Bluetooth Logger Manual

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Revision History

Version	Date	Description
1.0	November 2009	Release

Reference Documents

The documents listed below provide complementary specifications and information for the device:

- WLAN Driver Logger User Guide
- Standard Bluetooth specifications defined by the Special Interest Group (SIG)
- Script Pad Manual
- SWRU193A – Bluetooth Vendor-Specific HCI Commands.pdf
- Link Quality Monitor Manual
- Bluetooth Patch Description
- HCI Tester Manual

About This Document

This document describes the BT Logger application, which displays firmware debug messages and protocol commands from a TI Bluetooth device.

It is divided into the following chapters:

- **Chapter 1, Installation,** page 7, describes the minimum system requirements and the procedure for installing the Logger tool.
- **Chapter 2, Introduction,** page 9, introduces the Logger application from a Bluetooth® perspective.
- **Chapter 3, Configuration,** page 11, describes the configuration of the Logger tool.
- **Chapter 4, Functions,** page 23, describes the special features that facilitate the debugging process.
- **Chapter 5, A Quick Tour of the BT Logger Tester,** page 33, describes the options in the three main bars: menubar, toolbar and status bar.

Installation

The Logger tool is one of the components of the **TI Wireless Tools.exe** installation file. The following is a list of its minimum system requirements:

- Microsoft Windows® 2000 or Microsoft Windows® XP operating system
- Pentium® II processor
- 64 MB of RAM
- Hard disk drive with 100MB free space
- Serial Communication Port (RS-232) or USB Port (using Virtual COM Port)

To install the software:

- Run the **TI Wireless Tools** executable file and then follow the simple displayed instructions.
- After installation, the Logger application can be accessed by selecting **Start ➔ All Programs ➔ Texas Instruments ➔ Wireless Tools ➔ Logger**.

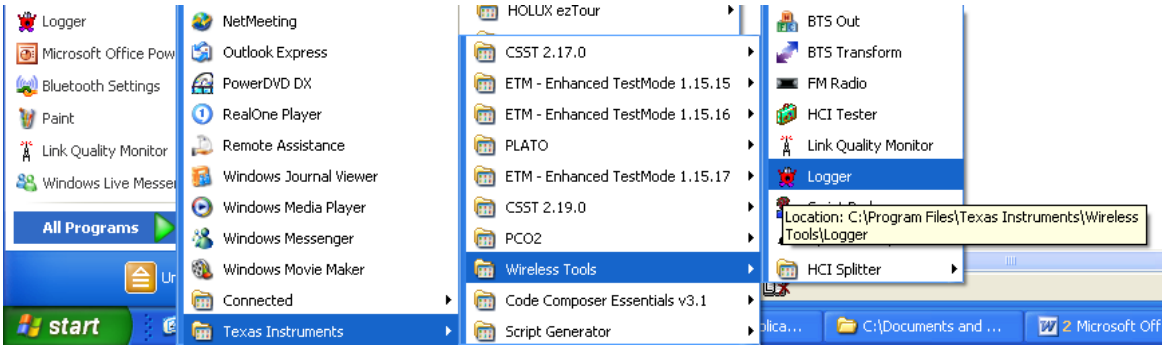

Figure 1: Logger Location

It is also accessible as a desktop shortcut and from the menubar, as shown below:

Figure 2: Logger Shortcut

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Introduction

From a Bluetooth® perspective, the Logger application can log two different types of messages in the same window simultaneously:

- Firmware debug messages
- Protocol commands

Note: For WLAN messages, you may refer to the *WLAN Logger Manual*.

The firmware debug messages are internal transactions, which occur inside the device, such as function calls, internal processes and variable values. In the **Logger** window, these messages are the rows with the port name **Island** #, as shown in Figure 4.

The protocol commands are layer messages, which consist of Host Controller Interface (HCI) and Link Manager Protocol (LMP) commands, as shown in the figure below. For specific details about these layer messages, you may refer to the standard Bluetooth specifications defined by the Special Interest Group (SIG) and the *SWRU193A – Bluetooth Vendor-Specific HCI Commands.pdf* document.

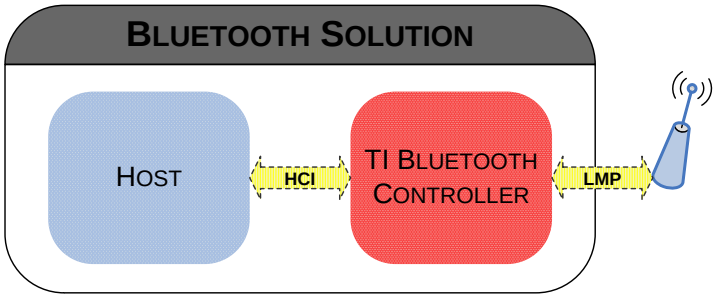

Figure 3: Protocol Commands Description

These messages appear in the **ProtView #** port in the **Logger** window, as shown below. The use of yellow highlighting is for illustration purposes only.

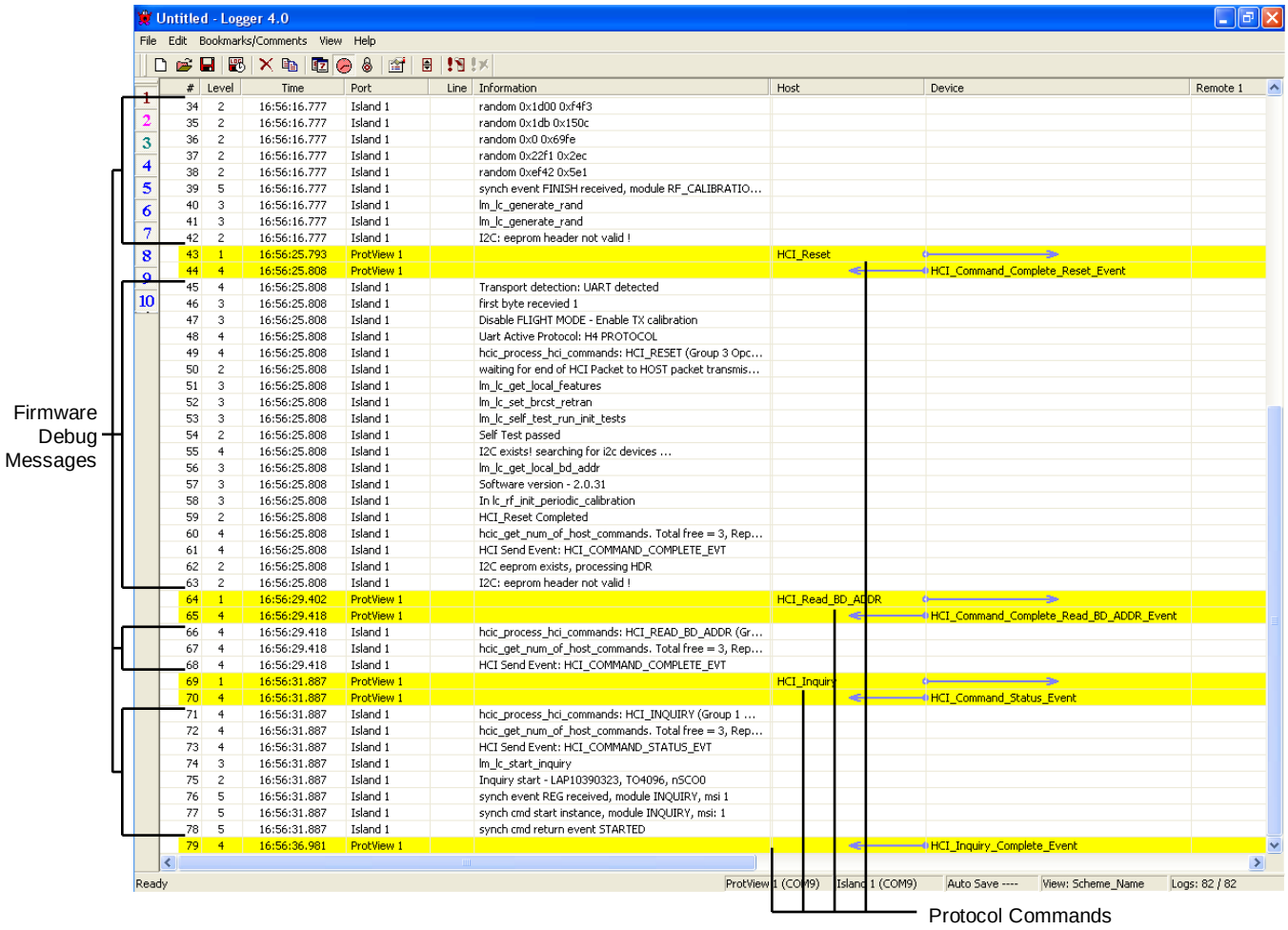

Figure 4: Logger Messages Example

Configuration

The Logger tool must be configured separately for tracing firmware debug messages and protocol commands, even though they appear together in the same window and use the same COM port.

- The *Section 3.1, Logger Tracing* helps setting up the firmware debug messages.
- The *Section 3.2, Protocol Monitor* provides the details to setup the protocol commands.

Both types of messages are independent. Therefore, it is not required to activate one type of message to see the other one. Nevertheless, it is possible to activate both at the same time.

The Logger tool connects to the BT_TX_DEBUG UART line from any TI device with Bluetooth® technology. The same COM port may be used by the Link Quality Monitor application simultaneously. You may refer to the *Link Quality Monitor manual* for more information.

Note: The port number must be smaller than 20.

