

SKF @ptitude Analyst and SKF Multilog On-line Systems

Documents features applicable to SKF DMx, IMx, WMx

Part No. 32296700-EN
Revision F

User Manual

Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual can result in serious injury. Keep this manual in a safe location for future reference.

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Introduction to SKF @ptitude Analyst and SKF Multilog On-line Systems

About This Manual

The SKF @ptitude Analyst and SKF Multilog On-line Systems manual describes the operation of online and protection systems supported in @ptitude Analyst. In these pages you will find information on the operation of the:

- Multilog Wireless Monitoring System (WMx)
- Multilog IMx Monitoring System (IMx)
- Multilog DMx Machine Monitoring System (DMx)

and their @ptitude Analyst for Multilog On-line Systems features.

- For the purposes of this documentation, all supported online systems are included in the Multilog On-line Systems category.

Since all On-line features work in conjunction with standard @ptitude Analyst operations, you should be familiar with @ptitude Analyst and its sections before using @ptitude Analyst software.

The @ptitude Analyst and Multilog On-line Systems manual is organized as follows:

Chapter 1, Introduction - Introduces manual conventions and overviews the @ptitude Analyst Software and the On-line Systems.

Chapter 2, Setting Up Your WMx Device – Describes how to manage your WMx devices in @ptitude Analyst.

Chapter 3, Working With Your @ptitude Analyst Hierarchy – Describes in detail how to organize your machinery measurement POINTs into @ptitude Analyst hierarchies, SETs, machines, and POINTs. Also details how to establish @ptitude Analyst's many alarm criteria. Describes Hierarchy editing procedures using @ptitude Analyst's Templates, Modify by Attribute feature, and Filters.

Chapter 4, Data Collection ROUTEs and Other Data Transfer

Operations - Describes how to create @ptitude Analyst measurement collection ROUTEs, how to download ROUTEs to the data collection devices, how to upload measurements from the data collection devices, and how to manually enter data into the @ptitude Analyst Hierarchy.

Chapter 5, Displaying Graphic Plots - Describes methods for displaying collected machinery measurements in graphic plot format, and describes in detail @ptitude Analyst's menu options for manipulating graphic plots to obtain useful analysis data.

Chapter 6, Generating and Printing SKF @ptitude Analyst Reports - Describes in detail how to create report templates and how to generate and print @ptitude Analyst reports.

Chapter 7, Multilog DMx Machine Monitoring Module - Provides an overview of @ptitude Analyst configuration for DMx Machine Monitoring System

Chapter 8, Transient Data Analysis - Describes setup and collection methods for run-up and coast-down data.

Appendix A, SKF @ptitude Analyst Toolbars - Offers an overview of @ptitude Analyst's toolbars and details the custom toolbar creation procedure.

Appendix B, Event Log Redirection - Describes Event Log redirection codes and terminology.

Appendix C, Data Collection Gating - Describes the data collection gating methods for the online systems.

Technical Support

If you have questions regarding the installation or operation of SKF @ptitude Analyst, please visit the self-help portal before contacting the help desk to see if the answer is already published: .

Technical Support Self-help Portal: www.skf.com/cm/tsg

If further assistance is needed, please submit a support request by clicking on the SUPPORT tab and one of our support engineers will contact you shortly.

The technical support team can be reached during normal business hours (7:00 a.m. to 4:00 p.m. local time) by phone, e-mail, or live chat:

- *Customers in Europe, Middle East and Africa:*
Phone: +46 31 337 6500
E-Mail: TSG-EMEA@skf.com
Chat: www.skf.com/cm/tsg
- *Customers in all other locations:*
Phone: 1-858-496-3627 or toll-free (USA) 1-800-523-7514
E-Mail: TSG-Americas@skf.com
Chat: www.skf.com/cm/tsg

Note: Standard technical support will be provided at no cost on products or software covered under an SKF Product Support Plan (PSP), whenever applicable. Many SKF Machine Health products include limited technical support for the first 180 days after purchase. Support obtained after 180 days or without PSP coverage will be subject to a per-incident fee. Contact the technical support team for more information.

Definition of On-line Systems

Throughout this @ptitude Analyst manual, SKF's Multilog IMx Monitoring System, Multilog WMx Monitoring System, and Multilog DMx Monitoring System are referred to as SKF's On-line Systems.

References specific to the IMx Machine Monitoring System use the term IMx.
References specific to the WMx Machine Monitoring System use the term WMx.
References specific to the DMx Machine Monitoring System use the term DMx.
References that apply to the WMx, IMx, and DMx systems use the general term “on-line device.”

Each of these systems is discussed in detail later in this introduction chapter.

What is the SKF @ptitude Analyst and On-line Systems System?

An SKF @ptitude Analyst and On-line Systems System consists of the following components:

1. A WMx, IMx, or DMx
2. @ptitude IMx Service, @ptitude WMx Service, or @ptitude Analyst Monitor (for DMx)
3. A host computer with:
 - an Ethernet connection (for IMx or DMx) or wireless network access (for WMx)
 - the appropriate Windows OS drivers
 - @ptitude Analyst

Communications

An Ethernet (TCP / IP) connection allows you to create a network consisting of several PCs and IMxs / DMxs. The Ethernet connection type is only available for use with IMxs or DMxs.

- A single PC running the @ptitude IMx Service can communicate with the IMxs and with several additional PCs running @ptitude Analyst software via the Ethernet connection.
- A single PC running the @ptitude Analyst Monitor application can communicate with the DMxs and with several additional PCs running @ptitude Analyst software via the Ethernet connection.
 - A DMx does not natively talk Ethernet and must therefore rely on a 9420 B&B Ethernet Gateway to convert from RS485 to Ethernet.

The online devices behave like any other peripherals on the intranet (for instance, a laser printer).

For detailed communication protocol installation information, refer to your on-line device's installation manual.

The Host Computer

The host computer has Microsoft Windows 7, 8.1 or 10, an Intel 2.0 GHz, 32 or 64-bit, or better processor, with 6 or more GB of RAM, and a 30 Gbyte hard disk (minimum 10 Gbyte); and enough free disk space to store your @ptitude Analyst for On-line Systems measurement Hierarchy (whose size depends on the number of monitored measurement POINTs). Together, the host computer and @ptitude Analyst software perform Hierarchy management, trending, display, and reporting functions for the On-line System.

For further details, refer to the SKF @ptitude Analyst Installation Manual (P/N 32312400).

SKF @ptitude Analyst Software

The easy-to-use @ptitude Analyst software works with DADs (Data Acquisition Devices) to assist machinery maintenance personnel in managing and analyzing their collected data. @ptitude Analyst automatically uploads measurement data from DADs and performs the tedious clerical work required in sorting, storing, and pre-analyzing measurement data. Use @ptitude Analyst to easily configure measurement POINTs (a machinery location at which measurement data is collected), for downloading measurement POINT setups to DADs, for Hierarchy manipulation of collected data, and to graphically display and generate reports on collected measurement data.

Exception Reports - @ptitude Analyst automatically compares current measurement values to past measurement values, and to pre-defined alarm values to detect changes from normal machinery conditions. Using hierarchy list alarm status indicators and detailed printed reports, @ptitude Analyst alerts maintenance personnel to alarm conditions (exceptions from normal conditions).

Analysis - @ptitude Analyst displays and prints various plots and reports for analyzing machinery condition.

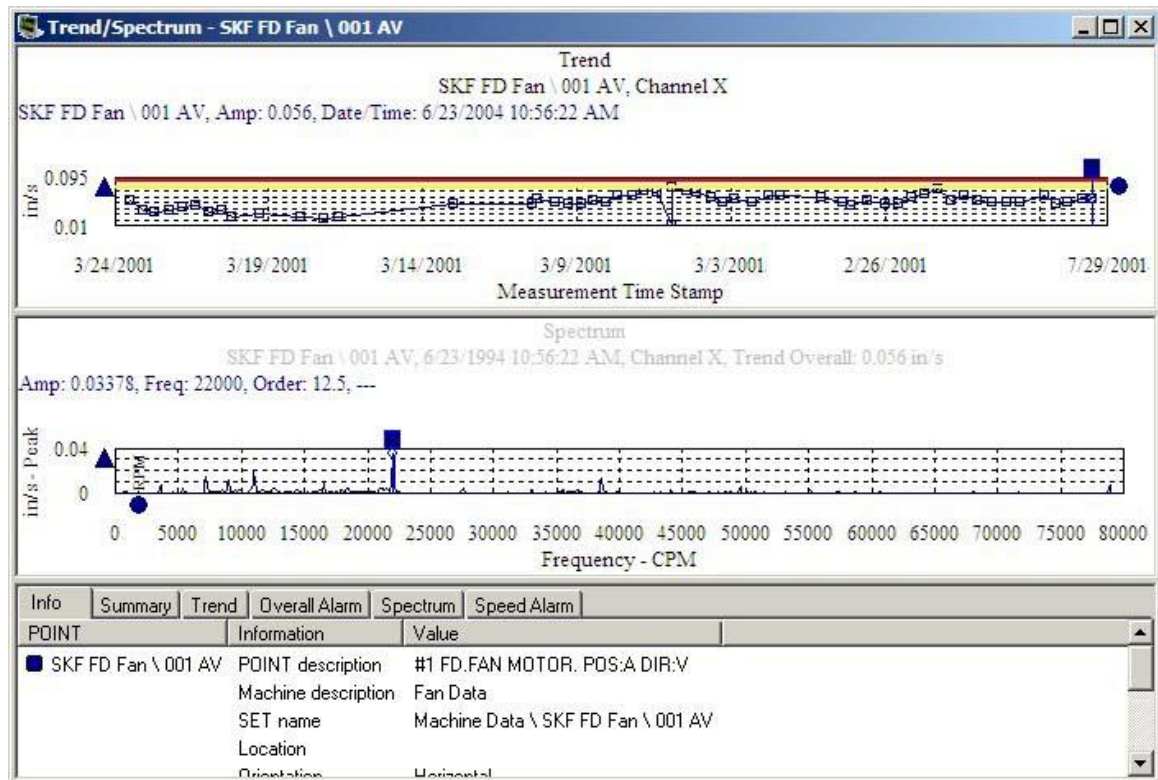


Figure 1 - 1.
Two Graphic Displays of an @ptitude Analyst Measurement.

Trend plots, FFT spectra (including waterfall and palogram plots), time waveforms, polar vector plots, and other plot types are easily displayed to help determine if machinery condition changes are occurring, and if so, to help with analyzing the cause of machinery condition changes.

For the easiest and most effective use of the On-line System, you should:

Use @ptitude Analyst to:

- Organize your hierarchy into SETs and machines.
- Add measurement POINTs to these Hierarchy machines, configuring each POINT's measurement and alarm settings as it is created.
- Download the measurement POINTs to the On-line System.

Use the On-line System to:

- Collect measurement data and detect alarms.

Use @ptitude Analyst to:

- Upload the collected data to @ptitude Analyst software.
- Run alarm detection features to quickly scan for abnormal machine conditions.
- Generate plots and reports to analyze, trend, report, and store measurement data.

The IMx System

Together with SKF @ptitude Analyst software, the SKF Multilog On-line System IMx provides a complete on-line system for early fault detection and prevention, automatic advice for correcting existing or impending conditions, and advanced condition-based maintenance to improve reliability, availability, and performance. @ptitude Analyst supports five IMx units: the IMx-8, IMx-M, IMx-P, IMx-S, and IMx-T.

The IMx-8

The IMx-8 is a cost effective 8 channel condition monitoring device which offers an optimized size when less than 16 channels are required. The IMx-8 is certified for wind power and marine industry environments, but can also be used across multiple segments. The device comes as a DIN rail mounted unit or inside an IP65 box.

The IMx-8 is key component and flexible on-line condition monitoring system tool for rotating machinery applications, such as turbines, motors, pumps, fans, gearboxes, etc. This enables acquired data trending and analysis, ensuring early identification of potential defects and the subsequent prevention of catastrophic machine failures.

The IMx-8 has eight analogue inputs with input range of ± 25 V. All channels are referenced to chassis/enclosure ground (all channels grounds are connected). The analogue input supports 2-wire ICP-type sensors (for example, accelerometers) with its internal power supply. The analogue input can also interface other 2-wire voltage output sensors with external power supply. Other types of sensors can be interfaced using external adapters.

The IMx-8 has two digital inputs. These digital inputs can interface with most standard types of digital inputs/sensors. The digital input can interface with 2- or 3-wired speed sensors and/or CMCP 2505 (Eddy probe converters). All channels are referenced to chassis/enclosure ground.

The IMx-8 connects only with firmware v6.0 or later.

SKF also provides the SKF Multilog IMx Manager app for iOS and Android. The app provides features to manage and configure the IMx system and to visualize measurement data. The SKF Multilog IMx Manager connects to the IMx-8 device via Bluetooth.

The IMx-M

The SKF Multilog On-line System IMx-M is a powerful, cost effective solution for a variety of machinery monitoring applications. Together, with SKF @ptitude Analyst, the IMx-M can provide a complete system for initiation of machinery shutdown, early fault detection, and diagnosis. In addition, the SKF Multilog On-line IMx-M system provides automated advice for correcting existing or impending conditions which can affect machine reliability, availability, and performance. Each SKF Multilog IMx-M is equipped with four cards: up to 64 analog inputs (dynamic and static), 32 digital / speed inputs, and 96 relay outputs.

The IMx-P

The SKF Multilog On-line System IMx-P is portable and battery powered with a battery life of approximately four hours in continuous operation (mains powered). The 16 analog signal inputs are configurable for a wide variety of sensors. Signals such as acceleration, velocity, and displacement or other parameters are easily adopted. In addition to the analog channels, eight digital channels may be used for measuring speed, trigger, or digital status (for example, indicating when a measurement can take place).

The SKF Multilog IMx-P can be used as a trouble-shooting device or as part of a condition monitoring system with several units together in a network. The system can also run in an existing LAN together with other computers, printers, servers, etc., or over the internet. The unit's unique built-in "hardware auto-diagnosis system" continuously checks all sensors, cabling and electronics for any faults, signal interruption, or power failure. Any malfunction triggers an alarm. If the main voltage fails or for some reason is disconnected, the battery power automatically takes over. In the case of system power failure, the system will automatically restart when the power returns.

The IMx-S

SKF Multilog On-line System IMx-S is a key component in an advanced condition monitoring system. It is a robust measurement unit designed for tough industrial environments. Each SKF Multilog IMx-S is equipped with 16 analog signal inputs and the SKF Multilog IMx-S 32 with 32 analogue signal inputs. The dynamic signal inputs are configurable for a variety of sensors. Signals such as acceleration, velocity and displacement or other parameters are easily adopted. Each input can be configured for standard accelerometers, proximity probes, 4–20 mA or ± 25 V.

In addition to the analogue channels, 8 digital channels on the SKF Multilog IMx-S 16 and 16 digital channels on the SKF Multilog IMx-S 32 may be used for measuring speed, trigger or digital status (e.g., indicating when a measurement can take place). Several measurement points may be attached to one channel and both AC and DC measurements can be measured on the same channel. Individual conditions for warning and alarm may be set for each point. Warning and alarm levels may be controlled by machine speed or load.

The SKF Multilog IMx-S works as a machine condition monitoring system with several other units together in a network with SKF @ptitude Analyst. The system can run in an existing LAN together with other computers, printers, servers, etc., or over the Internet. The unit's unique built-in hardware auto-diagnosis system continuously checks all sensors, cabling and electronics for any faults, signal interruption, or power failure and any malfunctions triggers an alarm. In the case of system power failure, the system will automatically restart when the power returns.

The IMx-T

SKF Multilog On-line System IMx-T is a key component in an advanced condition monitoring system. Designed to fit into a 19" rack enclosure, the Multilog IMx-T is equipped with 16–64 analogue signal inputs. The dynamic signal inputs are configurable for a wide variety of sensors. Signals such as acceleration, velocity and

displacement or other parameters are easily adopted. Each input can be configured for ICP (accelerometers), 4-20 mA or ± 25 V.

In addition to the analogue channels, 8-32 digital channels may be used for measuring speed, trigger or digital status (e.g., indicating when a measurement can take place). Several measurement points may be attached to one channel and both AC and DC measurements can be measured on the same channel. Individual conditions for warning and alarm may be set for each point. Warning and alarm levels may be controlled by machine speed or load.

The Multilog IMx-T works as a machine condition monitoring system with several other units together in a network with SKF @ptitude Analyst. The system can also run in an existing LAN together with other computers, printers, servers, etc., or over the Internet. The unit's unique built-in hardware auto-diagnosis system continuously checks all sensors, cabling and electronics for any faults, signal interruption, or power failure. Any malfunction triggers an alarm. In the case of system power failure, the system will automatically restart when the power returns.

