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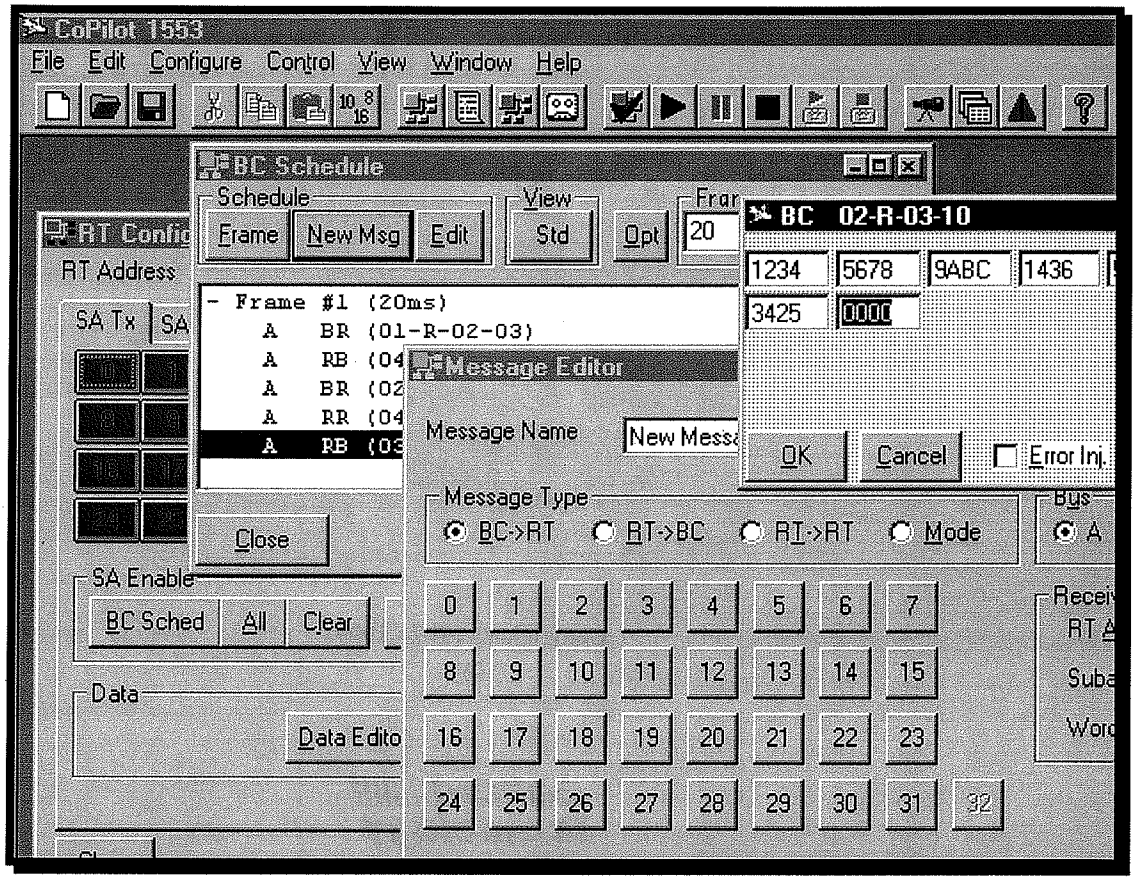
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Getting Started Series

Introducing ....

CoPilot 1553



by Ballard Technology, Inc.

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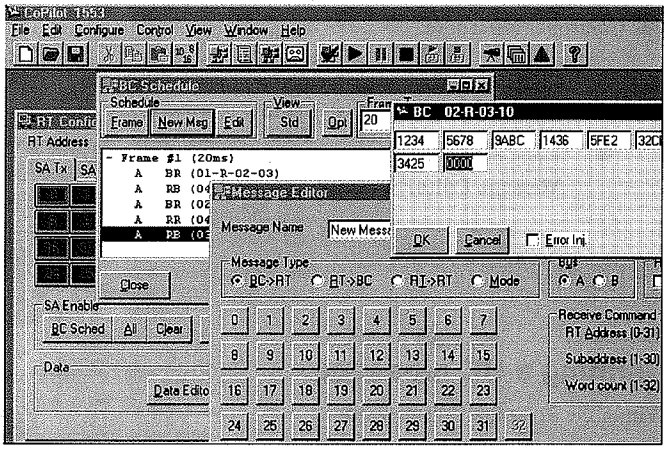
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Introducing CoPilot 1553

CoPilot 1553 is a Windows based software program developed by Ballard Technology, Inc. to simplify the simulation and testing of a MIL-STD-1553 databus. Using CoPilot and our CM1553-1, CM1553-3 (PCMCIA), PC1553-3 (ISA), LP1553-3 (PCI), LC1553-3 (cPCI) or BB1xxx (USB) family of boards, you can set up and run Bus Controller Schedules, Simulate RTs or engage the Bus Monitor with a few clicks of the mouse. You can also observe and change data while the bus is running. The tools and filters built into the CoPilot monitor assist you in locating and analyzing bus activity. With CoPilot there is no need to code software programs in order to access capabilities built into our new generation of 1553 boards.

Accessing CoPilot Features

All CoPilot capabilities are accessible through the menus or the Toolbar. Windows and dialog boxes are organized to simplify the tasks associated with defining BC, RT and Monitor properties. You can activate a simulation quickly, based on initialization values assigned by CoPilot or you can describe the attributes of each terminal precisely through these easy-to-use windows.



Learning by Example

One of the best ways to understand CoPilot is to examine how typical simulation and test activities are accomplished using CoPilot 1553. In the eight lessons which follow, you will learn how BC, RT and Monitor operations can be simulated easily. The tasks described in Lessons One through Seven can be run on any licensed 1553 board. The example described in Lesson Eight illustrates the use of a multi-terminal board.

The databus context for the eight lessons in this series is:

1) a Bus Controller
2) three RTs (RT #1 "Nav Display", RT #2 "Control Head", RT #3 "TACAN").
3) and a Bus Monitor.

One terminal is simulated in each of the first seven lessons. In the final lesson, all but one of these terminals are simulated.

Simulation Guidelines

When using CoPilot it is best to follow the sequence listed below. Although CoPilot is a very flexible tool, the menus and windows are structured to help organize and simplify the processes associated with MIL-STD-1553 test and simulation. Each lesson follows this same sequence. In some of the lessons the sequence is shortened to reflect the simplicity of the tasks involved.

Problem Statement

1) Defining the simulation objective.

Specifying the Configuration

2) Specifying BC, RT and Monitor terminal configuration and data.
3) Specifying which terminal specifications are to be loaded on the board (for simulation).

Running the Simulation

4) Starting simulation.
5) Observing and changing data during simulation.
6) Stopping simulation.

Examining Monitored Data

7) Examining sequential monitor data.

The lesson series begins with the creation and transmission of a single BC message and expands logically to multi-terminal simulation. The steps associated with each window are listed in detail. The figures in the right-hand column illustrate how the window appears after the listed sequence of steps is completed.

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Lesson One: Creating and Sending a BC Message

All activity on a MIL-STD-1553 Databus is initiated by a BC Message. Within CoPilot, all BC Messages are composed using the BC Message Editor and all messages are preserved within the Message List. The objective of lesson one is to illustrate how to create and send a single BC message using CoPilot. The following CoPilot windows are introduced in this lesson: **Message List**, **Message Editor**, **BC Data Editor**, **Message Display** and **Save**.

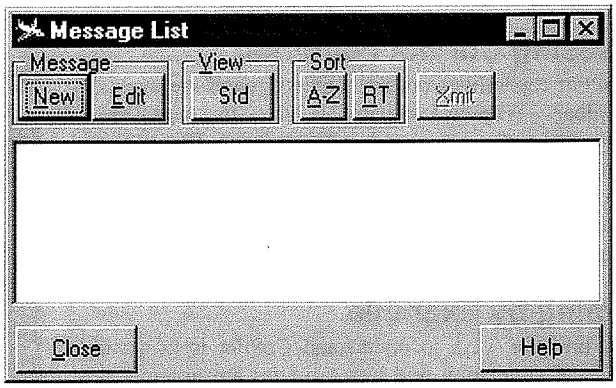
Problem Statement: Define and send a single BC message in which RT #1 receives three words in subaddress 2.