Topic **Page**

3.1 Logger Tracing

To perform Logger Tracing:

1 In the **Logger** window, on the menubar, select **View ➔ Settings**, as shown below:

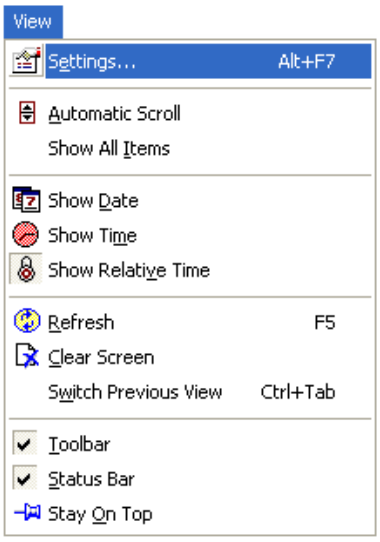

Figure 5: Opening Settings Window

The **Logger Settings** window is then displayed.

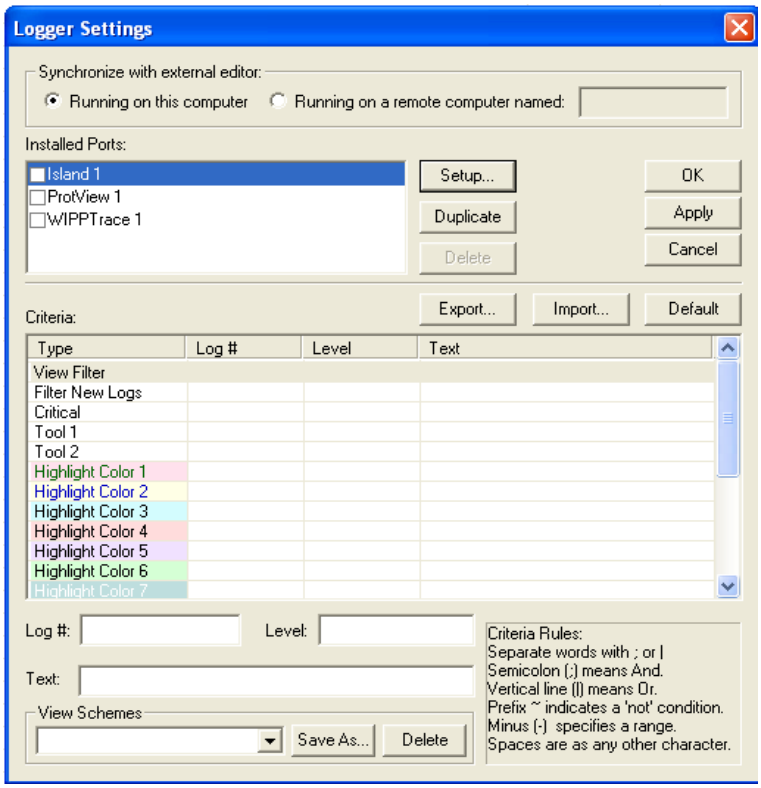

Figure 6: Selecting an Island Port

2 In the **Logger Settings** window, check an Island port. A **Setup** window is then automatically displayed. If this window is not displayed, click the **Setup**… button.

Note: One or more devices can be connected to the same Logger application. To enable firmware debug messages from different devices into the same **Logger** window, create more Island ports using the **Duplicate** button. Each device port must be configured independently by following Steps 2 through 5.
The following table describes the buttons in the Installed Ports area of the **Logger Settings** window.

Table 1: Buttons in the Installed Ports Section

Button	Description
Setup…	Opens the **Setup** window.
Duplicate	Duplicates the selected port to create a new instance of that port. Enables logging from different sources.
Delete	Deletes the selected port.
Apply	Applies the changes without closing the window.
Cancel	Discards the changes and closes the window.
OK	Saves the new settings and closes the window.

3 In the **Setup** window, from the dropdown list select the **COM port** (which must be smaller than COM20) where the BT_TX_DEBUG port is connected to the PC. (If a USB connection is being used, select the mapped Virtual COM port). The COM port number can be selected directly from the dropdown menu. However, for specific COM port configurations, click the **Setup…** button. By default, the BT_TX_LINE UART line uses a baud rate of 115,200 bps with RTS/CTS flow control, no parity, 8 data bits and 1 stop bit (you may refer to Figure 8).

4 Check one **and** only one ILI file in the Mapping Files. The ILI file is the configuration file used to decode the firmware debug messages coming from a TI Bluetooth device. An ILI file is distributed in each Bluetooth Service Pack released by TI. Some ILI files may be installed under **C:\Program Files\Texas Instruments\Wireless Tools\Logger\ILI folder**. You may refer to the *Bluetooth Patch Description document* for more details.

The **Parse Island Protocol** option must be checked. The **Parse Module Protocol** option is used for TI internal purposes only. If checked, traces may not be seen on the **Logger** window.

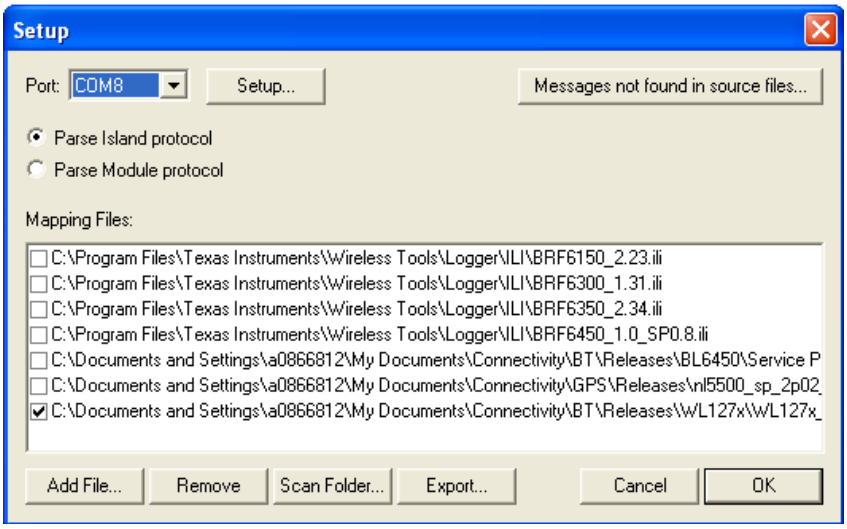

Figure 7: Setting up an Island Port

Table 2: Buttons on the Setup Window

Button	Description
Setup…	Opens the **Squirt-Serial Port Settings** window. Enables special port configurations.
Add File…	Adds a new ILI file, which helps decode firmware debug messages.
Remove	Removes the selected ILI file from the Mapping Panel.
Scan Folder	Not used – For TI Internal Use Only.
Export	Not used – For TI Internal Use Only.
Cancel	Discards the changes and closes the **Setup** window.
OK	Saves the new settings and closes the **Setup** window.

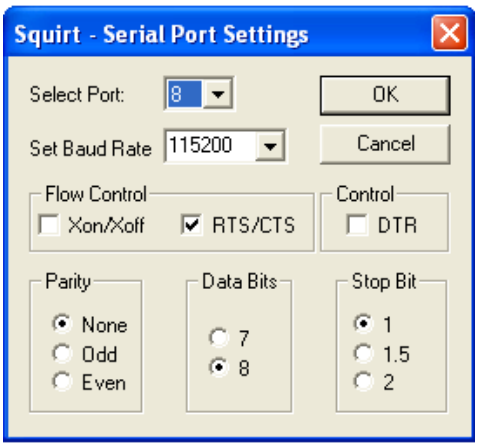

Figure 8: Special Island Port Configurations

5 Click **OK** in all the remaining open windows. The port number appears next to the corresponding Island port, as shown below (only one device is connected in this example).

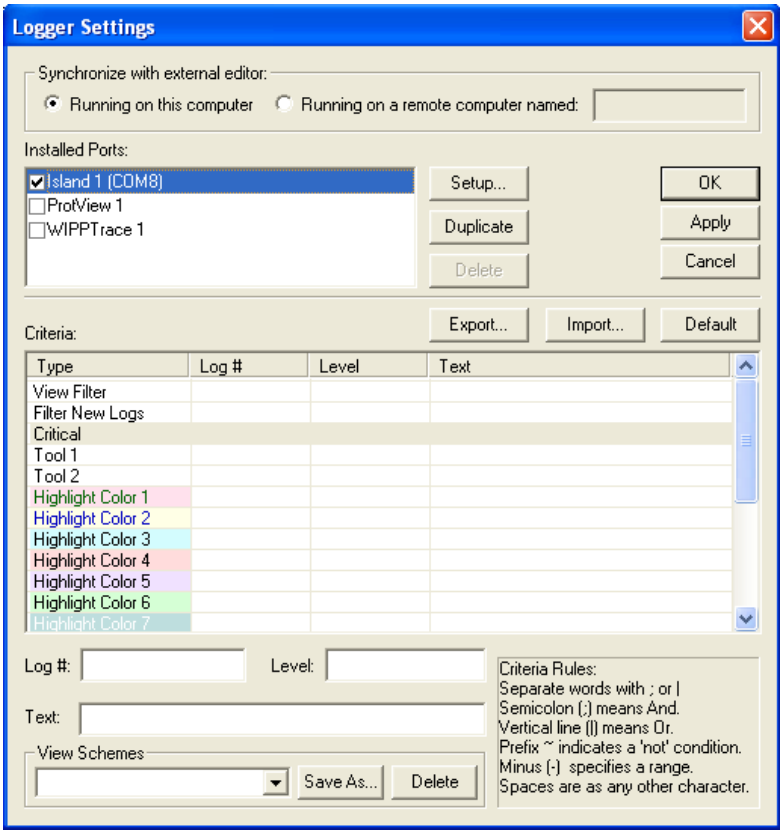

Figure 9: Island Port Connected

Note: The **Synchronize with external editor** area in the **Logger Settings** window is used for TI internal purposes only. The **Running on this computer** option must be selected for regular use. The **Criteria** area is used for filtering and is described in *Section 4.1, Filtering and Tagging*.

