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Decimator D3
User's Manual

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1.0 Operations Guide

1.1 Overview

This section describes how the Decimator works and how to use the Decimator. It includes a description of all common activities for which the Decimator is designed. Section 1.0 contains the basics and Section 2.0 provides a reference section for some of the details.

1.2 System Description

1.2.1 Equipment List / System Contents

The Decimator D3 product consists of the following:

- The Decimator D3
- The Decimator D3 CD containing:
  - Decimator D3 User's Manual (document 130825)
  - The API Socket Interface Specification (document 125497)
  - Programming Examples for the API Socket Interface
  - Contact details for SED Customer Service

Refer to Section 2.3 for installation instructions for the Decimator.

1.2.2 Functional Description

Refer to Figure 1-1 for a picture of the Decimator. Refer to Figure 1-2 for a picture of the Decimator connection plate. The Decimator installs in to a desktop computer's PCI Express x1 (PCIe) slot. Note that it does not work in a PCI slot. Alternately, it can be installed in any enclosure, mounted on standoffs and powered from +12 and +5 VDC. The Decimator contains software that will load a Java applet on your PC when referenced from a browser such as Internet Explorer, Chrome, or Firefox. The applet allows the user to make Spectrum Mode or Time Domain measurements (future) and to determine Decimator status.

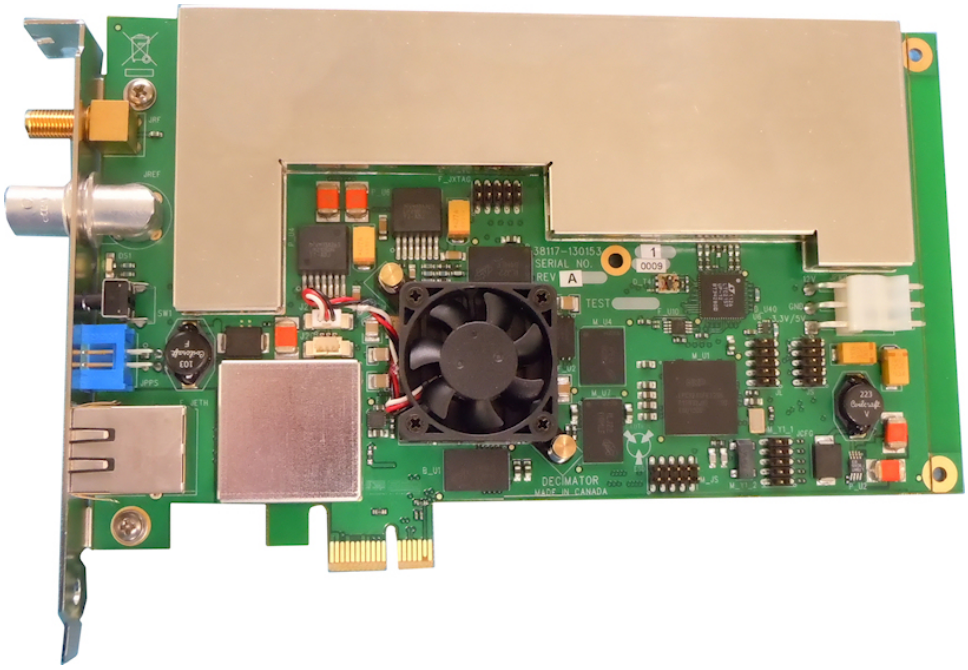

Figure 1-1 Decimator D3

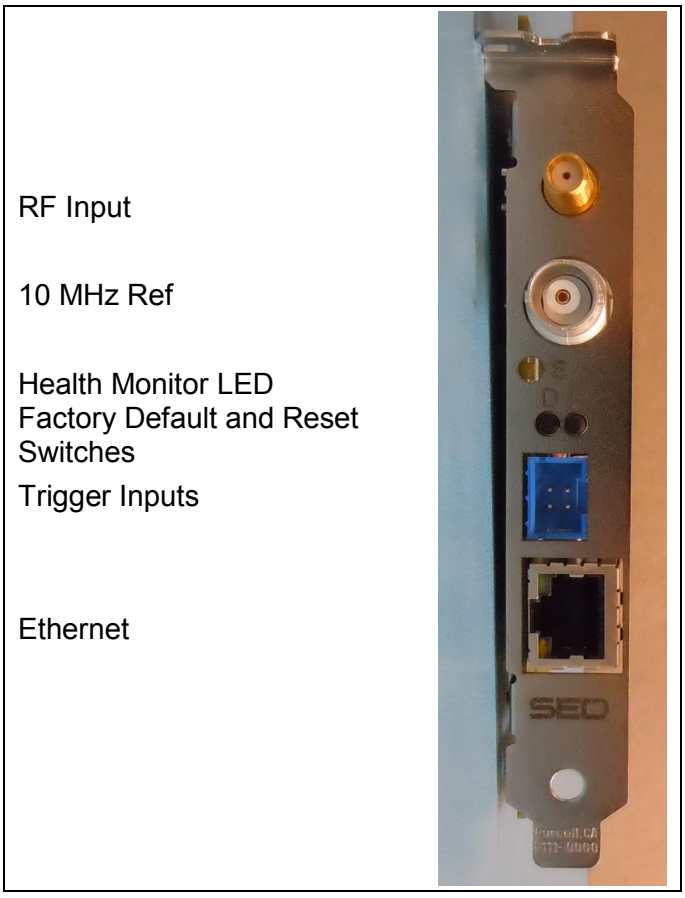

Figure 1-2 Connection Plate

1.3 Computer Requirements

A distinction is made between the host computer and the client computer. The host computer contains the Decimator. The client computer is the one that is accessing the Decimator over the network. The host computer and the client computer can be the same computer if desired.

1.3.1 Host Computer Requirements

The following minimum capabilities are recommended for the host computer:

- One PCI Express x1 (PCIe) slot
- A power supply with room for 25 Watts of steady state load

1.3.2 Client Computer Requirements

The following minimum capabilities are recommended for the client computer:

- 2.33 GHz Processor (or better)
- 4 GB of RAM (or better)
- An operating system that supports a web browser and Java VM as listed below
- A web browser such as Internet Explorer, Chrome, or Firefox
- Java JDK 1.6 release 10 or newer for Decimator software versions 3.0.0 and up
- An Ethernet connection available for the Decimator to connect to the computer

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2.0 Reference Section

2.1 General

This section is a complete reference of all the capabilities of the Decimator. In some cases all the relevant information was provided in Section 1. In this case the corresponding section here will refer back to Section 1.

2.2 User Interface Connection Details

No security restrictions are incorporated into the Decimator's Java Applet or API Socket Interface. Refer to Section 2.3.1.1 for details on the Web Configuration Manager security. The Decimator Java Applet and API Socket Interface are designed to allow up to 5 remote connections simultaneously. However, multiple connections will impact the speed at which the Decimator can make measurements, as measurement requests on all connections are handled on a first come first serve basis.

2.3 Configuring the Decimator For Use

The only thing that must be known to access the Decimator is the IP address. Refer to Section 2.3.1.2 for details on setting the IP address.

The Decimator can be set up as dedicated or shared access. With dedicated access, an Ethernet cable is connected directly between the client computer and the Decimator. In this configuration only the client computer can access the Decimator. With shared access, an Ethernet cable is connected between the Decimator and a hub or switch. In this configuration any computer on the network can access the Decimator. Any hub or switch is compatible with the Decimator but 10BaseT products will slow down the measurement speed.

No software, other than the Java runtime, needs to be installed on the host computer or the client computer in order to use the Decimator from a browser - the Java Applet will automatically be downloaded by the web browser. Direct access to the API Socket Interface requires user written API software.

2.3.1 Decimator Configuration

The Decimator uses a Web Configuration Manager (WCM) to modify the network configuration, calibration files, port names, and licence.

2.3.1.1 Accessing the WCM

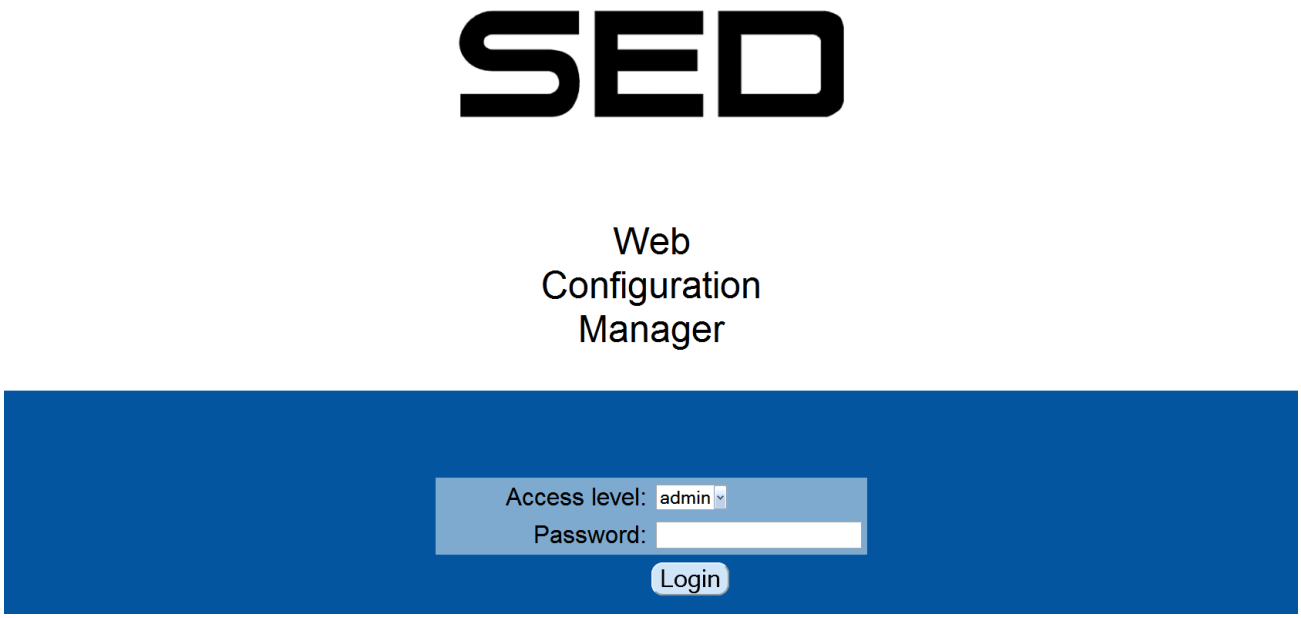
The Decimator network configuration factory defaults are:

- IP Address = 192.168.10.1
- Net Mask = 255.255.255.0
- Gateway = 192.168.10.1

To access the WCM, enter <decimator IP address>/cgi-bin/wcm.cgi into a web browser's address bar. For example, to access the Decimator on the default IP address, use the following

http://192.168.10.1/cgi-bin/wcm.cgi

This will display the following web page. To log in, select an access level and enter the password. The default password for access level admin is 'admin' (without the quotes). The password is case sensitive.