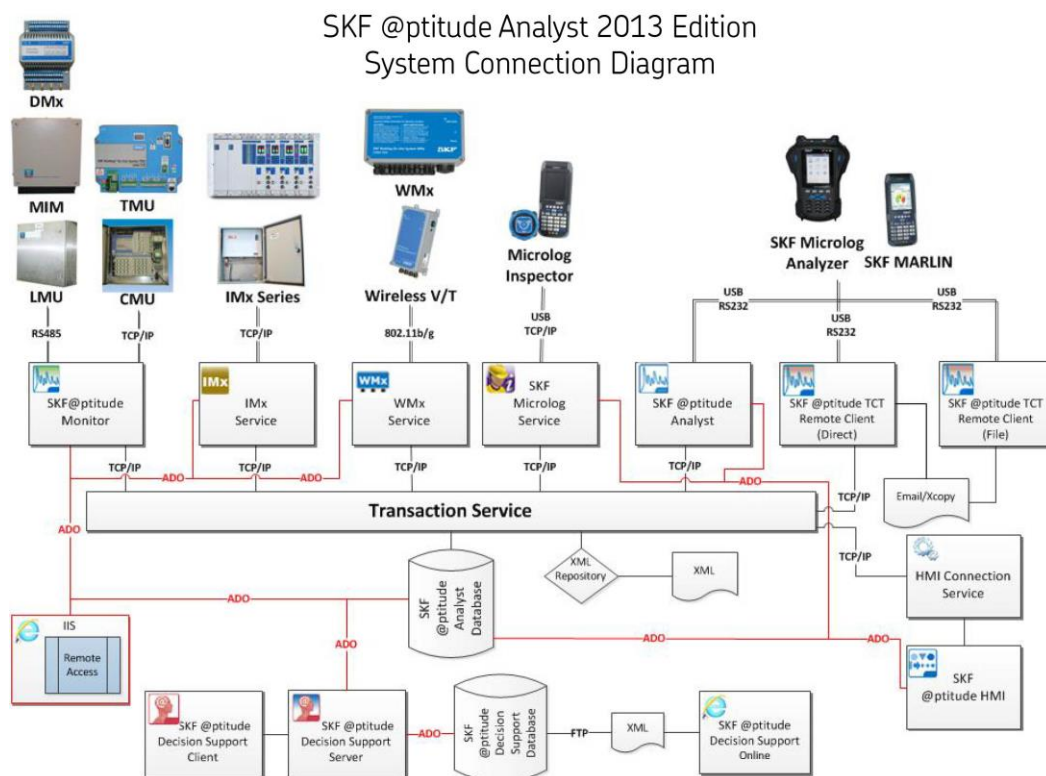


Figure 1 - 2.
Example of a Condition Monitoring System.

In the figure above, IMx units are connected using @ptitude LAN to @ptitude IMx Service. @ptitude IMx Service is also connected to a LAN network. Several @ptitude Analyst clients may be connected to this network. It is also possible to connect different types of on-line devices in the same network, for example an IMx and WMx.

To set up your IMx system for data collection:

- Install the IMx hardware. Reference your IMx Hardware User Manual for details.
- Identify the computer to run the SKF @ptitude IMx Service. You will need this information for the following step.
- Run SKF IMx Configurator. Identify the IP addresses for the IMx and the computer running IMx Service. You may need to contact your IT administrator to obtain IP address information.
 - Reference the SKF IMx Configurator manual for details.
- Run the SKF @ptitude Analyst Configuration Tool to add an IMx Service to the system. This step is necessary for setting up IMx devices in @ptitude Analyst. You may add multiple services on the same computer.
 - Reference the SKF @ptitude Analyst Configuration Tool manual for details.
- In @ptitude Analyst, set up your IMx devices, channels, and POINTs. Create measurement ROUTEs and download measurement data to the IMx.

Transaction Service

SKF Transaction Service is a support application that runs in the “background.” It is responsible for processing data received from the IMx, handling communication between @ptitude Analyst and IMx Service, and deleting POINTs on the IMx. SKF Transaction Service can also handle communication between @ptitude Analyst and @ptitude Analyst Monitor in an IMx system where data coming from the IMx is archived.

IMx Service

SKF Multilog IMx Service is also a support application that runs in the “background,” similar to @ptitude Analyst Monitor for the DMx.

Each IMx Service communicates with a set of IMxs. It is responsible for communicating with IMx devices, for processing data from IMxs and storing the data to the database. IMx Service uses the Transaction Service to report status information to @ptitude Analyst.

The WMx System

Together with SKF @ptitude Analyst software, the SKF Multilog On-line System WMx provides a complete on-line system for early fault detection and prevention, automatic advice for correcting existing or impending conditions, and advanced condition-based maintenance to improve reliability, availability, and performance.

The WMx unit is a compact, eight-channel, temporarily / permanently mounted, battery powered on-line data acquisition unit that communicates using your existing wireless network. It is ideal for monitoring machines in areas that are inaccessible, difficult or dangerous to reach, or where it would be expensive or hazardous to install cables.

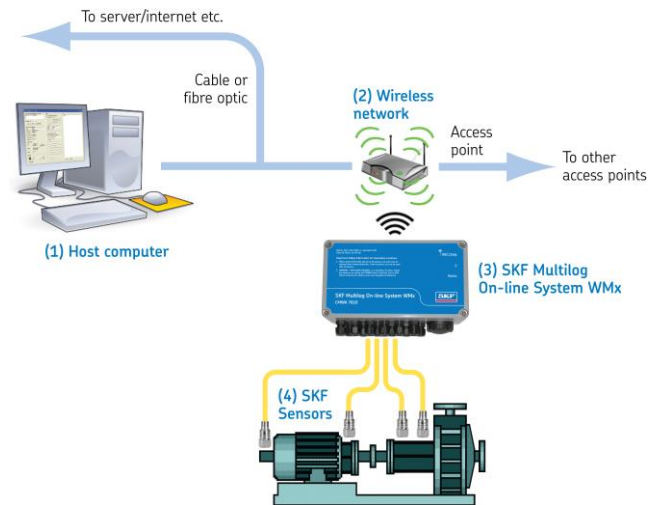


Figure 1 - 3.
WMx Network Overview.

To set up your WMx system for data collection:

- Install the WMx hardware. Reference your WMx Hardware User Manual (PN 32343900) for details.
- Identify the computer to run the SKF @ptitude WMx Service. You will need this information for the following step.
- Connect the WMx to the host computer using the supplied USB cable, and run the SKF Wireless Configuration Utility from the SKF @ptitude Analyst DVD's **Tools / WMx** folder to set up the network configuration. Reference your WMx Hardware User Manual for details.
 - You may download the Wireless Configuration Utility from the [SKF website](#). Select SKF Multilog WMx Series.
 - **(Windows XP users only)** The WMx USB device drivers are automatically installed when you install the WMx Configuration Utility or SKF @ptitude Analyst. For proper USB driver installation, you must connect and power on the WMx device before installing the software. When the **Windows XP Found New Hardware Wizard** displays, click **Cancel** and proceed with the software installation. If the WMx device is not available at the time of software installation, you must reinstall the device drivers when you first connect and power on the WMx. When the **Windows XP Found New Hardware Wizard** displays, proceed through the wizard to reinstall the drivers from SKF @ptitude Analyst DVD's **Tools / WMx / WMx USB Drivers** folder.
- Run the SKF @ptitude Analyst Configuration Tool to add a WMx Service to the system. This step is necessary for setting up WMx devices in @ptitude Analyst. You may only add one service on a computer.
 - Reference the SKF @ptitude Analyst Installation manual (PN 32312400) for details.

- In @ptitude Analyst, set up your WMx devices, channels, and POINTs.

Transaction Service

SKF Transaction Service is a support application that runs in the “background.” It is responsible for processing data received from the WMx, handling communication between @ptitude Analyst and WMx Service, and deleting POINTs on the WMx. SKF Transaction Service can also handle communication between @ptitude Analyst and @ptitude Analyst Monitor in a WMx system where data coming from the WMx is archived.

WMx Service

SKF Multilog WMx Service is also a support application that runs in the “background,” similar to @ptitude Analyst Monitor for the DMx.

Each WMx Service communicates with a set of WMxs. It is responsible for communicating with WMx devices, for processing data from WMxs and storing the data to the database. WMx Service uses the Transaction Service to report status information to @ptitude Analyst.

Setting Up Your WMx Device

Management of your WMx devices takes place from the **View** menu's **WMx Device** screen.

Overview

The **WMx Device** screen displays all WMx devices currently connected to @ptitude Analyst, and allows you to edit WMx device settings and channel settings.

- To configure a new device's network connection settings, use the @ptitude Analyst Configuration Tool's **WMx Service** screen.

To open the WMx Device screen:

- Click the **View** menu's **WMx Device...** option. The **WMx Device** screen displays.

The **WMx Device** screen is divided into two panes. The left pane is set up in a hierarchical structure, displaying each device, and each device's assigned channels, diagnostic POINTs, and Unassigned POINTs. The right pane displays information for the item that is selected in the left pane. Each hierarchy level is detailed in the sections that follow.

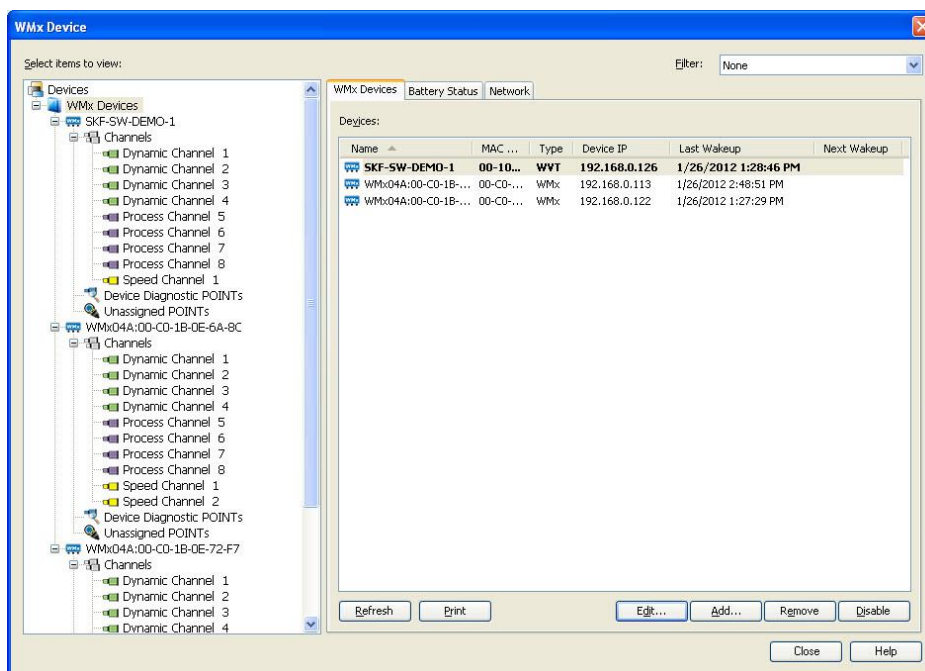


Figure 2 - 1.
The **WMx Device** Screen.

Fields include:

Select items to view – Displays each connected WMx and its assigned channels and POINTs in a hierarchical structure. Click an item to display its information in the right panel.

Filter – Select **None**, **By bad channel**, or **By name** from the **Filter** drop-down list to filter the items that display in the left pane.

None – All items display in the standard hierarchical structure.

By bad channel – Only those channels which have collected BOV out of range data display in the left pane.

By name – Enter the name of the item(s) you wish to display in the left pane.

Refresh – Click to refresh the view.

Print – Click to print a summary of the right panel view.

Edit – Click to display the **Device Properties** screen and modify device and channel settings.

Add – Click to display the **Device Properties** screen and add a new WMx device to @ptitude Analyst.

- Adding a device allows you to set up and assign POINTs to the device before it is online. The device must still be registered through the WMx Service before it can communicate with the @ptitude Analyst software.

Remove – Click to remove the selected device. When you remove a device from @ptitude Analyst, the device is automatically powered down. Select **Yes** or **No** when prompted to continue with the removal.

- When you remove a device from @ptitude Analyst, you should physically disconnect the device. Otherwise, the next time you connect to the WMx Service, the device will reappear in @ptitude Analyst.

Disable – Click to disable data collection for the selected device. You are prompted to power down the device. Select **Yes**, **No**, or **Cancel**.

Yes – Disable and power down the device.

No – Disable data collection only.

Cancel – Abort disabling the device.

Close – Click to exit the **WMx Device** screen.

WMx Devices Levels Overview

When the **WMx Devices** level is selected in the left pane, the right pane displays three tabs – **WMx Devices**, **Battery Status**, and **Network**.

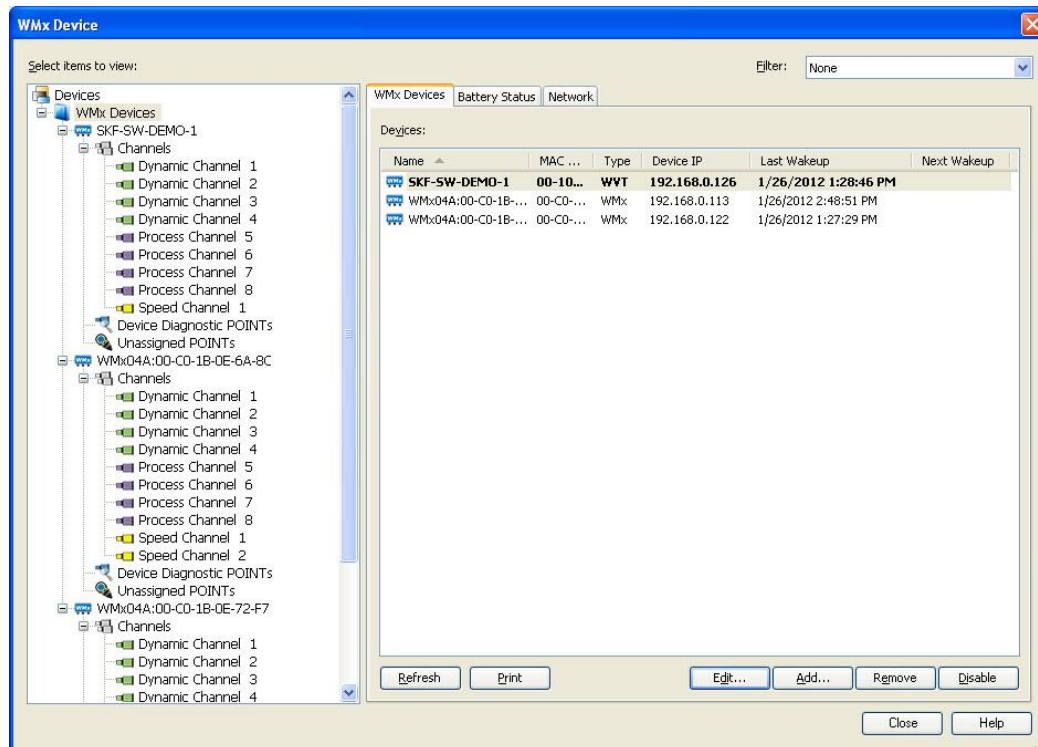


Figure 2 - 2.

The **WMx Device** Screen's **WMx Devices** Tab.

WMx Devices Tab

The **WMx Devices** tab displays a list of WMxs currently connected to @ptitude Analyst. The name of the device, MAC address, device type (WMx / WVT), device IP address, last wakeup time, and next scheduled wakeup time display. You may edit currently connected devices, remove / disable currently connected devices, or add a new device to @ptitude Analyst.

To edit a device:

- Select a device from the **Devices** list.
- Click the **Edit** button. The **Device Properties** screen displays.
- Click the **Device Setup** and **Channels** tabs and edit as necessary.
 - Reference the **Device Properties** section later in this chapter for details.

To add a new WMx device:

- Click the **Add** button. The **Device Properties** screen displays.
- Click the **Device Setup** or **Channels** tabs and edit as necessary.
 - Reference the **Device Properties** section later in this chapter for details.

To remove a device:

- Select a device from the **Devices** list.
- Click the **Remove** button. A message displays, informing you that the device is automatically powered down upon removal.

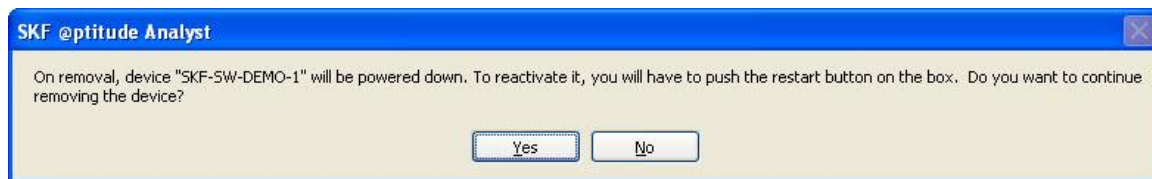


Figure 2 - 3.
Continue with removal prompt.

- Click **Yes** or **No** when prompted to continue with the removal.

To disable a device:

- Select a device from the **Devices** list.
- Click the **Disable** button. A message displays, asking if you wish to power down the device.

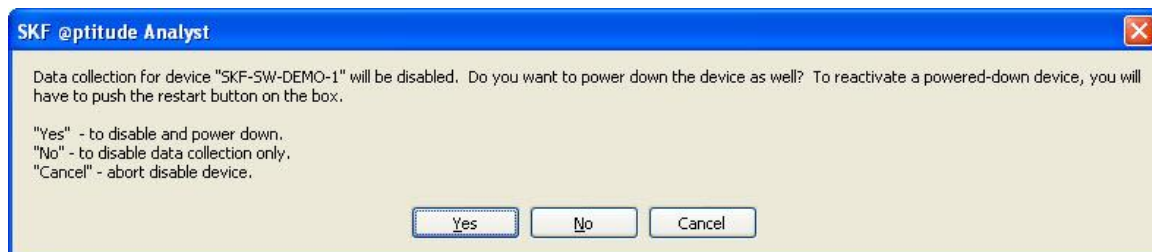


Figure 2 - 4.
Continue with disable prompt.

- Click **Yes** or **No** when prompted to continue with the disable.

Battery Status Tab

The **Battery Status** tab displays the battery / power status for each connected WMx device.