Specifying the Configuration:

Accessing the Message List Window

Since a BC command is part of the Bus Controller definition, the first step is to advise CoPilot that you are specifying a Bus Controller procedure.

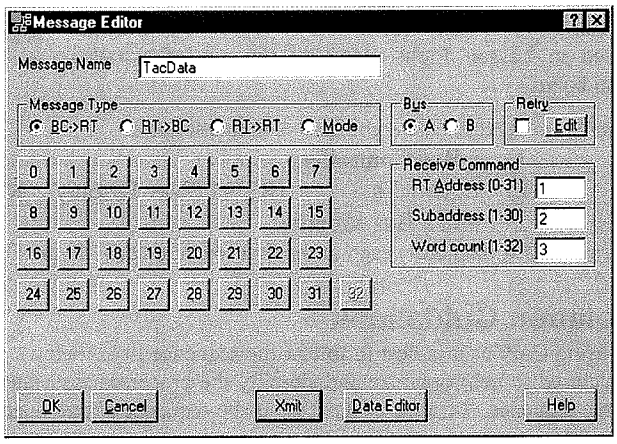
- Click the  button located on the toolbar to access the **Message List** window.
- Then, click the "New" button to access the **Message Editor** window.



Defining a BC Message

Within the **Message Editor** window,

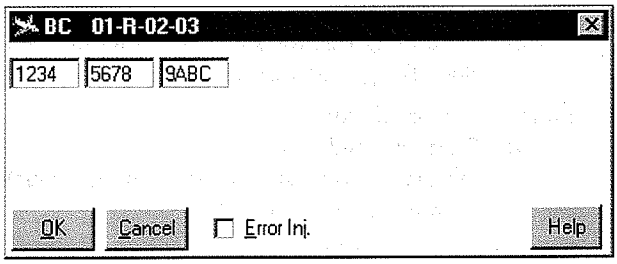
- Type "TacData" into the Message Name field. *(The assignment of a message name is optional.)*
- Click on the BC-->RT button in the Message Type frame to define an RT receive message.
- Click keys 1, 2, and 3 to define the RT, SA, and WC parameters.
- Then, click on the Data Editor button to access the BC Data Editor window.



Defining BC Data values

The parameters of this command are shown in the header. In this example, three data cells are visible since the command calls for three data words.

- Type "1234" (and then press Tab or Enter to move to the next data field), "5678" and then "9ABC" to define the 3 data words. *(Data can be defined by Hex, Decimal, or Octal values.)*
- Click the "OK" button to close the Data Editor and return to the Message Editor.
- Click the "OK" button in the Message Editor to return to the Message List window.



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Running the Simulation:

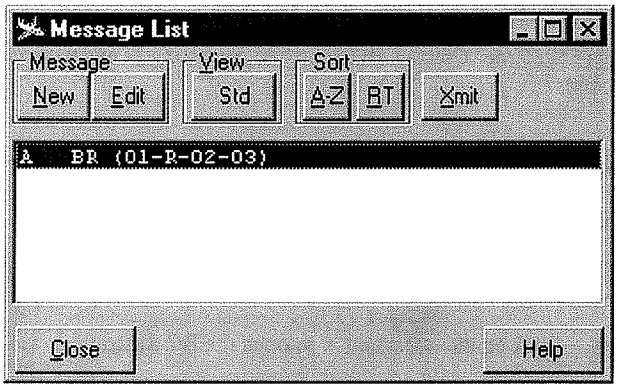
Transmitting a Single Message

Normally the first step in running a simulation is to specify which configuration definitions are to be loaded on the 1553 board. Then you may start the simulation by clicking the "Start" button on the CoPilot toolbar. Transmitting a single BC command is even easier.

To send a single message from the **Message List**:

- Click on a message to select it. (Since there is only message in this example, the message is already selected.)
- Click the "Xmit" button to load the highlighted message onto the board and transmit it over the bus.

If the 1553 board is properly defined and installed in the host, the **Message Display** window appears.

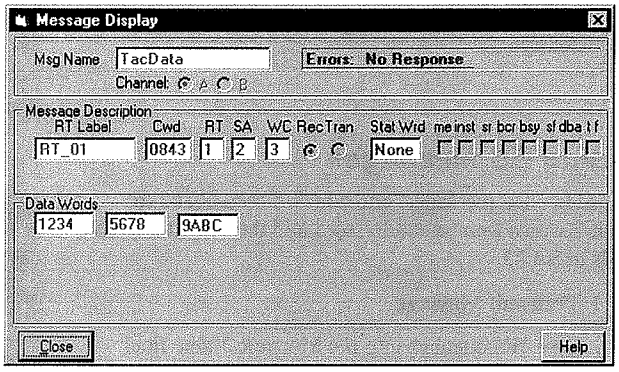


Message Display Window

Information associated with the message is displayed in this window including the status word, response time and data words. If we were connected to an external RT, the received status word would have been reported.

You can continue to select and send messages from the Message List window as described above or (as long as this window is visible) you may double click a message to load and send it over the 1553 databus.

The Message Display window stays on-screen until you click the "Close" button on the this window or the "Close" button on the Message List window.

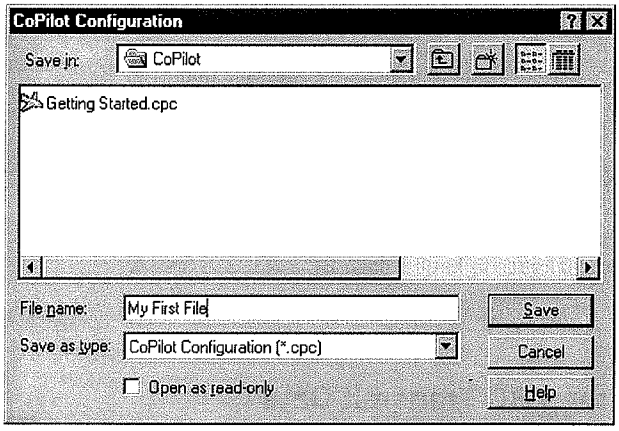


Saving Specifications

BC, RT and Monitor specifications can be saved for future use in a CoPilot Configuration file (commonly referred to as the .CPC file).

- Click the  button to access the familiar "Save dialog box".
- Assign the name of your choice.

Configuration data is saved in a CPC file and Sequential Monitor data is saved in a CPM file. In addition, selected options which are used routinely as CoPilot standards are stored in the Host System Registry.



Summary:

In Lesson One, you learned (1) how to access the BC Message List, (2) how to create, (3) how to transmit and view the results of a single message and (4) how to save specifications for future use.. Although we did not demonstrate it, you can also transmit single messages from the Message Editor.

Building on these ideas, you will learn in Lesson Two how to build a BC Schedule and how to examine and change data values when a BC simulation is active.

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Lesson Two: Creating and Using a BC Schedule

The BC Schedule controls the content and frequency of messages sent by the Bus Controller. The objective of lesson two is to illustrate how to build and activate a BC Schedule using CoPilot. The following windows and controls are introduced in this lesson: **BC Schedule**, **BC Data Editor**, **TSA** and **Data Selection** windows and the **Start Simulation** and **Stop Simulation** controls.

Problem Statement: Create a BC Schedule consisting of one transmit and one receive message and transmit each command 50 times per second.

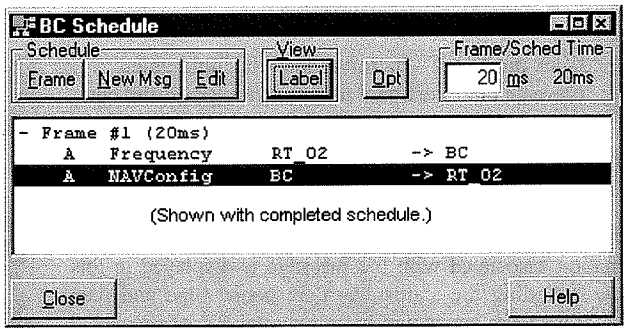
Specifying the Configuration:

Accessing the BC Schedule Window

All of the attributes of the Bus Controller can be set through the BC Schedule window.

- Click on the  button to open the BC Schedule window.
- Click "New Msg" to access the Message Editor.

All messages in a BC Schedule are assigned to frames. In Lesson Eight you will learn how to create and use multiple frames.