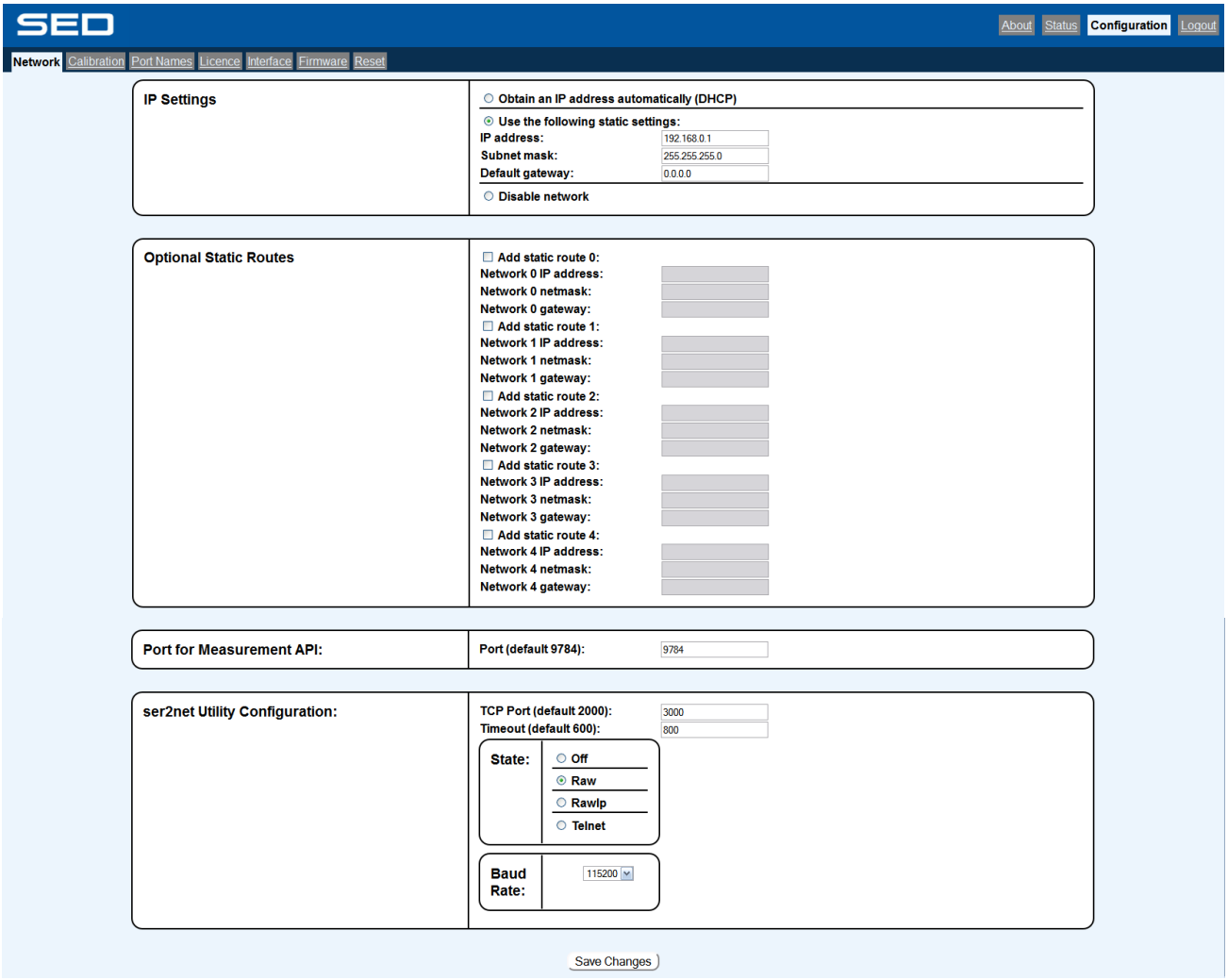


The client computer, whether using the Java Applet, API Socket Interface, or WCM, must have the appropriate network routes to access the 192.168.10.xxx subnet. If a ping or inspection of the routing table determines that no connectivity exists, then a route needs to be configured. To configure connectivity for a Windows 2000/XP/Vista/7 computer, enter the route from a command window. For example, if the client computer has an IP address of 192.168.123.100, enter the following command

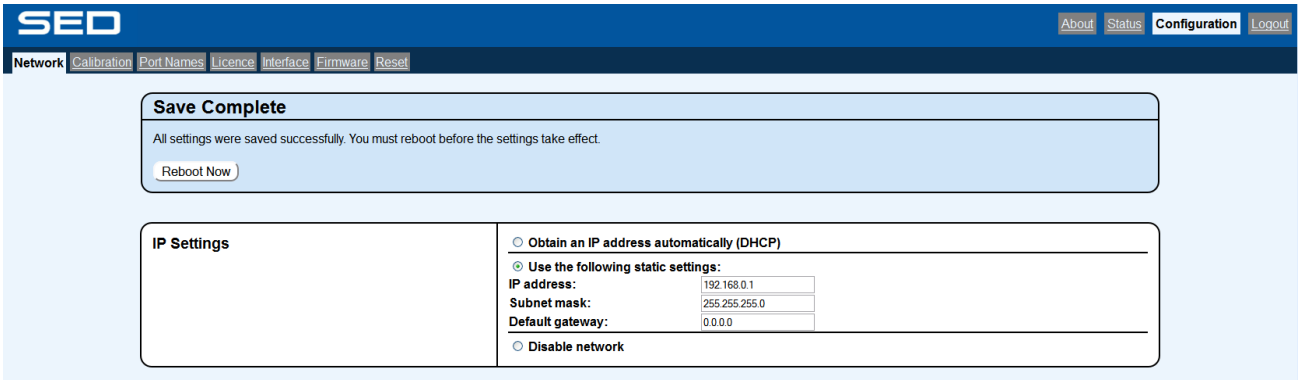
route add 192.168.10.0 mask 255.255.255.0 192.168.123.100

2.3.1.2 Modifying the Network Configuration

To change the Decimator's network configuration, log in to the Web Configuration Manager as described in Section 2.3.1.1 and navigate to the Network tab. The follow page will be displayed



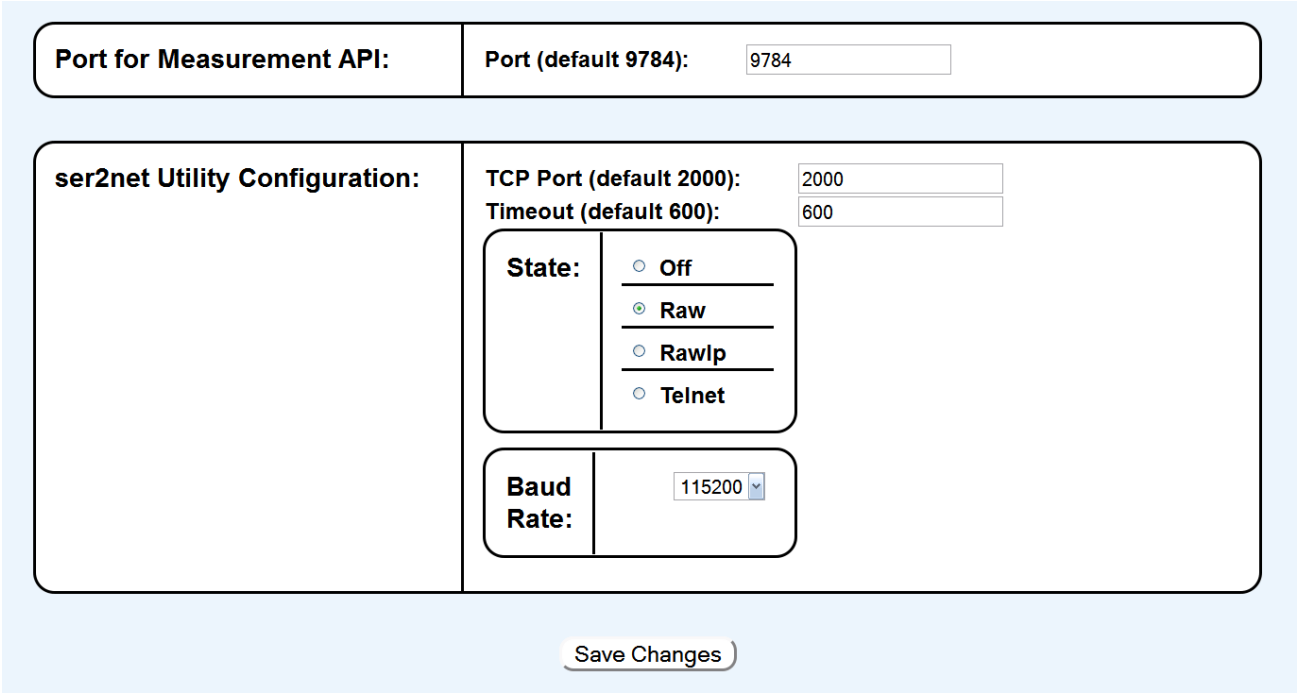
Enter the new network information and click Save Changes. The following page will be displayed



Click Reboot Now to reboot the Decimator and begin using the new settings.

2.3.1.3 Utilizing the Serial to Network Proxy

The Decimator has an on board serial port (RS232) configured with the ser2net utility. The ser2net utility allows access to the Decimator's serial port via an Ethernet socket port (TCP). To configure ser2net, log in to the WCM as described in Section 2.3.1.1 and navigate to the Network tab. The ser2net Utility Configuration, shown below, can be found by scrolling to the bottom of the network tab.



Default ser2net settings:
State - *Off*
Baud Rate – *9600 bits/sec*
Parity: *None* (Not Configurable)
Data Bits: *8 bits* (Not Configurable)
Stop Bit(s): *1bit* (Not Configurable)

Available Configuration Options:

1. State - The following options can be set under state:

   a. *off* : Disables ser2net

   b. *raw*: The data is transferred bi-directionally between the serial port and the TCP port as-is

   c. *rawlp*: The data is transferred only from the TCP port to the serial port as-is

   d. *telnet*: The data is transferred between the serial port and the TCP port using telnet protocol

2. Baud Rate - Number of bits per second used by the serial port. Available options are: 4800, 9600, 19200, 38400, 57600 and 115200

The Decimator serial port uses 3.3V TTL signals NOT RS232 levels. The physical location of the serial port on the card and the pin layout are shown in Figure 2-1.