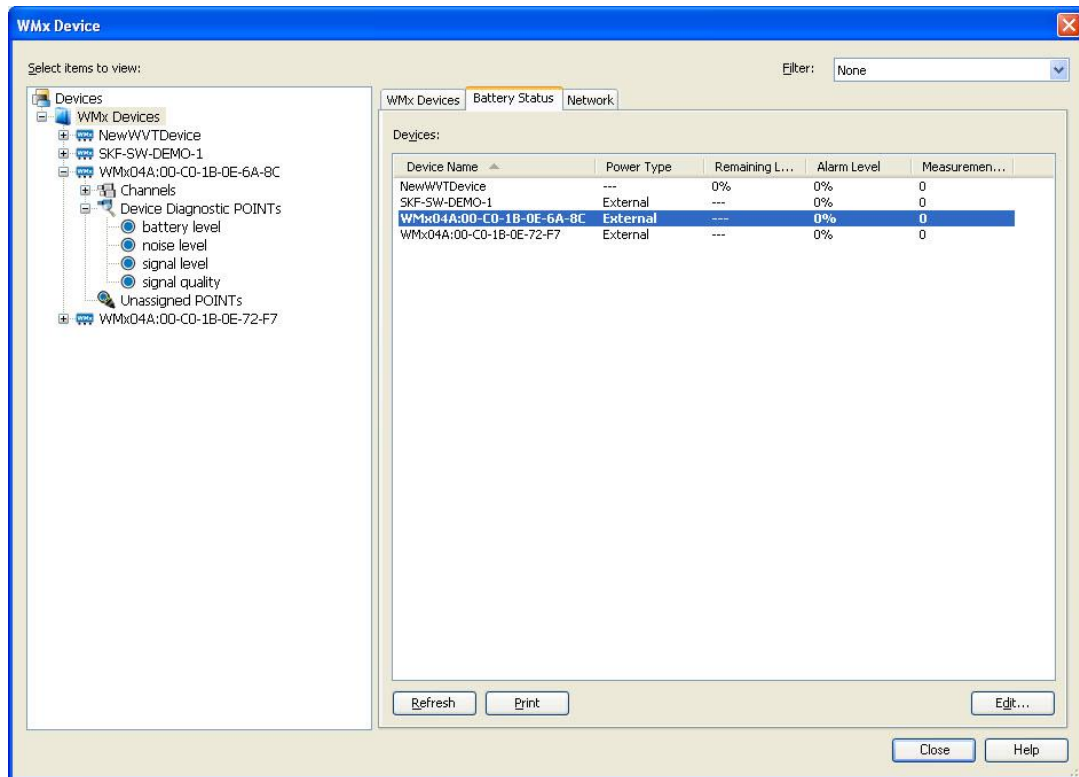


Figure 2 - 5.
The WMx Device Screen's **Battery Status** Tab.

To edit a device's battery information:

- Select a device from the **Devices** list.
- Click the **Edit** button. The **Device Properties** screen displays.
- Click the **Device Setup** tabs and edit the Battery information area as necessary.
 - Reference the **Device Properties** section later in this chapter for details.

Network Tab

The **Network** tab displays the network connection and diagnostic information for each connected device.

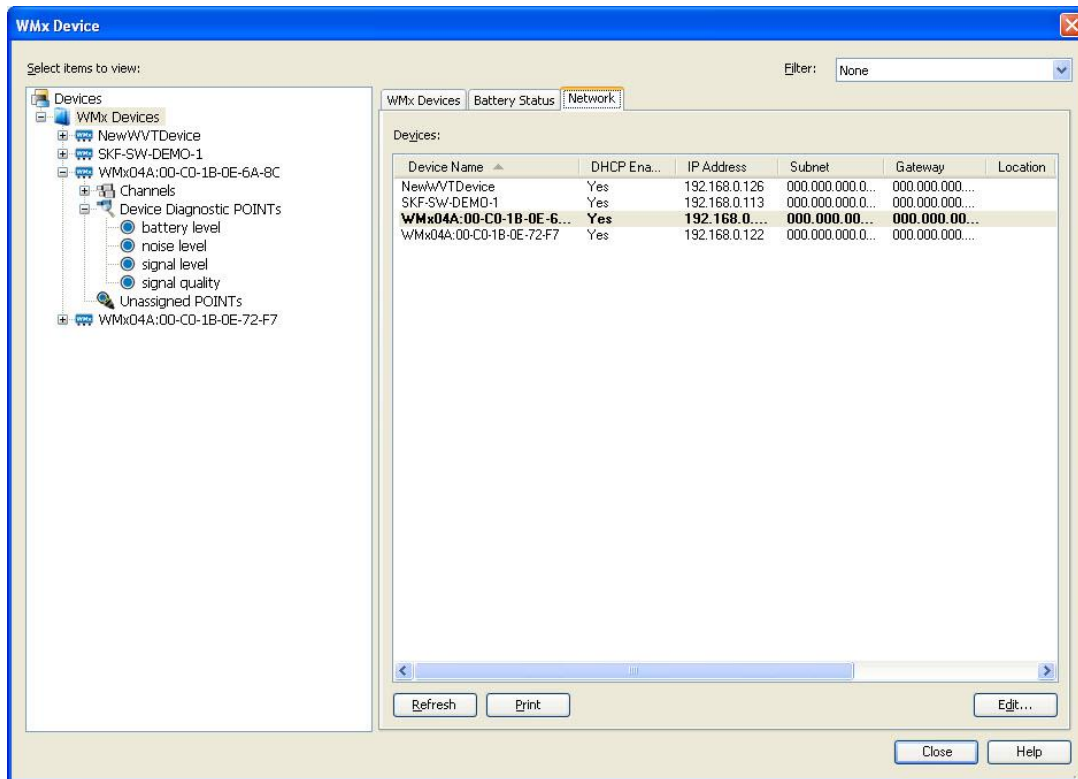


Figure 2 - 6.
The **WMx Device** Screen's **Network** Tab.

- WMx network information is read-only in @ptitude Analyst's **WMx Device** screen. To modify your network settings reference the SKF @ptitude Analyst Installation Manual for details.

To view more network information details:

- Select a device from the **Devices** list.
- Click the **Edit** button. The **Device Properties** screen displays.
- Click the **Network Info** tab.
 - Reference the **Device Properties** section later in this chapter for details.

Device Level

When you select a device from the left pane, the right pane displays two tabs – **Device Info** and **Channels**.

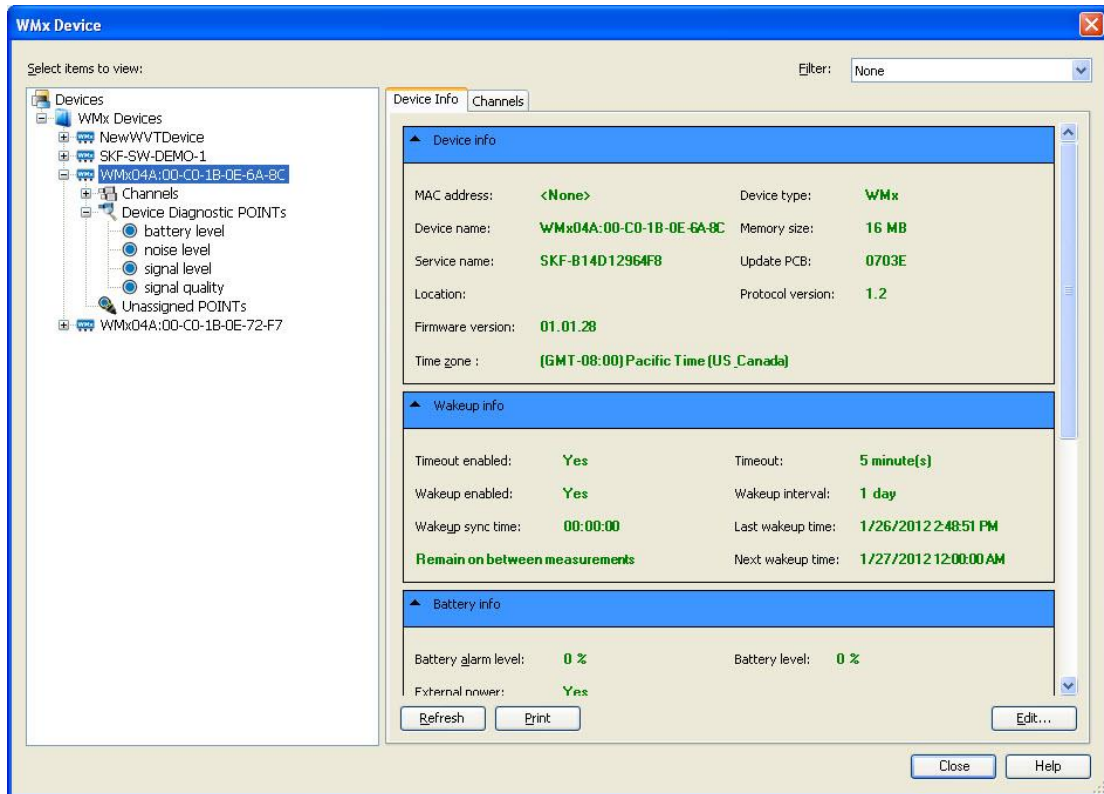


Figure 2 - 7.
The **WMx Device** Screen's **Device Info** Tab.

Device Info Tab

The **Device Info** tab displays a summary of the selected device's settings, wakeup, battery, network, and diagnostic information.

To edit the selected device's settings:

- Click the **Edit** button. The **Device Properties** screen displays.
- Click the **Device Setup** tab and edit as necessary.
 - Reference the **Device Properties** section later in this chapter for details.

Channels Tab

The **Channels** tab displays a summary of the channels assigned to the selected device.

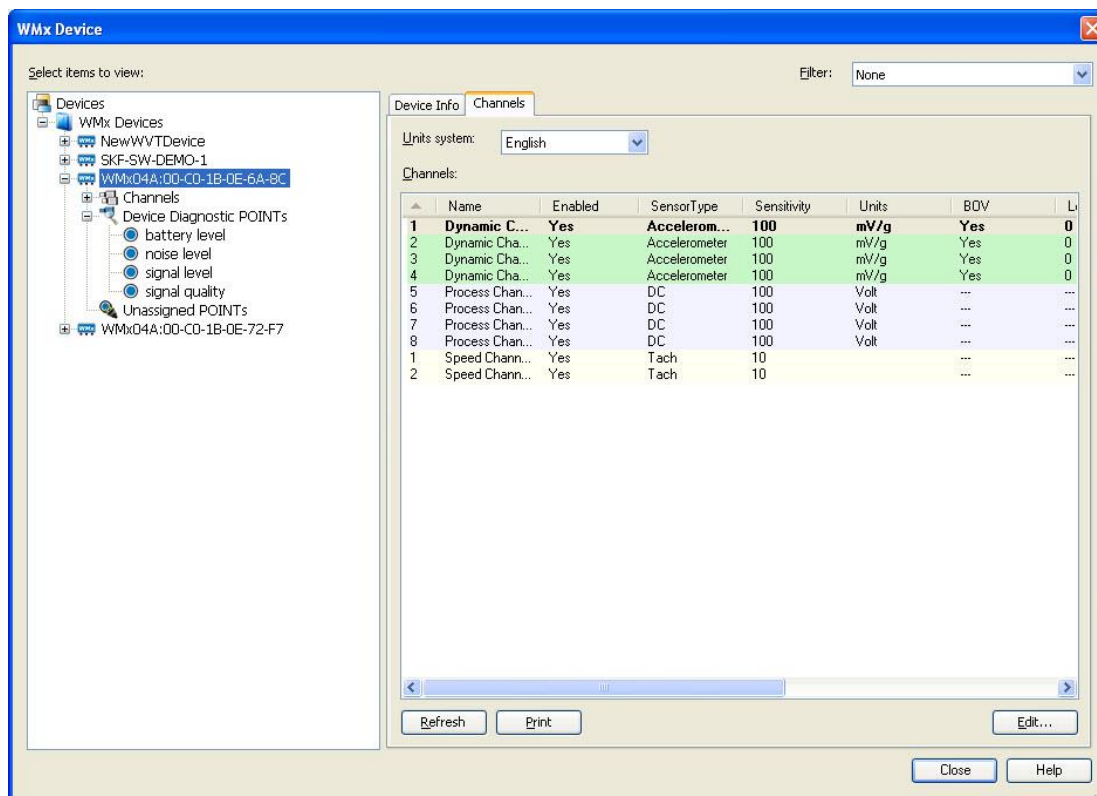


Figure 2 - 8.
The WMx Device Screen's **Channels** Tab.

To edit the selected device's channels:

- Select a device from the **Devices** list.
- Click the **Edit** button. The **Device Properties** screen displays.
- Click the **Channels** tab and edit as necessary.
 - Reference the **Device Properties** section later in this chapter for details.

Channels Level

When you select the **Channels** hierarchy item or a specific channel in the left pane, the right pane displays a summary of the channel settings.

Channels Tab

If you select the **Channels** hierarchy item, the **Channels** tab displays. Reference the **Device Level / Channels Tab** section above for details.

Channel Info Tab

If you select a specific channel hierarchy item, the Channel Info tab displays a summary of the selected channels information.

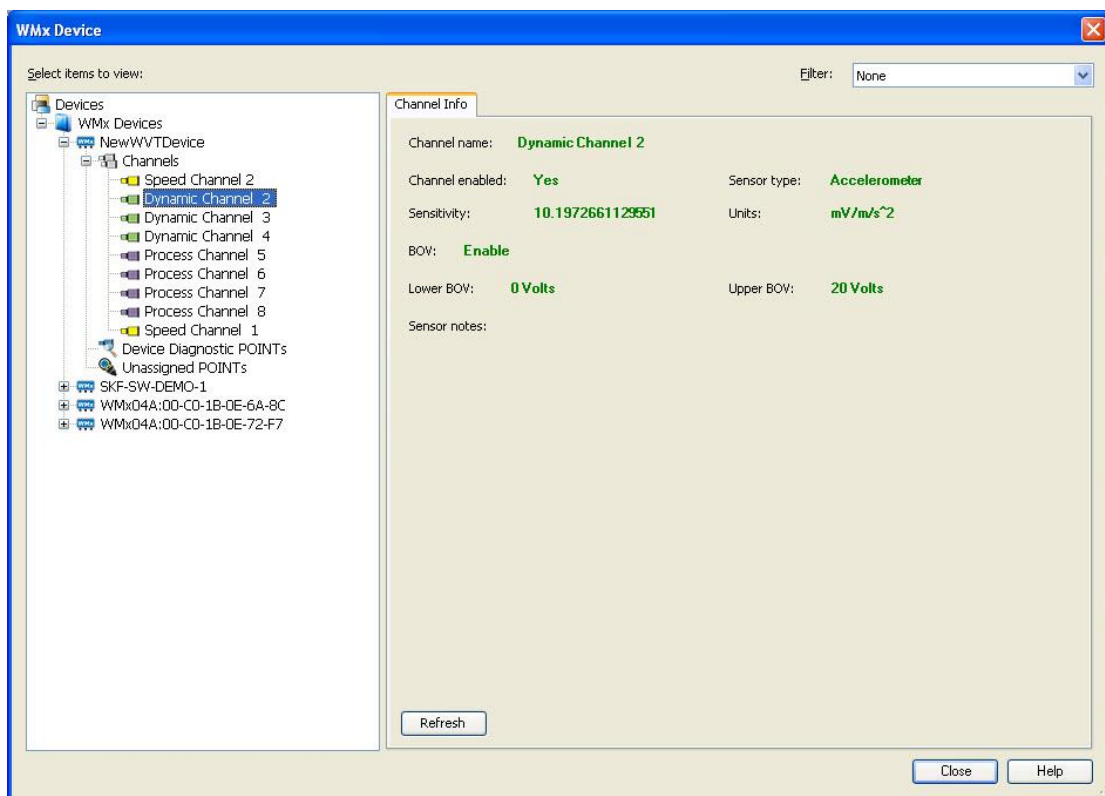


Figure 2 - 9.
The **WMx Device** Screen's **Channel Info** Tab.

- The **Channel Info** tab is a read-only tab and the **Edit** button is not available. To modify the selected channels settings, reference the **Device Level / Channels Tab** section above.

Device Diagnostic POINTs Level

Device Diagnostic POINTs are used to trend the WMx battery status and wireless connection performance parameters. The diagnostic POINTs assigned to the device display below the **Device Diagnostic POINTs** hierarchy item.

- Diagnostic POINTs are created and assigned to a WMx device using the **Insert** menu's **Insert POINT** option. Reference **Chapter 3, Working With Your SKF @ptitude Analyst Hierarchy** for details on inserting new POINTs.

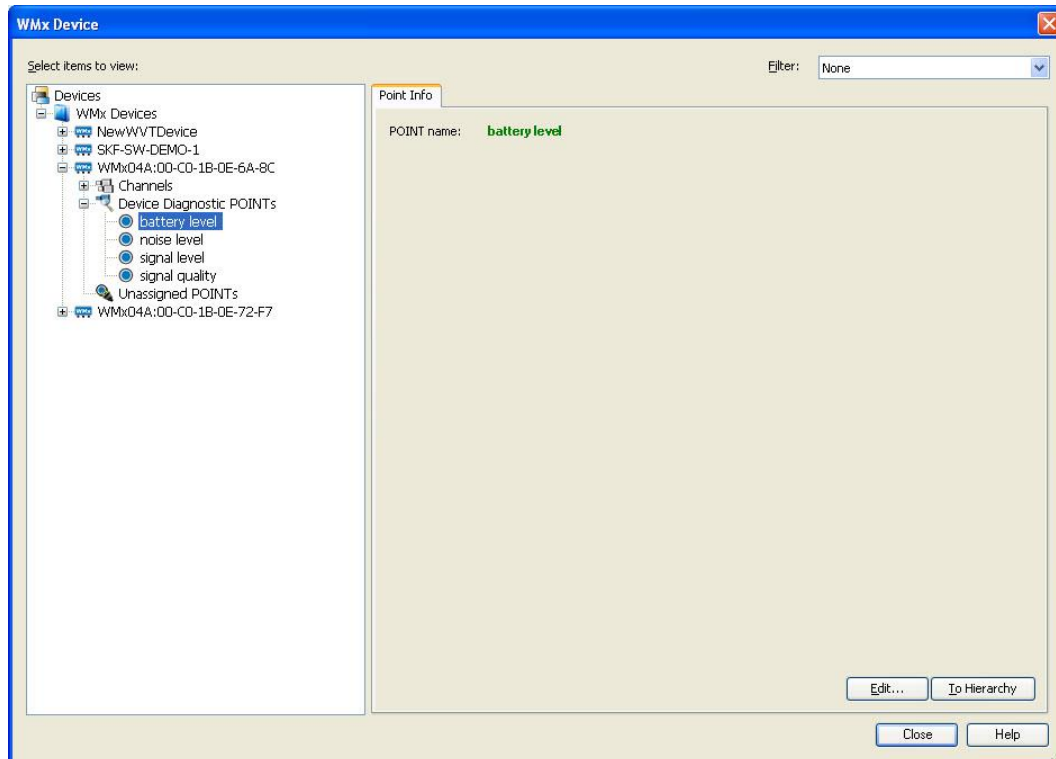


Figure 2 - 10.