Defining BC Messages

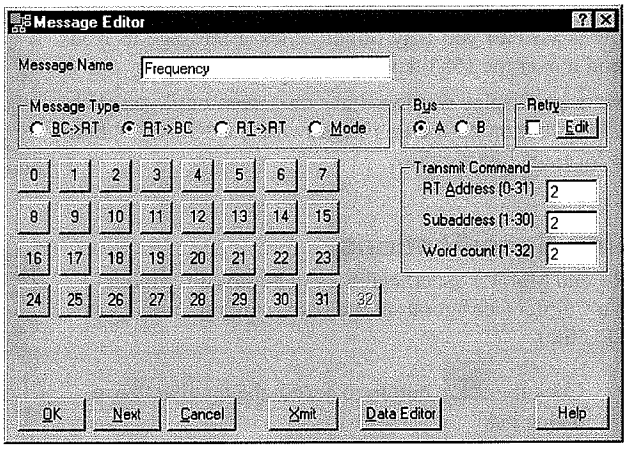
Compose two BC messages, one which directs RT#2 to transmit 2 words from subaddress #2 and the other to receive 4 words in SA #3.

RT Transmit Message

- Type "Frequency" into the Message Name field.
- Select the RT→BC Message Type.
- Click keys 2, 2, and 2 to define the RT address, subaddress, and word count.
- Select "Next" to transfer the message to the Schedule and clear the Message Editor for a new message.

RT Receive Message

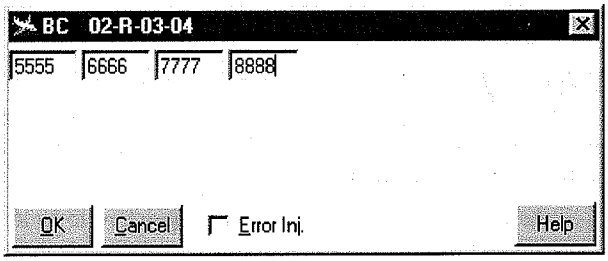
- Type "NAVConfig." into the Message Name field.
- Enter the following data: BC→RT, 2, 3, and 4.
- Then, click the Data Editor button.



Defining BC Transmit Data

To define the four data words to be sent by the Bus Controller:

- Type 5555, 6666, 7777, and 8888 into the blank text fields. The Tab or Enter key may be used to advance from one data cell to the next.
- Select "OK" to close, then click "OK" to close the Message Editor.

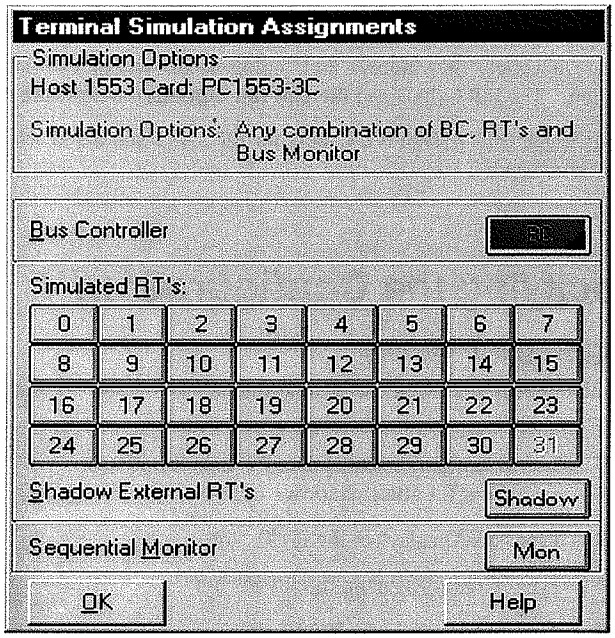


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Selecting Terminals

With CoPilot, you may define BC Schedules, RT definitions, and Monitor in advance, then select which of these will be used for simulation at "run time". This is done through the Terminal Simulation Assignment (TSA) window.

- Open the TSA window by clicking the button on the toolbar.
- Click the BC button to select it for simulation.
- Click "OK" to close the window.



Running the Simulation:

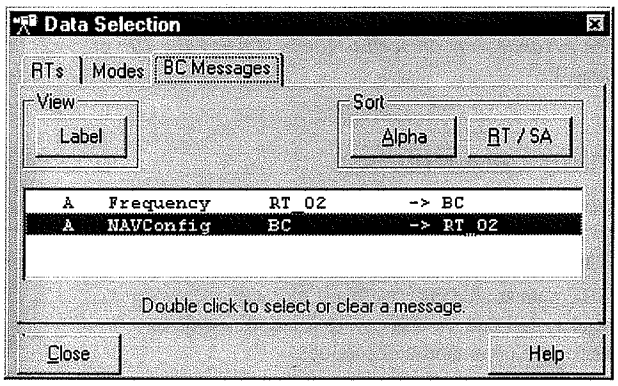
Starting the Simulation

- To start the simulation, press the button on the toolbar. *CoPilot uploads the BC Schedule and starts the simulation.*

Data Interaction (Optional)

You may also observe and change the data while the simulation is running.

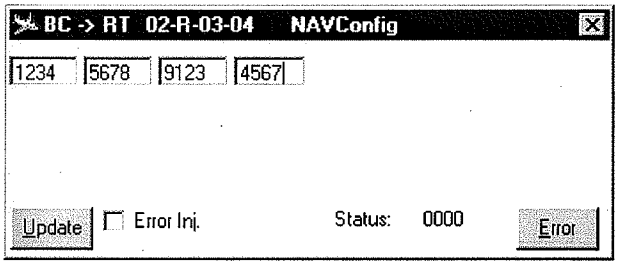
- Click the button to open the **Data Selection** window.
- Click the "BC Msg" tab to access a list of messages included in the schedule.
- Click on the view button (once) to change the message display form to Labels (Msg. Names).
- Double click on the message labeled "Nav Config" to open a Data Message window.



Changing Message Data (Optional)

Since the "NavConfig" message is transmitted by the BC, the data can be changed while the BC simulation is running.

- Change the data to the following: 1234, 5678, 9123, and 4567.
- Click "Update". CoPilot reloads the data while the board is running.
- Click on the **X** in the upper right hand corner to close the window.



Stopping the Simulation

- Click on the button to end the simulation.

Summary:

In Lesson Two, you learned (1) how to access and create a BC Schedule, (2) how to select terminals for simulation, (3) how to start a simulation (4) and how to change transmitted values. See the CoPilot Manual or the online Help commands to explore other options available through the BC Schedule.

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Lesson Three: Special Features

There are a variety of windows and dialog boxes within CoPilot which may be used to simplify and add clarity to your 1553 simulation. The **RT Labels** and the **CoPilot Options** windows are examples.

Problem Statement: Assign RT Labels for RT's 1, 2 and 3 and select an algorithm for assigning data values for BC transmit and RT transmit commands.

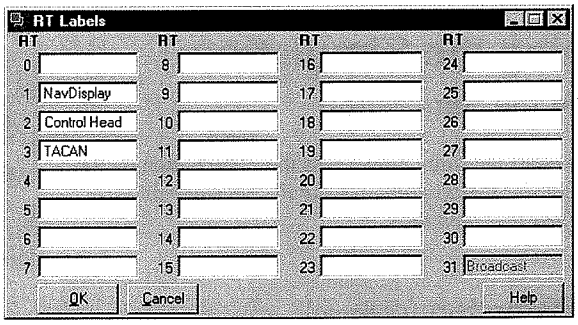
Specifying the Configuration:

Assigning RT Labels

Although optional, it is often useful to assign labels to your Remote Terminals.

- In the Configure menu, select RT Labels option to open the **RT Labels** window.
- Type "NavDisplay" in the RT#1 slot.
- Type "ControlHead" in the RT #2 slot.
- Type "TACAN" in the RT #3 slot.
- Click on "OK" to close.

(You can advance from one cell to the next using the Tab or Enter keys.)