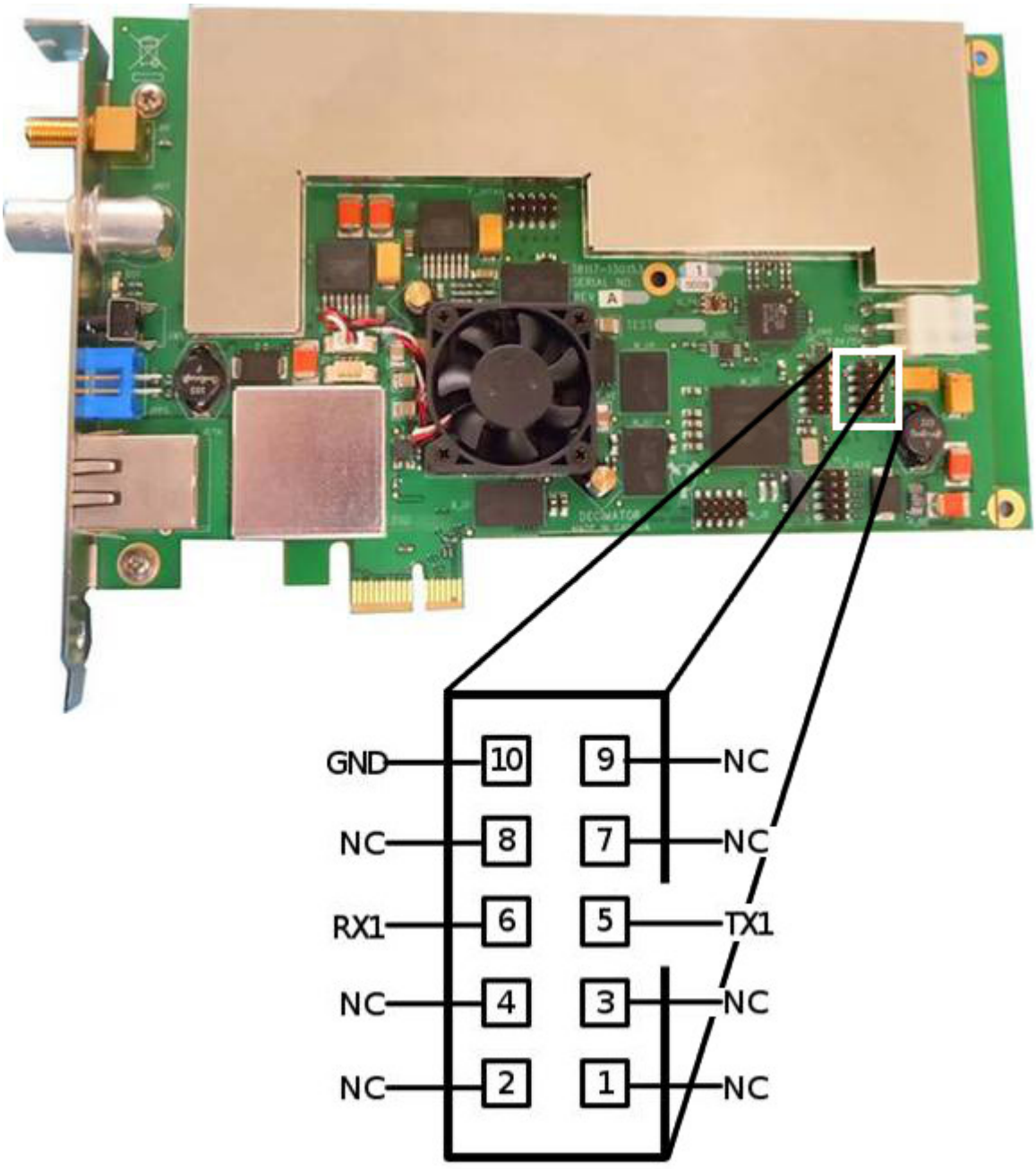


Figure 2-1 Serial Port Connection Pins

2.3.1.4 Restoring the Factory Defaults

The factory default switch can be used to restore the Decimator's network configuration and API Socket Interface port to the defaults. Any calibration or licence files installed will remain unchanged. The procedure to restore the factory default settings on the Decimator is as follows:

1. Locate the factory defaults (D) switch on the Connection Plate. Depress the switch and hold
2. Locate the reset switch (R) on the Connection Plate. Depress the switch and release
3. Continue to hold the factory defaults switch until the health monitor LED is green. This can take up to 120 seconds
4. The factory defaults are now restored

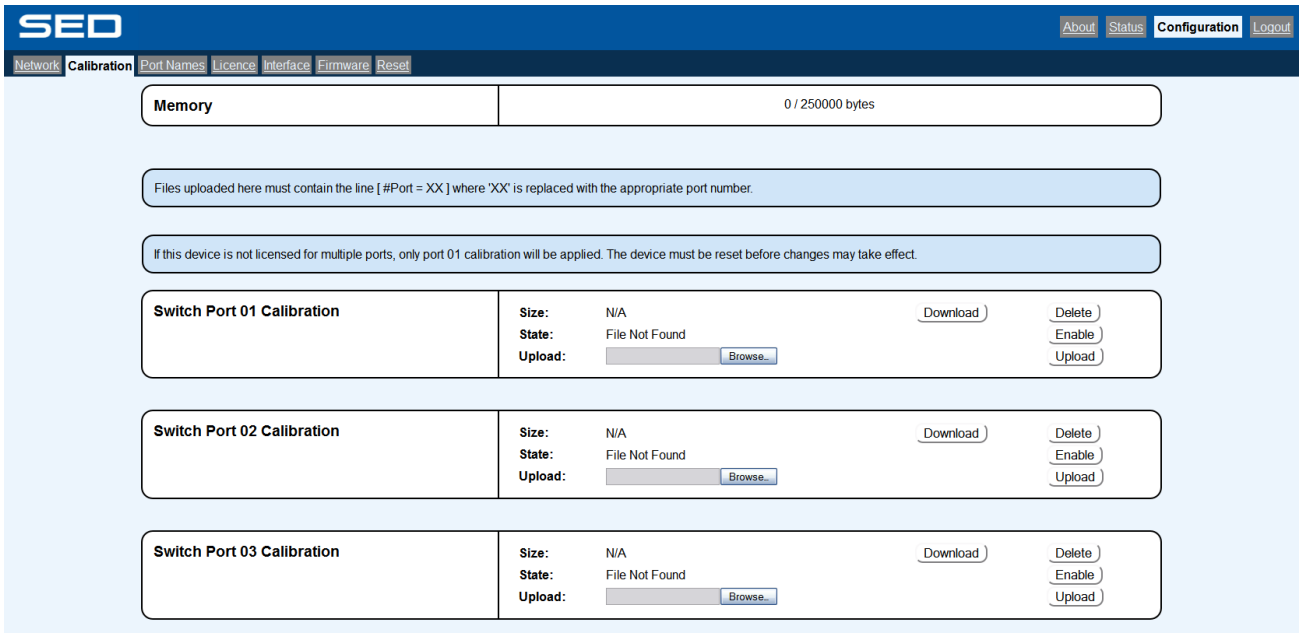
2.3.1.5 Switch Port Calibration Files

The Calibration tab, shown below, is used to install or modify a switch port calibration. An example switch port calibration file is included on the CD. After a switch port calibration file is installed or modified, the Decimator will have to be reset for the changes to take effect.

The switch port calibration file must include the line:

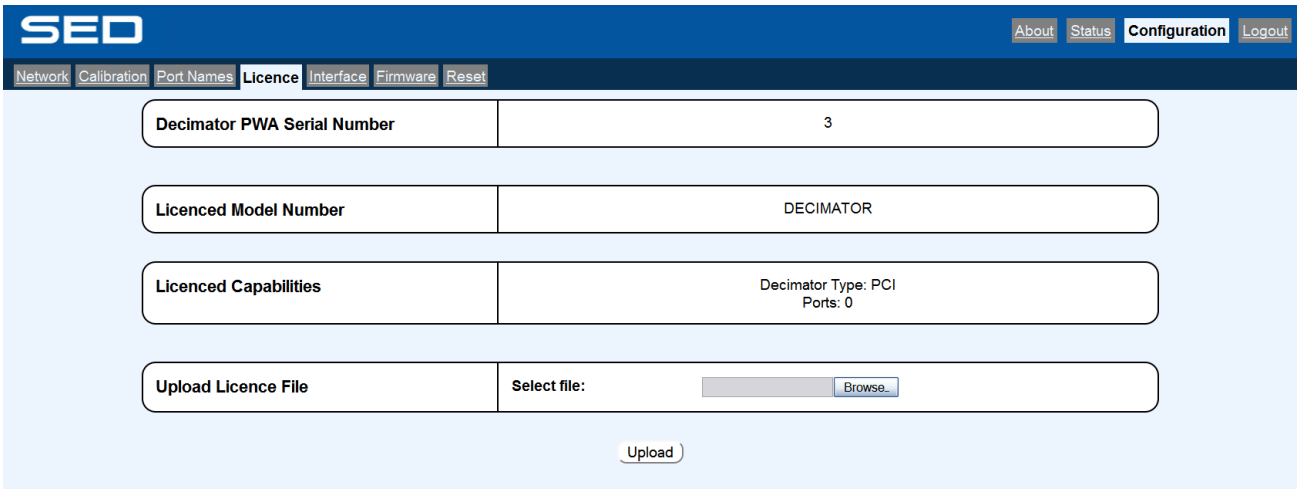
#Port = XX

Where XX is the port for which the calibration is intended (ie. XX = 1 for port 1, XX = 7 for port 7, XX = 12 for port 12, etc). For a Decimator with no switch port licence, only port 1 is valid. Be sure to upload the proper calibration file to the proper port or the Decimator may return undesired results. Note that the Decimator will use linear interpolation to determine the desired offset between calibration points.

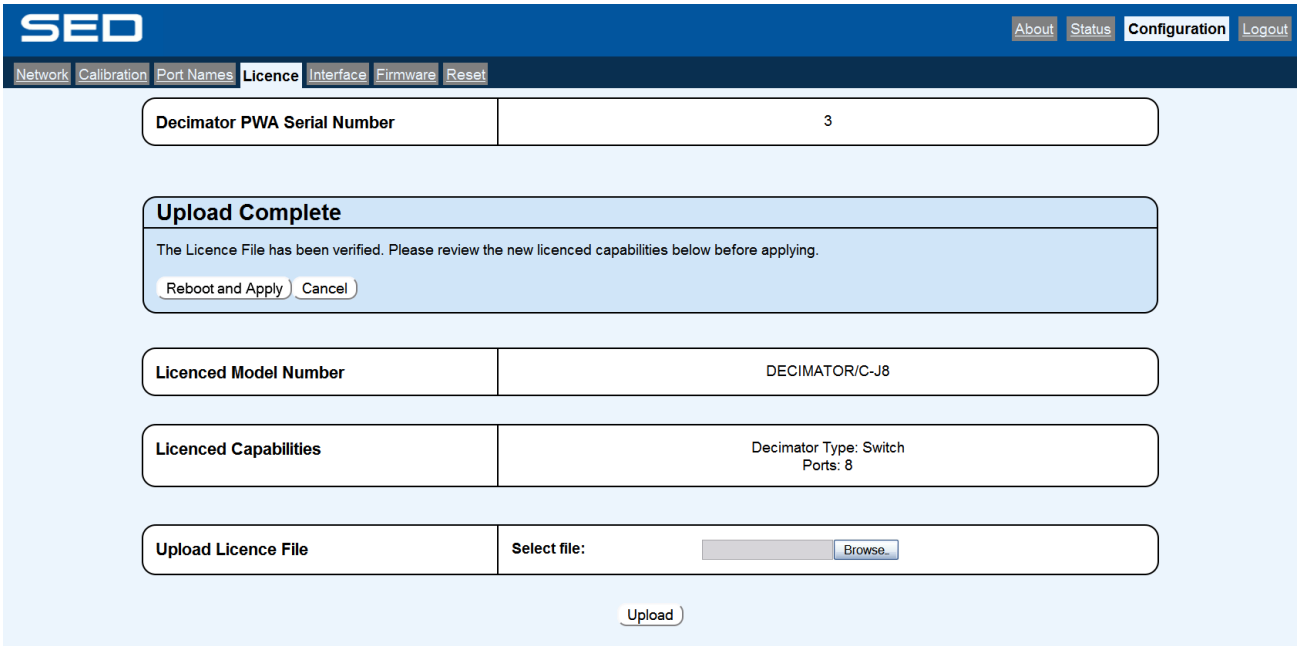


2.3.2 Decimator Licence Files

The 'Licence' tab of the Decimator WCM, shown below, can be used to modify the available features of the Decimator. To begin the licence file upgrade, first click the 'Browse' button and select the SED provided licence file. Then click the 'Upload' button to transfer the file to the Decimator.