If the logs on the **Logger** window are dump data, as shown below, the ILI file selected in step 3 is incorrect. If this is the case, return to step 3 and search for the correct ILI file.

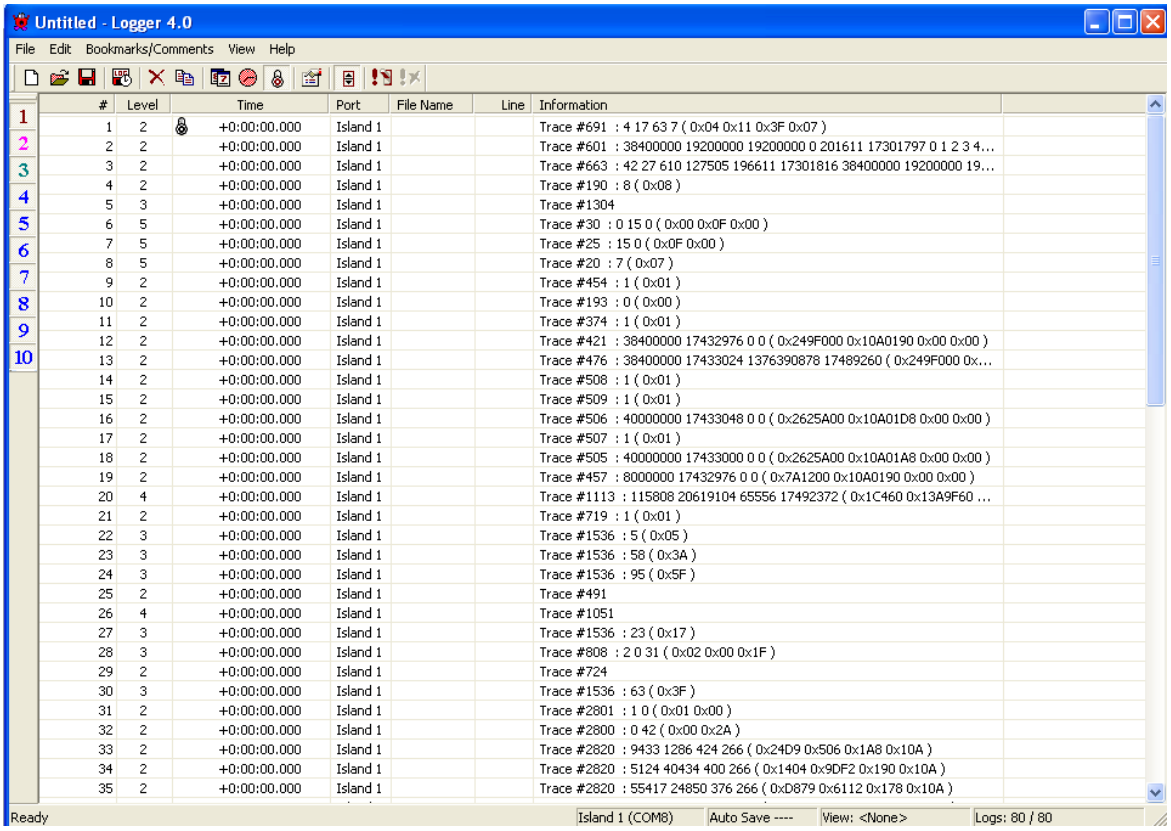

Figure 10: Incorrect ILI File Example

3.2 Protocol Monitor

To enable the Protocol Commands on the Logger window:

1 First send the following command either by using the HCI Tester Tool (you may refer to the *HCI Tester Manual*) or it must be included in the BTS InitScript (meaning as specified in TIInit_7.2.31.bts, you may refer to the *Script Pad Manual* in order to edit BTS files).

Send_HCI_VS_Enable_Protocol_Viewer 0xFF68, 1

You may refer to the *Vendor Specific (VS) Command* document for specific details on this command and to the *SWRU193A – Bluetooth Vendor-Specific HCI Commands.pdf*.

If the HCI Tester is used, the **Send_HCI_VS_Enable_Protocol_Viewer** command is under the HCI_VS_Legacy_Commands folder, as shown below.

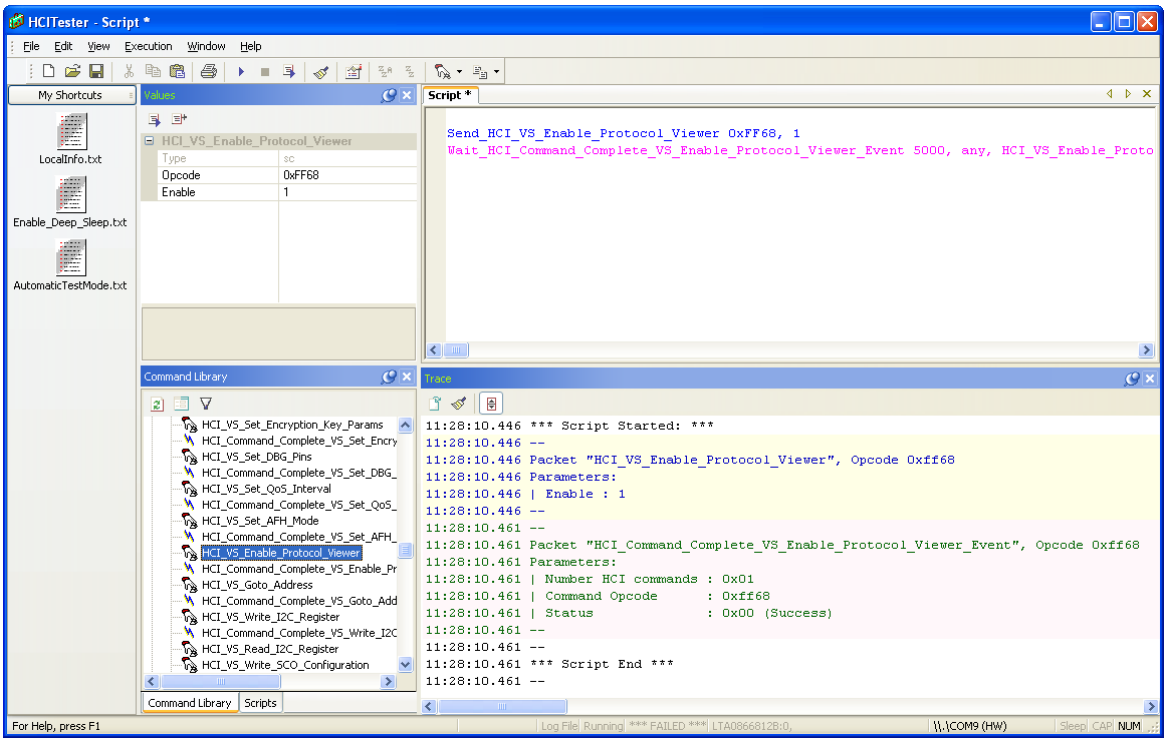

Figure 11: Using HCI Tester to Enable Protocol Commands

If a BTS InitScript is used, the **Send_HCI_VS_Enable_Protocol_Viewer** command is added at the end of the file, as shown below:

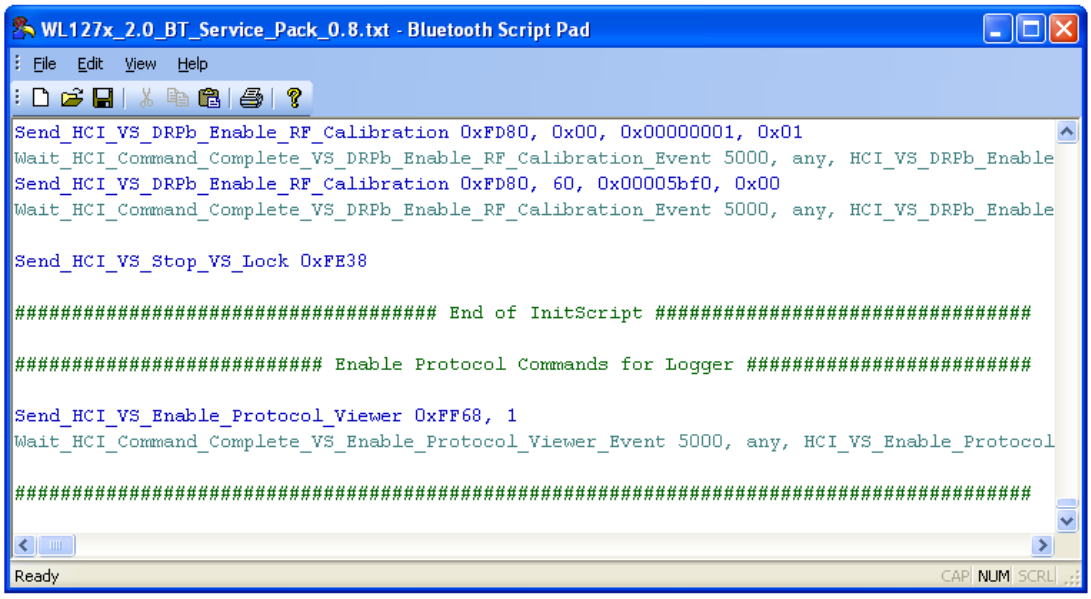

Figure 12: Enable Protocol Commands on BTS file

2 In the **Logger** window, select **View ➔ Settings…** from the menubar.

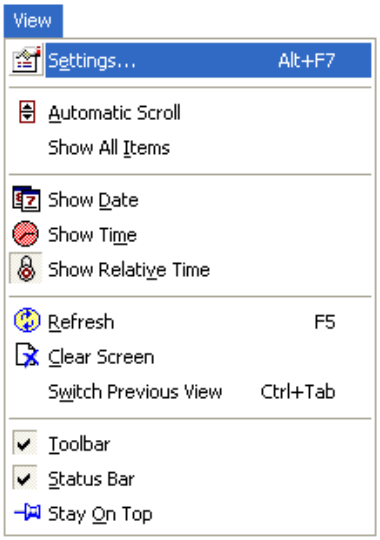

Figure 13: Open Settings Window

The **Logger Settings** window is then displayed, as shown below:

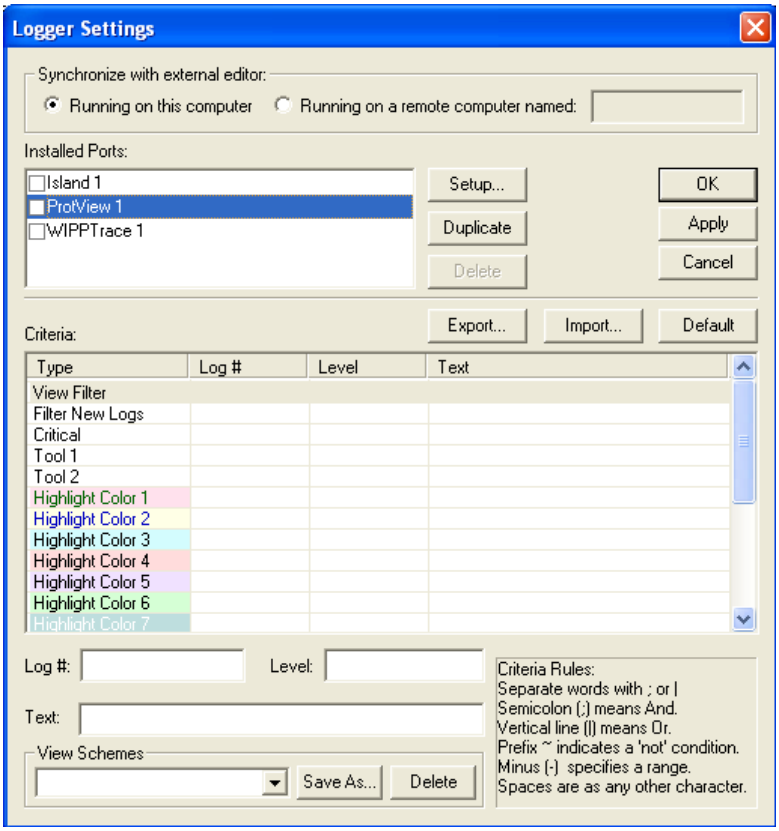

Figure 14: Selecting a Prot View Port

3 In the **Logger Settings** window, check a ProtView port and the **Setup** window is automatically displayed. If this does not happen, click the **Setup…** button.

Note: One or more devices can be connected to the same Logger application. To enable protocol commands from different devices into the same **Logger** window, create more ProtView ports using the **Duplicate** button. Each device port must be configured independently by following Steps 3 through 6.
Refer to Table 1 for a detailed description of the buttons in the **Installed Ports** section of the **Logger Settings** window.

4 In the **Setup** window, select the **COM port** (this must be smaller than COM20) where the BT_TX_DEBUG port is connected to the PC. If a USB connection is being used, select the mapped Virtual COM port.

The COM port number can be selected directly from the dropdown menu. However, for specific COM port configurations, click the **Setup…** button. By default, the BT_TX_LINE UART line uses a baud rate of 115,200 bps with RTS/CTS flow control, no parity, 8 data bits and 1 stop bit (you may refer to Figure 16).

5 Check one and only one XML file in the Mapping Files. The XML file must correspond to the device and firmware version of the Bluetooth chip because it is the HCI Library which parses the protocol commands coming from the Bluetooth device. An XML file is distributed in each Bluetooth Service Pack released by TI. Some XML files may be installed under the **C:\Program Files\Texas Instruments\Wireless Tools\XML** folder. You may refer to the *Bluetooth Patch Description document* for more information.

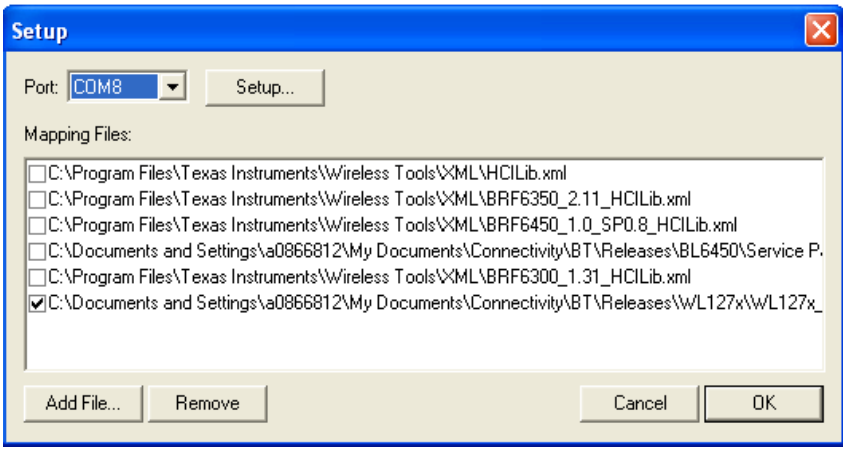

Figure 15: Setting Up a ProtView Port

Table 3: Buttons on the Setup Window

Button	Description
Setup…	Opens the **Squirt-Serial Port Settings** window. Enables special port configurations.
Add File…	Adds a new XML file to the Mapping Files.
Remove	Removes the selected XML file from the Mapping Files.
Cancel	Discards the changes and closes the **Setup** window.
OK	Saves the new settings and closes the **Setup** window.

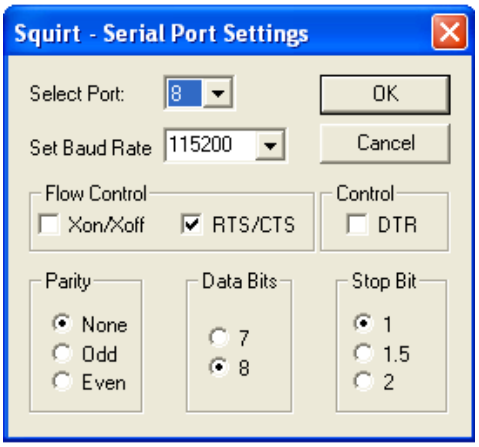

Figure 16: Special ProtView Port Configurations

6 Click **OK** in all the remaining open windows. The port number appears next to the corresponding ProtView port as shown below (only one device is connected in the example shown below).

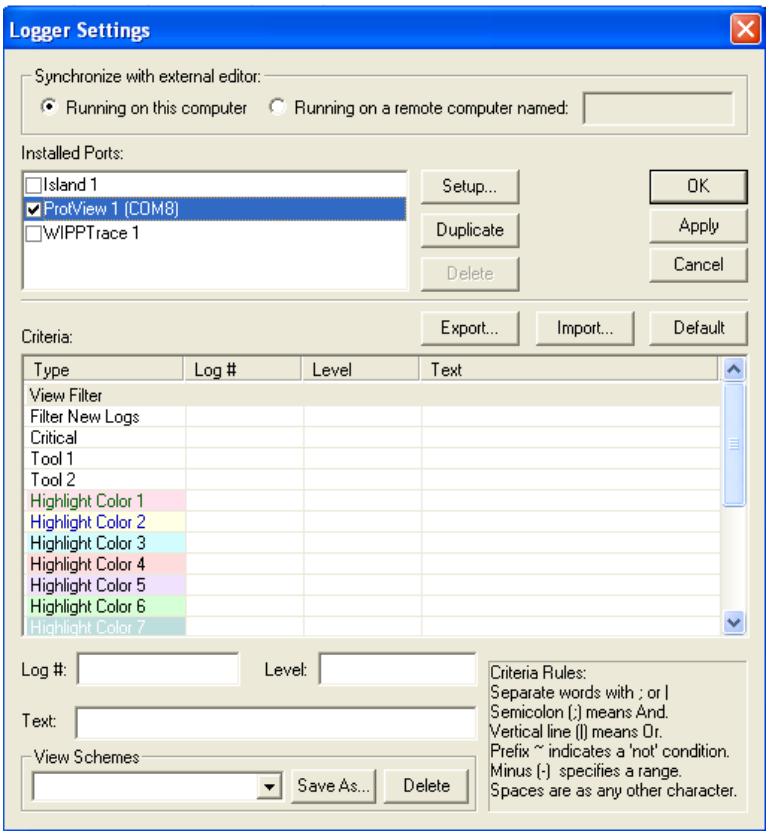

Figure 17: ProtView Port Connected

Note: The **Synchronize with external editor** section in the **Logger Settings** window is used for internal TI purposes only. The **Running on this computer** option must be selected for normal usage. The **Criteria** section is used for filtering and is described in *Section 4.1, Filtering and Tagging*.

The Protocol Commands appear on the **Host** and **Device** columns for the HCI commands and on the **Device** and **Remote #** columns for the LMP commands, as shown below. As mentioned in the *Chapter 2, Introduction,* on page 9, the host communicates with the Bluetooth device using HCI commands, and the Bluetooth device communicates with its peers using LMP protocol transactions (you may refer to Figure 3). The arrows on the Logger show the direction of this data flow.

The following shows an example of HCI commands and LMP commands (to three different peers). Note that the details of each command can be seen by placing the cursor on the selected command. A text box (with a light yellow background) appears with the specific command details.

