields in the **Define Database Message** dialog box. For a description of the fields, see page 27.
- c. Enter data values. Do one of the following:
  - Type a hexadecimal value in each cell of the Word table.
  - To insert default values, click **Default**.
  - To copy the data from the first cell to all other words (up to the number of words defined in the WC field), click 1 -> AII.
  - To insert random data, click Random.
  - To clear the values, click **Clear**.
- d. [Optional] To configure transmit condition, click Set Transmit Conditions. For more information, refer to the Exalt Plus User's Guide.
- e. Click  $\mathbf{OK}.$  The Quick Message is added to the simulation scenario.

or

a. To add a Database Message to the simulation scenario, drag a Message Type from the Access Board to the bus list area of the simulation scenario. The Database Message dialog box is displayed.

🔀 Define Database Message			×
Name: Engine Safety WC: 8 💌 Gap: 40 🛛	● BC>RT Source ● RT>BC s ● RT>RT Destination	RT: 🗾 🔽 SA 🖸 on BC:	
Retries 0 💌 same 💌 B	us Bus: 💿 A 💿 B		
Set Data:			
Link Status: 🛡 Linked 💿 Unlinked			
EU Name Location	Туре	Constant E	expression
Temperature word:0 Bit:0 Len:16	Integer	/	Set
			13 14 15
	000 0000 0000 0000 0000	0000 0000 0000 00	0000 0000 0000
Default	1->All Random	Clear	
Error Injection: No Errors	Update Frequency:	100 ms	
	OK Ca	ncel	
Set Transmit Conditions			

#### Figure 16 Define Database Message Dialog Box

b. Complete the desired fields, as described in the following table. For more information, refer to the *Exalt Plus User's Guide*.

Field Name	Description
Name	Name of the Quick Message.
WC	Number of 16-bit words to send in the message. Available values are: 1–32.
Retries	Number of times to resend the message in case of transmission error.
Gap	Intermessage gap time in microseconds ( $\mu$ s). The minimum gap time is 4 $\mu$ s.
Bus	Select whether to send all retries on the same bus, or to alternate between buses. Available values are: same and alternate.
Bus A	Send messages on bus A.
Bus B	Send messages on bus B.

Field Name	Description
BC->RT	Send BC to RT message.
RT->BC	Send RT to BC message.
RT->RT	Send RT to RT message.
Destination RT	RT and SA number of the message destination.
Set Data	
Linked Status	Whether the message is linked to another message. When two messages are linked, there are sent twice, but only once instance is stored in memory. Changes to one linked message affect the other message. This is useful when you want to send the same message two or more times, but only store it once in memory.
	Messages are linked by default when you drag a message from within the simulation scenario to a blank row in the scenario, or when you drag the same message two or more times from the <b>Access Board</b> to the simulation scenario. Available options are: Linked and Unlinked.
Error Injection	<i>[Optional]</i> Select the type of error to inject into the message: Available options are: No Errors, Non_Contiguous Words, Incorrect Word Count, Incorrect Bit Count, Incorrect Parity, Incorrect Sync.
Update Frequency	Frequency in milliseconds to increment the <b>timeval</b> value, when using the <b>timeval</b> function in an expression.

c. Enter data values. Do one of the following:

- For each EU, type a decimal value in the **Constant** column of the EU table, or type a hexadecimal value in the coresponding cells of the Word table.
- To insert default values, click **Default**.
- To copy the data from the first cell to all other words (up to the number of words defined in the WC field), click 1 -> All.
- To insert random data, click **Random**.
- To clear the values, click **Clear**.

- d. To use an expression instead of a constant value, click **Set** in the **Expression** column. An expression box is displayed in the dialog box. Do one of the following:
  - Type an expression in the expression box.
  - Drag one or more EUs from the Access Board to the expression box.
  - Click Functions and Operators to add functions and operators to the expression.
- e. [Optional] To configure transmit condition, click Set Transmit Conditions. For more information, refer to the Exalt Plus User's Guide.
- f. Click  $\mathbf{OK}.$  The Database Message is added to the simulation scenario.
- 7. Click the **Start** icon **b** to start transmitting and monitoring bus communications.
- 8. Select Lab Mode | Watch tab to view the transmitted data. For H009 modules, a loopback cable is required to view the transmitted data.