Once the new licence file has been uploaded the following page will be displayed. Click the 'Reboot and Apply' button for the new licence file changes to take effect.



2.4 API Socket Interface

The Application Program Interface (API) is a socket interface used to configure and initiate measurements, retrieve measurement data, and monitor status. The default port for the API Socket Interface is 9784, but this can be configured through the WCM Network tab. The required information for programmatic access is described in a separate document named "Decimator API Specification (125497_revX).pdf" provided on the CD.

2.5 Java Applet Software

In addition to the API Socket Interface, there is a built-in graphical user interface (GUI) that can be displayed using any web browser, such as Internet Explorer, Chrome, or Firefox. The GUI is quite intuitive to use and allows interactive use of the Decimator for any general purpose investigation that a traditional digital or analog spectrum analyzer can be used for.

Refer to Figure 2-2 for a picture of the main applet for the Decimator. The applet window is divided into two areas: the screen, on the left side main area, and the control buttons, on the right side column.

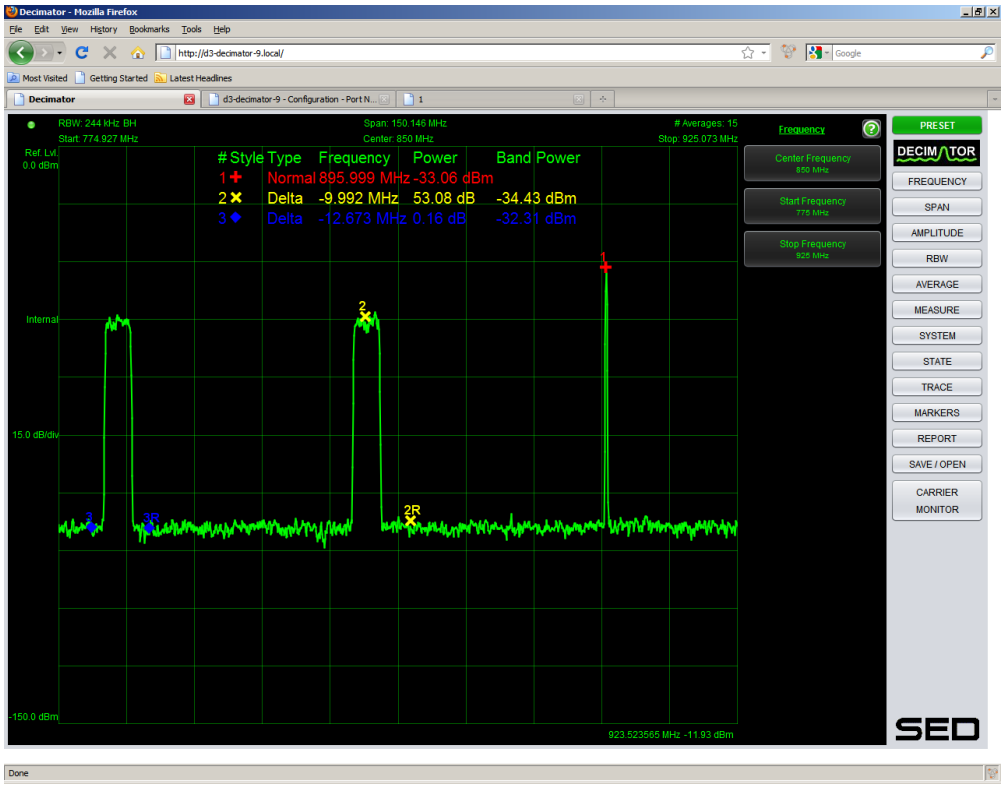


Figure 2-2 Decimator Main Applet

For the spectrum mode, the basic operations made by the Decimator are to collect the samples required for the selection made, perform a windowed FFT (see Section 2.5.2.1), and present the spectrum data to the operator. Similar to traditional spectrum analyzers, the speed of the measurement is a function of the RBW and the span.

2.5.1 Main Screen

The main screen consists of four areas, as shown in Figure 2-3.

The Plot Area, to the center, consisting of the grid and plot of the signal. Marker values show up at the top of the plot area.

The North Settings Bar, along the top, consisting of the connection LED, RBW, Span, # Averages, Start Frequency, Center Frequency, and Stop Frequency.

The West Settings Bar, along the left, consisting of the Reference Level, Reference Select, Scale per Division, and minimum displayed power level.

And finally, the South Mouse Indicator Bar, along the bottom, consisting of the mouse cursor positions frequency and amplitude.

The Screen Area will automatically update the values of the various parameters in real time as the signal changes or the user changes parameters.

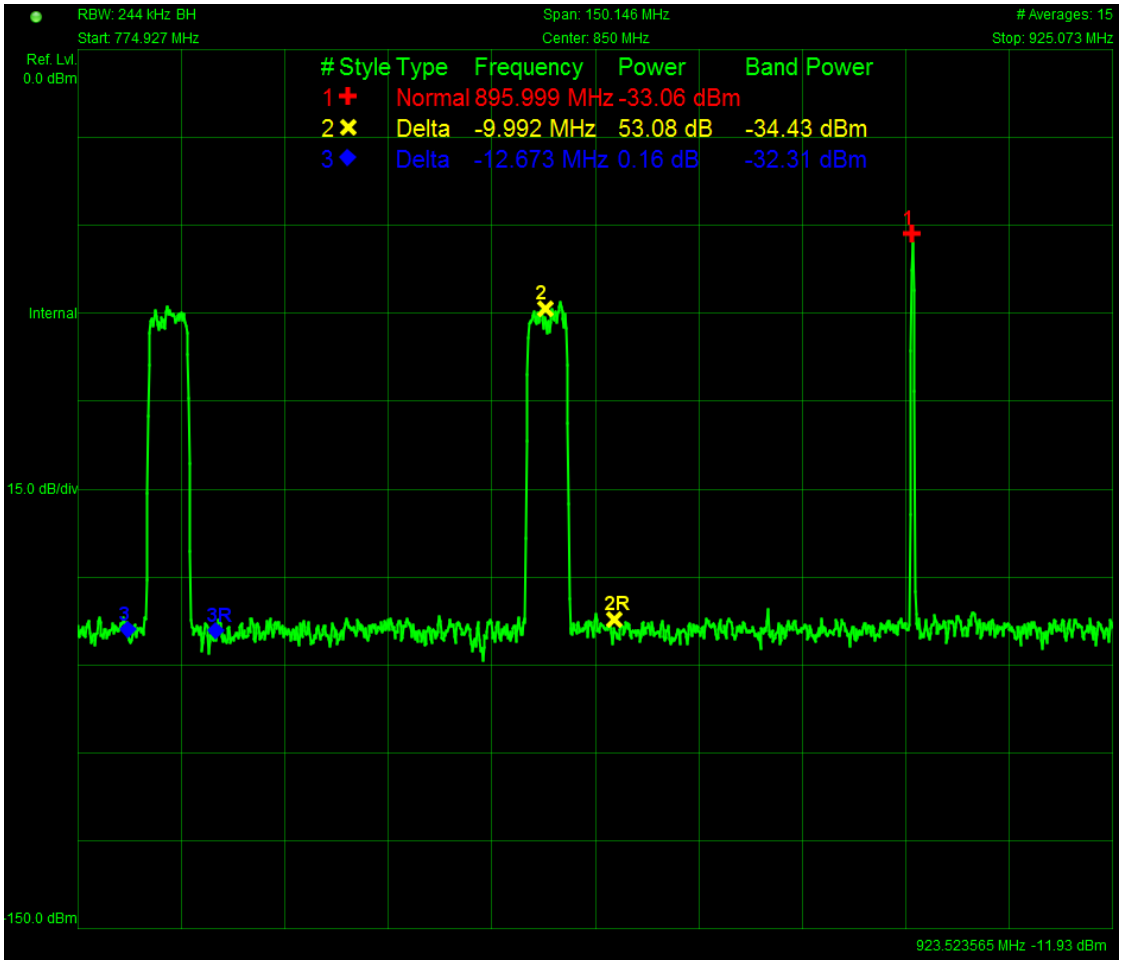


Figure 2-3 Decimator GUI Main Screen

2.5.2 Control Buttons and Menu

The Control Buttons reside along the right side of the applet in two columns. The right most column of buttons consists of the major functions and the column of buttons to the left of it are the context-sensitive buttons as dictated by the present major function that is selected.

Clicking on one of the major function buttons will change the context sensitive buttons to the available editable options. Clicking on one of the context sensitive buttons will either apply that option or bring up a separate dialog box that can be edited to a value or chosen from a drop down list.

The options available for each context sensitive function can be multiple levels deep. The menu options and their specific functionality are outlined in the table below.

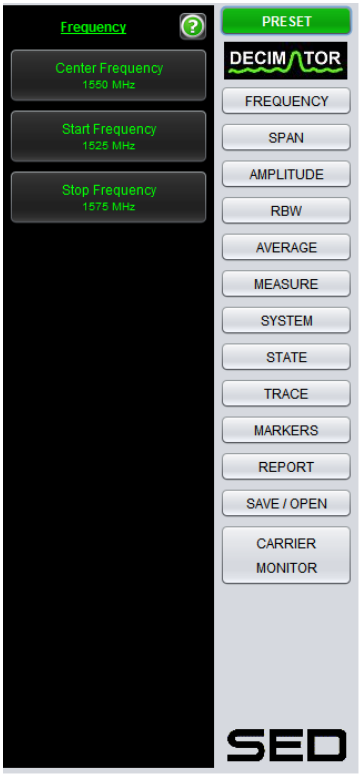


Figure 2-4 Decimator GUI Control Buttons

Table 2-1 describes in detail each button and data field of the Decimator's GUI. Use of the GUI is described further in the Help file under the System button.