The **WMx Device** Screen's Device Diagnostic POINT's **POINT Info** Tab.

- For the battery diagnostic POINT level alarm, there are many factors that affect battery life. Two main influential factors are how long the WMx has to stay on to collect a set of measurements, and how often the measurements are collected. Both vary from site to site. To determine a baseline, it is recommended that you set up a typical route and run the WMx with your typical collection schedule until the batteries are completely depleted. Then use the trended battery level to set up your site specific alert and danger alarm levels. When the battery is below critical level (which may be above 0% battery level), no more measurements will be collected and a "battery level below critical" message is entered in the @ptitude Analyst Event Log. Depending on the WMx device wakeup settings, the system continues to periodically log new battery critical messages into the

Event Log if the battery level remains below critical. Reference the **Battery Life Estimation and Optimization** section in your **WMx Hardware User Manual** for more details.

- For the wireless link, signal, and noise POINT level alarms, you must first establish baseline readings for a working Wi-Fi connection, and then adjust the alert and danger alarm threshold levels.

POINT Info Tab

When you select a diagnostic POINT the POINT Info tab displays, allowing you to view details and edit settings for the selected diagnostic POINT.

To edit a diagnostic POINT's settings:

- Select the diagnostic POINT you wish to modify.
- Click the **Edit** button. The selected diagnostic POINT's **POINT Properties** screen displays.
- Make any necessary changes to the POINT's settings. Reference **Chapter 3, Working With Your SKF @ptitude Analyst Hierarchy** for details on the **POINT Properties** screen.
- Click **OK** when you are finished editing the diagnostic POINT's settings.

To locate the diagnostic POINT in the @ptitude Analyst Hierarchy:

- Select the diagnostic POINT you wish to locate.
- Click the **To Hierarchy** button. The **WMx Device** screen closes and the diagnostic POINT is highlighted in the @ptitude Analyst Hierarchy.

Diagnostic POINT Overview

Four diagnostic POINT types are available for trending battery level and wireless network parameters:

Battery Level
Wireless Link
Wireless Signal
Wireless Noise

Battery Level - Trends the remaining battery life in % for lower out-of-window alarm thresholds.

There are many factors that affect battery life. Two of them are, how long the WMx has to stay on collecting the measurements, and how often the measurements are collected. Both vary from site to site. To determine a baseline, it is recommended that you set up a typical route and run the WMx with your typical collection schedule until the batteries are completely depleted. Then use the trended battery level to set up your site specific alert and danger alarm levels.

When the battery is below critical level (which may be above 0% battery level), no more measurement will be collected and a "battery level below critical" message is entered in the @ptitude Analyst event log.

Wireless Link – Percentage that trends the Wi-Fi overall link quality with lower out-of-window alarm thresholds. Higher percentages indicate stronger links.

Wireless Signal - Trends the Wi-Fi signal level in dBm with lower out-of-window alarm thresholds.

Wireless Noise - Trends the noise level in dBm with upper out-of-window alarm thresholds.

- Although the diagnostic POINTs are created under the channel node in the hierarchy, they are system parameters. Only one of each POINT type is needed for each WMx.
- You must first establish baseline readings for a working Wi-Fi connection, and then adjust the alert and danger alarm threshold levels.

For your reference, the following table describes wireless parameters in a typical office environment with reliable connections.

Distance from axis point	Link quality	Signal level - dBm	Noise level - dBm
10 m (30 ft)	60	-50	-85
13 m (40 ft)	45	-60	-85
30 m (100 ft)	25	-70	-85

Unassigned POINTs Level

Unassigned POINTs are POINTs that have been assigned to device but not to one of the device's channels.

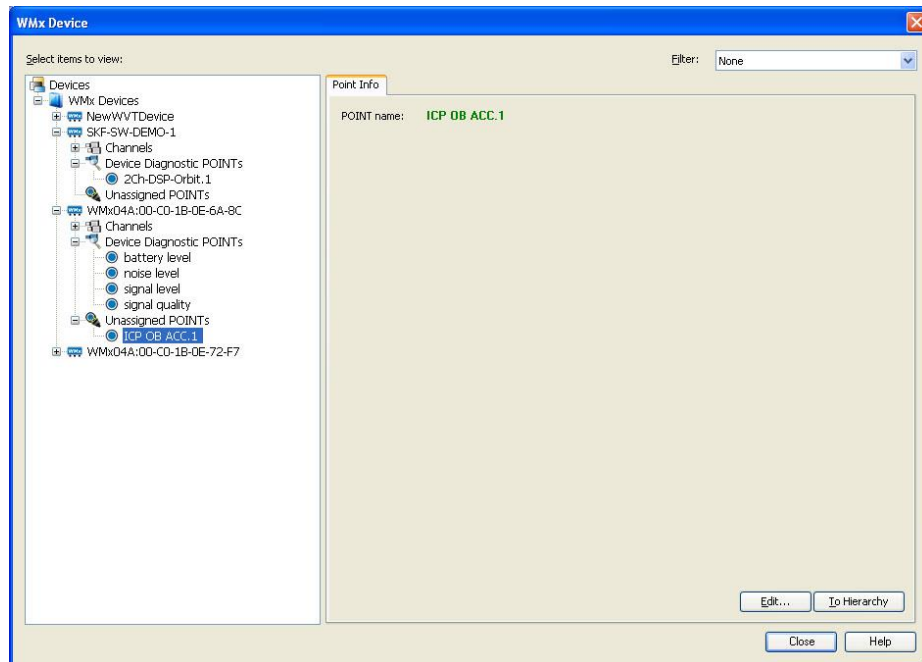


Figure 2 - 11.

The **WMx Device** Screen's Unassigned POINT's **POINT Info** Tab.

POINT Info Tab

When you select an UnassignedPOINT the POINT Info tab displays, allowing you to view edit settings for the selected unassigned POINT. For example, you may wish to assign channels to the unassigned POINT from this screen.

To edit an unassigned POINT's settings:

- Select the unassigned POINT you wish to modify.
- Click the **Edit** button. The selected unassigned POINT's **POINT Properties** screen displays.
- Make any necessary changes to the POINT's settings. Reference **Chapter 3, Working With Your SKF @ptitude Analyst Hierarchy** for details on the **POINT Properties** screen.
- Click **OK** when you are finished editing the unassigned POINT's settings.

To locate the unassigned POINT in the @ptitude Analyst Hierarchy:

- Select the unassigned POINT you wish to locate.
- Click the **To Hierarchy** button. The **WMx Device** screen closes and the unassigned POINT is highlighted in the @ptitude Analyst Hierarchy.

Device Properties

The **Device Properties** screen allows you modify the selected device's settings, view the device's network information, and modify its channel settings.

To open the **Device Properties** screen, click the **Edit** button from the **WMx Device** screen.

The screenshot shows a window titled "Device Properties - SKF-SW-DEMO-1" with three tabs: "Device Setup", "Network Info", and "Channels". The "Device Setup" tab is active. It contains three sections: "Device information", "Wakeup information", and "Battery information".

Device information:

- MAC address: 00-10-7A-71-A0-45 (with a "No MAC address" checkbox and a "Swap..." button)
- Device name: SKF-SW-DEMO-1
- Service name: SKF-B14D12964F8 (dropdown menu)
- Location: (empty text field)
- Firmware version: 03.00.50
- Device type: WWT (dropdown menu)
- Memory size: 8 MB (dropdown menu)
- Update PCB: ICON0703D
- Protocol version: 1.3
- Time zone: (GMT-08:00) Pacific Time (US & Canada) (dropdown menu)

Wakeup information:

- Timeout: 5 minute(s) (with "Timeout enabled" checkbox checked)
- Wakeup interval: 1 day (dropdown menu) (with "Wakeup enabled" checkbox checked)
- Wakeup sync time: 00 : 00 : 00 (spinners)
- Power down between measurements (radio button selected)
- Remain on between measureme (radio button unselected)
- Last wakeup time: 1/26/2012 4:39:09 PM
- Next wakeup time: ---

Battery information:

- Battery alarm level: 0 %
- Battery level: 0 %
- External power: No

At the bottom right are buttons for "OK", "Cancel", and "Help".

Figure 2 - 12.
The **Device Properties** Screen's **Device Setup** Tab.

Depending on the level from which the Device Properties screen is launched, up to three tabs display – **Device Setup**, **Network Info**, and **Channels**.

Device Setup tab

The **Device Setup** tab allows you to edit the WMx device's settings.

Fields include:

Device Information area

MAC address – Enter the MAC address of the physical device. The MAC address can be found on the device's packaging.

No MAC address – Enable if you do not yet have the MAC address. This would allow the user to create a new device, channel configuration, and POINT assignments.

Swap button – Click to replace the selected device with a new device, but still retain the channel configuration and POINT assignments for both devices, without the user having to recreate the channel configuration / POINT assignments for the new device. The **Swap Device** dialog displays a list of devices available for swapping. Select the new device and click **OK**.

- Devices can not be downgraded. For example, you cannot swap device channel configuration and POINT assignments from a device with 16 MB of memory to a device with 8 MB of memory; also you cannot swap device channel configuration and POINT assignments from a WMx to a WVT.

Device name – Enter a unique name to identify the device.

Device Type – Displays the device type (WMx or WVT). This field is only editable for new devices.

Service Name – Select the WMx Service name that the device uses to connect to @ptitude Analyst from the drop-down list.

Memory Size – Displays the device's memory size. This field is only editable for new devices.

Location – Enter the physical location of the device.

Update PCB: (read-only) – Displays the device's PCB information.

SKF Part No.	PCB	Memory size	Features
CMWA WVT	ICON0603	8 MB	Obsolete, limited functionality
CMWA 7810	0703E	8 MB	Full functionality with original resolution for the enveloped measurements
CMWA 7810	0703E	16 MB	Expanded memory, full functionality, improved enveloped POINT resolution.

- Reference the WMx POINTs' End Frequency and Lines Validation for 8 MB WMx devices and enveloped POINTs and 16 MB WMx devices and enveloped POINTs tables in Chapter 3 - Working With Your SKF @ptitude Analyst Hierarchy / Setup Tab – WMx POINTs section.

Firmware version – (read-only) Displays the device's current WMx firmware version.

Protocol version – (read-only) Displays the device's current protocol version.

Time zone – Select the time zone of the device's physical location from the drop-down list.

Wakeup Information area

Timeout – Specify how long the WMx should remain idle while waiting for commands from the WMx Communication Service before going back to sleep.

Timeout enabled – Disable if you do not wish to use the network timeout.

Wakeup interval – Specify the amount of time between wakeups.

- At wakeup, the unit has a limit on the time that it remains powered up if it is unable to make contact with the network. This reduces battery drain when, for example, the network is temporarily down. If the unit wakes up and is unable to establish communication with its network it attempts to retry to connect. Reference the **Retry Strategy** section later in this chapter for details.

Wakeup enabled – Allows you to switch between *WakeUp Mode* and *Continuous mode*.

- Check this box to enable *WakeUp Mode*.

WakeUp Mode is when the WMx automatically takes measurements on a specified schedule. The wakeup schedule is set using the **Wakeup Interval** and **Wakeup Sync Time** fields on the **Device Setup** tab. This tells the unit at what time it should take data for the first time followed by the interval at which repetitive data collection should occur.

- Unchecked to enable *Continuous Mode*.

In *Continuous Mode*, the device does not follow a wakeup schedule. If the device's ON / OFF button is switched to OFF, it will not wakeup until the device is switched ON again by pressing the ON / OFF button on the device.

The WMx can also power down automatically in *Continuous Mode* if the WMx loses connection with the host computer and no command has been received from the host computer within the timeout period specified in the **Timeout** field described above. If this happens, you must press the ON / OFF button to manually restart the device.

Wakeup sync time – It is possible to synchronize the wake-up to a particular time using these fields. For example, if **Wakeup sync time** is set to a time of 15:00, **Wakeup interval** is set to two hours, and the time now is 17:00, then the unit will wake up at 17:15 (13:15, 15:15, 17:15, etc.) and every two hours thereafter. This value is used the first time you use the WMx.

- For systems with a large number of WMxs, it is helpful to stagger the synchronization of each unit by at least two minutes. This prevents all of the units from waking up together and all trying to connect to the host computer simultaneously, causing potential memory issues. Battery life is optimized if WMxs do not need to wait to be serviced by the host.

Last wakeup time – Displays the date and time of the last wakeup.

Next wakeup time – Displays the time of the next scheduled wakeup.

Power down between measurements – This mode is the only mode available when the WMx is battery powered, in order to conserve battery power. It is also available when the WMx is externally powered. The WMx powers down between measurements; therefore, any schedule changes are not effective until the next scheduled wake up time. When the unit is switched off, a real-time clock remains running that is used to power the unit up at pre-determined intervals.

Remain on between measurements - This mode is available only when the WMx is externally powered. After the WMx has completed taking measurements, it stays on and waits for the next scheduled interval to take the next round of measurements. It continues to listen between measurements, and immediately acts on any received commands. The WMx is more responsive to schedule changes in this mode. This is the recommended mode for an externally powered WMx.

Battery Information area

Battery alarm level – Specify a low battery life percentage to trigger a low battery event in the Event Log. For example, if set to 20%, when the remaining battery life reaches 20%, an event is initiated.

Battery level – (read-only) Displays the percentage of remaining battery run-time.

External power – (read-only) Displays **Yes** if powered by external power or **No** if powered by battery.

- Click **OK** to apply any changes and return to the **WMx Device** screen.

Network Info tab

The **Network Info** tab displays the device's network connection information and network diagnostic information.

- The information on this screen is read-only. To make changes to the network information, reference the SKF @ptitude Analyst Installation Manual for details.

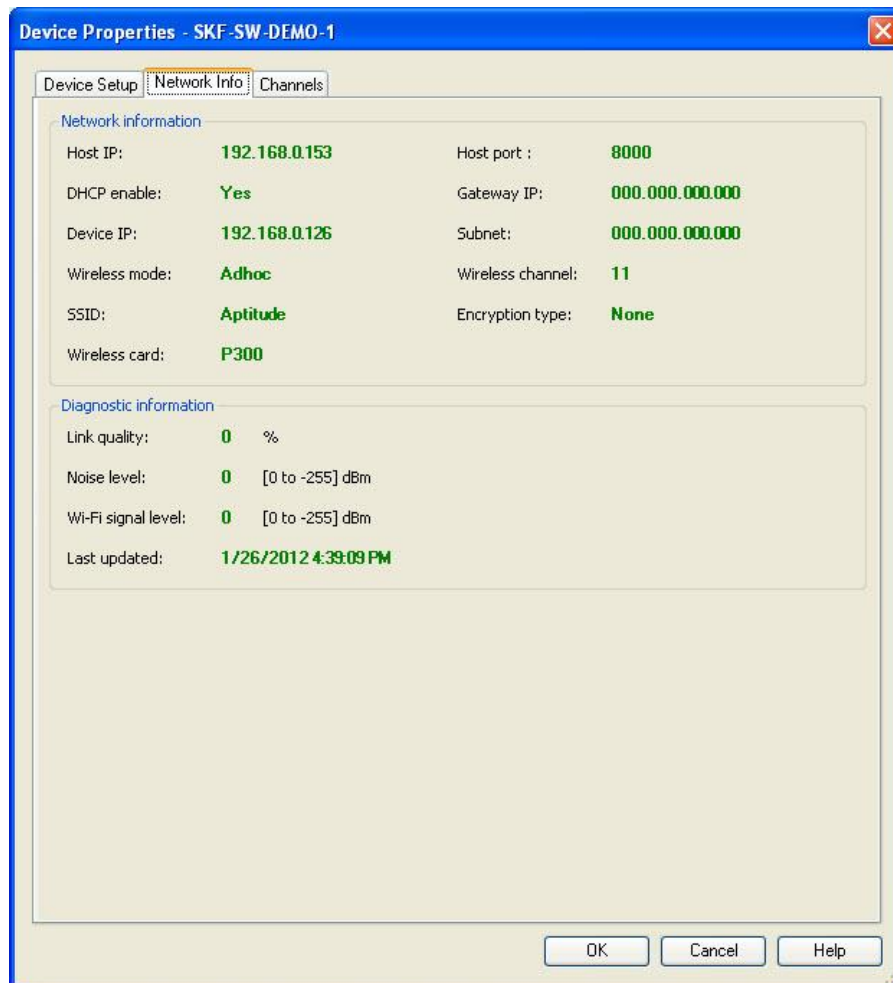


Figure 2 - 13.
The **Device Properties** Screen's **Network Info** Tab.

Fields include:

Network information area

Host IP – Displays the host computer's IP address.

Host Port – Displays the host computer's host port.

DHCP enable – Displays **Yes** or **No**, dependin on if the device is using a dynamic IP address.

Gateway IP – Displays the device's gateway IP address.

Device IP – Displays the device's IP address.

Subnet – Displays the device's subnet mask address.

Wireless mode – Displays the type of wireless network being used (Ad-hoc for peer-to-peer or Structured Network if an access point is used).

Wireless channels – Displays the wireless channel being used.

SSID – Displays the wireless network name.

Encryption type – Displays the encryption type (Disabled (None), WEP 64 bit, WEP 128 bit, WPA-PSK (TKIP/AES), WPA2-PSK (TKIP/AES)).

Wireless card – Displays the model name of the wireless card.

Diagnostic information area (read-only)

Link quality – Displays the current quality of the link to the network (0 to 100 %).

Noise level – Displays the current noise level (0 to -255 dBm). The lower the number, the lower the noise is; therefore, the closer to zero, the higher the noise level is.

Wi-Fi signal level – Displays the current Wireless Network signal quality (0 to -255 dBm). The closer to zero, the stronger the received signal is. The lower the number, the weaker the received signal is.