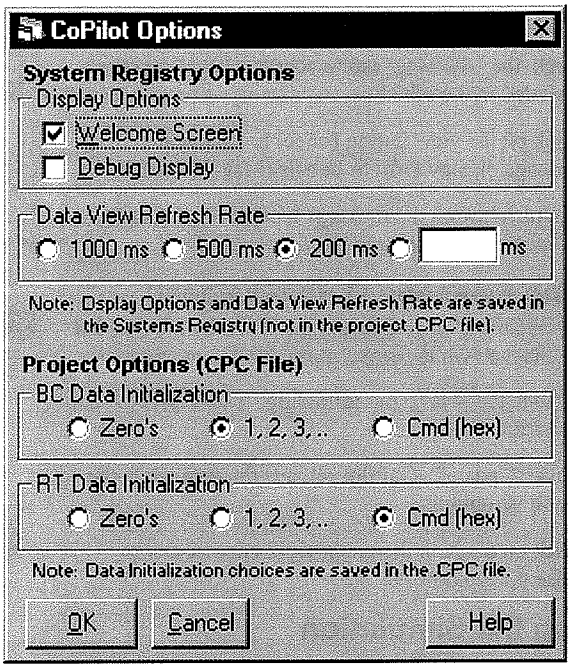
Defining Data Rules

Although you can define many things through the CoPilot Options window, we limit our current interest to establishing the BC and RT data assignment rules.

Define BC data so that each transmit message follows a sequential 1, 2, 3 pattern and define RT data words to increment from command word values.

- Open the CoPilot Options window under the Configure menu.
- Click on the "1,2,3" radio button in the BC Data Initialization frame.
- Click on the "Cmd (hex)" button in the RT Data Initialization frame.
- Click "OK" to close the window.

(Parameters referenced in the upper portion of the Options Window govern standard CoPilot behavior and are therefore stored in the Host System Registry. Data Initialization choices are treated as project options and saved with other configuration data in the CPC file.)



Summary:

In Lesson Three you got a glimpse of two optional windows which can simplify tasks associated with test and simulation activities. You will see the effects of these declarations in the lessons which follow.

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Lesson Four: Simulating an RT

A Remote Terminal transmits and receives data as directed by the Bus Controller. The object of this lesson is to demonstrate how an RT can be simulated in the simplest possible way. The **RT Msg tab of the Data Select** window is introduced in this lesson.

Problem Statement: Simulate RT #2 (Control Head), legalizing all transmit and receive subaddresses. The RT transmit data values are to be defined by the data assignment rules selected in Lesson Three.

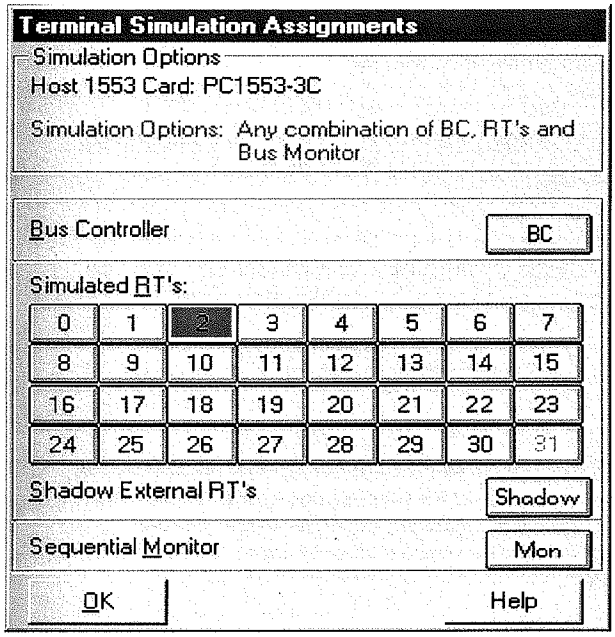
Specifying the Configuration:

In this example, no explicit RT specification is required except to identify the RT within the TSA window.

Selecting Terminals

Typically, the TSA selection determines which user defined terminal specifications are loaded onto the board. In this example since RT #2 is not explicitly defined, the board is loaded based on CoPilot initialization values. Consequently, all transmit/receive subaddresses for RT #2 are legalized.

- Click the  button on the toolbar to open the TSA window.
- Select RT #2. (If any other item is highlighted, (e.g., BC), click that button to deselect it.)
- Select "OK" to close the TSA window.



Running the Simulation:

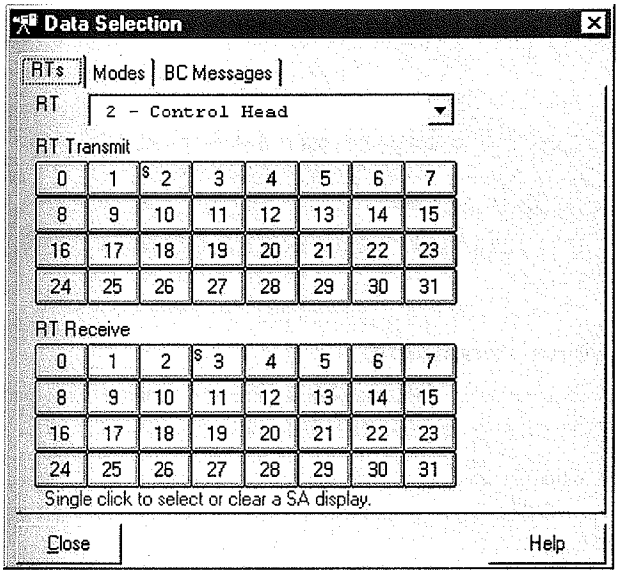
Starting the Simulation

- To start the simulation, press the  button on the toolbar. *CoPilot defines RT #2 with all transmit and receive subaddresses legalized and starts the simulation.*

Data Interaction

To change the data during the simulation, use the Data Selection Option.

- Click the  button to open the Data Selection window *(the RT Msg tab is displayed).*
- Next, click the down arrow and select RT #2, which has been named "Control Head."
- To view data, click one of the transmit or receive subaddress keys (illustrated in Lesson Five).



Stopping the Simulation

- To Stop the simulation click on the  button.

Summary:

In Lesson Four, you learned how to simulate an RT using RT properties defined by the CoPilot. In the next lesson you discover how these terminal properties can be set explicitly.

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Lesson Five: Configuring an RT

When simulating an RT, you may want to specify subaddress legalization, transmit data values, mode codes, status word response and even error injection behavior. You can define these characteristics through the **RT Configuration** and **RT Data Editor** windows.

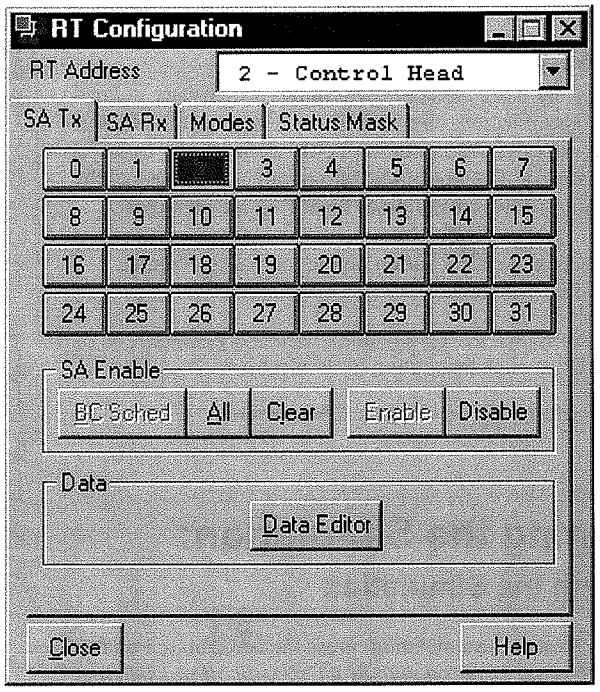
Problem Statement: Simulate the "Control Head" terminal (RT #2), legalizing only transmit subaddress #2 and all receive subaddresses. Define two data words for Tx subaddress #2 and revise these values during the run.

Specifying the Configuration:

Defining RT attributes:

- Click  on the toolbar to open the RT Configuration window.
- Click on RT#2 (Control Head) in the "RT Address" listbox. *The 4 tabbed panels will reflect the current state of the RT defined in the RT Address listbox.*
- Select the "SA Tx" tab then click the "Clear" button to illegalize all transmit subaddresses, then double click key 2 to legalize subaddress 2.
- To access the RT Data Editor for subaddress #2, click SA key #2 once, then click the "Data Editor" button.