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description
Preset	N/A	Sets the Decimator back to the default measurement settings and clears any stored traces, states and markers.
Frequency	Center Frequency	Edit the center frequency. Displays the desired and actual center frequency values. Clicking on the menu item displays the Center Frequency Edit dialog. Values that are too low or too high are automatically adjusted to the limit.
	Start Frequency	Edit the start frequency. Displays the desired and actual start frequency values. Clicking on the menu item displays the Start Frequency Edit dialog. Values that are too low or too high are automatically adjusted to the limit.
	Stop Frequency	Edit the stop frequency. Displays the desired and actual stop frequency values. Clicking on the menu item displays the Stop Frequency Edit dialog. Values that are too low or too high are automatically adjusted to the limit.

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description
Span	Span	Edit the span. Displays the desired and actual span. Clicking on the menu item displays the Span Frequency Edit dialog. Values that are too low or too high are automatically adjusted to the limit
	Full Span	Sets the span to 2995 MHz
	Min Span	Sets the span to 16 kHz
Amplitude	Auto Y axis	Edit whether the Reference Level and Scale/Div are adjusted automatically to show the entire active trace. Values: • True • False
	Reference Level	Edit the Reference Level. This value will be automatically set if Auto Y axis is set to true.
	Scale/Div	Edit the scale per vertical division. This value will be automatically set if Auto Y-axis is set to true.
	Auto Atten.	When enabled, the attenuation level is automatically set to the appropriate value, depending on the power level of the incoming signal.
	Manual Atten.	Allows the input attenuation to be set manually.
RBW	RBW	Edit the resolution bandwidth. Clicking on the menu item displays the RBW Edit dialog. Values that are too low or too high are automatically adjusted to the limit.
	RBW Mode	Auto or Manual. When set to Auto, the RBW will be calculated as a ratio of the span based on Ratio. When set to manual, the user can manually edit the RBW. Available on software version 3.0.2 and up
	Ratio	The ratio between span and RBW. Available on software version 3.0.2 and up
Average	Average	Edit the number of averages.
	Detector	Edit the detector used. Values: • Normal • Peak
	Hold	Edit the hold mode. Values: • Normal (none) • Max Hold • Min Hold
Measure	Capture Mode	Edit the capture mode. Values: • Continuous • Single • Stopped
	Restart	Restarts the measurement if in Continuous Capture Mode. This is handy if Max Hold is on in Continuous Mode.

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description
	FFT Window	Edit the Fast Fourier Transform window type. Further information regarding the effects of the window type can be found in Section 2.5.2.1 Values: • Rectangular • Flattop • Blackman-Harris (default) • Hamming • Hanning
	Optimization	Edit the Optimization. Further information regarding Optimization type can be found in Section 2.5.2.1 Values: • Spurious • Speed
System	Reference Select	Edit the Reference Select. Values: • External • Internal • Auto (External if an external reference is supplied, Internal if not)
	CrossPol Mode	Edit the CrossPol Mode. Span must be less than 52 MHz. Users should ensure proper values set for the Switch Port and CrossPol Switch Port settings. Values: • True • False
	Switch Port	Edit the Switch Port. 0 indicates that CrossPol mode cannot be enabled. If a switch port licence is installed the value will be from 1 to 8. If no switch port licence is installed the value is 0.
	CrossPol Switch Port	Edit the CrossPol Switch Port. 0 indicates that CrossPol mode cannot be enabled. If a switch port licence is installed the value will be from 1 to 8. If no switch port licence is installed the value is 0.
	Color Scheme	Edit the color scheme of the background and grid lines Values • Normal (Black and green) • Print (White and black)
	Connection Timeout	Time in seconds to wait before the software tries to connect to the Decimator after communication was interrupted
	Reset	Perform a software reset on the card.
	Status	Display the status of the Decimator in a display dialog
	Error Log	Display the list of errors that have occurred since the GUI started
	Help	Display the Decimator UI help in the default browser.

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description	
State	State 1 to State 10	Store or restore the state of Decimator from storage of one of 10 states. When the state is captured, a gear marker icon is shown on the menu item. Hovering over the menu item when a state is captured, displays the state in a tool tip. Clear – Clears the state Capture – Stores the current state Apply – Applies the stored state to the current state View – View the stored state in a display dialog.	
Trace	Active	Selects the active trace. Allows the following parameters to be edited:	
		Visible	Sets whether or not the active trace is visible. Values: • Show • Hide
		Color	Edit the color of the active trace. Displays a color edit dialog.
		Thickness	Edit the thickness of the active trace in pixels. Values: • 1 • 2 (default) • 3 • 4 • 5
		Export to CSV	Export the trace points to a CSV file. Displays a File 'Save As' dialog.
		Back	Navigate back to the Trace menu.
	CrossPol	Selects the active trace. Allows the following parameters to be edited:	
		Visible	Sets whether or not the active trace is visible. Values: • Show • Hide
		Thickness	Edit the thickness of the active trace in pixels. Values: • 1 • 2 (default) • 3 • 4 • 5
		Export to CSV	Export the trace points to a CSV file. Displays a File 'Save As' dialog.
		Back	Navigate back to the Trace menu.
	Trace 1 to Trace 4	Edit the memory based traces. The trace color is shown in the menu item.	
		Capture	Copy the active trace to the stored trace. Displays a graph icon on the menu item and on the Trace menu item one level above when captured.

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description	
		Clear	Clear the trace from memory.
		Visible	Sets whether or not the active trace is visible. Values: • Show • Hide
		Color	Edit the color of the stored trace. Displays a color edit dialog.
		Thickness	Edit the thickness of the active trace in pixels. Values: • 1 • 2 (default) • 3 • 4 • 5
		Freq. Rendering	Edit the frequency rendering mode. Values: • Overlay – Display the trace exactly as it was shown when captured, disregarding the current frequency settings. This is a WYSIWYG of the trace when it was captured. • Absolute – Displays the trace at its captured frequency. It may be off screen. • Shifted – Displays the trace centered in the screen, but scales it in frequency according to the new span.
		Ampl. Rendering	Edit the amplitude rendering mode. Values: • To Scale – Displays the trace amplitude to scale • Overlay – Dislpays the trace amplitude as it was captured disregarding the reference level. It may be off screen.
		Export to CSV	Export the trace points to a CSV file. Displays a File 'Save As' dialog
		Details	Displays the settings at the time the trace was captured.
		Back	Navigate back to the trace menu list
Markers	Marker 1 to Marker 5	Edit the markers that can be applied to traces. The markers are added to the active trace and then can be moved to memory based traces. The trace color is shown in the menu item. Note that markers can only be dragged using the mouse on memory based traces that have the Freq. Rendering set to Absolute.	

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description	
		Style	Set the style of the marker. When Normal or Delta, a paper clip graphic is shown. Values: • Off – Turns off the marker • Normal – a single marker • Delta – a pair of markers
		Shape	Edit the shape of the marker. Values: • Plus • X • Diamond • Up Facing Triangle • Down Facing Triangle • Right Facing Triangle • Left Facing Triangle • Circle • Do Not Enter • Circle Plus
		Color	Edit the color of the marker. Displays a color edit dialog.
		Trace	Edit what trace the marker is attached to. Values: • Current (Active) • 1 • 2 • 3 • 4
		Frequency	Enabled when the marker is turned on, this displays the Frequency Edit dialog to adjust the marker frequency.
		Function	Enabled when the marker is turned on, this displays the functions that can be performed on the marker frequency. Values: • Peak Search • Marker to Center Frequency • Marker to Reference Level • Next Right Peak • Next Left Peak • Next Lower Peak
		Freq. Adjust	Enabled when the marker is turned on, this displays a previous and next button. The buttons will move the marker one point to the left or right.

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description	
		Reference Frequency	Enabled when the Style is Delta, this displays the Frequency Edit dialog to adjust the reference frequency marker.
		Reference Function	Enabled when the Style is Delta, this displays the functions that can be performed on the reference frequency marker. Values: • Peak Search • Marker to Center Frequency • Marker to Reference Level • Next Right Peak • Next Left Peak • Next Lower Peak
		Ref. Freq. Adjust	Enabled when the Style is Delta, this displays a previous and next button. The buttons will move the reference frequency marker one point to the left or right.
Report	Export to CSV	Export the active trace and any captured memory based traces to a CSV file. Displays a File Save as Dialog.	
	Export to HTML	Export the screen, traces, markers and states to an HTML file report. Displays a File Save as Dialog to specify a target directory. The Decimator UI optionally displays the report HTML file in the default browser when done.	
Save/Open	Save Screen to PNG	Save the screen to a PNG file. Displays a File Save as Dialog.	
	Save Project	Save the current settings, memory based traces, markers attached to memory based traces, and states to a project xml file. Displays the File Save as Dialog.	
	Open Project	Opens a saved project from file and loads the data into the Decimator UI. The current settings, memory based traces, markers attached to memory based traces, and states are loaded from the project xml file.	
Carrier Monitor	New Measurement	Create a new measurement using the current state of the Decimator. Provide a name and specify which analyses to run.	
	Measurement Delay	The measurement delay in seconds. This is the time to wait between successive measurements.	
	Log Directory	The output log directory for traces and analysis files. If blank, logging will not occur. Log files will be in a subdirectory off this root log directory in a format root_log_dir/yyyy_mm_dd/measurement_name/ Within that directory there will be a • BandPower.csv (if Band Power analysis is configured) • PresenceOfACarrier.csv (if Presence of a Carrier Analysis is configured) • trace subdirectory containing a trace file per trace with an hh_mm_ss_uuu.csv format	

Table 2-1 Decimator GUI Button and Menu Descriptions

Button	Menu Item	Description

	Email	An edit window to specify:
		• Master Switch – enables email
		• Mail Server
		  ○ Name
		  ○ Port
		• From
		  ○ Email
		  ○ Name
		• Recipients
		  ○ Email
		  ○ Name
		  ○ Style
		  ▪ Simple Text – text only
		  ▪ Rich HTML – text and screen shot
		• Test button – Select a recipient and click the test button to send a test email.
		• Note: Ensure nothing is blocking port 25, such as virus software. You will need to remove or disable that port blocking for email to work.

	SNMP	An edit window to specify:
		• Master Switch – enables SNMP
		• Trap Destinations
		  ○ IP Address
		  ○ Port
		  ○ Community
		• Test button – Select a trap destination and click the test button to send a test trap. Default values used.
		• Show MIB button – Extract the MIB file from the application and prompt the user to save the file to local disk. This MIB file can be loaded directly into an NMS.

	Band Power	Displays sub menus for the default Band Power analysis. This analysis measures the Nominal Power in the span. Nominal Power Edit the default Nominal Power in dBm. Tolerance Power Edit the default Tolerance Power in dBm.
	Presence of a Carrier	Displays sub menu for the default Presence of a Carrier analysis. This measures the maximum delta power in the span. Delta Power Edit the default Delta Power in dB.

2.5.2.1 Advanced Measurement Settings

Pressing the Measure button allows access to some advanced settings, not typically changed for most measurements, but available if desired. These settings allow the user to select the FFT Window type and Optimization.