Last updated – Displays a date/time stamp of the device's last wakeup.

- Click **OK** to apply any changes and return to the **WMx Device** screen.

Channels tab

The **Channels** tab allows you to view and edit the device's channel settings.

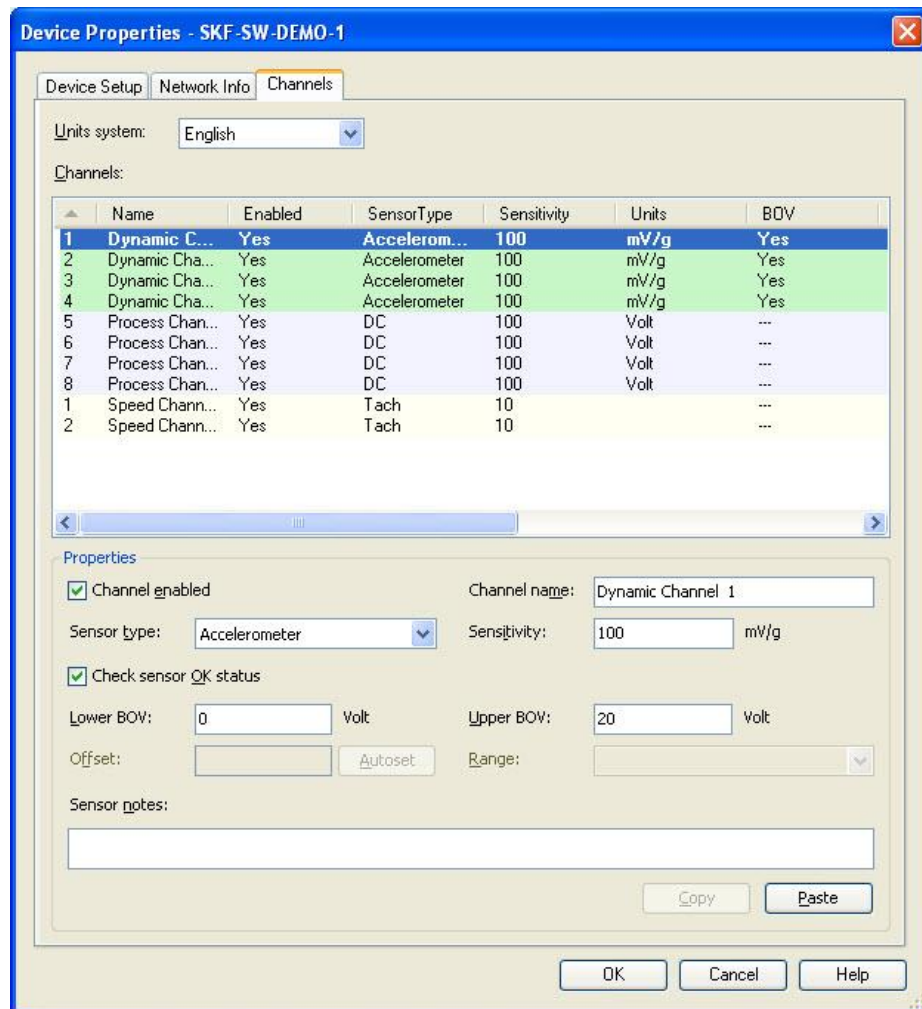


Figure 2 - 14.
The Device Properties Screen's Channels Tab.

Fields include:

Units system – Select the system units (**English** or **Metric**) to use on this tab.

Channels – Displays a list of the channels assigned to the device. The name, status (enabled / disabled), sensor type, sensitivity, units, and BOV (bias output voltage) status display for each channel.

Properties area – When a channel is selected in the **Channels** list, the channel properties display for editing purposes. Edit the following fields to make changes to a channel's settings:

Channel enabled – Click the **Channel Enabled** checkbox to enable a channel on the WMx. If the channel is disabled, the WMx skips the POINTs assigned to that channel during data collection.

Channel name – Assign the channel a unique name.

Sensor type – Specify the type of sensor used by the selected channel (**Accelerometer**, **Displacement Probe**, **Velocity Sensor**, **DC**, and **Tach**).

Sensitivity – Enter a value for the sensitivity of the sensor to be used in making the measurement.

Check sensor ok status – Click to enable this option. When enabled, @ptitude Analyst will check the sensor status, and will display the sensor status in **Device status** and **Online Data View** dialogs. If data is outside specified range, the WMx does not collect the data.

Lower BOV – Type in the BOV upper limit value.

Upper BOV – Type in the BOV lower limit value.

Offset – Enter a value in milivolts to offset the zero point of the measurement. Click the **Autoset** button to adjust the sensitivity and offset calculation using the **Offset Calculator**. The **Offset Calculator** allows you to set the sensitivity and offset values for scaling the WMx process input from channels 5 to 8 using two signal levels and their corresponding engineering units.

The calculator uses simple algebra to calculate the **Sensitivity** (slope) and the **Offset** (Y-intercept of a linear sensor curve).

POINT1 / POINT2 – Enter the **Engineering Unit** (X) from the sensor (i.e., °C, °F, etc.) and the corresponding **Signal level** (Y) in mV for both points from a sensor curve (X1, Y1 / X2, Y2). The calculator uses the following equation:

$$\text{Sensitivity} = (Y2 - Y1) / (X2 - X1)$$

$$\text{Offset} = Y1 - X1 * \text{sensitivity}$$

For example, MSS2100T temperature range is from 2 to 120 °C and 10 mV / °C in the 0-3 VDC range:

For setting up the input temperature in °C,

(POINT1) at signal = 20 mV, the temperature = 2 °C

(POINT2) at signal = 1200 mV, the temperature = 120 °C

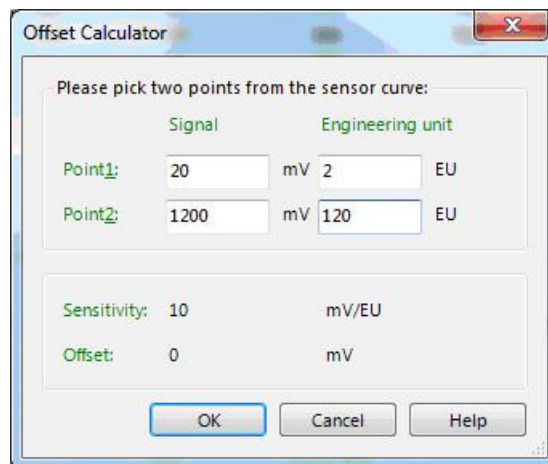


Figure 2 - 15.
The **Offset Calculator** Dialog in °C.

$$\text{Sensitivity} = (1200 - 20) / (120 - 2) = 10 \text{ mV} / ^\circ\text{C}$$

$$\text{Offset} = 20 \text{ mV} - 2 ^\circ\text{C} * 10 \text{ mV} / ^\circ\text{C} = 0 \text{ mV}$$

For setting up the input temperature in degF,

(POINT1) at signal = 20 mV, the temperature = 35.6 °F

(POINT2) at signal = 1200 mV, the temperature = 248 °F

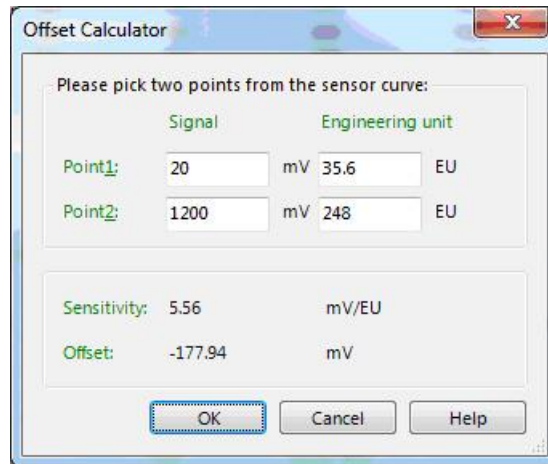


Figure 2 - 16.

The **Offset Calculator** Dialog in °F.

$$\text{Sensitivity} = (1200 - 20) / (248 - 35.6) = 5.56 \text{ mV} / ^\circ\text{C}$$

$$\text{Offset} = 20 \text{ mV} - 35.6 ^\circ\text{C} * 5.56 \text{ mV} / ^\circ\text{C} = -177.9 \text{ mV}$$

- Click **OK** to accept the calculated values and return to the **Channels** tab. The **Sensitivity** and **Offset** fields automatically update to reflect the calculated values.

Range – Select **0-3 V**, **0-10 V**, or **4-20 mA** input range from the drop down list. Input range must match the hardware's range jumper setting.

- For details on jumper settings, reference the SKF Multilog On-line System WMx CMWA 7810 User Manual's Jumper Summary section in Chapter 2.

Sensor notes – Type in any additional information you would like to store with the selected sensor settings.

To edit channel properties:

- Select the channel you wish to edit from the **Channels** list.
- In the **Properties** area, edit channel name, enable / disable the channel, and edit the sensor information.
 - When you start to edit a field in the **Properties** area, the **Channels** list turns gray, allowing you to only make changes to the selected channel. Also, the **Save** and **Undo** buttons become available.
- To cancel changes to the selected channel, click **Undo**.

- When you have finished editing the channel properties, click **Save** to save your changes.
- Use the **Copy / Paste** function to copy the selected channel's properties and paste to another channel. To copy channel properties to multiple channels, select the **Number** checkbox of each channel, then click **Paste**.
- Click **OK** to apply any changes and return to the **WMx Device** screen.

SKF Multilog WMx Retry Strategies Summary

Mode	Power Up or Wakeup	Communication Interrupted (Lost connection) For example, lost PC or Lost Access Point or WMx service stopped
Power Down Between Measurements The only mode available for battery powered devices; it is also available for externally powered devices.	The SKF Multilog WMx tries to connect to the WMx Service for 40 seconds, then powers down for up to 3 minutes (see Note 1 below for next retry time calculation). It then wakes up to retry for another 40 seconds. If no connection is established, it will shut down until the next scheduled wakeup time and repeat the cycle until connection is established.	SKF Multilog WMx idles, at a maximum, until the network timer times out (see Note 2 below). It shuts down for 3 minutes, and then starts the power up or wakeup process described in the adjacent left column.
Remain On Between Measurements (or Continuous) This mode is available only for externally powered devices.	After being manually switched on, the SKF Multilog WMx continues to try to connect to the WMx Service. It resets after the network timer times out (see Note 2 below) and continues to retry after a reset. It repeats the cycle until connection is established.	SKF Multilog WMx idles, at a maximum, until the network timer times out (see Note 2 below) and resets. After the reset, it starts the power up or wakeup process described in the adjacent left column.

Note 1: The next retry time is calculated by rounding up to the minute, then adding two minutes.

Note 2: Configure the network timeout in SKF @ptitude Analyst's **WMx Devices > Network** tab... **Device Properties / Device Setup** tab. Refer to the **SKF @ptitude Analyst and SKF Multilog On-Line Systems User Manual** (P/N 32296700) for details. Normally, the device will apply the retry strategy as soon as it detects the network communication is lost. However, when the device is waiting for a command and does not detect the network communication loss, then the device will apply the retry strategy when the network timeout expires.

SKF Multilog WMx in “Power Down Between Measurements” Mode

Wakeup

This example shows the execution of the new retry strategy using an SKF Multilog WMx scheduled to wake up at 15 minute intervals. The SKF Multilog WMx woke up at 14:45:10 and tried to connect. It tried for 40 seconds and then shut down at 14:45:53. To calculate the next retry time, it rounded up the current time to 14:46, and added two minutes to 14:48. At 14:48:10, it woke up to retry. After trying for 40 seconds, it shut down at 14:48:53. The next wakeup time is 14:45 + 15 minutes equaling 15:00 hours. The Log record for this example is shown below.

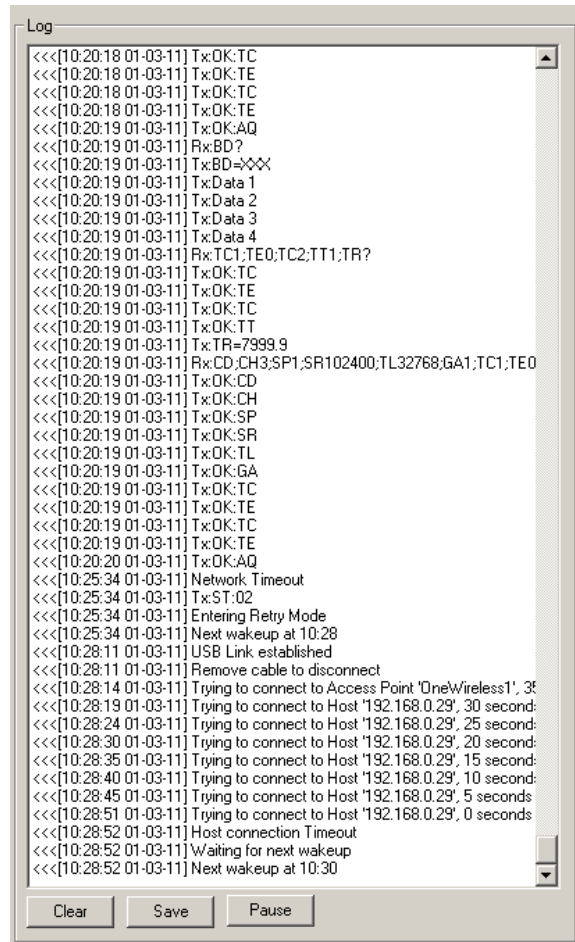


Figure 2 - 17.

Log Showing the SKF Multilog WMx Scheduled to Wakeup at 15 Minute Intervals.

Interrupted Communication

In the example below, the **Timeout** was set at five minutes, and the **Wakeup interval** was set at 15 minutes. The SKF Multilog WMx was connected and communicating, but was interrupted at 10:20:20. Because it did not detect the connection loss, the timeout expired five minutes later, at 10:25:34, and it shut down. Before it shut down, it calculated the next retry time according to Note 1 (rounded up the current time to the next minute and added two minutes) as 10:28. It woke up at 10:28:11 to retry for 40

seconds and finally shut down again at 10:28:52, with the next wakeup time scheduled for 10:30. The Log record for this example is shown below.



Figure 2 - 18.
Log Showing the Response to Interrupted Communication.

SKF Multilog WMx in “Remain on between Measurements” Mode

In the “Remain On Between Measurements” or “Continuous” mode, the WMx Service sends a probe command every minute to refresh the network timer function.

Manually Powered Up

In this example, the SKF Multilog WMx's **Timeout** was set at five minutes. After it was manually powered up, the SKF Multilog WMx was unable to connect to the WMx Service. It continued to try, and reset five minutes later at 16:36:32. After the reset, it continued to try to connect. The Log record for this example is shown below.

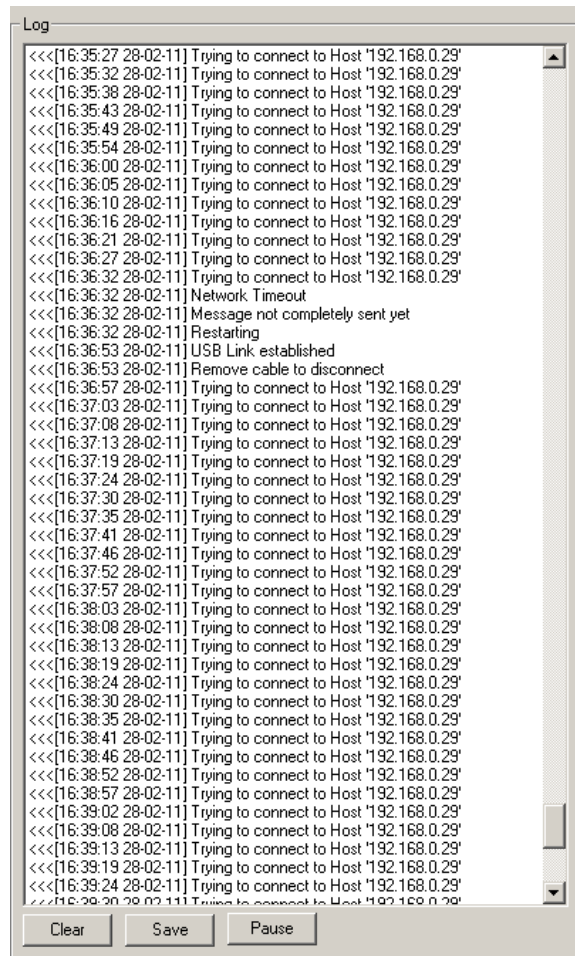


Figure 2 - 19.

Log Showing a WMx in Remain on Between Measurements Mode – Manually Powered Up.

Interrupted Communication

In the event the network is disconnected, the SKF Multilog WMx will reset after the timeout expires and then try to reconnect.

In the example below, the **Timeout** was set at five minutes. The SKF Multilog WMx completed a scheduled measurement at 15:00:05 and then went into idle status. The WMx Service sent a probe command every minute to keep the timer function from resetting. There was a network issue at 15:08:07. As a result, the SKF Multilog WMx no longer received the probe command. After five minutes (when the timeout expired), the SKF Multilog WMx reset at 15:13:21. After the reset, the unit continued to try to connect. The Log record for this example is shown below.