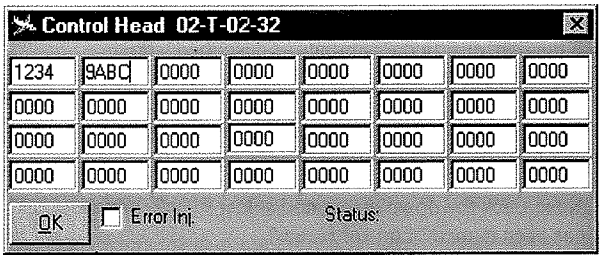
Before moving on to the RT Data Editor, note the four tabbed panels at the top of the RT Configuration window. You can legalize Receive subaddresses, legalize mode codes and establish status word response through these tabbed windows.



Defining RT Transmit Data

Unlike the BC Data Editor, there is nothing in this selection sequence to specify how many words must be defined, so 32 data input fields are visible.

- Type 1234 and 9ABC into the first 2 data fields.
- Click "OK" to accept the data and close the RT Data Editor window. *Control passes back to the RT Configuration window.*
- Click "Close" again to close the RT Configuration window.



Selecting Terminals

The TSA window tells CoPilot which terminals to simulate when the user selects the Start Button.

- Click the  button on the toolbar to open the TSA window.
- Select RT #2. *(Deselect any other terminals.)*
- Select "OK" to close the TSA window.

(TSA window is illustrated in Lesson Four.)

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Running the Simulation:

Starting the Simulation

- Press the  button on the toolbar to activate the simulation.

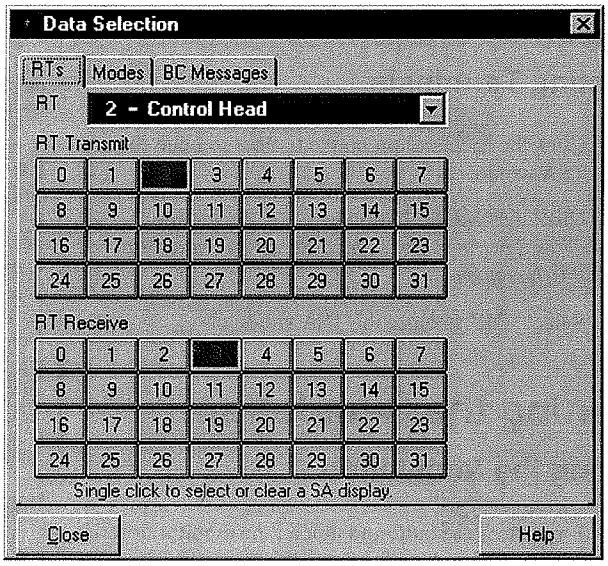
  In this example, the board is actually placed in a ready condition, awaiting command words from the Bus Controller.)

Data Interaction

As with the Bus Controller, you may observe and change the data for RT #2 while the simulation is active.

- Click the  button to open the Data Selection window.
- Next, select RT #2 *(labeled "Control Head").*
- Finally, click RT transmit subaddress #2 to activate a Message Data window.

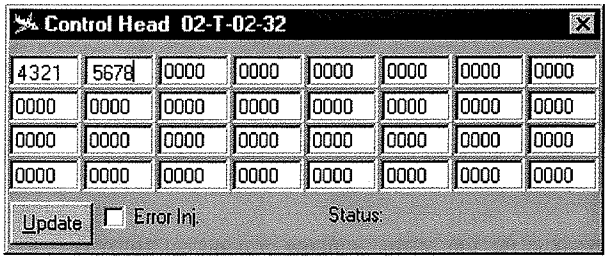
The transmit subaddresses are marked by a green triangle if data are defined. Transmit and receive subaddresses are marked with an "S" if the subaddress is referenced in the BC simulation schedule. We have not defined a Bus Controller schedule in Lesson Five, but the "S" marks are a carry-over from Lesson Two.



Changing RT Transmit Data

When the Message window first appears, it displays the "1234", "9ABC" values defined earlier in this lesson.

- Change the data values to "4321", "5678"
- Click Update to upload the data to the board.
- Click the **X** in the upper right hand corner to close the Message window.
- To close the Data Selection window, click the "Close" button.



Stopping the Simulation

- To Stop the simulation click on the  button.

Summary:

In Lesson Five you learned (1) how subaddresses are legalized through the RT Configuration window and (2) how RT transmit data is defined prior to and during a simulation. It should be noted that the Message windows are also very useful for viewing data being received by simulated or real RTs during the simulation run. If you need a full sequential record of bus traffic, use the CoPilot Bus Monitor illustrated in Lessons Six and Seven.

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Lesson Six : Monitoring the 1553 Databus

All CM1553-1, PC1553-3 and LP1553-3 boards provide full Monitor capability. If you are using the multi-terminal PC1553-3C or LP1553-3C board, you are able to simulate a BC and/or RTs and monitor the bus at the same time. Using CoPilot you can capture and examine a sequential record of bus traffic with a few clicks of the mouse. In this lesson you are introduced to the **CoPilot Monitor** window and some of its data handling features.

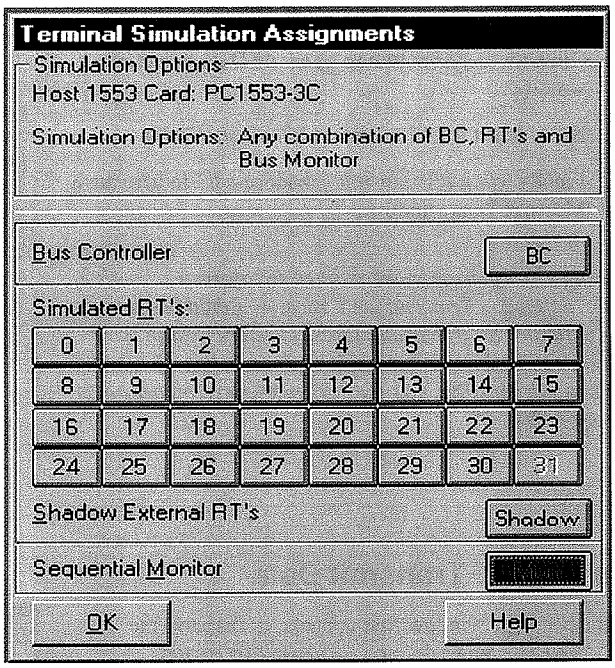
Problem Statement: Monitor and retain a full sequential record of all 1553 bus traffic in the simplest possible way.

Specifying the Monitor Configuration:

If you want a sequential record of all bus traffic, you simply select the Monitor function in the TSA window and start the card. CoPilot sets up the Monitor to capture all bus traffic and records it in on-board memory.

Selecting Terminals

- Click the  button on the toolbar to open the TSA window.
- Click the "MON" button to select the monitor. *Click any other highlighted BC or RT button to deselect them.*
- Select "OK" to close the TSA window.



Running the Simulation:

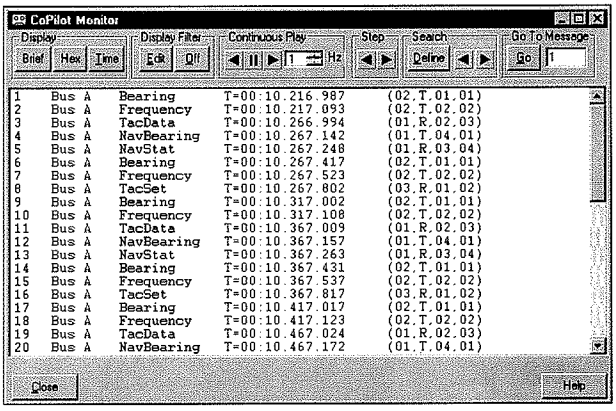
Starting the Simulation

- Press the  button to upload the monitor criteria onto 1553 board and activate the data capture.

Data Interaction

The Monitor window appears as soon as the board is loaded. All messages are posted in the monitor window as they are received.

The buttons at the top of this window provide control over data display, data search, display filtering and playback. These features are described on the next page.



(Illustration above based on example in Lesson Eight.)