A selection of FFT window types have been made available to provide the user with expanded analysis capability. The available window types and their respective characteristics are shown in Table 2-2.

Table 2-2 FFT Window Type Figures of Merit

FFT Window	Highest Side Lobe Level (dB)	Equivalent Noise BW (bins)	3.0 dB BW (bins)	Scallop Loss (dB)
Rectangular[1]	-13.0	1.00	0.89	3.92
Flattop[2, 3]	-93.6	3.77	3.72	0.005
Blackman-Harris[1]	-92	2.00	1.90	0.83
Hamming[1]	-43.0	1.36	1.30	1.78
Hanning[1]	-32.0	1.50	1.44	1.42

Configuring the Decimator to an Optimization setting of Spurious will increase the measurement time but reduce, and in most cases remove completely, the spurious signals generated within the Decimator. It is recommended that Speed Optimization be used when measuring modulated or noise signal band power, as spurious optimization can reduce measurement accuracy. An Optimization setting of Speed will increase measurement speed at the expense of leaving internally generated spurious signals visible to the user.

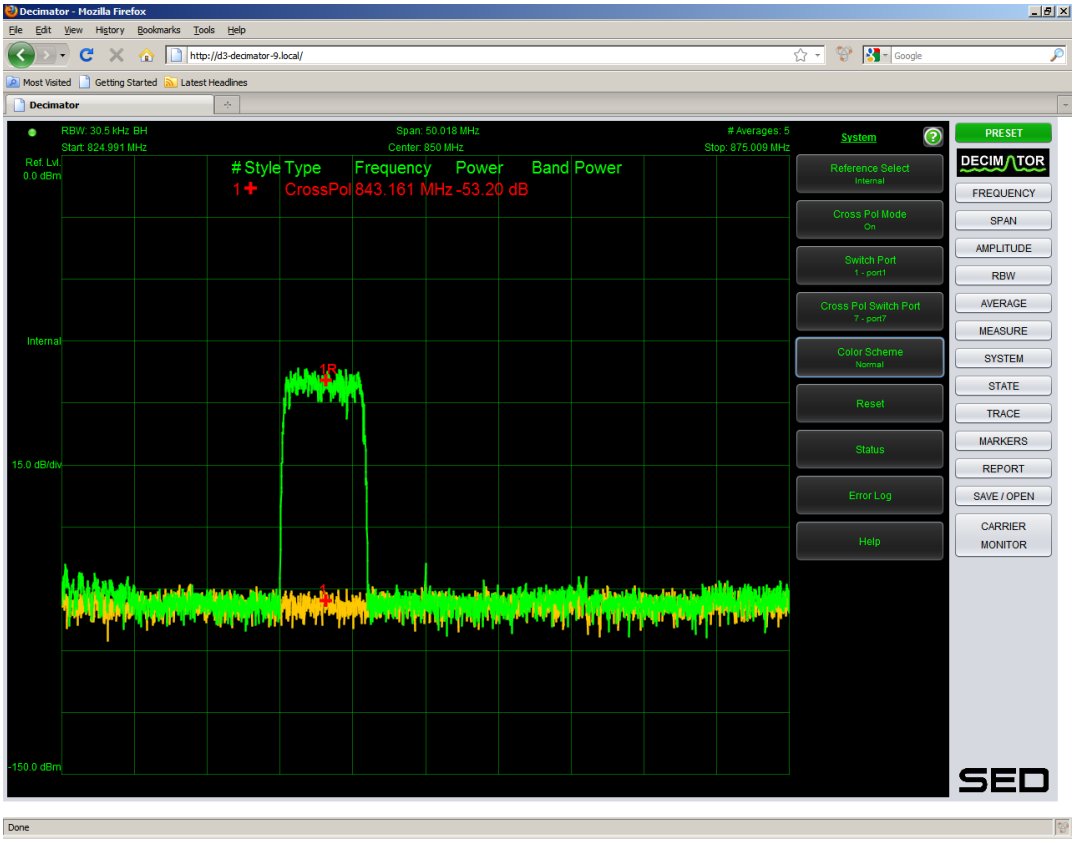
2.5.3 Cross Polarity Mode

A Decimator with a switch port licence can enable Cross Polarity mode (CrossPol). In this mode the Decimator will display the spectrum from two inputs simultaneously. In the example below, the green trace, Switch Port, is configured as “1 - port1” and the orange trace, Cross Pol Switch Port, is configured as “7 – port7”. The input port names default to “portX” where X is a number between 1 and 8. These names can be changed through the WCM’s Port Names tab. CrossPol markers display the delta power between the two traces.

[1] “On the Use of Windows for Harmonic Analysis with Discrete Fourier Transform”, Fredric J. Harris, Proceedings of the IEEE, Vol. 66, No. 1, January 1978

[2] “Extremely Flat-Top Windows for Harmonic Analysis”, Irini S. Reljin, Branimir D. Reljin, Veljko D. Papić, IEEE Transactions on Instrumentation and Measurement, Vol. 56, No. 3, June 2007”

[3] “Technical Review, Windows to FFT Analysis”, Brüel & Kjær, No. 3 1987

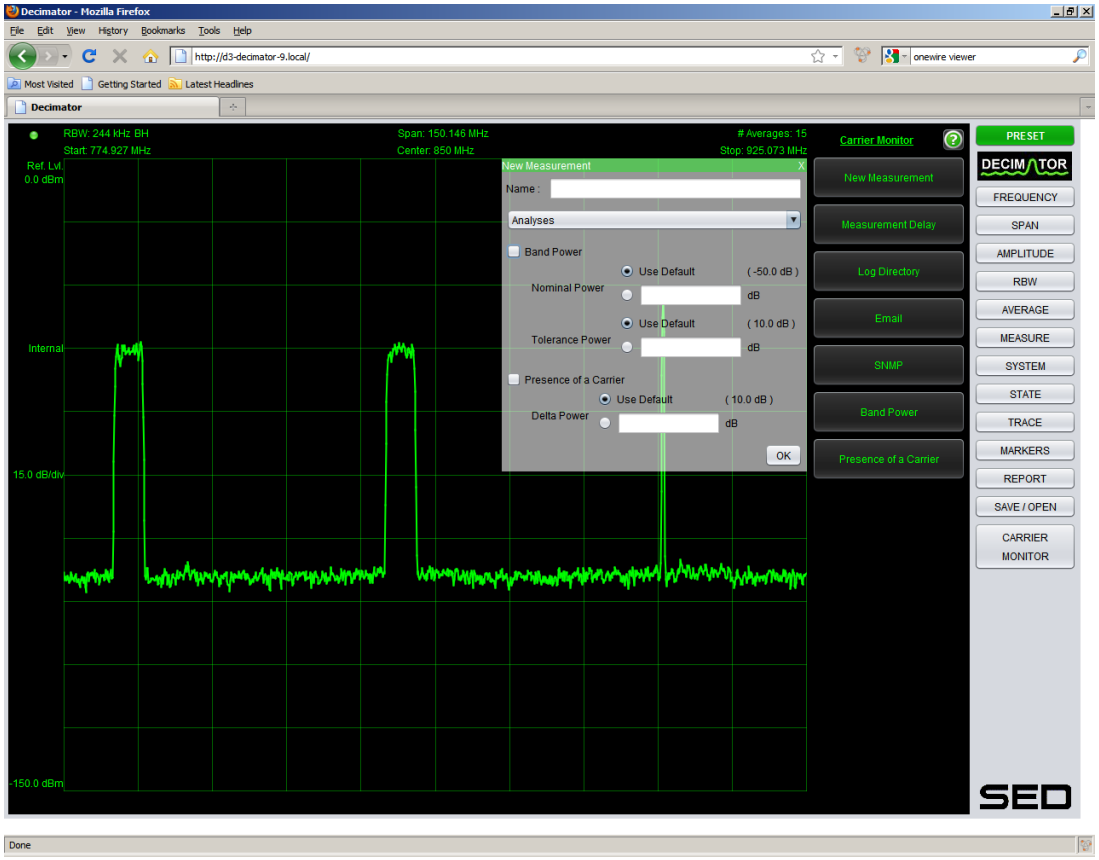


2.5.4 Carrier Monitor

The Decimator can be configured to monitor up to 100 carriers, validating the captured trace for limits within acceptable Band Power and Presence of a Carrier thresholds. The measurement is defaulted to use the entire span of the viewport. If configured, email or SNMP trap notification events will be raised when an alarm threshold is exceeded. To use the carrier monitor, a new measurement must be configured then enabled.

2.5.4.1 New Measurement

The following figure shows the New Measurement window. A unique name must be giving to each new measurement. Use the drop down box to configure the options for Analyses, Notifications, and State. Note that the state options are not configurable through this menu. These values are determined from the current Java Applet configuration.



Once all of the options are configured, click the Ok button in the corner of the New Measurement window. This will cause the Carrier Monitor Toolbar to be displayed on the left side of the Java Applet.

2.5.4.2 Carrier Monitor Toolbar

The carrier monitor toolbar appears after one New Measurement has been configured. Moving the mouse cursor over the toolbar widens it to make the measurement names visible. Figure 2-5 shows the Java Applet with three Carrier Monitor measurements configured. Note that the measurement has been 'Played' so many of the Carrier Monitor Toolbar buttons have been disabled. The selected carrier ("Carrier 1" from the Measurement Table) has up to 24 hours of results shown in the Carrier window.

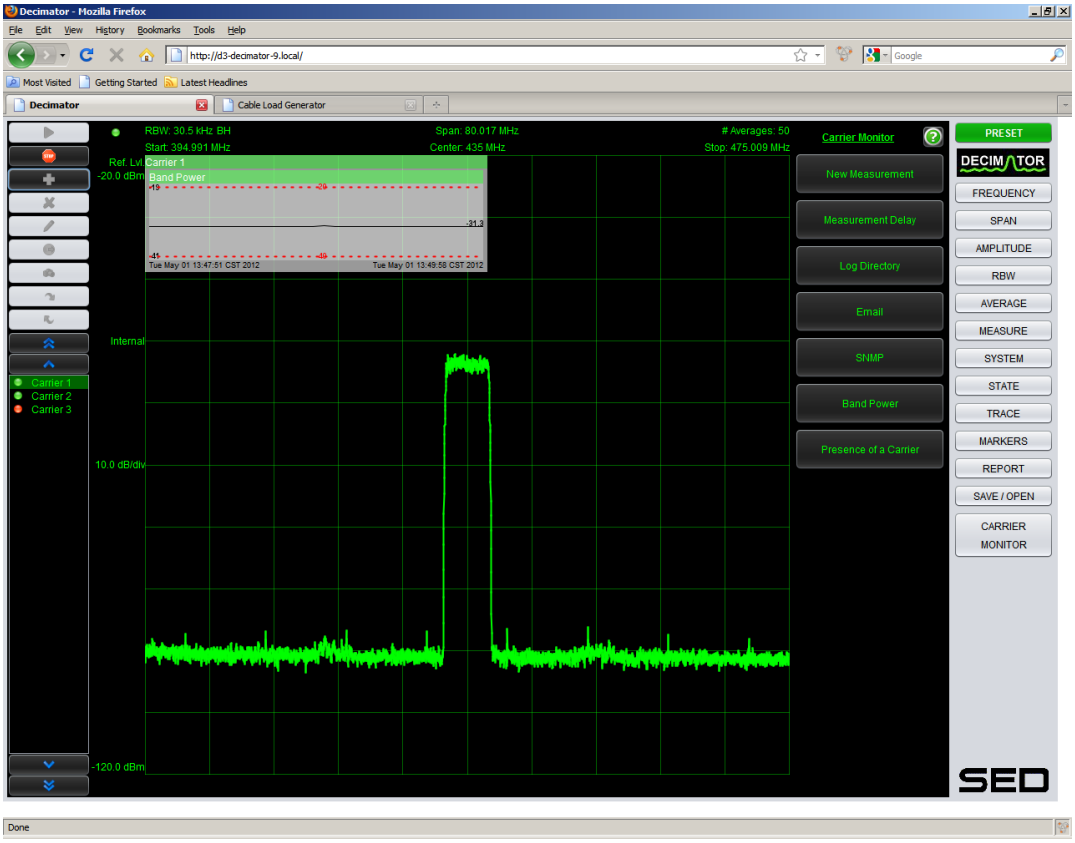
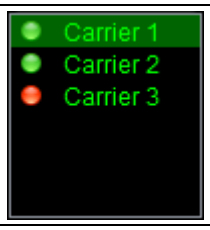


Figure 2-5 Carrier Monitor

The following Table describes each of the Carrier Monitor Toolbar buttons.