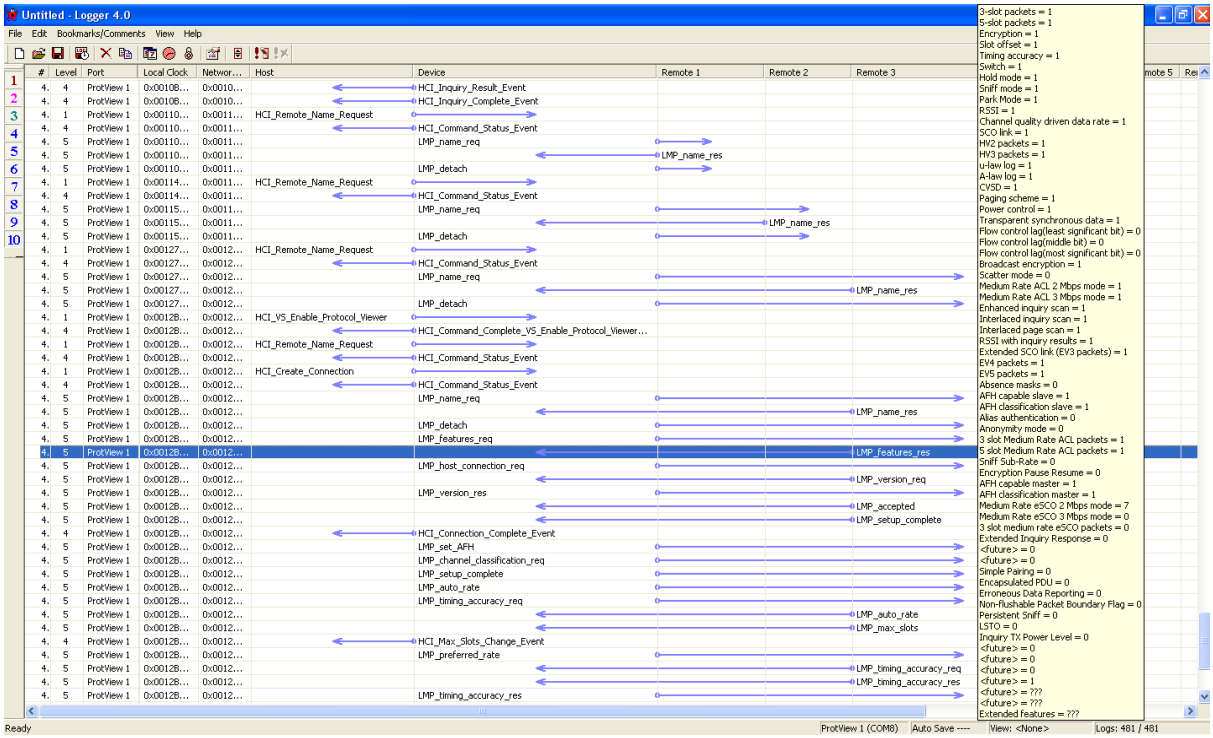

Figure 18: Protocol Commands on Logger

Functions

The Logger application provides special features to facilitate the debugging process, such as **filtering**, **tagging**, **timing**, **bookmarking**, **commenting**, **finding** and **auto-saving** logs. This chapter describes each of these options in detail.

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4.1 Filtering and Tagging

The **Criteria** panel and the **Level Filter** bar provide tagging and filtering options in certain fields. The description of this panel and bar is provided in the following subsections.

4.1.1 Criteria Panel

The **Criteria** panel area in the **Logger Settings** window provides filtering and tagging options for an easier debugging experience. To open this panel, select **View ➔ Settings…** on the menubar (you may refer to Figure 13). In the **Logger Settings** window, the **Criteria** panel is located in the middle lower part of the window as shown below.

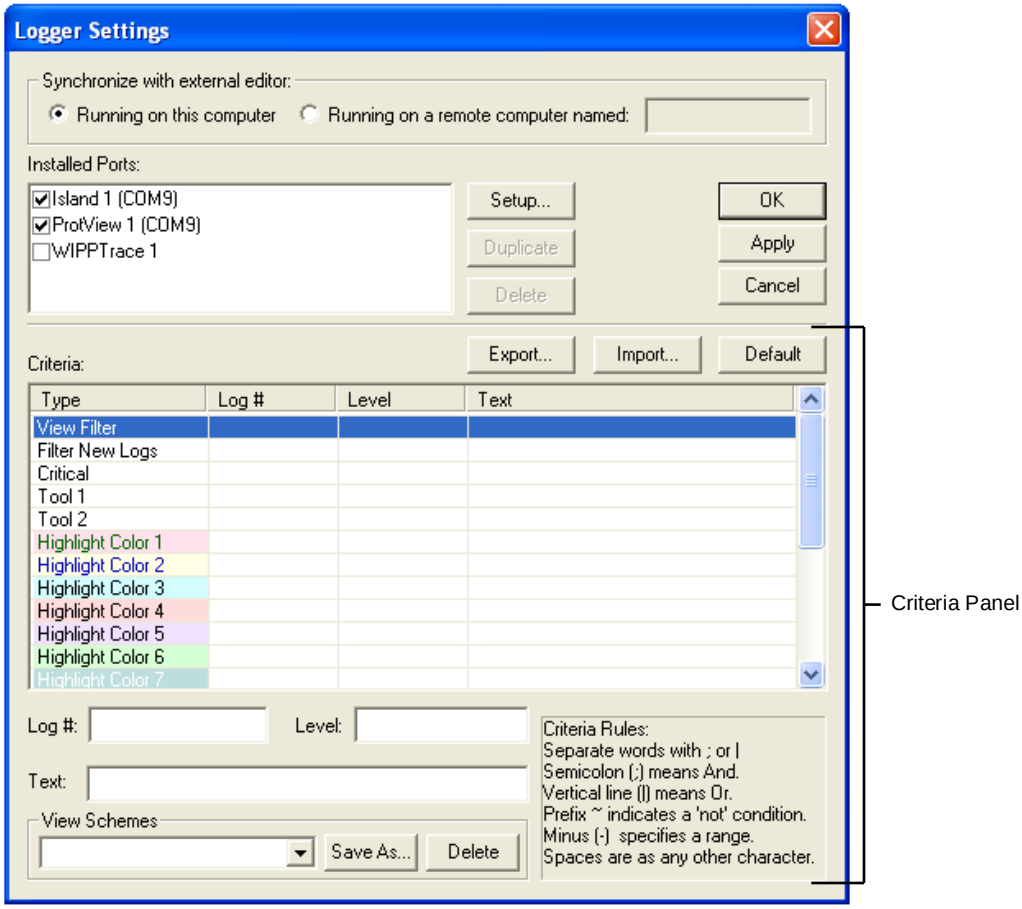

Figure 19: Criteria Panel

4.1.1.1 Criteria Types

The **Criteria Types** are described in Table 4. To set a criterion, click on the criteria type row and set the appropriate filter values (text boxes). Table 5 provides details of these filter values, and Table 6 provides the logical operators that can be used with these filter values in order to set advanced criterions. The filter values are case insensitive.

Table 4: Criteria Types

Criteria Type	Description
View Filter	Determines which logs are visible and which are hidden on the Logger. This is a soft filter. Therefore, hidden logs remain available in the background.
Filter New Logs	Permanently deletes all logs that meet these criteria. This is a hard filter. Filtered logs cannot be recovered.
Critical	Inserts a red exclamation symbol in the # column. A sound alarm can be linked to these logs (you may refer to *Section 5.2, Toolbar*).
Tool #	Runs any external file or application when the appropriate log appears.
Highlight Color	Highlights the corresponding logs with the selected colors.

Table 5: Value Fields

Filter Value	Description
Log #	Selects the log number(s).
Level	Selects the level(s).
Text	Text data to be searched in the Information column in the Logger.

Table 6: Criteria Rules

Criteria Rules	Description
;	AND function between phrases.
|	OR function between phrases.
~	NOT condition, must be placed at the beginning of any phrase to be excluded.
-	Defines a range, meaning **From-to**, **From-**, **-To.**
(blank_space)	Represents a space character, and is treated in the same manner as any other character.

4.1.1.2 Criteria Masks

The filter values create a mask which can be saved in an **INI** file or in a **View Scheme** for future use, as described below, meaning that filter values may be reutilized in the future.

To manage (open, save and delete) filter values in an **INI** file, the buttons on the top section of the **Criteria panel** are utilized (as shown below). Table 7 describes how to save, add or clear such mask values.

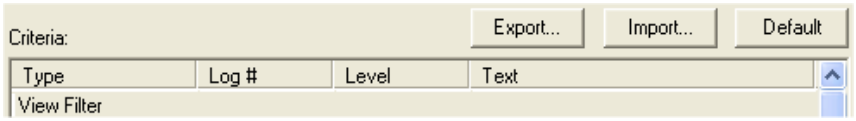

Figure 20: Manage INI Files

Table 7: INI Mask File

Button	Description
Export…	Saves the current criteria settings to an external file.
Import…	Imports an **INI** mask file.
Default	Clears all the criteria values for the currently selected type.

To manage (apply, save, delete) filter values in a **View Scheme**, the textbox and buttons on the bottom section of the **Criteria** panel are used (you may refer to Figure 21).

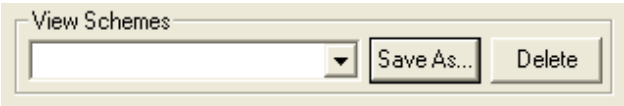

Figure 21: View Scheme Section

To create a new View Scheme:

1 Click the **Save As…** button to display the following window:

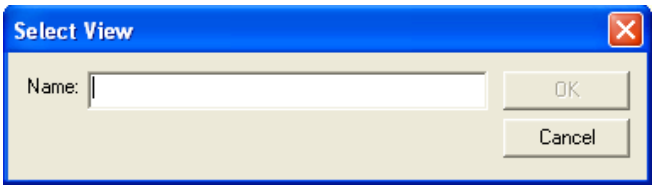

Figure 22: New View Scheme

2 In the **Select View** window (shown above), type in the label of the new **View Scheme** and click **OK**. The new scheme appears in the dropdown text box shown in Figure 21, and can be selected in the future.