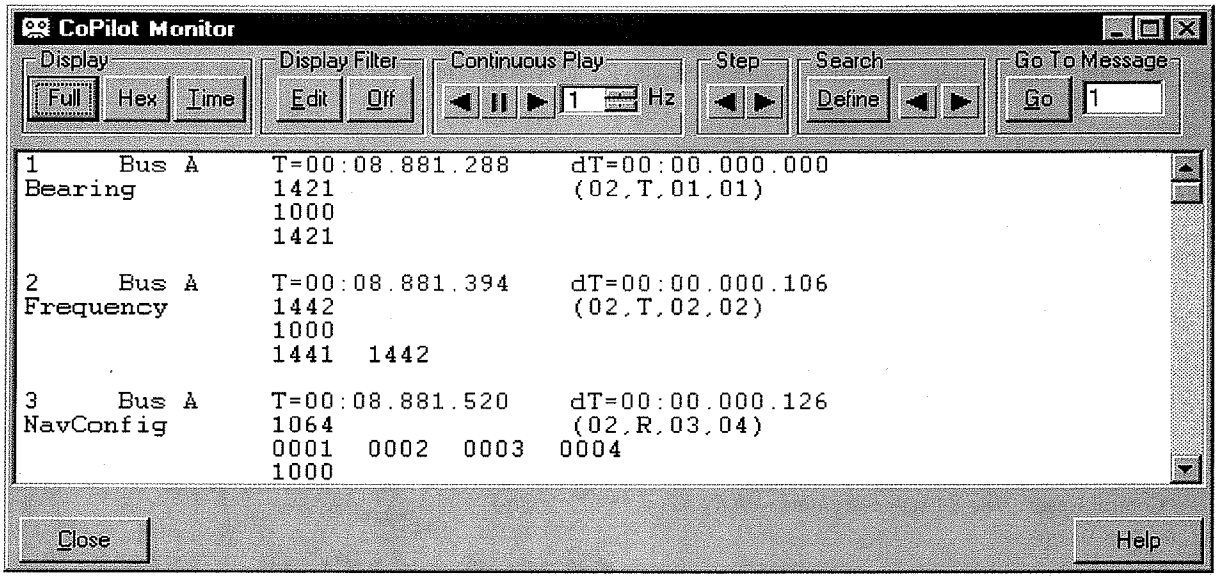
Stopping the Simulation

- Click the  button stop the Monitor capture.
- When you have finished examining the monitor records, click the "Close" button to close the CoPilot Monitor window.

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Exploring Monitored Data:

The purpose of a Bus Monitor is to create a sequential record of bus traffic which can be examined later. The features available through the Monitor window can simplify and accelerate the examination of monitored data..



Search and Display Features

Display Frame:

- Full/Brief/Form: Click the left-most button to toggle between the "Full" multi-line display (shown above), the "Brief" one-line display (shown on the preceding page) and the "Form" display (shown in Lesson Seven)..
- Data Display: Click the second button to translate the display of data values into a Hexadecimal, Decimal or Octal format.
- Time Tag: Records displayed in the "Brief" one-line format includes a time tag value. Click the third button to toggle between a standard time-tag and delta time (*between messages*). Both are included in the "Full" display.

Display Filter: In Lesson Seven, you will learn how to collect specific records based on "Capture Filters". The display filters work in the same way except they are used as an analysis tool after data are captured.

- Edit: Click the Edit button to access the Display Filter window. The process of defining display filters and capture filters is identical.
- On/Off: Click the On/Off button to apply the display filter criteria.

Continuous Play: When the data are being captured, you may have difficulty reading the data. Using the Continuous Play buttons, you can scroll the data forward or backward at a readable rate. This may be particularly useful in conjunction with the use of Display Filters.

Step: The Left and Right arrows may be used to step forward or backward through the monitor records.

Search: The search keys allow you to find data quickly based on a wide variety of criteria.

- Define: Click to define search criteria including RT/SA values, data content or error conditions.
- Arrow Keys: Click the forward or back keys to locate the next record which meets the search criteria.

Go To Message: Used to reposition the display to the selected record number.

Saving or Opening Monitor Files

Monitor Data may be saved in Binary or ASCII files through the CoPilot Menu. When a monitor file is reopened, the Monitor window is activated and all the analysis capability described above is available.

Summary:

In Lesson Six, you learned how to run a basic Monitor using CoPilot. Next, you will learn how to configure it so that only the messages and terminals you want to monitor are captured.

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Lesson Seven: Monitoring Selectively

In Lesson Six, you discovered how easy it is to create a sequential monitor record of all data traffic. CoPilot does that automatically. It may be more useful however, to limit the sequential record to specific messages or a few RT/SA combinations. In this lesson, you are introduced to the **Monitor Initialization** window .

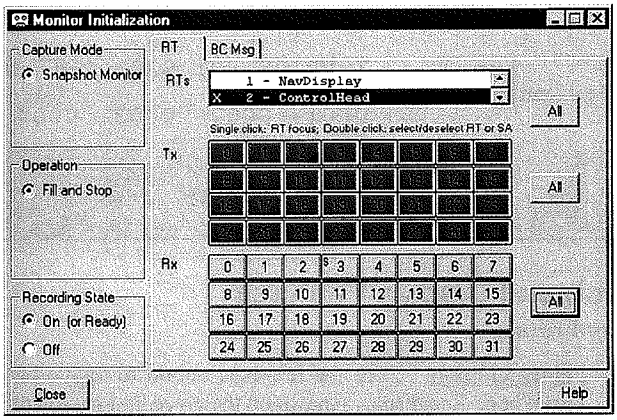
Problem Statement: Capture all RT Transmit data associated with RT #2 (Control Head) but ignore all other messages.

Specifying the Configuration:

When Monitor Initialization window is activated, you may observe that all RTs and all subaddresses are selected. This represents the normal Monitor capture definitions. The simplest approach to defining this limited monitor objective is to toggle the RTs off, then select the Transmit subaddresses for RT #2.

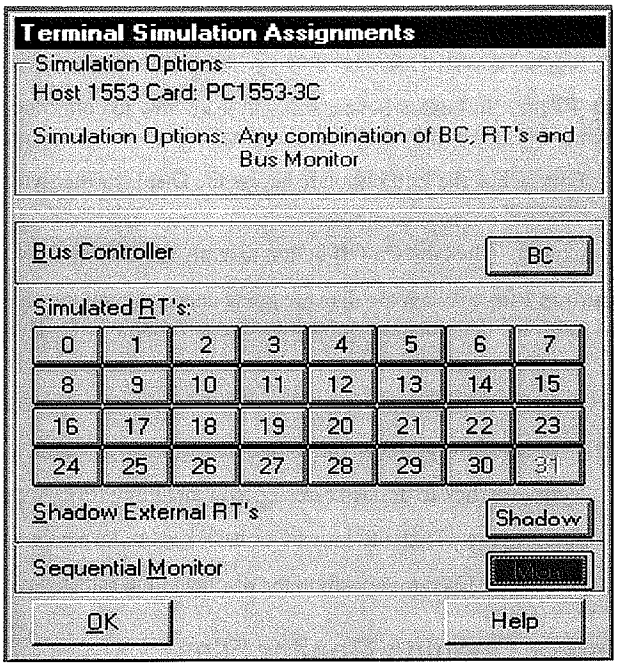
Defining Bus Monitor Objectives

- Click the  button to open the Monitor Initialization window.
- Click the "ALL" button to the right of the RT listbox to deselect all of the RTs, then double click on "Control Head". *The SA keys associated with RT #2 become visible.*
- Click the "ALL" button to the right of the Rx Subaddresses to deselect all receive SAs. *All the transmit keys become green (selected) and the receive SA keys become gray (not selected).*
- Click on the "CLOSE" button to close the Monitor Initialization window.



Selecting Terminals

- Click the  button on the toolbar to open the TSA window.
- Click the "Mon" button to select the monitor.
- Select "OK" to close the TSA window.

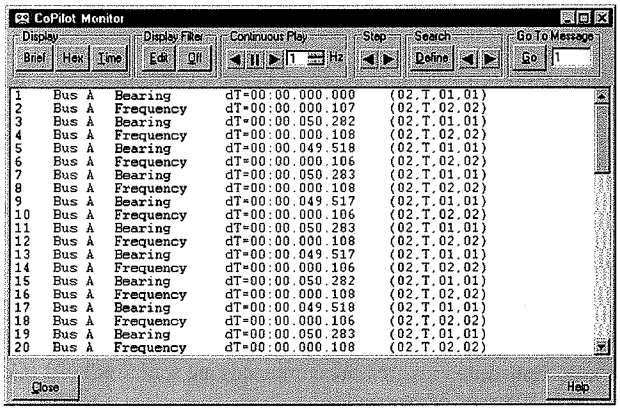


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Running the Simulation:

Starting the Simulation

Press the  button to upload the monitor capture criteria and start the monitor.