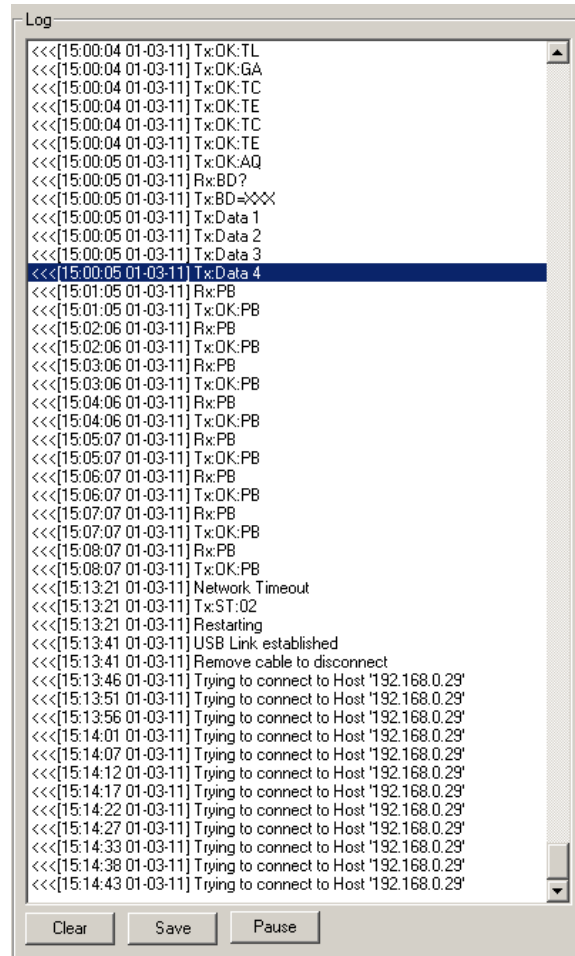


Figure 2 - 20.
Log Showing the Response to Interrupted Communication.

WMx Service Memory Watch

The Memory Watch function allows the WMx Service to periodically monitor the amount of physical and virtual memory being used by the server, and refreshes the service whenever memory consumption exceeds a specified threshold.

To configure the Memory Watch function's wakeup period:

- Open the **skfWMxService.exe.config** file located in the **C:\Program Files\SKF-RS\SKF @ptitude Analyst** folder.

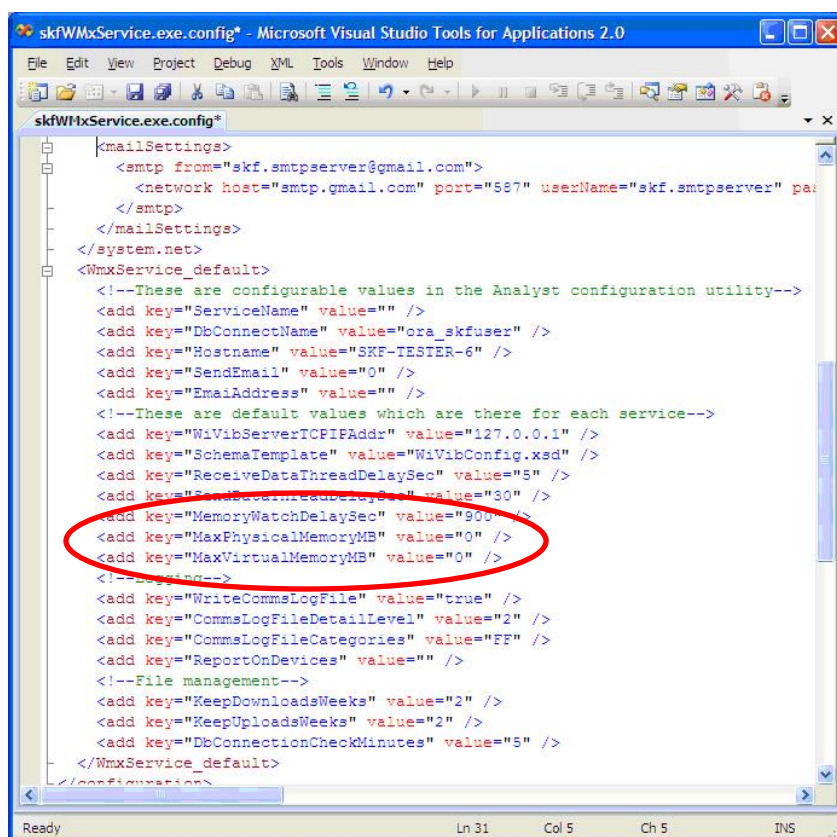


Figure 2 - 21.
The skfWMxService.exe.config Configuration File.

- Scroll down to locate the **WmxService_default** section.
- Edit the value fields for the following keys to configure the Memory Watch settings:

Do not edit any other value fields in the skfWMxService.exe.config configuration file than the fields specified below.

MemoryWatchDelaySec – Specify how often the Memory Watch function checks the server's memory consumption. Default is 900 seconds (15 minutes).

MaxPhysicalMemoryMB – Specify the maximum limit of physical memory in megabytes. A setting of zero seconds means monitoring is not enabled. Default is zero.

MaxVirtualMemoryMB – Specify the maximum limit of virtual memory in megabytes. A setting of zero seconds means monitoring is not enabled. Default is zero.

- In order to trigger the Memory Watch function to refresh the service, the **MaxPhysicalMemoryMB** and **MaxVirtualMemoryMB** must be set to a value greater than zero. When either value is set to zero, monitoring is disabled.

- Click **File / Save** and close the configuration file.

Working With Your SKF @ptitude Analyst Hierarchy

Selecting which of your machinery requires monitoring, what measurements to perform on the selected machinery, and how often to perform these measurements requires a careful study of the needs of the plant.

Creating a Paper Copy Hierarchy

It is advisable to create a paper copy Hierarchy before creating your @ptitude Analyst Hierarchy. This paper copy Hierarchy of your machinery measurement POINTs should be organized in hierarchical format by machines and POINTs for each machine.

```

HIERARCHY
POWER GENERATION

GAS TURBINE
GT INLT 1HV
GT INLT 1VV
GT INLT 1XV
GT INLT 2HV
GT INLT 2VV
GT INLT 2X
MAIN PUMP
WATER TREATMENT
  
```

For each Hierarchy, use an outline format to create your Hierarchy's organizational hierarchy, with measurement POINTs branching from machines, which branch from SETs.

Take time to organize your paper copy Hierarchy thoroughly. A complete and organized paper copy Hierarchy makes building your @ptitude Analyst Hierarchy much easier. When naming POINTs, it is helpful to keep machine names and POINT identifiers in columns (as exemplified above).

- If you have several machines with the same title (for example, GAS TURBINE), use an alpha or numeric prefix or suffix to uniquely identify one machine only (for example, GAS TURBINE INLT).

About POINT Names

In the @ptitude Analyst system, each measurement must be identified by a descriptive name. This can be accomplished by adding a suffix to each equipment name to denote the specific location, measurement orientation, and type of measurement.

Suffixes such as AHV, 1VD, and so on, can be used to identify specific MCD Probe vibration measurements, with letters denoting which end of the machine (A, B, 1, 2, etc.), direction (H - horizontal, V - vertical, or A - axial), and type of measurement (V - velocity, D - displacement, etc.).

- In a hierarchy list, POINTs branching from the same machine must have unique names. However, POINTs branching from different machines may share the same name. Also, each machine must have a unique name. If you try to create a machine with the same name as another in the hierarchy list, SKF @ptitude Analyst automatically adds a numeric suffix to the machine's name. The same holds true for POINTs branching from the same machine. For example, if you have a machine named **Pump** and try to name another machine with the same name, @ptitude Analyst adds a suffix, and the new machine is named **Pump.1**.

Overview

In @ptitude Analyst, you create a Hierarchy that organizes your monitored machinery measurements into a hierarchy structure consisting of Groups (which consist of organizational SETs, machines, or custom groups) and measurement POINTs.

Each @ptitude Analyst hierarchy displays in the Hierarchy window in which its hierarchy items list. Multiple databases display in the same Hierarchy window, and only one Hierarchy window may be open at a time.

When building your Hierarchy, you insert hierarchy Groups, which you identify as either a Machine hierarchy item or an organizational SET hierarchy item, or a custom Group Type you create.

IMPORTANT

All hierarchy lists must contain Machine hierarchy items from which measurement POINTs branch. Measurement POINTs cannot branch from a SET hierarchy item or the root node. They must branch from a "Machine" hierarchy item.

After creating your paper copy hierarchy, your next task is to use your paper copy hierarchy to input your organizational hierarchy into @ptitude Analyst to build your @ptitude Analyst hierarchy. This chapter walks you through the usual @ptitude Analyst steps for creating a new hierarchy. These steps are:

- Create one or more new hierarchies.
- Create each hierarchy's organizational SETs (optional) and Machines.
- Add measurement **POINTs** to their appropriate machine, configuring each POINT as it is created.

The general steps required to create a new hierarchical structure are listed below. Refer to the indicated dialogs and topics for more information on specific steps.

- Use the **File** menu's **New** option to create a new hierarchy. A hierarchy window displays with a **Hierarchy** root node.

- With the Hierarchy window active, use the **Insert** menu to insert new **Groups** in the hierarchy window. Specify the new Group's **Type** as either **Machine** group, a **SET** group, or one of your custom groups (if available).
 - Refer to **Group Properties** for more information.
- After inserting your Machine hierarchy items, click to highlight a specific Machine and insert **New POINTs** for the Machine. Specify the new POINT's **DAD** and **POINT Properties**.
 - Refer to **POINT Properties** for more information.

IMPORTANT:

- * *Machines must have unique names.*
- * *POINTs must branch from a machine.*
- * *POINTs branching from the same machine must have unique names.*

Displaying Existing Hierarchies in the Hierarchy Window

To display hierarchies in the Hierarchy window:

- Use the **File** menu's **Open/Close** command to display the **Open/Close** dialog. All available hierarchies display in the **Open/Close** dialog.
 - Only the hierarchies to which the user has access display. For details on setting Hierarchy access, refer to the *Customizing Your @ptitude Analyst Software* section in *Chapter 2 – Getting Around in SKF @ptitude Analyst* of your *SKF @ptitude Analyst Introduction and Global Features* user manual.
- In the **Open/Close** dialog, enable the checkbox next to the hierarchy name(s) you wish to display in the Hierarchy window and click **OK**.

The selected hierarchies display in the Hierarchy window.

To remove a hierarchy from the Hierarchy window:

- Use the **File** menu's **Open/Close** command to display the **Open/Close** dialog.
- In the **Open/Close** dialog, disable the checkbox next to the hierarchy name(s) you wish to no longer display in the hierarchy and click **OK**. The disabled hierarchies no longer display in the Hierarchy window.

Creating a New SKF @ptitude Analyst Hierarchy

@ptitude Analyst's installation program installs a "demo" Hierarchy (unless you selected to install an empty Hierarchy only). You should create a new Hierarchy to store your machinery vibration measurements.

To create a new @ptitude Analyst Hierarchy:

- Select the **File** menu's **New** command. The **New** dialog opens.
- Enter a unique name for the new Hierarchy and click **OK**.

A blank Hierarchy window displays. The Hierarchy name appears in the window's title bar.

- Access to the new Hierarchy is assigned only to its creator. To give other users access to the new Hierarchy, refer to the **Managing Users** section in the **SKF @ptitude Analyst Introduction and Global Features User Manual**.

Setting Your Primary Hierarchy

@ptitude Analyst's Hierarchy window displays multiple hierarchies at one time in the same window. One hierarchy must be designated as the primary hierarchy.

The primary hierarchy is the default hierarchy and owns any newly created ROUTEs and Workspaces. When working in areas of the application that require hierarchy selection (e.g., Reports, Filters, Workspaces, etc.), this hierarchy will be offered by default. When in areas of the application where hierarchy selection is not offered (for example, Transfer), the primary hierarchy will automatically be used.

To set the primary hierarchy:

- In the **File** menu's **Open/Close** dialog, you may click the **Set Primary** button to set the highlighted hierarchy as the primary hierarchy. The primary hierarchy name appears in bold with the **[primary]** displayed next to the hierarchy name.

OR

- In the **Hierarchy** window, right click the hierarchy's root node, and select the **Set Primary** option. The primary hierarchy name displays in bold.

Inserting @ptitude Analyst Groups

- The DMx system hierarchy is created automatically, based on DMx modules communicating with @ptitude Analyst Monitor. (Refer to **Chapter 7** for details.) Although there is no need to manually insert the Group, this section contains information on configurable Group properties that may be useful to DMx users.

When building your hierarchy, you insert hierarchy Groups which you identify as either a Machine hierarchy item, an organizational SET hierarchy item, or a custom Group Type previously created.

To insert a new Group:

- Select the **Insert** menu's **New Groups** option. The **Group Properties** screen displays.
 - The keyboard's **Insert** key may also be used to insert a new group when in a Hierarchy, ROUTE, or Workspace window.

Group Properties Screen

General Tab

Group Properties / General fields are organized into three areas; **Settings**, **Segment and asset tracking**, and **Miscellaneous**.

Settings fields include:

Name – Enter a unique name to identify the new group.

Description – (optional) Enter a description to further identify the new group.

Type – Select **Machine** or **SET** from the drop down list.

- Custom group types may also be available for selection. Creation of custom group types is discussed later in this chapter.
- Once a Group's **Type** is specified, it cannot be changed.

Enable data collection checkbox – Click the checkbox to enable POINT transfer to a DAD.

- By default, data collection is enabled. To temporarily disable data collection, clear the checkbox.

Segment and asset tracking fields include:

Segment name – Enter text that defines the Group's physical location. For example, enter "Level 2" or "Press Section."

Asset name – Enter text that defines the physical machinery currently occupying the **Segment** entered above. For example, enter a machine's serial or part number.

- **Segments** remain fixed while **Assets** may be moved from one location (segment) to another.

- **Segment name** and **Asset name** fields are unavailable when working with a template item's group properties.

Miscellaneous fields include:

Priority – Priority assignments may be used in filtering and reporting. A machine is typically given a Priority rating when a problem is found and you wish to prioritize the problems to be addressed. Specify a machine's priority from the drop down list.

- The **Priority** field is only available if you are working with a Machine-type Group.
- Assign a color for each machine priority to allow easy identification of all machines with priority assignments. Enable to display a machine priority color in the hierarchy for all machines with assigned priority levels on the **Customize / Preferences / General** tab. Default is disabled.

Available priority assignments are:

- <No Priority>
- 1 – Critical
- 2 – High
- 3 – Medium
- 4 – Low
- 5 – Lowest

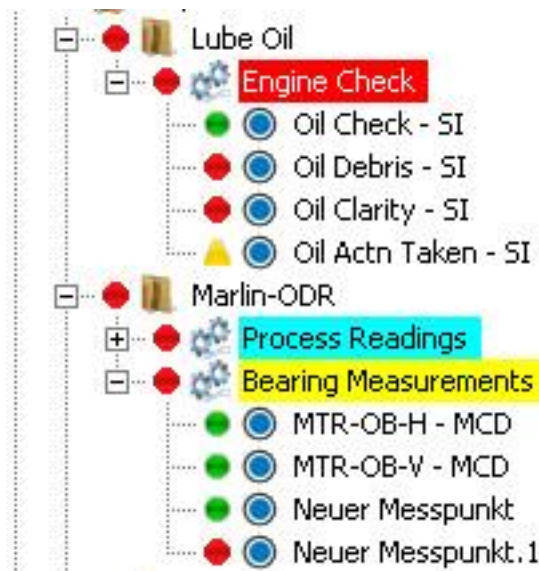


Figure 3 - 1.
Example of Machine Priority Color Displayed in Hierarchy.

Filter Keys Tab

@ptitude Analyst allows you to create **Filter Keys** which can be associated with POINTs and Machines for automated filtering purposes. For example, if you activated a “Pump” filter key for a Group and later filter a hierarchy list using the **Filter Key / Pump**, then all Groups with active Pump filter keys display in the filtered Workspace.

- Filter key creation is discussed later in this chapter.

Filter key searches list all POINTs or Machines sharing a specified filter key (or multiple filter keys). The **Filter Key** tab lists all created filter keys and indicates whether or not they are currently assigned.

- Click a specific filter key’s checkbox to associate it to the current POINT.
 - The checkbox appears gray if the filter key is enabled for a parent hierarchy item.
- Click the **Filter Key** tab’s **OK** button to save your filter key assignments.

Messages Tab

The **Messages** tab allows you to apply previously defined “shared” messages, and to create new, private messages to assign to the selected group.

The screenshot shows the 'Group Properties' dialog box with the 'Messages' tab selected. The dialog has a title bar with a close button. Below the title bar are tabs: 'General', 'Tags', 'Filter Keys', 'Messages' (selected), 'Notes', and 'Images'. The 'Messages context:' section contains a table with three columns: 'Context', 'Purpose', and 'Name'. The first row has 'Machine Instruction', 'Instruction', and '<Private>'. Below this is a large empty text area. The 'Properties' section has four fields: 'Messages:' with a dropdown menu showing '<Private>', 'Format:' with a dropdown menu showing 'Free form', 'Summary:' with a text box containing 'FD Fan Data Collection Info', and 'Content:' with a large text box containing 'Ensure sensor is properly mounted before collecting data.' At the bottom right of the 'Content' box is a 'Share As...' button. At the very bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Context	Purpose	Name
Machine Instruction	Instruction	<Private>

Messages context:

Properties:

Messages: <Private>

Format: Free form

Summary: FD Fan Data Collection Info

Content: Ensure sensor is properly mounted before collecting data.

Share As...

OK Cancel Help

Figure 3 - 2.
The **Group Properties** Screen’s **Messages** Tab.

@ptitude Analyst's **Group Properties / Messages** feature allows you to create and assign one message for general machine instruction purposes. The **Messages context** area displays the type of message available for assignment and any existing messages already applied. You can assign a previously created public message to the current group, or create and apply a new private message.

The **Name** drop down list displays all previously created messages and a **<Private>** option. Use this drop down list to specify whether you wish to set up a unique **<Private>** message for the current group only, or specify a previously defined "shared" message (selected by name). If you specify a shared message, its format, summary, and content automatically display in subsequent fields. If you specify a Private message, proceed to configure the message settings as described below.

- For more information on creating and managing public messages, refer to the **Customize / Database Operations** section later in this chapter.

Format – This drop down list allows you to specify your message's format.

Free form – Allows you to manually type in the summary and content for your message.

Summary – Type in text summarizing your message for easy recognition. For example, if you have a message that details specifics about a group of machinery, your summary may read, "FD Fan Data Collection Information."

Content – Enter your complete message in the content text area. Using the above example, your alarm message content would include detailed data collection information, specific to the current group. For example, your message may read "Ensure sensor is properly mounted before collecting data, etc."