### ARINC 429 Simulation

To configure simulation for 429 channels:

- 1. Select Status Mode | Define tab | System subtab. The Status Mode | Define | System screen is displayed.
- 2. In the Workpad, click Settings next to the module. The Status Mode | Quickset screen is displayed.

	WorkPad													
Status Mode > QuickSet > Dev0_Mod1_429														
Enable	Chan	R/T		Spec/	Equipment ID Name		Eq ID		Speed		Parity		Update	New
<b>d</b>	0	R	•		Flight Management Computer (702)	-	002	•	Low	•	Odd	•	Update	New
<b>d</b>	1	R	•		Flight Management Computer (702)	-	002	•	High	•	Even	•	Update	New
<b>I</b>	2	R	•		Thrust Control Computer (703)	-	003	•	Low	•	Odd	•	Update	New
<b>I</b>	3	R	•		Inertial Reference System (704)	-	004	•	Low	•	Odd	•	Update	New
<b>I</b>	4	R	•		Attitude and Heading Ref. System (705)	-	005	•	Low	•	Odd	•	Update	New
<b>I</b>	5	R	•		Flight Control Computer (701)	-	001	•	Low	•	Odd	•	Update	New
<b>d</b>	6	R	•	С		-	000	•	Low	•	Odd	•	Update	New
<b>d</b>	7	R	•	С		-	000	•	Low	•	Odd	•	Update	New
<b>d</b>	8	R	•	С		•	000	•	Low	•	Odd	•	Update	New
<b>I</b>	9	R	•	С		•	000	•	Low	•	Odd	•	Update	Νεω

#### Figure 17 Status Mode | Quickset Screen

- 3. For each channel you would like to use for simulation, click the arrow in the **R/T** column and select '**T**'. The channel and module name are displayed in mauve on the Access Board to indicate that the channel is being used for simulation.
- 4. Select Lab Mode | Transmit tab.
- 5. In the **System** or **Groups tab** of the **Access Board**, expand a carrier board, a module, and select a channel configured for simulation.

6. The Simulation Scenario area is displayed in the WorkPad.

WorkPad				
Laboratory Mode > Transmit > Dev0_Mod1_429 > Flight Management Computer (702) (Channel-0)				
* None Other				
Simulation Scenario				
Line Label Name	Label#	Frequency	Data 🔺	
			•	
Move 👽 Move 🏠 Delete Remove	Sim New Scena	rio Save Scenario		

Figure 18 Simulation Scenario Label List

- 7. Add one or more messages to the scenario. Do one of the following:
  - a. To add a Quick Label (message) to the simulation scenario, double-click a blank row in the label list area. The **Define Quick** Label dialog box is displayed.

Define C	Quick Label		×
Name:	Label	Frequency: 100	
Number:	1	Error Injection: No Error	
Data: (	0x 0 Random		
		OK Cancel	

Figure 19 Define Quick Label Dialog Box

- b. Complete the fields in the **Define Quick Label** dialog box. The fields in this dialog box are similar to the fields in the **Define Database Label** dialog box. For a description of the fields, see page 33.
- c. Click  $\mathbf{OK}.$  The Quick Label is added to the simulation scenario.

or

- a. To add a Database Label (message) to the simulation scenario, in the **System** or **Groups tab** of the **Access Board**, expand a channel, then a label. The configured EUs are displayed under the label.
- b. Drag a label from the Access Board to the label list area of the simulation scenario. The Define Database Label dialog box is displayed.

Define Database Label					>
Name: Cross Track Distance (	.abel 3)	Frequenc <b>y</b> :	100		
Number:		Error Injection:	No Error	•	
Data: Ox 0 Ra	ndom	📃 SDI	00 🔻		
Update Freq: 100 ms		📃 SSM	00 💌	🖲 2 bit 🕒 3 bit	
EU Name	Location	Ту	)e	Constant	Expression
Cross Track Distance (Label 3)	] Bit:14 Len:15	BC	D		Set
			ancal		

#### Figure 20 Define Database Label Dialog Box

c. Complete the fields, as described in the following table. For more information, refer to the *Exalt Plus User's Guide*.