To delete a View Scheme:

- Select the desired scheme from the dropdown textbox and click the **Delete** button.

4.1.2 Level Filter Bar

The **Level Filter** bar shows or hides logs according to the selected trace level(s). This is a soft filter. Therefore, hidden traces are kept in the background. This bar appears on the top left side of the **Logger** window by default. However, it can be dragged to a different place. For example, on the top bar.

To hide traces from a specific level, uncheck its corresponding number on the **Level Filter** bar. To make the traces visible, check the number accordingly. Figure 23 shows the location of the **Level Filter** bar, as well as the current visible levels as set by the **Level Filter**, meaning Checked Levels: 3, 4 and 5.

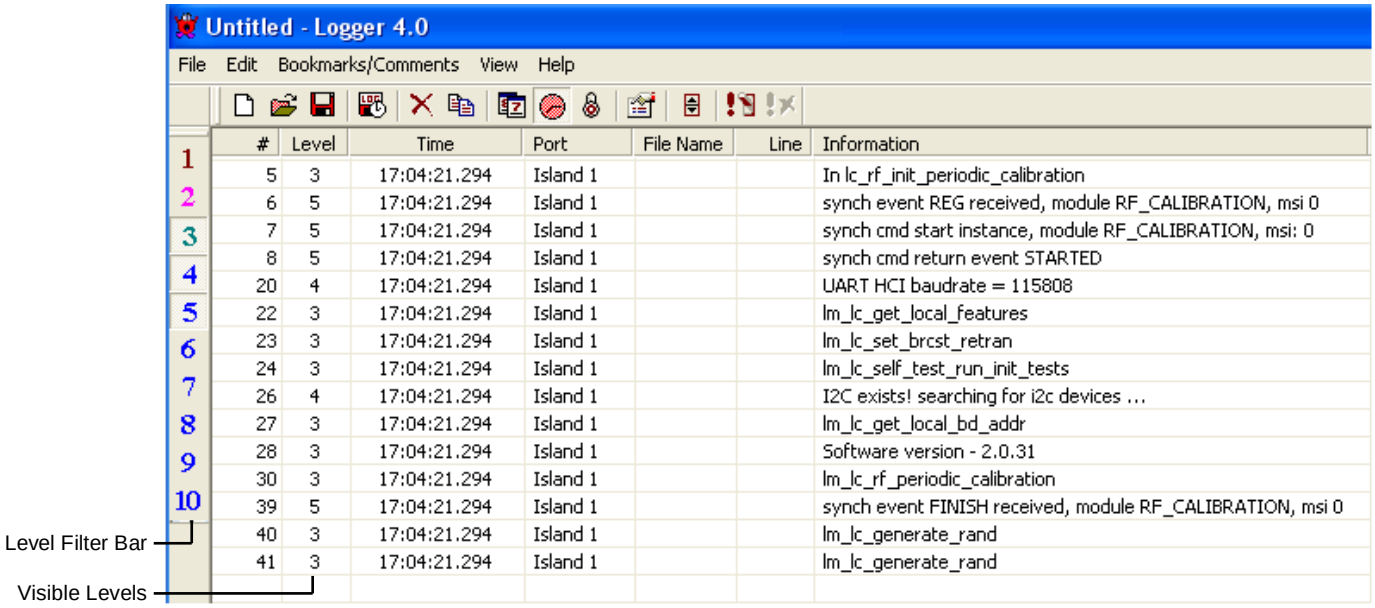

Figure 23: Filtering Example Using the Log Level Bar

Select All Levels and **Clear All Levels** options are available by right-clicking anywhere inside the **Logger** window and selecting the corresponding option on the pop-up menu. The following shows the right-click menu options.

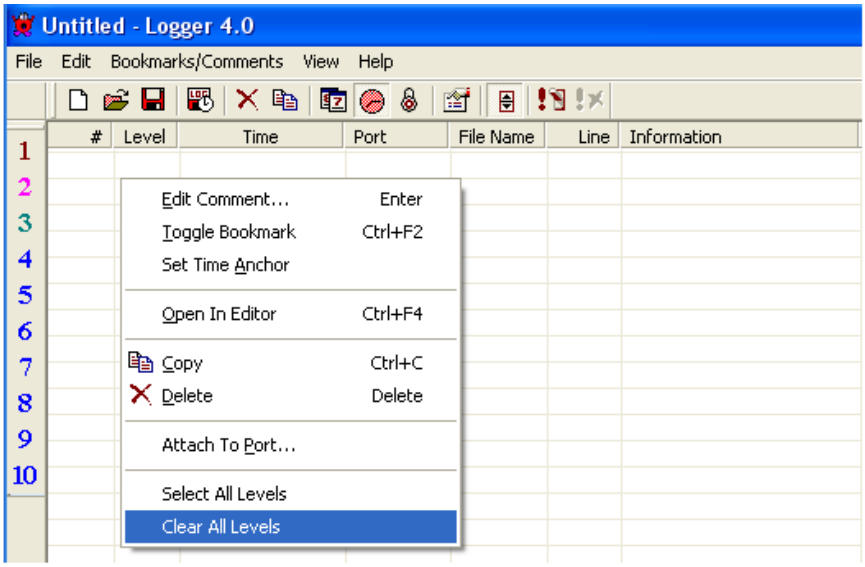

Figure 24: Right Click Menu

4.2 Timing

The Logger supplies three time references for each log, Date, Time and Relative Time, which may appear (if selected) under the **Time** column on the **Logger** window. Each of these references can be hidden or made visible by clicking on the corresponding icon available from the **View** menu or on the toolbar, as shown below.

The Date and Time are taken from the Operating System/PC clock, and the Relative Time is calculated relative to a Time Anchor (reference). By default, the Time Anchor is set to the first log. However, it can be situated on any trace by right clicking on it and selecting the **Set Time Anchor** option from the pop-up menu, as shown below. This option is also available from the **Edit** menu.

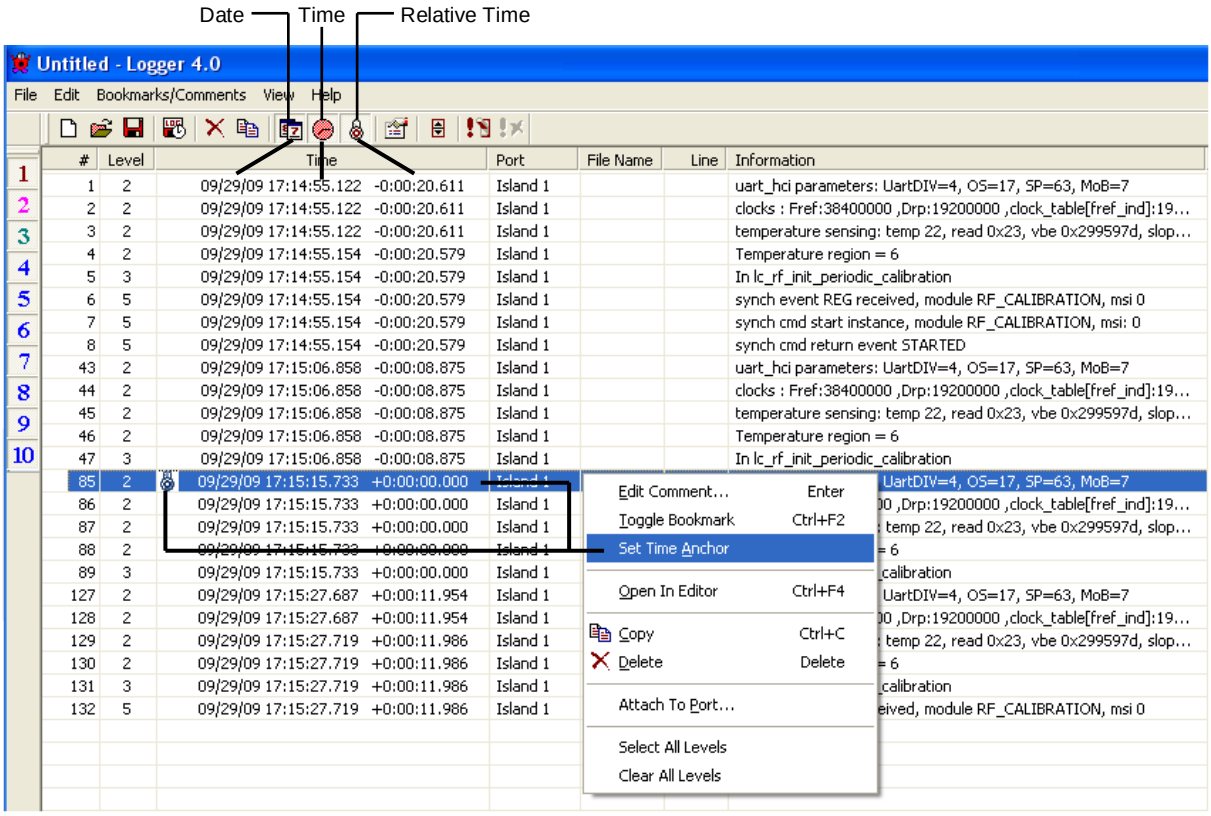

Figure 25: Timing Options

4.3 Bookmarks and Comments

The bookmarking and commenting options help track important traces, as well as write customized notes for certain logs. To add, edit or remove a bookmark or a comment, right click on the desired trace and select the corresponding action. More options are available from the **Bookmarks/Comments** menu, as shown below.