To assign a shared message to the current group:

- Select the shared message from the drop down list and click the **OK** button.
Shared messages may be applied to an unlimited number of groups.

Shared Message

Alarm messages initially created as private messages may be converted into shared (public) messages. To share a newly created Private message, select the new Private message and click the tab's **Share As** button.

The **Enter Name** dialog specifies the message as a shared (public) message. When the **Enter Name** dialog displays, you will be prompted to give the shared message a unique name for easy identification.

- Enter a name for the shared message and click the **OK** button.
- The new shared message **now** appears as an available selection in the dialog's drop down list. Shared messages are easily assigned to other groups to simplify setup and maintenance.

Notes Tab

The **Group Properties / Notes** tab allows you to attach a text note to the Group along with a date / time stamp. This feature conveniently stores and records relevant Group information such as maintenance history.

- Coded notes uploaded from the on-line device for the current Machine display in the **Notes** tab.
- Click the **Notes** tab's **Add** button to add a new note and date / time stamp.
- Click the **Save** button to save edits made to a note.
- Click the **Undo** button to cancel edits made to a note.
- Click the **Remove** button to remove the selected note from the display.

Group Properties / Notes fields include:

Date – Select the current date from the drop down list.

Time – Select the current time.

The selected date and time appear in the tab's left **Notes** field.

Text – Type in desired note text in the text field.

- Click the tab's **OK** button to save all entries.

Images Tab

Scanned photographs or digital images can be added to a particular Group, stored in the Hierarchy, and viewed from the **Images** tab. Images help identify SETs / machines, organize similar equipment, and document known defects.

Group Properties / Images fields include:

Image – All attached images display in the drop down list.

Description – Enter text to identify the image. Click the **Save** button to save your description entry. If saved, the new description replaces the filename in the **Images** list.

- Click **OK** to save your new description entry.

To add a new image:

- Click the **Add** button to add a new image. The Windows' **Open** dialog displays. Select desired image and click **Open** to add or **Cancel** to undo.
 - Added images use the filename as the default description.

To replace / update the current image:

- Click the **Browse** button.
- Select a replacement image. The new image displays on the tab.
- Click **Save** to confirm the image replacement.
- Click **Cancel** to undo the image replacement.
 - The image name and description of the old image are retained for the replacement image.

To export an image to a specific location:

- Select the image to export.
- Click the **Export** button.
- When prompted, enter the desired export location and click **OK**.

The image is copied and saved to the specified location, but still remains attached to the assigned Group.

Details Tab

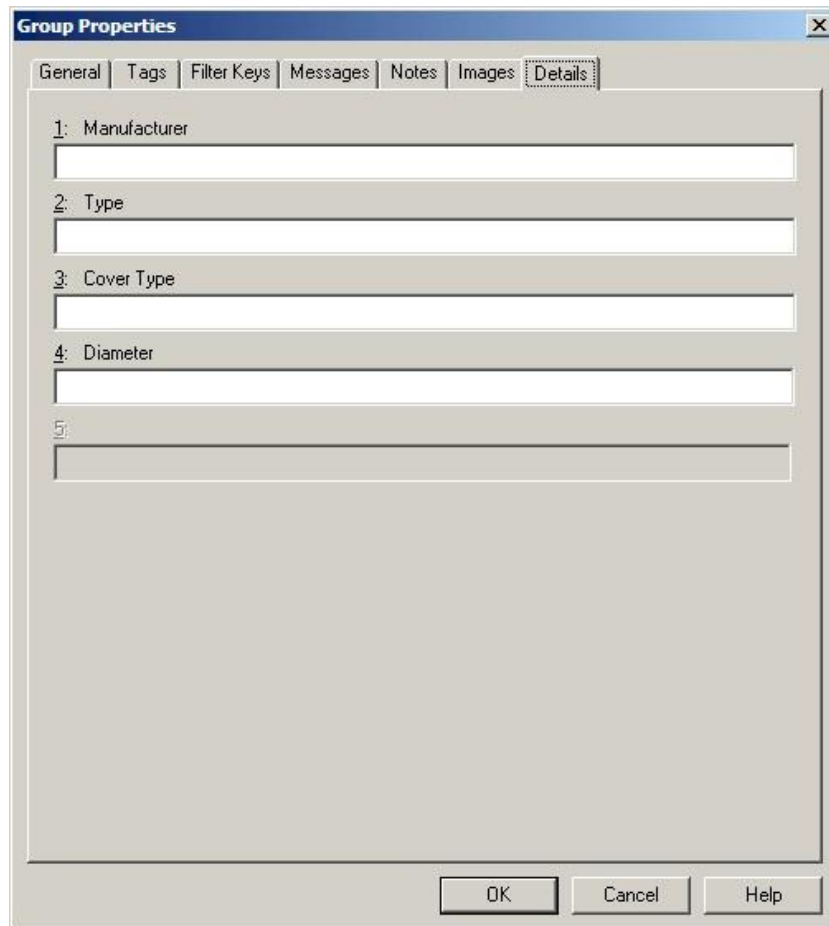
The screenshot shows a Windows-style dialog box titled "Group Properties". It has a tabbed interface with tabs for "General", "Tags", "Filter Keys", "Messages", "Notes", "Images", and "Details". The "Details" tab is currently selected. Inside the dialog, there are five labeled text input fields: "1: Manufacturer", "2: Type", "3: Cover Type", "4: Diameter", and "5:". Each field has a corresponding empty text box below it. At the bottom of the dialog, there are three buttons: "OK", "Cancel", and "Help".

Figure 3 - 3.
The **Group Properties** Screen's **Details** Tab.

- The **Details** tab is available only for custom Group Types.

Additional Group information can be entered in the **Details** tab and stored in the Hierarchy. The five fields that appear in the **Details** tab are defined in the **Customize / Database / Group Types** screen when you define a custom Group Type.

Enter appropriate information in the text box following the customized fields. Helpful **Details** information may include serial number, RPM, address, etc. These fields may be customized to support any type of information applicable to your specific application.

The **Details** tab is unavailable if detail options have not been previously defined in the **Database / Group Type** screen.

Inserting New POINTs

- The DMx system hierarchy is created automatically, based on DMx modules communicating with @ptitude Analyst Monitor. (Refer to **Chapter 7** for details.) Although there is no need to manually insert POINTs, this section contains information on configurable POINT properties that may be useful to DMx users.

Use the **Insert** menu to insert new measurement POINTs to your hierarchy machines.

To insert new POINTs:

- In the Hierarchy window, select the machine from you wish the new POINT to branch.
- Select the **Insert** menu's **New POINT** option. The **DAD / POINT Type Selection** dialog displays.
 - The keyboard's **Insert** key may also be used to insert a new POINT.

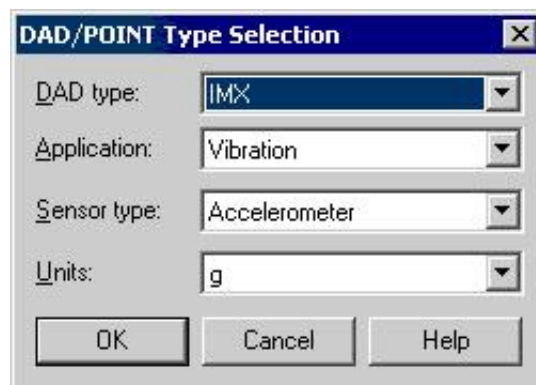


Figure 3 - 4.
The **DAD / POINT Type Selection** Dialog.

From the **DAD / POINT Type Selection** dialog, your **DAD Type**, **Application**, **Sensor**, and **Units** selections determine the POINT type. For example, **Vibration / Accelerometer / mm / sec** settings denote an acceleration to velocity type measurement, whereas **Vibration / Accelerometer / gE** settings denote an enveloped acceleration measurement.

Fields in this dialog include:

DAD Type – Select WMx / IMx from the drop down list of available DADs.

Application – Only applications consistent with your DAD type selection display in the **Application** drop down list. Select the appropriate application.

Sensor – Only sensors consistent with your selected application display in the **Sensor** drop down list. Select the appropriate sensor.

Units – Only units consistent with your selected sensor type display in the **Units** drop down list. Select the appropriate units.

- Click **OK** to save your settings.
- Click **Cancel** to terminate POINT insertion.
 - Once the POINT is saved with **DAD / POINT Type** information, this information cannot be modified.

After **DAD / POINT Type Selection** settings are saved, the **POINT Properties** screen automatically displays.

POINT Properties

The **POINT Properties** screen allows you to enter all POINT information and settings. On each tab:

- Click **OK** to save settings.
- Click **Cancel** to undo settings.

General Tab

The **POINT Properties** screen's **General** tab allows you to enter the POINT name and description and displays the DAD / POINT Type information you previously entered.

The screenshot shows the 'POINT Properties' dialog box with the 'General' tab selected. The dialog has a title bar with a close button. Below the title bar is a tabbed interface with the following tabs: Speed Alarm, Messages, Notes, Frequencies, Images, Band, Envelope, Threshold, General (selected), Setup, IMx Setup, Schedule, Filter Keys, Setup Log, and Overall. The 'General' tab contains the following fields and controls:

- Identity** section:
 - Name:** Text field containing 'New POINT'.
 - Description:** Text field containing a single space character.
 - Enable data collection:** A checked checkbox.
 - DAD type:** Text field containing 'IMX'.
 - Application:** Text field containing 'Vibration'.
 - Sensor type:** Text field containing 'Accelerometer'.
 - Units:** Text field containing 'mm/s'.
- Location:** A text field followed by a right-pointing arrow button.
- Two unchecked checkboxes at the bottom:
 - ☐ Only include POINT in reports if last measurement has been collected
 - ☐ Clear alarms for Non Collection last measurements.

At the bottom right of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Figure 3 - 5.
The **POINT Properties** Screen's **General** Tab.

POINT Properties / General fields include:

Name – Enter a unique name to identify the POINT.

Description – Enter a description to further identify the POINT.

Enable data collection – When POINTs are downloaded to the collection instrument, the **Enable data collection** setting determines whether the POINT is downloaded or ignored. Click the checkbox to enable.

DAD Type – Displays the DAD type previously assigned when the POINT was created.

Application – Displays the application type assigned when the POINT was created.

Sensor – Displays the sensor type assigned when the POINT was created.

Units – Displays the appropriate measurement unit assigned when the POINT was created.

- The **DAD Type**, **Application**, **Sensor**, and **Units** fields of the **General** tab cannot be edited once they have been assigned.

- When a POINT is disabled from downloading, its existing alarm conditions do NOT affect the system.

Location – Enter the data collection POINT on the machine. Options include:

Normal – Alphabetic identifiers A-J.

Displacement – Numeric identifiers 1-10.

Other – Six specific identifiers:

Drive End

Non-Drive End

Outboard

Inboard

Coupled End

Non-Coupled End

Orientation – Select from drop down list options (**Axial, Horizontal, None, Radial, Triax, Vertical, X, Y**).

Exclude from reports if last measurement is a Non-collection event. – Select (check) to have any reports that would include this POINT exclude it if its last measurement was a non-collection event (for example, the machine was marked as non-operating or certain measurement conditions were not met).

Clear Alarms for Non-collection last measurements. – Select (check) to have the system clear any previous measurement alarms for this POINT if its last measurement was a non-collection event (for example, the machine was marked as non-operating or certain measurement conditions were not met).

Sensor Setup Tab

The screenshot shows the 'POINT Properties' dialog box with the 'Sensor Setup' tab selected. The dialog has a title bar with a close button. Below the title bar is a row of tabs: Speed Alarm, Messages, Notes, Frequencies, Images, Band, Envelope, General, Sensor Setup (selected), Setup, Schedule, Filter Keys, Overall, Digital Output, and Gating. The 'Sensor names' field is a dropdown menu showing '<Custom sensor>'. Below this is a 'Properties' section with 'Sensor power' set to 'Internal ICP (4.4 mA)' and 'Settling time' set to '3.0 second(s)'. There is a large empty text area for 'Sensor notes'. Below that is a 'Channel status settings' section with a checked checkbox for 'Check sensor OK status', a 'Lower limit' of '4.0', and an 'Upper limit' of '18.0'. A 'Share As...' button is located to the right of the 'Upper limit' field. At the bottom of the dialog are 'OK', 'Cancel', and 'Help' buttons.

Figure 3 - 6.

The **POINT Properties** Screen's **Sensor Setup** Tab.

- RPM POINTs and Logic POINTs do not support sensor setup, so the **Sensor Setup** tab does not appear in the **POINT Properties** screen if the selected POINT is configured as an RPM, or Logic POINT.

The **Sensor Setup** tab allows you to re-apply previously defined “shared” sensors, eliminating the need to define sensor settings individually, saving time and database space.

Use the **Sensor Setup** tab to set a POINT's sensor settings. Settings can be configured in a variety of ways using the tab's fields.

The current sensor name appears in the **Sensor names** field. The current sensor's properties display below in the screen's **Properties** and **BOV Settings** areas.

The **Sensor names** drop down list displays all previously created sensors and a **<Custom Sensor>** option. Use this drop down list to specify whether you wish to set up a unique **<Custom Sensor>** for the current POINT only, or specify a previously defined sensor (selected by name). If you specify a shared sensor, its settings automatically

display in subsequent fields. If you specify a custom sensor, proceed to configure the tab's alarm settings as described below.

The **Properties** area provides options relating to Sensor Power, Settling Time, and Sensor Notes.

Sensor Power – Select the appropriate sensor power setting. Options include **Charge Converter**, **External Power**, and **Internal ICP (4.4 mA)**.

Settling Time – Type in the appropriate settling time in seconds.

Sensor Notes – Type in any additional information you would like to store with the selected sensor settings.

The **BOV Settings** area provides options relating to BOV gating.

Check Sensor OK Status – Click to enable this option. When enabled, @ptitude Analyst software will check the sensor status, and will display the sensor status in **Device status** and **Online Data View** dialogs.

Upper Limit – Type in the BOV upper limit value.

Lower Limit – Type in the BOV lower limit value.

To assign a shared sensor to the current POINT:

- Select the shared sensor from the drop down list and click the **OK** button. Shared sensors may be applied to an unlimited number of POINTs.

Shared Sensors

Sensors initially created as custom sensors may be converted into shared sensors. To share a newly created custom sensor, select the new custom sensor and click the tab's **Share As** button.

The **Share As** dialog specifies the sensor as a shared sensor. When the **Share As** dialog displays, you will be prompted to give the shared sensor a unique name for easy identification.

- Enter a name for the shared sensor and click the **OK** button.

The new shared sensor now appears as an available selection in the drop down list. Shared sensors are easily assigned to other POINTs to simplify POINT setup and maintenance.

Setup Tab – WMx POINTs

The screenshot shows the 'POINT Properties' dialog box with the 'Setup' tab selected. The dialog contains various configuration options for a WMx POINT. The 'Device' is set to '00-C0-1B-0E-6A-8C' and the 'Channel name' is 'Dynamic Channel 1'. The 'Full scale' is '100 gE' and 'Detection' is 'Peak to peak'. The 'Input filter range' is '30K to 600K CPM' and 'Gain' is '1'. The 'Freq. type' is 'Fixed span', 'Lines' is '800', 'Save data' is 'FFT and time', and 'Window' is 'Hanning'. The 'Start freq.' is '0 kCPM', 'Speed' is '1500 RPM', 'End freq.' is '120 kCPM', 'Averages' is '1', 'Low freq. cutoff' is '300 CPM', and 'Averaging' is 'Average'. The 'Enable tachometer' checkbox is checked, 'Tacho 1' is selected, 'Trigger Timeout' is '1 Second(s)', 'Pulses/Rev' is '1', 'Linear factor' is '0', and 'Linear speed units' is empty. The 'Control POINT' is 'None'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Figure 3 - 7.
The **POINT Properties / Setup** Tab.

Enter on-line device POINT setup information in this tab.

- The **POINT Properties / Setup** tab displays differently, depending on the POINT and DAD type. The following **Setup** fields apply to WMx POINTs.

If **Setup** units allow editing, the values display in an edit field.

- The **POINT Setup Validation** screen launches when you enter incompatible or erroneous information on the **Setup** tab.

Setup fields include:

Device – Select the appropriate on-line device name from the drop down list. The list contains all available device names.

- Devices may be added or removed in the **View menu's WMx Device** dialog.

Channel Name – Select the channel name from the drop down list to assign the POINT to a channel. Available channels are limited to channels assigned with the POINT's selected sensor type. Click the browse (...) button to display the **Channel Selection** dialog.

- Reference **Chapter 2, Setting Up Your WMx Device** for details on configuring WMx channels.

The **Channel Selection** dialog allows you to select a channel name and view the selected channel's properties. The fields are read only. Use the drop down list to select a different channel and view its properties. Click **OK** to save the selected channel and return to the **Setup** tab. Click **Cancel** if you do not wish to keep the selected channel.

Gain - (1 or 10). For small signals, select a multiplier to apply to the input sample to improve resolution. The default value is **1**; select **10** to improve amplitude resolution.

- Gain is not applicable for DC, Diagnostic, Speed, or integrated POINTs.
- Although you apply this multiplier to the input sample to improve resolution, it does not affect the final signal.

Detection - Click on the list box to view the choices (**Peak**, **Peak to Peak**, and **RMS**). Select the method of dynamic signal detection from the drop down list.

Input filter range - Specify the amplitude range scaling for envelope acceleration POINTs.

3K to 60K CPM

30K to 600K CPM

300K to 2.4M CPM

Freq. Type - (read-only) (**Fixed Span**).

Fixed Span – Specifies frequency as the unit of measurement for the horizontal axis of the FFT spectrum.

Full Scale - Enter a number to define the anticipated maximum amplitude to be measured for this POINT.

Save Data – Determines whether the DAD collects **FFT** data, **Time** Record data, or both.

Start / End Freq. – The **Start** frequency is always set to zero. Select the upper, full scale frequency range of the FFT between 1.5 kCPM and 2400 kCPM from the drop down list. Unless you are making a very unusual measurement, the upper full scale frequency should always be greater than running speed.