Button Name	Button Graphic	Description
Play		Start the carrier monitor. This will sequentially process the carrier monitor measurements. If a threshold is exceeded Measurement Status LED will go red and, if enabled, a notification will be sent.
Stop		Stop the carrier monitor measurements
Add		Create a new measurement
Delete		Delete the selected measurement
Edit		Edit the selected measurement
Recall State		Recall the Decimator state from the selected measurement
Capture State		Capture the state of the decimator to the selected measurement
Move Measurement Down		Move the selected measurement down one

Button Name	Button Graphic	Description
Move Measurement Up		Move the selected measurement up one
Scroll to Top		Scroll to the top of the measurement table
Scroll Up		Scroll up one
Measurement Table	 OR 	When the mouse cursor is not in the Carrier Monitor Toolbar area, then only the Measurement Status LED is shown. Otherwise, a two column table with Measurement Status and Measurement Name is shown LED: Gray is unknown, Green is success, Red is failure
Scroll Down		Scroll down one
Scroll to Bottom		Scroll to the bottom of the measurement table

2.5.4.3 Carrier Monitor Notifications

The Carrier Monitor can be configured to send SNMP or email notifications if a measurement threshold is exceeded. Note that both the master switch (press Carrier Monitor→Email or Carrier Monitor→SNMP) and the measurement notification control (select the measurement from the Carrier Monitor Toolbar and click the 'Edit' button and then select Notifications from the drop down menu) must be enabled for notifications to be generated.

2.5.4.4 From the Command Line

After setting up the measurements for carrier monitoring in the previous section and running and testing interactively, it may be beneficial to run the carrier monitoring not from within the Java Applet, but from a command line task.

To do this, perform the following:

- Run the Decimator UI to create a project file with all the measurements in it. Test it out running in the browser interactively. Include things like measurement delay, trace analysis result logging, email notifications, SNMP configuration and all your measurements. Save the project file to disk. (e.g. C:/myproject.xml)
- Obtain the decimator.jar file by searching in your browser's cache for the file "decimator.jar". (Consult your browser documentation to find the directory and/or search your drive) Some browsers allow a "File | Save As…" option to save the current page to disk, which will in turn save "decimator.jar" to the directory.
- Shutdown the Decimator UI.

- From the command line run:
  - java -java.util.logging.config.file="FullPathToJavaLoggingPropertiesFile" -cp decimator.jar com.sedsystems.decimator.CarrierMonitoring -IpAddress "YourDecimatorCardIpAddress" -Port "YourPort" -ProjectFile "FullPathToYourProjectFile"
- As an example:
  - java -Djava.util.logging.config.file=C:/decimator.properties -cp decimator.jar com.sedsystems.decimator.CarrierMonitoring -IpAddress 192.168.10.1 -Port 9784 -ProjectFile C:/myproject.xml
- A sample decimator.properties java logging file exists at the bottom of the Decimator Java Applet help (click System → Help)

2.5.5 Query String

Normally, the user interface is started with default settings. If you find you often change the settings to the same values regularly, you can save a Project and reopen it each time you use the Decimator, or you may want to take advantage of the query string function.

The user interface can be configured via the URL used to access it, so that it will start with the specified settings. For example, the URL http://192.168.10.1/index.html?frequency=1455.5 will start the user interface with the center frequency set to 1455.5 MHz. The complete list of possible parameters is shown below.

Parameter Name	Description	Expected Data Type	Example	Default Value
Frequency	Sets the center frequency	Decimal, MHz	frequency=1345.23	half of the available frequency
Span	Sets the span	Decimal, kHz	span=24.885	the minimum span value
RBW	Sets the resolution BW	Decimal	RBW=95	100
Averages	Sets the number of averages	Decimal	averages=12	10
Autoyaxis	Turns Y axis auto scaling on/off	Boolean (true=on)	autoyaxis=false	true (auto scaling on)
Yref	The Y axis reference value. (value at the top of the plot)	Decimal (dB)	yref=-10	0
dbdiv	The number of dB per division on the Y axis.	Decimal (dB)	dbdiv=5	10
switchport	Selects the switched RF port (8-Port Decimator only)	Decimal (1 to 8)	switchport=5	1
autoattenuation	Toggles input attenuation between auto and manual	Boolean (true=auto)	autoattenuation=true	true (automatic attenuation)

Parameter Name	Description	Expected Data Type	Example	Default Value
attenuation	Sets the attenuation level in dB	Decimal	attenuation=5	0
referenceselect	Toggles the clock reference between internal/external	Enum: external internal auto	referenceselect=auto	internal
capturemode	Sets the capture mode	Enum: stopped single continuous	capturemode=continuous	stopped
fftwindow	Sets the FFT window	Enum: rectangular flattop blackman-harris hamming hanning	fftwindow=flattop	blackman-harris
fftoverlap	Sets the FFT overlap	Decimal (0 to 1)	fftoverlap=0.4	0.5
spectralinversion	Sets the spectral inversion	Boolean (true=on)	spectralinversion=true	false
optimization	Sets the optimization or dithering option	Enum: spurious speed	optimization=speed	spurious
detector	Sets the detector option	Enum: peak normal	detector=peak	normal
hold	Sets the hold mode	Enum: normal max hold min hold	hold=max hold	normal
colorscheme	Sets the color scheme on the plot	Enum: normal print	colorscheme=print	normal

The parameters must be appended to the regular URL using the standard URL query string format (parameter list and URL separated by '?', parameters separated by '&', and parameter name/value separated by '='). The parameters can be in any order, and parameter names are case insensitive. You may specify as many or as few parameters as you like.

Examples:

- http://192.168.10.1/index.html?frequency=1350.5&span=25.5
  - Sets the center frequency to 1350.5 MHz, and span to 25.5 kHz.

- http://192.168.10.1/index.html?autoyaxis=false
  - Turns off automatic Y-axis scaling.
- http://192.168.10.1/index.html?frequency=1350.5&span=25.5&RBW=98&averages=11&referenceselect=external&capturemode=continuous
  - Sets the center frequency to 1350.5 MHz, span to 25.5 kHz, resolution bandwidth to 98 Hz, the number of averages to 11, enables the external frequency reference, then starts a continuous mode trace.

2.5.6 Time Domain Mode (Future)

Note: the time domain mode User Interface is not accessible on the Java Applet at this time. It will be made available when demand warrants it. Time domain mode is only available from the API Socket Interface at this time.

The time domain mode is used to measure the instantaneous power of the input signal in the actual span shown.

For the time domain, the basic operations made by the Decimator are to collect the samples contiguously and then display the data in the time domain to the operator.

This also can be done in Raw mode or Decimated mode. Raw mode takes the full input range of the Decimator and displays the time domain data. Decimated mode reduces the bandwidth down to the desired span (as close as it can; refer to the actual span reported). The resultant time domain data is displayed to the user. Note that the scale and time range of the display are actual values, based on the settings chosen.

2.6 SNMP Interface

The Decimator supports monitoring of the operational status through the SNMP interface. MIB definitions are available to provide translations of the OIDs to readable labels. The SNMP interface provides read-only data concerning the device operations.

The OIDs of interest are the device identification and version information, as well as the operational status.

The device identification is provided in the ISO branch of the object ID structure. The ENTITY-MIB file contains the translations for these nodes. Notable entries are as follows:

.1.3.6.1.2.1.47.1.1.1.1.8	Hardware revision.
.1.3.6.1.2.1.47.1.1.1.1.10	Software revision.
.1.3.6.1.2.1.47.1.1.1.1.11	Serial number.

Status information on the device operations is provided in the ISO branch as well. The IADC-MIB file contains the OID translations. Entries are as follows:

.1.3.6.1.4.1.9633.4.1.1.0	Input overload status.
.1.3.6.1.4.1.9633.4.1.2.0	Overall device status, indicates if a major fault occurred.
.1.3.6.1.4.1.9633.4.1.3.0	System up time, indicates how long the device has been running since last reset.
.1.3.6.1.4.1.9633.4.1.4.0	Voltage of the onboard 1.2v power supply (if available).
.1.3.6.1.4.1.9633.4.1.5.0	Voltage of the onboard 2.5v power supply (if available).
.1.3.6.1.4.1.9633.4.1.6.0	Voltage of the onboard 5.0v power supply (if available).
.1.3.6.1.4.1.9633.4.1.7.0	Voltage of the onboard 12.0v power supply (if available).
.1.3.6.1.4.1.9633.4.1.8.0	Voltage of the onboard 17.0v power supply (if available).
.1.3.6.1.4.1.9633.4.1.9.0	Onboard temperature.
.1.3.6.1.4.1.9633.4.1.10.0	The center frequency of the current capture.
.1.3.6.1.4.1.9633.4.1.11.0	The span width of the current capture.
.1.3.6.1.4.1.9633.4.1.12.0	The resolution bandwidth of the current spectrum capture. If a time capture is in progress, the value is 0.
.1.3.6.1.4.1.9633.4.1.14.0	Internal clock setting.
.1.3.6.1.4.1.9633.4.1.16.0	Auto attenuation setting.
.1.3.6.1.4.1.9633.4.1.17.0	Number of available switch ports.
.1.3.6.1.4.1.9633.4.1.18.0	The currently selected switch port.

The MIB OID files are available from the HTTP interface of the Decimator. To obtain the files, enter the filename for each into the URL field of a browser and then save the file for use by your SNMP tools. For example, to access the files using the default IP address, use the following URLs:

- http://192.168.10.1/ENTITY-MIB.mib
- http://192.168.10.1/IADC-MIB.mib
- http://192.168.10.1/SEDSYSTEMS-MIB.mib

Refer to Decimator API Specification (125497) included on the CD for further information.