The bookmarks are displayed with an empty green square icon next to the log number, whereas the comments are shown with a line-filled green squared icon at the same location. All comments and bookmarks are automatically saved when the logger logs are saved to a file. Table 8 provides some useful key shortcuts for this function.

Table 8: Bookmarking/Commenting Key Shortcuts

Keys	Description
F2	Next Bookmark/Comment
Ctrl+F2	Toggle Bookmark on/off
Enter	Edit Comment

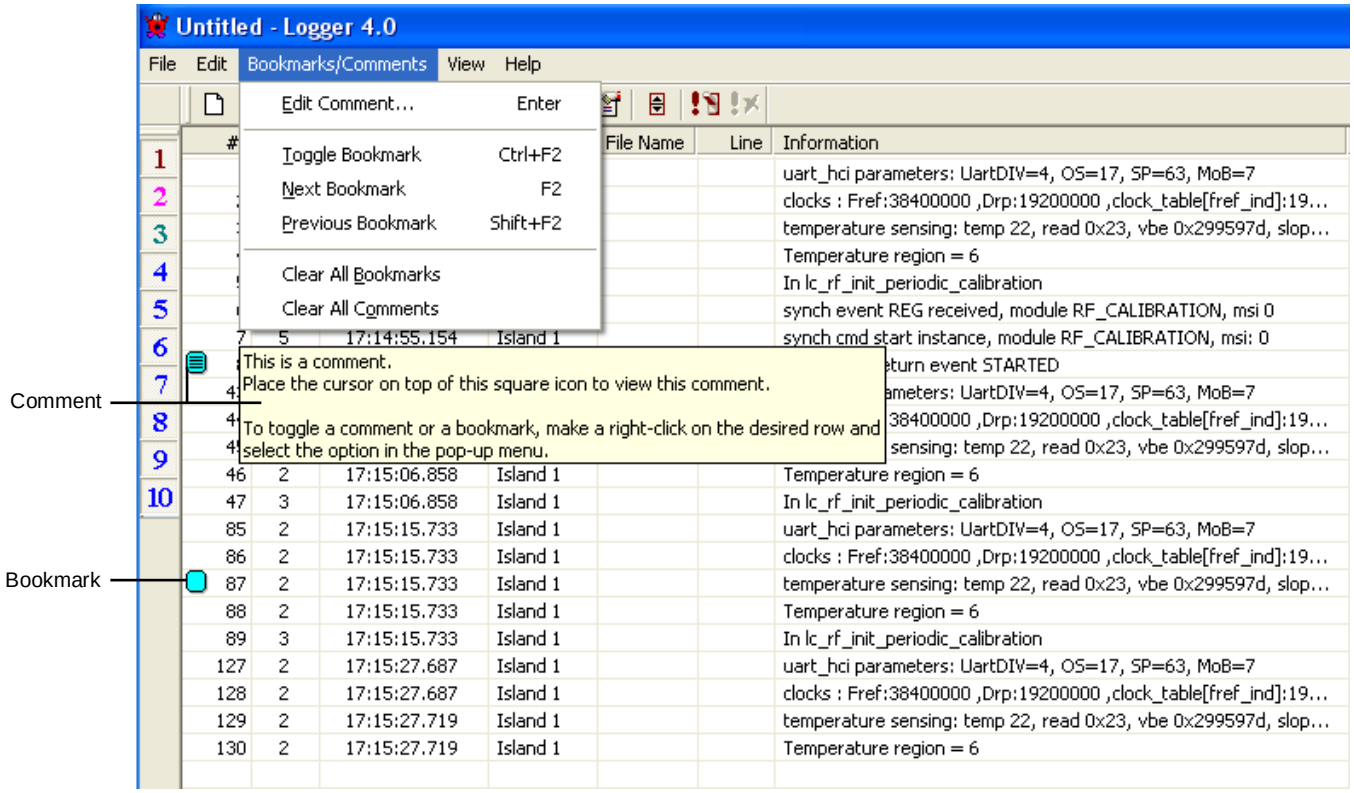

Figure 26: Bookmark and Comment Example

4.4 Find

The Logger application contains searching capabilities. The search can be performed by specifying the log number, tracing level or matching text. Only the text in the **Information** column is searched. The log number and the tracing level are searched in the # and the **Level** columns respectively.

The **Find** function is located in the **Edit** menu. The following figure shows the **Find** window and its options.

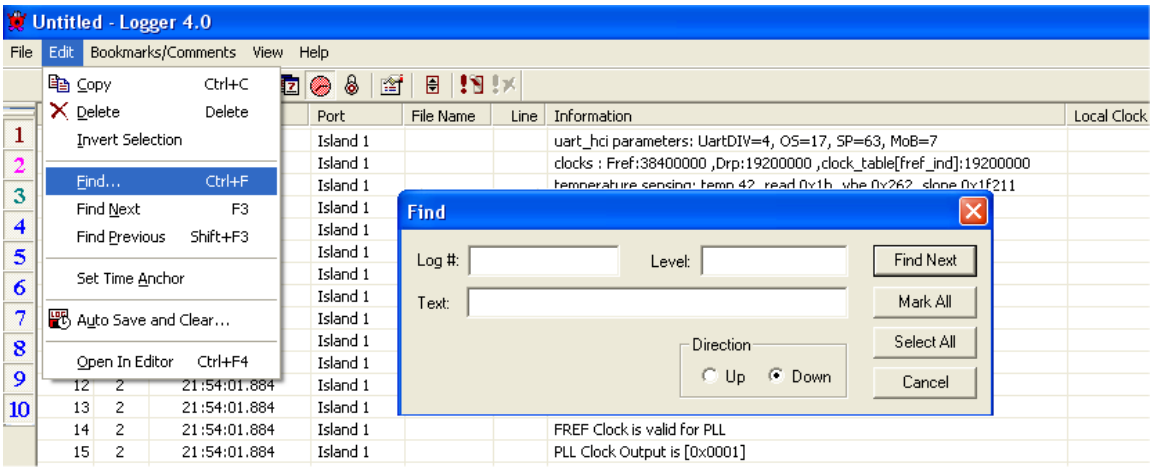

Figure 27: Find Function

4.5 Auto-Save

The **Auto-Save** function is designed for scenarios where a large quantity of data must be saved. This function provides the option to split chunks of data and save them in separate files while tracing.

The **Auto-Save** function is found under the **Edit** menu, as shown below, or can also be located in the toolbar menu. In the **Save** and **Clear** window, set the corresponding values (ensure that the **Activate Save and Clear** option is checked) and click **OK** to enable the **Auto-Save** feature.

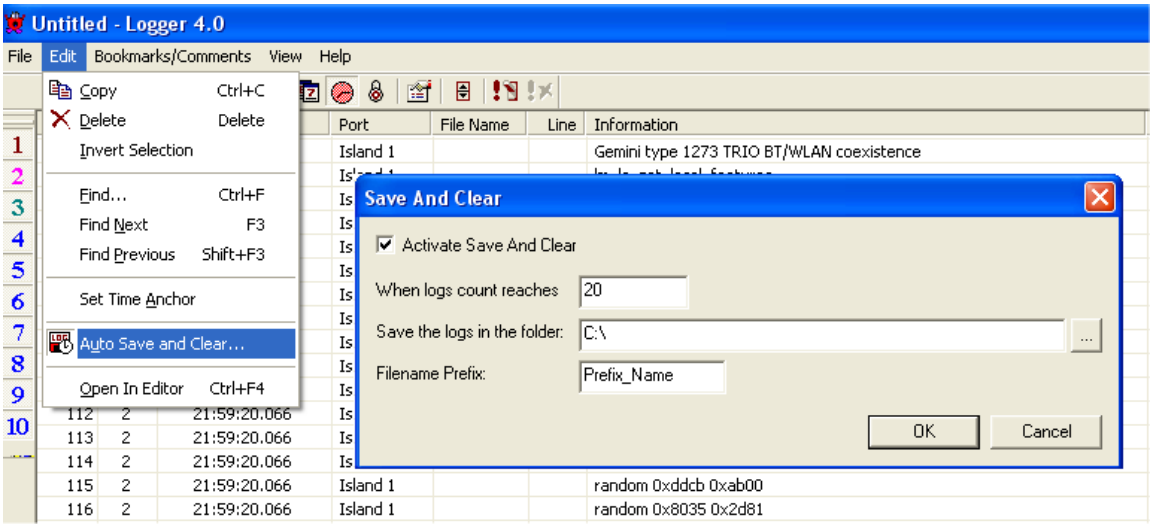

Figure 28: Auto-Save Function

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A Quick Tour of the BT Logger Tester

This chapter provides a description of the options that appear in the three main Logger bars: menubar, toolbar and status bar. The location of each bar is shown below.