Data Interaction

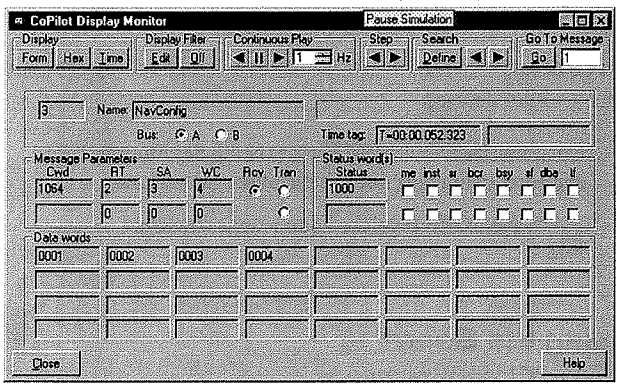
The monitor window opens immediately. From the figure on the right, you can observe RT #2 transmit data but no other bus traffic. Compare this display with the monitor records shown in Lesson Six.

The monitor examples in Lessons Six and Seven are based on the BC schedule described in Lesson Eight.

Viewing One Message at a Time

It is often useful when reviewing monitor records to focus in on a single message using the Form View Option.

- To select Form View, click the left-most button under the Display heading until the Form appears.



Form View is particularly useful for reviewing a completed file in conjunction with display filters and with the use of the Continuous Play or Step buttons. Since all the message parameters appear in the same location, it is easy to detect changes in message content.

Stopping the Simulation

- To Stop the simulation click on the  button.
- Click the close button to close the Monitor window.

Summary:

In Lesson Seven, you learned how to monitor a selected set of RT/SA commands. You have now covered the basics of CoPilot 1553 during a Single Terminal Simulation. In Lesson Eight, you will learn how to run a complex, multi-terminal simulation.

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Lesson Eight: Multi-terminal Simulation

The bus defined at the beginning of this lesson sequence included (a) a Bus Controller, (b) three RTs and (c) a Bus Monitor. In each of the previous lessons, you learned how to simulate one of the terminals on this bus. In many cases, a one terminal simulation is all that is required. Sometimes, though, you may have only one "real" terminal and you need to simulate all of the others which interact with it. In Lesson Eight you will learn how to simulate multiple terminals.

The simulations represented by Lessons One through Seven could be run on any of the CM1553-1 or 1553-3 boards. Although you could run a multi-terminal simulation by using several single-terminal boards, it is easier and more efficient to use a multi-terminal board. In this lesson, because we want to simulate a Bus Controller, 2 RTs and activate a concurrent monitor, you must use the PC1553-3C, LP1553-3C, LC1553-3C, CM1553-3C or BB13xx USB boards. (You could also use a 1553-3B$_4$ or 1553-3B$_{32}$ board if the concurrent monitor is not required.)

The first step in Lesson Eight is to purge all of the definitions specified in Lessons One through Seven (1) to reinforce the lessons learned already and (2) to illustrate how easy it is to run a multi-terminal simulation. The **File menu** and the **BC Display Filter**, **BC Frame** and **Board Setup** windows are introduced in this lesson.

Problem Statement: Simulate (1) a Bus Controller, (2) RT #1 {NavDisplay}, (3) RT #2 {Control Head} and (4) activate a bus monitor. This is to be connected to a bus on which RT #3 {TACAN} is a real device.

Define a BC Schedule in which the commands are sent to RT # 2 (Control Head) 20 times per second but the frequency of all other commands is 10 times per second.

Specifying the Configuration:

File New

From the CoPilot desktop

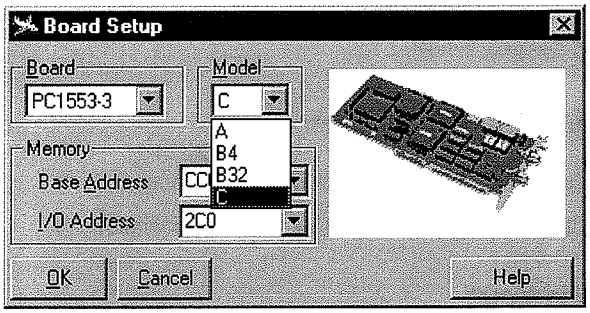
- Click the  button to clear existing definitions and reset using CoPilot initialization parameters.
- If a "Save existing values" query appears, select "No".

Defining the Board

To specify a PC1553-3C board

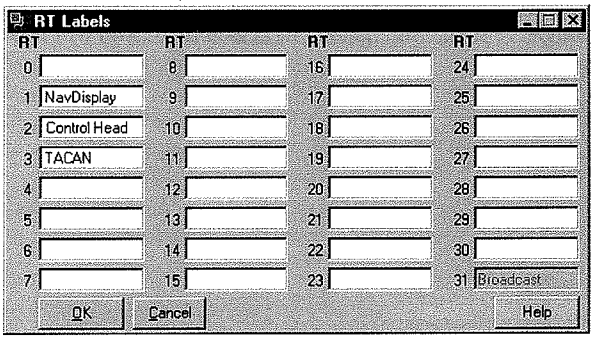
- Click the "Board Setup" entry under the Configure menu.
- Click the down arrows to select PC1553-3 board and the C model.
- Click OK to close.

The standard Base and I/O address are shown. This can be changed if there is a conflict with other boards.



Assigning RT Labels

- Open the RT Labels window (Configure menu).
- Assign "NavDisplay", "ControlHead" and "TACAN" to RTs 1, 2 and 3.
- Click OK to close.



Defining Data Rules

- Open the CoPilot Options window (Configure menu).
- Select the "1,2,3" data option for BC messages and "Cmd" for RT's.
- Click OK to close.

(See Lesson Three.)

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Defining the BC Schedule

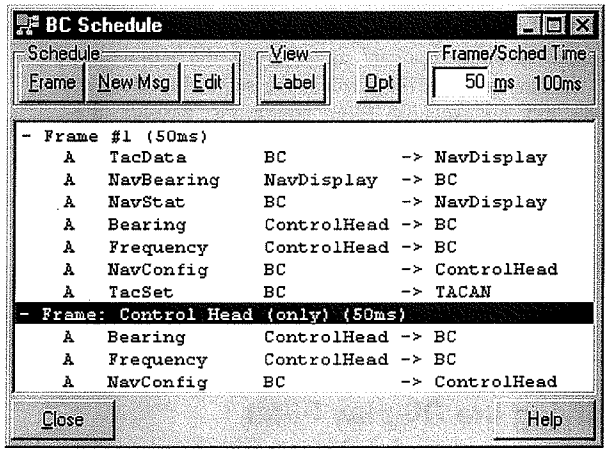
There are seven unique messages in BC Schedule. Since three of these (those directed to RT #2) must be transmitted 20 times per second and the other four transmitted 10 times per second, you must include all of the messages in one frame and include the three commands associated with RT #2 in a second frame.

Following the process defined in Lesson Two:

- Click  to open the BC Schedule window, then click "New" to access the Message Editor.
- Define the following BC Commands:

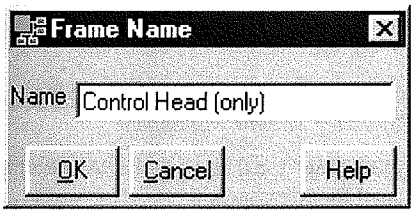
"TacData"	BC→RT	1, 1, 3,	(next)
"NavBearing"	RT→BC	1, 2, 1,	(next)
"NavStat"	BC→RT	1, 3, 4,	(next)
"Bearing"	RT→BC	2, 1, 1,	(next)
"Frequency"	RT→BC	2, 2, 2,	(next)
"NavConfig"	BC→RT	2, 3, 4,	(next)
"TacSet"	BC→RT	3, 1, 2,	(OK).

All of the above are assigned to "Frame # 1".