Field Name	Description
Name	Name of channel (equipment name).
Number	Equipment ID number.
Data	Displays the total value of the Database Label (message) in hexadecimal format.
Update Freq	Frequency in milliseconds to increment the timeval value, when using the timeval function in an expression.
Frequency	Frequency in milliseconds that the label is transmitted over the bus.
Error Injection	<i>[Optional]</i> Select the type of error to inject into the message: Available options are: No Error, Parity Error (in every word), Null bit error (in ARINC bit 2), Stretch bit error (in ARINC bit 2), Bit count high (33 bits transmitted), Bit count low (31 bits transmitted), Suppress parity (no parity).

Field Name	Description
SDI	To use a Source Destination Identifier, select the SDI checkbox, then select 00, 01, 10 or 11 from the drop-down box.
SSM	To use a Sign/Status Matrix, select the SSM checkbox, then either select 2 bit and select 00, 01, 10 or 11 from the drop-down box, or select 3 bit and select 000, 001, 010, 011, 100, 101, 110, 111 from the drop-down box.

- d. To use a constant value, type a decimal value for each EU in the Constant column.
- e. To use an expression instead of a constant value, click **Set** in the **Expression** column. An expression box is displayed in the dialog box. Do one of the following:
  - Type an expression in the expression box.
  - Drag one or more EUs from the Access Board to the expression box.
  - Click Functions and Operators to add functions and operators to the expression.
- f. Click  $\mathbf{OK}.$  The Database Label is added to the simulation scenario.
- 8. Click the **Start** icon **b** to start transmitting and monitoring bus communications.
- 9. When a loopback cable is connected to the 429 module, you can view the transmitted data by selecting Lab Mode | Watch tab.

### **Discrete Simulation**

To configure simulation for Discrete channels:

- 1. Select Status Mode | Define tab | System subtab. The Status Mode | Define | System screen is displayed.
- 2. In the Workpad, click Settings next to the module. The Status Mode | Quickset screen is displayed.

WorkPad				
Status Mode > QuickSet >	Dev25_Mod3_Discrete			
Select the cl	hannels that are to be in t	ransmit mode:		
Set to transr	nit: 🔼 🔲	None		
	0 🗖 10			
	1 🚺 11 2 🗖 12			
	3 🗖 13			
	4 <b>–</b> 14 5 <b>–</b> 15			
	6 🔽 16 7 💆 17			
	8 🔽 18 9 🗖 19			
	Back To System			

#### Figure 21 Status Mode | Quickset Screen

3. Select the channels you would like to use for simulation.

- 4. Select Lab Mode | Transmit tab.
- 5. In the System or Groups tab of the Access Board, expand a carrier board and select a module.
- 6. The Simulation Scenario area is displayed in the WorkPad.

WorkPad			
Laboratory Mode	> Transmit > Dev25_Mod3_Discrete		
None Other			
Discrete modu	le simulation settings are set from syste	em/group tab in Access Board.	
Channel #	Name	Function	
0	Channel 0	0	
1	Channel 1 Channel 2	0	
2	Channel 3	0	
	Channel 6		

Figure 22 Discrete Module Simulation Scenario

- 7. Expand the module and the Discrete Message. The channels configured for simulation are displayed in **red** and the module name is displayed in **mauve** on the **Access Board**.
- 8. To add an expression, right-click a simulation channel and select **Set channel function**. The **Channel Expression** dialog box is displayed.

K Channel 1	l (Discrete Message	e)	×
r Expression			
0			Functions
			Operators
	ОК	Cancel	

### Figure 23 Channel Expression Dialog Box

- 9. Do one of the following:
  - Type an expression in the expression box.
  - Drag one or more Discrete channels from the Access Board to the expression box.
  - Click Functions and Operators to add functions and operators to the expression.

10. Click the **Start** icon **b** to start transmitting and monitoring bus communications.

11. When a loopback cable is connected to the Discrete module, you can view the transmitted data by selecting Lab Mode | Watch tab.

### Saving Your Exalt Plus Configuration

When closing *Exalt Plus*, you are asked whether you want to save the package and then whether you want to save the scenario file. The package file (\*.pak) contains the entire configuration including all defined EUs and graphs. Simulation scenarios are saved in separate scenario files (\*.scn).

The most recently saved package and scenario files are automatically loaded when you restart Exalt Plus.

Disclaimer

### ALL RIGHTS RESERVED

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.

July 2007, Rev A-1