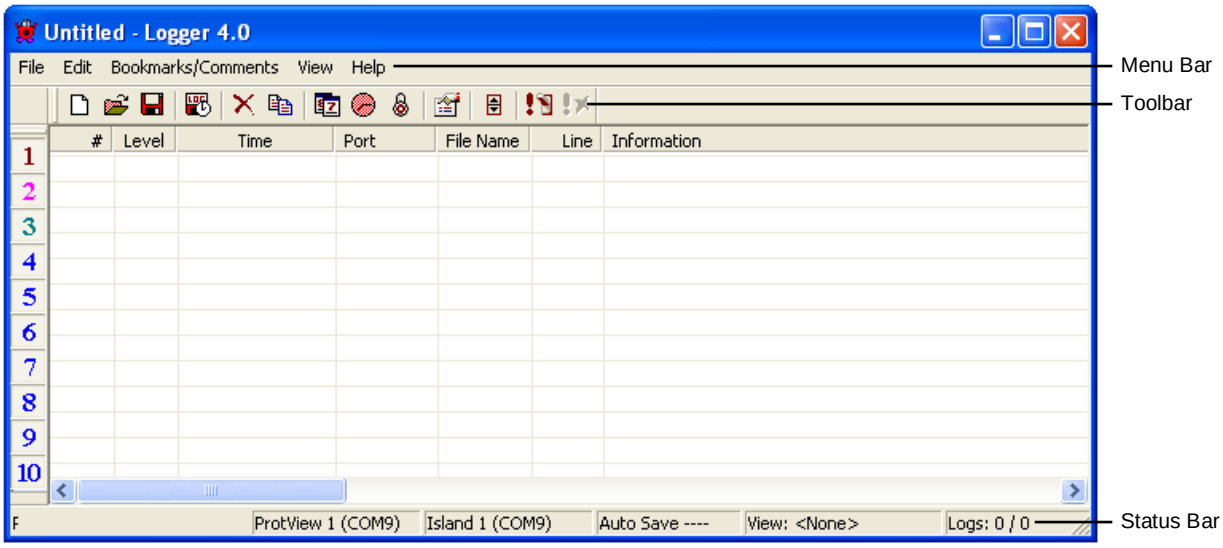

Figure 29: Logger Bars

Topic **Page**

5.1 Menubar

This section describes the menubar options.

5.1.1 File Menu

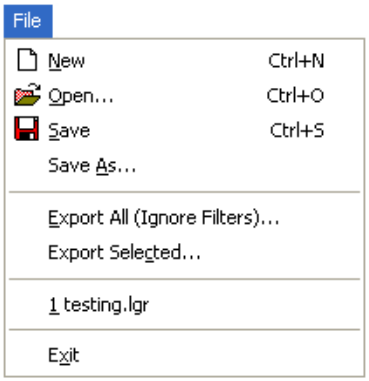

Figure 30: File Menu

Table 9: File Menu Content

File Menu	
New	Creates a new Logger file (*.lgr)
Open	Opens an existing Logger file (*.lgr)
Save	*Saves the current data on a Logger file (*.lgr)
Save As…	*Saves the current data on a new Logger file (*.lgr)
Export All (Ignore Filters)…	*Saves the current data on a text file (*.txt)
Export Selected…	Saves the selected rows on a text file (*.txt)
Filenames	Shortcuts to last open Logger files (*.lgr)
Exit	Quits the Logger application

Note: * Ignores all **Soft Filter** settings and saves hidden data. Comments and Bookmarks are saved in the Logger (*.lgr) format only.

5.1.2 Edit Menu

Figure 31: Edit Menu

Table 10: Edit Menu Content

Edit Menu	
Copy	Copies selected rows
Delete	Deletes selected rows
Invert Selection	Selects unselected rows and unselects selected ones
Find…	Opens the **Find** window, as described in *Section 4.4, Find*
Find Next	Searches down for next matching criteria, as described in *Section 4.4, Find*
Find Previous	Searches up for previous matching criteria, as described in *Section 4.4, Find*
Set Time Anchor	Sets a zero time reference on a selected row, as described in *Section 4.2, Timing*
Auto Save and Clear	Opens the **Auto-Save** window, as described in *Section 4.5, Auto-Save*
Open In Editor	For Internal TI Use Only

5.1.3 Bookmarks/Comments Menu

Figure 32: Bookmarks/Comments Menu

Table 11: Bookmarks/Comments Menu Content

Bookmarks/Comments Menu	
Edit Comment…	Opens a comment on a selected row, as described in *Section 4.3, Bookmarks and Comments*
Toggle Bookmark	Inserts/deletes a bookmark, as described in *Section 4.3, Bookmarks and Comments*
Next Bookmark	Moves down to the next bookmark or comment, as described in *Section 4.3, Bookmarks and Comments*

Bookmarks/Comments Menu	
Previous Bookmark	Moves up to the next bookmark or comment, as described in *Section 4.3, Bookmarks and Comments*
Clear All Bookmarks	Clears all available bookmarks, as described in *Section 4.3, Bookmarks and Comments*
Clear All Comments	Clears all available comments, as described in *Section 4.3, Bookmarks and Comments*

5.1.4 View Menu

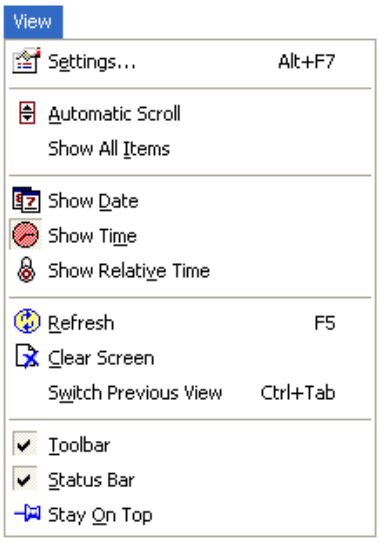

Figure 33: View Menu

Table 12: View Menu Content

View Menu	
Settings…	Opens the Logger Settings window, as described in *Chapter 3, Configuration*, on page 11 and in *Section 4.1.1, Criteria Panel*
Automatic Scroll	Adjusts the scroll bar to keep new incoming traces visible
Show All Items	Shows all the traces including the hidden ones by soft filters
Show Date	Hides/Shows date data in the time column, as described in *Section 4.2, Timing*
Show Time	Hides/Shows time data in the time column, as described in *Section 4.2, Timing*
Show Relative Time	Hides/Shows the relative time in the time column, as described in *Section 4.2, Timing*
Refresh	Refreshes a window
Clear Screen	Hides all visible traces in the Logger window
Switch Previous View	Switches to a previous View Scheme, as described in *Section 4.1.1, Criteria Panel*
Toolbar	Hides/Shows the toolbar
Status Bar	Hides/Shows the status bar
Stay On Top	For Internal TI Use Only

5.1.5 Help Menu

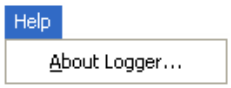

Figure 34: Help Menu

Table 13: Help Menu Content

Help Menu	
About Logger…	Provides the Logger version number

5.2 Toolbar

The toolbar contains shortcuts to some menu bar items. Table 14 provides a content description of each of these shortcuts. These items are also described in *Section 5.1, Menubar*.

Figure 35: Toolbar

Table 14: Toolbar Content

Toolbar	
	Starts a new Logger file (*.lgr)
	Opens an existing Logger file (*.lgr)
	Saves the current data on a Logger file (*.lgr)
	Opens the Auto-Save window, as described in *Section 4.5, Auto-Save*
	Deletes selected rows
	Copies selected rows
	Hides/Shows date data in the time column, as described in *Section 4.2, Timing*
	Hides/Shows time data in the time column, as described in *Section 4.2, Timing*
	Hides/Shows the relative time in the time column (you may refer to *Section 4.2, Timing*)
	Opens the Logger Settings window, as described in *Chapter 3, Configuration*, on page 11 and in *Section 4.1.1, Criteria Panel*
	Adjusts the scroll bar to keep new incoming traces visible
	Sets audio beeps when critical traces appear, as described in *Section 4.1.1, Criteria Panel*
	Mutes beeps from critical traces, as described in *Section 4.1.1, Criteria Panel*

5.3 Status Bar

The status bar provides information of connections and some functions.

Table 15: Status Bar Content

Status Bar	
Protocol Monitor Port(s)	Displays connected ProtView Ports, as described in *Section 3.2, Protocol Monitor*
Logger Tracing Port(s)	Displays connected Island Ports, as described in *Section 3.1, Logger Tracing*
Auto-Save	Shows the current file part number, as described in *Section 4.5, Auto-Save*
Filter View	Shows the current View Scheme Filter, as described in *Section 4.1.1, Criteria Panel*
Logs	Displays Visible versus Total number of logs

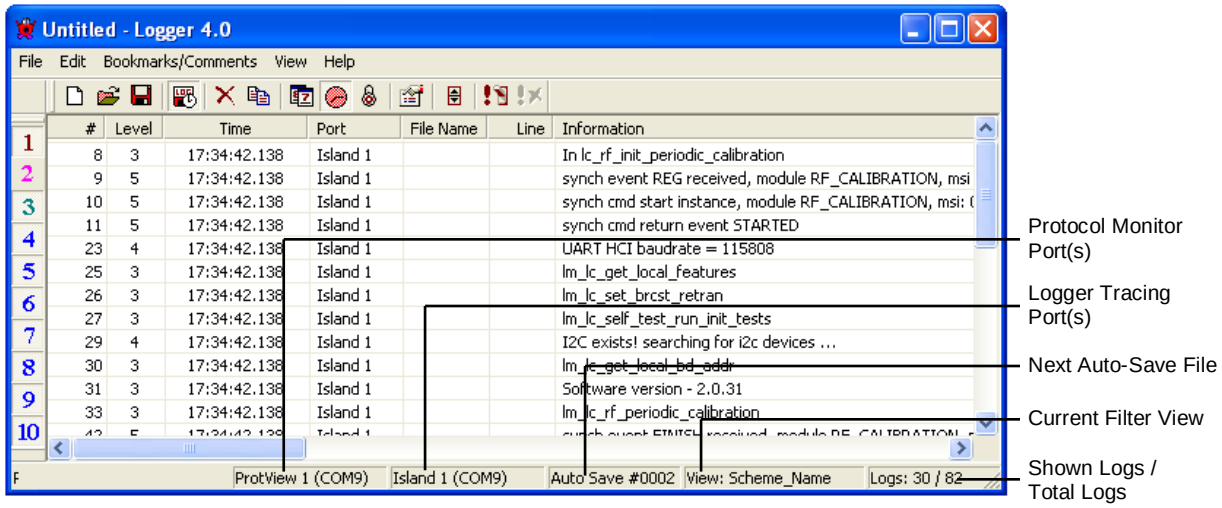

Figure 36: Status Bar