Adding a Second Frame

- Click the Frame button to open the Frame Editor
  - type "Control Head (only)"
  - then click OK to close the Frame Editor.
- Click the message labeled "Bearing" to highlight,
  - click the Copy  button then
  - click the frame labeled "Control Head (only)"
  - and click the Paste  button to add "Bearing" into the second frame.
- Repeat the process above to add "Frequency" and "NavConfig" to the "Control Head (only)" frame.
- Click the "OK" to close the BC Schedule window.



Defining the RT Configuration

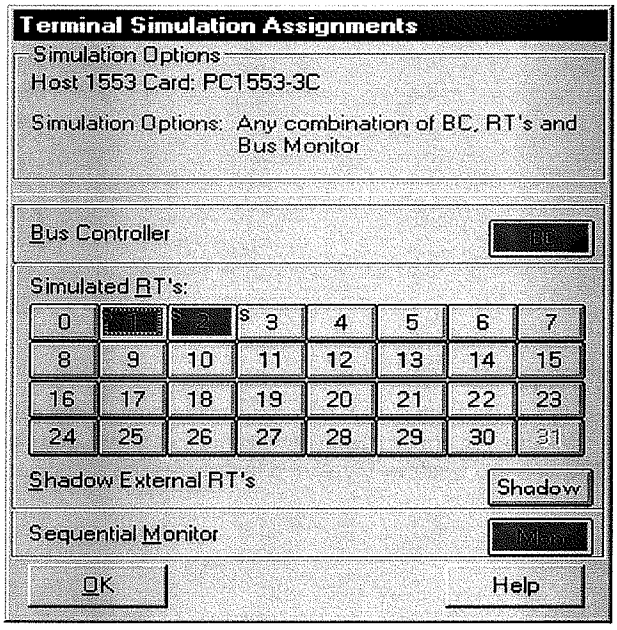
The steps associated with defining RTs uniquely are outlined in Lesson Five. In this lesson, you activate two RTs based on CoPilot defaults by selecting RTs 1 and 2 in the TSA window.

Specifying Monitor Requirements

The steps associated with specifying Capture Filter criteria are outlined in Lesson Seven. In this lesson, you capture all bus traffic by selecting the Monitor through the TSA window.

Selecting Terminals to be Simulated

- Click the  button on the toolbar to open the TSA window.
- Click the BC, RT#1, RT#2, and MON buttons to specify which terminals are to be simulated.
- Select "OK" to close the TSA window.



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Running the Simulation:

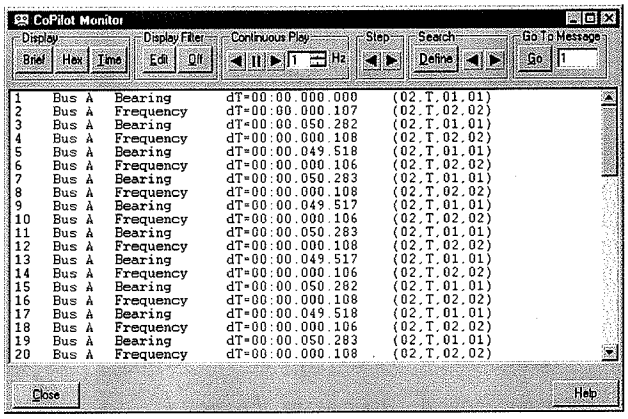
Starting the Simulation

Press the  button to upload the configuration specifications to the PC1553-3C board and to start the simulation.

Data Interaction

The Monitor window appears as soon as the simulation begins. All bus traffic is recorded in the sequential monitor since you did not specify filter conditions through the Monitor Initialization window. You can limit the display of monitored data through Display Filters.

Display filters can be invoked while the simulation is active or after the monitoring activity is complete.

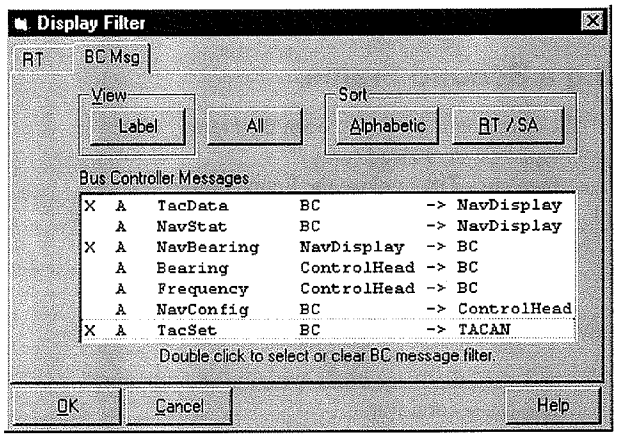


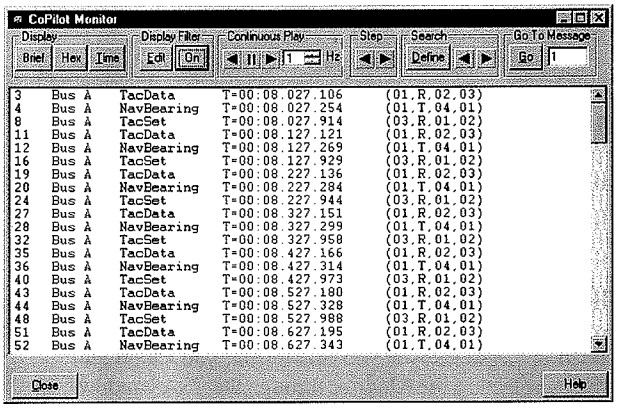
Specifying the Display Filter

In Lesson Seven you defined the Monitor Filter based on RTs and Subaddresses. When a Bus Controller is simulated, you can specify monitor filters by selecting BC messages.

To limit the display of monitor records to "TacData", "NavBearing" and "TacSet":

- Click the "Edit" button on the Monitor window, *The Display Filter window will appear.*
- Click the "BC Msg" tab then click the "All" button to deselect all BC Messages.
- Double-click on the three named messages, then click the "OK" button to close the Display Filter window.





Summary:

In Lesson Eight, you learned how to create a multi-terminal simulation, using the CoPilot 1553 windows introduced in the first seven lessons. Whether you are simulating one terminal or many, you can simulate and test a MIL-STD-1553 databus easily using CoPilot 1553. The tools and windows introduced in these lessons are only the beginning of what CoPilot has to offer.

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Increase your Productivity with CoPilot 1553

Just the Beginning

In eight brief lessons, you learned how easy it is to simulate and test MIL-STD-1553 terminals using CoPilot 1553, and you have only scratched the surface! If you look back at the windows shown in these lessons you may discover numerous options that were not demonstrated. In addition, there are a number of special purpose windows you didn't explore: windows which allow you to define mode codes, broadcast and retry properties of the bus; dialog boxes and toolbar buttons which allow you to define radices of data, error detection and error injection capabilities and much more. You can access all of these capabilities as easily as you activated the bus monitor or defined BC commands through intuitive windows using the mouse or keyboard.

Take a CoPilot Test Drive

The best way to discover how CoPilot 1553 can increase your own productivity is to try it. We would be happy to send you an evaluation copy of CoPilot. With it you can duplicate the examples illustrated in these lessons and examine all the features available through the CoPilot menu, toolbar and windows. The evaluation copy does not allow you to control hardware. If you already have a Ballard Technology 1553 board, we can register your board for a limited period of time so you can evaluate the full capability of the hardware and software.

Ordering Information

CoPilot 1553 is available in two versions:

SW-1553-CS: CoPilot 1553 - Single-terminal
(for CM1553-1, CM1553-3A, PC1553-3A, LP1553-3A, LC1553-3A and BB11xx [USB] boards)

SW-1553-CM: CoPilot 1553 - Multi-terminal
(for CM1553-3B$_4$, CM1553-3B$_{32}$, CM1553-3C,
PC1553-3B$_4$, PC1553-3B$_{32}$, PC1553-3C,
LP1553-3B$_4$, LP1553-3B$_{32}$, LP1553-3C,
LC1553-3B$_4$, LC1553-3B$_{32}$, LC1553-3C
BB12xx, BB13xx and BB14xx USB boards)

CoPilot runs under Windows 95 ™, Windows 98 ™, Windows 2000 ™ or Windows NT ™ and comes with on-line help and printed documentation.

Contact

Ballard Technology, Inc.
3229 A Pine Street
Everett, WA 98201 USA

Phone: 1-800-829-1553 or 1-425-339-0281
Email: sales@ballardtech.com
Fax: 425-339-0915

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