2.6.1 Input Signal Considerations

The input to the Decimator must between 5 and 3000 MHz. Note that the input can be limited by an external filter to the band of interest within this range in order to avoid reducing the signal to noise ratio of the instrument. The more broadband noise allowed into the Decimator's input, the lower the dynamic range will be. The total power in the full input frequency range should not exceed the input power level specification for Decimator. Refer to the specification in Section 2.8. Any band pass, high pass, or low pass RF filter suitable for 50-ohm applications may be used on the input to the Decimator.

2.6.2 10 MHz Reference Considerations

The Decimator uses a 10 MHz reference as a frequency reference. Note that frequencies reported will be limited in accuracy and phase noise by the choice of 10 MHz reference. The on-board frequency reference is accurate to ±2.6 ppm and is selected by default. An external reference will typically provide better accuracy.

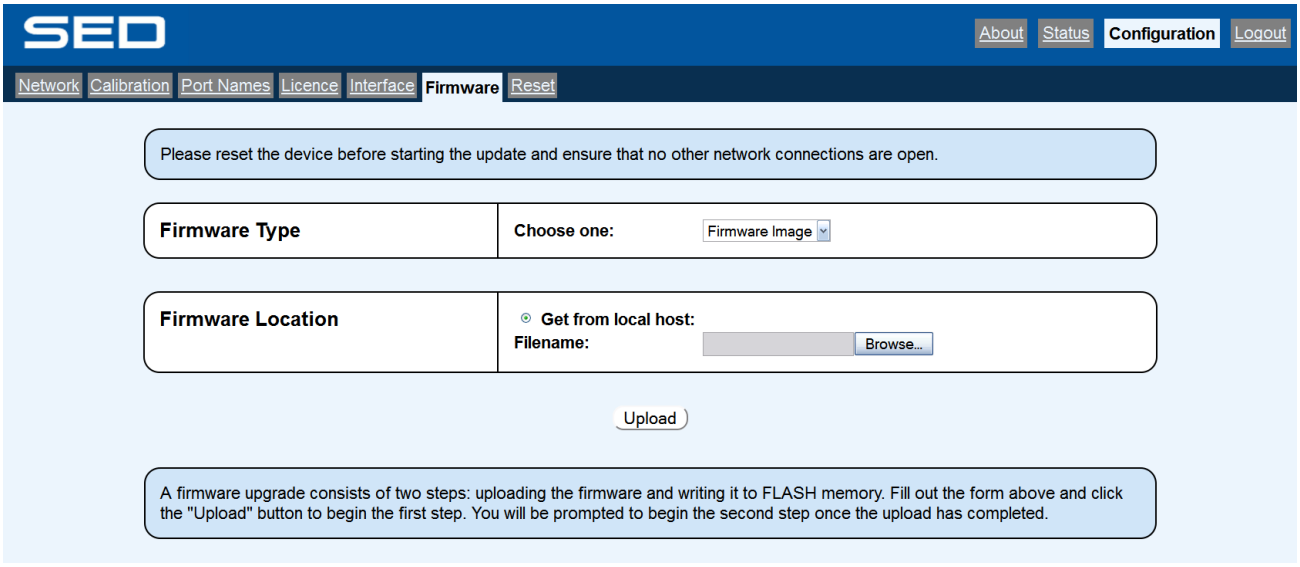
The external frequency reference must be selected through the Java Applet or the API Socket Interface. The setting will remain selected until you close the connection.

2.7 Updating the Firmware

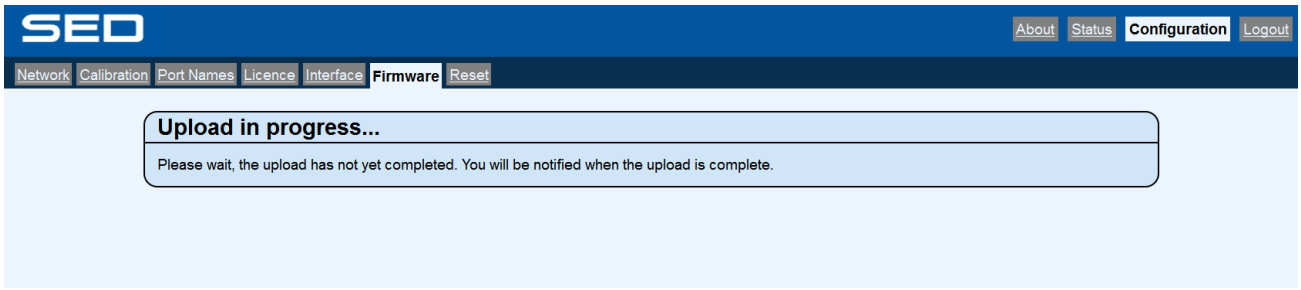
The Decimator incorporates a web page to manage updating the firmware, which eliminates the need to return the unit to the factory for updates.

Reset the Decimator before installing firmware and ensure there are no API connections made, including the Java Applet and the API Socket Interface, after the reset and during the installation. The Decimator can be reset in the Configuration->Reset tab of the Web Configuration Manager or by cycling the power to it.

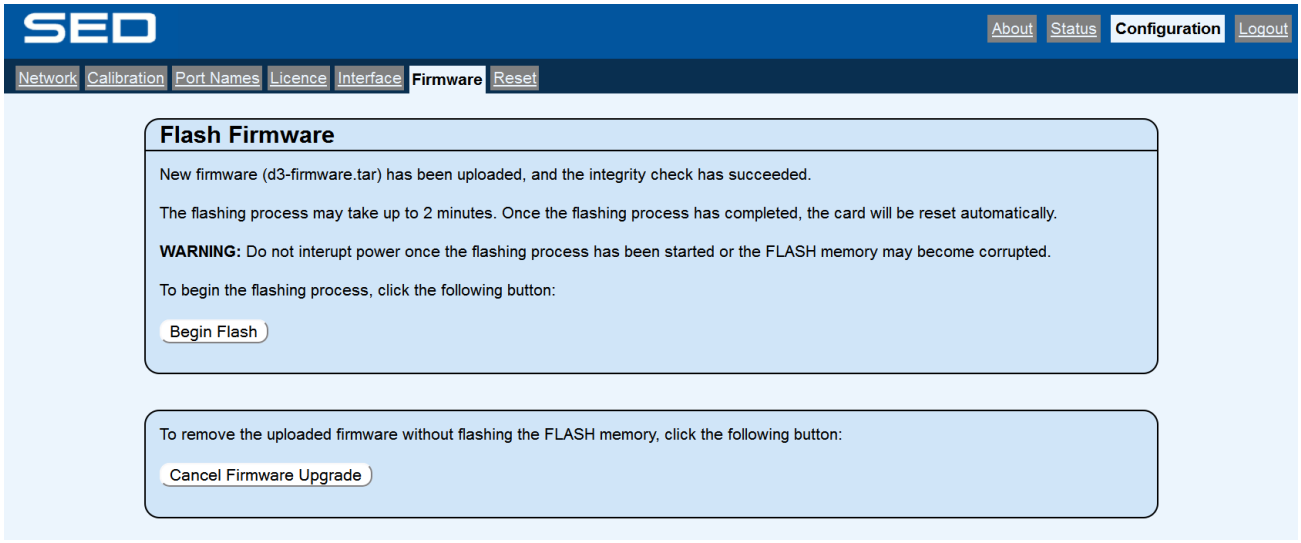
The Firmware Upgrade tab, shown below, is the default tab displayed after successfully logging in to the Decimators WCM. Refer to Section 2.3.1.1 for details on logging in.



The firmware update file, supplied by SED, can be transferred to the Decimator using a local host computer. After specifying the firmware location and clicking Upload, the file will be obtained and then the following screen will be displayed



Once the upload is complete, a confirmation page will be displayed



Clicking on Begin Flash will update the Decimator firmware. When complete, the Decimator will be automatically reset. If the firmware file fails the integrity check, it is highly recommended that the Cancel Firmware Upgrade button be pressed or there is a risk the Decimator may be rendered unresponsive.

2.8 General Specifications

Parameter	Specification
Power Requirements	PCIe 25 watts, or 3-pin Molex connector: 3.3/5V 1A and 12V 1A
Environmental	Indoor environment
Temperature	Operational Temperature Range: 0 to +55°C Non operating: -20°C to +70°C
Humidity	Operating: 10% to 95% non condensing Non operating: 10% to 95% non condensing
Mechanical	
Size	half size PCIe card, 6.875 by 4.2 inches
Physical Interfaces	
RF Input	SMA, 50 ohms Input Frequency Range: 5 MHz to 3,000 MHz Input Power: +5 dBm to –110 dBm (aggregate) Maximum Safe Input +10 dBm
Control	RJ-45, 10/100base-T, half or full duplex TCP/IP API, SNMP, HTTP
Reference	BNC, 50 ohms 10 MHz, -5 dBm to +13 dBm
Health Monitor LED	Green if the Decimator is ready for use Red if the Decimator has encountered an error Not illuminated if the Decimator is initializing
Trigger Inputs	Future Use
PCIe x1	Used to power the Decimator. The Decimator can not be controlled through the PCIe interface
Measurements	
Amplitude Accuracy	± 0.5 dB (at 25°C) [1] ± 1.0 dB (5 to 40°C)
Frequency Accuracy	± 2.6 ppm (internal) or as per external reference source
Frequency Resolution	1 Hz
Resolution Bandwidth	1 Hz to 15 MHz
Spurious	Images: < -55 dBc (typical) Aliasing: < -55 dBc (typical) DC Offset: (time domain only) < -30 dBc (typical)
Single Measurement Span	up to 220 MHz
Multiple Measurement Span	up to 2995 MHz
Averaging	User selectable, up to 255 averages

Parameter	Specification
Measurement Speed[3]	500 MHz span, 1 MHz RBW, 200 ms 200 MHz span, 30 KHz RBW, 630 ms 80 MHz span, 100 kHz RBW, 170 ms 3.5 MHz span, 8 kHz RBW, 90 ms
Modes of Operation	
	Raw Snapshot Mode: Number of IQ time samples is approx 32 million Linear Power/Bin (4096 Samples, up to 255 averages) Log Power/Bin (4096 Samples, up to 255 averages) Raw IQ Samples - decimated 16 - 4092 in steps of 4 – sampling frequency up to 3.7 MHz Selectable Spectral Inversion Programmatic measurement and control over Ethernet based API
Notes: 1. Measurement conditions: 10 averages, input level between -8 dBm and -68 dBm, 3 sigma 2. Resolution bandwidths auto or manual adjustable 3. Expected rates with 10 averages, speed optimization 4. All specification at 25°C unless otherwise noted and are subject to change without notice.	

2.9 Warranty / Repair Contact Information

If your Decimator is not operating correctly, contact the Service Department for support and a Return Material Authorization (RMA) number if applicable. There are no serviceable parts on the Decimator.

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