Low Freq. Cutoff – Enter a low frequency cutoff filter value for dynamic measurements. Although values are allowed from 0.0 CPM to 2,400 kCPM, the range for normal measurements is from approximately 200 CPM to 600 CPM, or the equivalent in Hz.

Pulses / Rev - Used to determine machine running speed. If a tachometer is connected, enter the number of tach. pulses that occur for each shaft revolution.

Lines – The spectrum's FFT resolution. Click the drop down list box to view available choices.

- The higher the resolution, the longer the data collection.

100	200	400	800
1600	3200	6400	12,800

Window – Select the type of window used in the FFT processing. Click the drop down list box to view the choices (**Hanning** or **Flat Top**). A window function must be applied to any periodic time record prior to performing an FFT. The **Hanning** and **Flat Top** window functions attenuate to zero both the leading and trailing edges of the sample in order to prevent leakage error caused by discontinuities in the time record.

Hanning – A dynamic signal analyzer window function that provides better frequency resolution than Flat Top, but with reduced amplitude accuracy. Useful for machine vibration measurements, general purpose measurement, and measurements containing random noise.

Flat Top – A dynamic signal analyzer window function which provides the best amplitude accuracy for measuring discrete frequency components. Useful for calibration of machine vibration measurements using displacement probes in fluid-film bearings.

Speed – Enter the nominal shaft speed in RPM.

Averages – Select the number of FFT averages to be collected (1 to 20). The higher the number of averages, the longer the data collection.

Averaging – (**Average** or **Synchronous Time**) If averaging has been selected for the POINT, determines the type of averaging performed, (either normal averaging, no averaging, peak hold averaging, or synchronous time averaging). Synchronous Time requires a tachometer assignment.

Enable tachometer - Click to enable tachometer.

Trigger Timeout - Enter the number of seconds (1 to 60) that the WMx waits for the trigger pulse before it will abort the measurement. An entry of 0 seconds is not allowed.

Linear Factor – Enter a numerical value for the desired multiple of machine speed to calculate the linear production speed.

Linear Speed Units – Type in the linear speed unit.

WMx POINTs' End Frequency and Lines Validation

8 MB and 16 MB WMx and Non-enveloped POINTs

End Frequency	Valid Lines	Max Time (seconds)
25	100 or 200	8
50	100, 200 or 400	8
100	100, 200, 400 or 800	8
200	100, 200, 400, 800 or 1600	8
500	100, 200, 400, 800, 1600 or 3200	6.4
1K	100, 200, 400, 800, 1600, 3200 or 6400	6.4
2K	100, 200, 400, 800, 1600, 3200, 6400 or 12800	6.4
5K	100, 200, 400, 800, 1600, 3200, 6400 or 12800	2.56
10K	100, 200, 400, 800, 1600, 3200, 6400 or 12800	1.28
20K	100, 200, 400, 800, 1600, 3200, 6400 or 12800	0.64
40K	100, 200, 400, 800, 1600, 3200, 6400 or 12800	0.32

WVT and Non-enveloped POINTs

End Frequency	Valid Lines
50	100, 200 or 400
100	100, 200, 400 or 800
200	100, 200, 400, 800 or 1600
500	100, 200, 400, 800, 1600 or 3200
1K	100, 200, 400, 800, 1600, 3200 or 6400
2K	100, 200, 400, 800 or 1600
5K	100, 200, 400, 800, 1600 or 3200
10K	100, 200, 400, 800, 1600, 3200 or 6400

WVT devices and enveloped POINTs

Input Filter Range	End Frequency in Hz	Valid Lines
500 to 10K Hz	100	100
	200	100 or 200
	500	100, 200 or 400
	1K	100, 200, 400 or 800
	2K	100, 200, 400, 800 or 1600
	5K	100, 200, 400, 800, 1600 or 3200
	10K	100, 200, 400, 800, 1600, 3200 or 6400

8 MB WMx devices and enveloped POINTs

Input Filter Range	End Frequency in Hz	Valid Lines
50 to 1K Hz	25	100 or 200
	50	100, 200 or 400
	100	100, 200, 400 or 800
	200	100, 200, 400, 800 or 1600
	500	100, 200, 400, 800, 1600 or 3200
	1K	100, 200, 400, 800, 1600, 3200 or 6400
500 to 10K Hz	100	100
	200	100 or 200
	500	100, 200 or 400
	1K	100, 200, 400 or 800
	2K	100, 200, 400, 800 or 1600
	5K	100, 200, 400, 800, 1600 or 3200
5K to 40K Hz	10K	100, 200, 400, 800, 1600, 3200 or 6400
	200	100
	500	100 or 200
	1K	100, 200 or 400
	2K	100, 200, 400 or 800
	5K	100, 200, 400, 800 or 1600
	10K	100, 200, 400, 800, 1600 or 3200
	20K	100, 200, 400, 800, 1600, 3200 or 6400
	40K	100, 200, 400, 800, 1600, 3200, 6400 or 12800

16 MB WMx devices and enveloped POINTs

Input Filter Range	End Frequency in Hz	Valid Lines
50 to 1K Hz	25	100, 200, 400, 800 or 1600
	50	100, 200, 400, 800, 1600 or 3200
	100	100, 200, 400, 800, 1600, 3200 or 6400
	200	100, 200, 400, 800, 1600, 3200, 6400 or 12800
	500	100, 200, 400, 800, 1600, 3200, 6400 or 12800
	1K	100, 200, 400, 800, 1600, 3200, 6400 or 12800
500 to 10K Hz	25	100 or 200
	50	100, 200 or 400
	100	100, 200, 400 or 800
	200	100, 200, 400, 800 or 1600
	500	100, 200, 400, 800, 1600 or 3200
	1K	100, 200, 400, 800, 1600, 3200 or 6400
	2K	100, 200, 400, 800, 1600, 3200, 6400 or 12800
	5K	100, 200, 400, 800, 1600, 3200, 6400 or 12800
5K to 40K Hz	10K	100, 200, 400, 800, 1600, 3200, 6400 or 12800
	25	100
	50	100 or 200
	100	100, 200 or 400
	200	100, 200, 400 or 800
	500	100, 200, 400, 800 or 1600
	1K	100, 200, 400, 800, 1600 or 3200
	2K	100, 200, 400, 800, 1600, 3200 or 6400
	5K	100, 200, 400, 800, 1600, 3200, 6400 or 12800
	10K	100, 200, 400, 800, 1600, 3200, 6400 or 12800
	20K	100, 200, 400, 800, 1600, 3200, 6400 or 12800
	40K	100, 200, 400, 800, 1600, 3200, 6400 or 12800

Setup Tab – IMx POINTs

The screenshot shows the 'POINT Properties' dialog box with the 'Setup' tab selected. The dialog has a title bar with a close button. Below the title bar is a tabbed interface with the following tabs: Speed Alarm, Messages, Notes, Frequencies, Images, Band, Envelope, Threshold, General, Setup (selected), IMx Setup, Schedule, Filter Keys, Setup Log, and Overall. The 'Setup' tab contains the following fields and controls:

- Device: A dropdown menu showing '<Unassigned>'.
- Channel name: A dropdown menu showing '<Unassigned>' and a button with three dots.
- Full scale: A text box with '0.5' and a unit dropdown showing 'in/s'.
- Detection: A dropdown menu showing 'Peak'.
- Freq. type: A dropdown menu showing 'Fixed span'.
- Lines: A text box with '400'.
- Save data: A dropdown menu showing 'FFT'.
- Window: A dropdown menu showing 'Hanning'.
- Start freq.: A text box with '0' and a unit dropdown showing 'kCPM'.
- Speed: A text box with '1800' and a unit dropdown showing 'RPM'.
- End freq.: A text box with '120' and a unit dropdown showing 'kCPM'.
- Averages: A dropdown menu showing '1'.
- Low freq. cutoff: A text box with '300' and a unit dropdown showing 'CPM'.
- Averaging: A dropdown menu showing 'Average'.
- Linear factor: A text box.
- Linear speed units: A text box.
- Control POINT: A text box and a button labeled 'Select...'.

At the bottom of the dialog are three buttons: OK, Cancel, and Help.

Figure 3 - 8.
The **POINT Properties / Setup** Tab.

Enter on-line device POINT setup information in this tab.

- The **POINT Properties / Setup** tab displays differently, depending on the POINT type. The following **Setup** fields apply to IMx POINTs.

If **Setup** units allow editing, the values display in an edit field.

- The **POINT Setup Validation** screen launches when you enter incompatible or erroneous information on the **Setup** tab.

Setup fields include:

Device – Select the appropriate on-line device name from the drop down list. The list contains all available device names.

- Devices may be added or removed in the **Customize** menu's **Online Settings** dialog.

Channel Name – Select the channel name from the drop down list to assign the POINT to a channel. Available channels are limited to channels assigned with the POINT's selected sensor type. Click the browse (...) button to display the **Channel Selection** dialog.

- Reference the **Customize / Online Settings** section for information on configuring IMx channels.

The **Channel Selection** dialog allows you to select a channel name and view the selected channel's properties. The fields are read only. Use the drop down list to select a different channel and view its properties. Click **OK** to save the selected channel and return to the **Setup** tab. Click **Cancel** if you do not wish to keep the selected channel.

Full Scale - Enter a number to define the anticipated maximum amplitude to be measured for this POINT.

Detection - Click on the list box to view the choices (**Peak, Peak to Peak, RMS, True Peak, and True peak to peak**). Select the method of dynamic signal detection from the drop down list.

Freq. Type - Click the drop down list box to view the choices (**Fixed Span** or **Order Track**).

Fixed Span – Specifies frequency as the unit of measurement for the horizontal axis of the FFT spectrum.

Order Track – Specifies orders of running speed as the unit of measure for the horizontal axis of the FFT spectrum, requires a phase reference input to collect the measurement.

- During the download to the IMx, if you are using firmware version 2.0 or greater, enveloped acceleration POINTs will download with order tracking.

For acceleration envelope order track POINTs, the minimum and maximum tracking speeds are determined by the envelope band and the minimum and maximum Fmax value, based on the formulas below:

- Minimum tracking speed \geq (minimum final Fmax) x (revolutions / lines)
- Maximum tracking speed \leq (maximum final Fmax) x (revolutions / number of lines)

Pre-processing	Min Fmax	Max Fmax	Minimum tracking speed
ENV1	5	200	1 CPM
ENV2	5	2000	1 CPM
ENV3	5	10000	1 CPM
ENV4	5	40000	1 CPM

If the formula results in a minimum speed between 0.75 and 1 CPM, the system will use 1 CPM as the minimum speed.

For example, using Envelope 3 with 2 revolutions and 800 lines, the minimum speed, as per the formula above, must be greater than:

- $5 \times 2 / 800 = 0.0125 \text{ Hz}$ or 0.75 CPM

Using the same parameters, the maximum speed must be less than:

- $10000 \times 2 / 800 = 25 \text{ Hz}$ or 1500 CPM

Save Data – Determines whether the DAD collects **FFT** data, **Time** Record data, or both. An additional **FFT and Phase** option is available for Order Tracking POINTs.

Start / End Freq. – The **Start** frequency is always set to zero. Enter the upper, full scale frequency range of the FFT between 0.3 kCPM and 2400 kCPM . Unless you are making a very unusual measurement, the upper full scale frequency should always be greater than running speed.

If the **End Freq.** value is outside the allowable range, an error message will display.

If dividing the **End Freq.** value into 2400 kCPM does not result in an integer, a warning message will display. For better performance, it is recommended to only use frequencies that divide 2400 kCPM into an integer.

When downloading the POINT information to the IMx, the end frequency value sent depends on the firmware version in use. If using firmware version 2.0 or greater, the end frequency value entered will be sent. If using firmware prior to version 2.0, the end frequency entered will scale to the closest value (10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000, or 40000 Hz). In this case, a message will display informing you that the frequency has been scaled down.

- If **Freq. Type** is set to **Order Track**, select upper frequency from the **End Order** drop down list. **End Order** list options are determined by the **Lines** of resolution setting.
- If **Freq. Type** is set to **Order Track**, the **Start Freq.** field changes to a **Revolutions** field that indicates the number of shaft revolutions necessary to perform the measurement, as determined by the **Lines** of resolution and **End Order** settings.

Low Freq. Cutoff – Enter a low frequency cutoff filter value for dynamic measurements. Although values are allowed from 0.0 CPM to 2,400 kCPM, the range for normal measurements is from approximately 200 CPM to 600 CPM, or the equivalent in Hz.

- If **Freq. Type** is set to **Order Track**, the **Low Freq. Cutoff** field is set in **Orders** of running speed.

Lines – The spectrum's FFT resolution. Click the drop down list box to view available choices.

- The higher the resolution, the slower the data collection.

100	200	400	800
1600	3200	6400	

Window – Select the type of window used in the FFT processing. Click the drop down list box to view the choices (**Uniform** or **Hanning**). A window function must be applied to any periodic time record prior to performing an FFT. The **Hanning** window function attenuates to zero both the leading and trailing edges of the sample in order to prevent leakage error caused by discontinuities in the time record.

Uniform – A dynamic signal analyzer window function with uniform weighting across time. Useful for measuring transients or mechanical response measurements.

Hanning – A dynamic signal analyzer window function that provides better frequency resolution than Flat Top, but with reduced amplitude accuracy. Useful for machine vibration measurements, general purpose measurement, and measurements containing random noise.

Speed – Enter the nominal shaft speed in RPM.

Averages – Select the number of FFT averages to be collected (1, 2, 4, 8, 16, 32, 64, or 128). The higher the number of averages, the slower the data collection.

- Averaging is not normally recommended when collecting enveloped acceleration (gE) POINTs.

Averaging – (**Average**, or **Synchronous Time**) If averaging has been selected for the POINT, determines the type of averaging performed, (either normal averaging, no averaging, peak hold averaging, or synchronous time averaging). Synchronous Time requires a tachometer assignment.

Linear Factor – Enter a numerical value for the desired multiple of machine speed to calculate the linear production speed.

Linear Speed Units – Type in the linear speed unit.

Control POINT Setup

To select a control POINT for the POINT being configured:

- Click the **POINT Properties / Setup** tab's **Select POINT** button. The **Control Point** dialog displays.
 - The control POINT and its dependent POINT must be in the same Hierarchy.
- Click the **Select control POINT** button.
- In the list, click to select the new POINT's control POINT.
- Click **OK**.

To clear the control POINT for the POINT being configured.

- Click the **Clear** button.
- Click **OK**.

Setup Tab – IMx Logic POINTs

Enter Logic POINT Setup information in this tab.

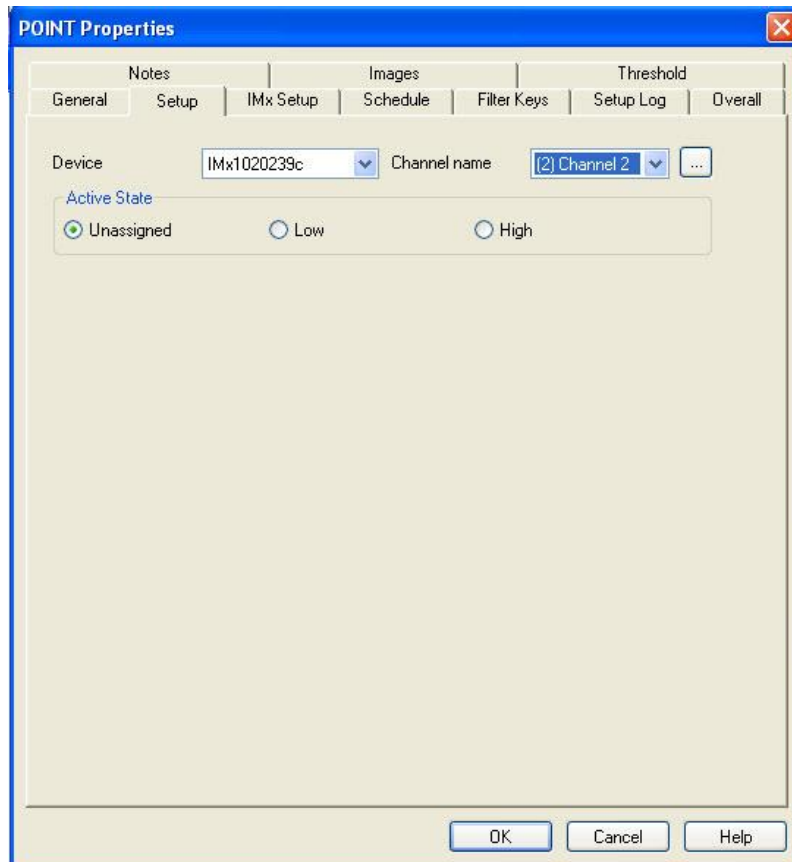


Figure 3 - 9.
The **POINT Properties / Setup** Tab.

- The **POINT Properties / Setup** tab displays differently depending on the POINT type. The following **Setup** fields apply to IMx Logic POINTs.

A logic POINT monitors the logic state (high or low) of one of eight digital channels of IMx-S, IMx-T, IMx-P, and one of two digital channels of IMx-8; and one of eight protection digital channels of the IMx-M. These channels accept TTL or 12-24V signals from Programmable Logic Controllers (PLCs) or any other source. Logic POINTs are often used as gating POINTs.

Setup fields include:

Device – Select the device from the drop down list.

Channel name – Select the channel name from the drop down list to assign the POINT to a channel. Available channels are limited to channels assigned with the POINT's selected sensor type. Click the browse (...) button to display the **Channel Selection** dialog.

- Reference the **Customize / Online Settings** section for information on configuring IMx channels.

The **Channel Selection** dialog allows you to select a channel name and view the selected channel's properties. The fields are read only. Use the drop down list to select a different channel and view its properties. Click **OK** to save the selected channel and return to the **Setup** tab. Click **Cancel** if you do not wish to keep the selected channel.

Active State – Click to select **High** or **Low**. The active state specifies whether the logic condition is true when the signal is *high* or *low*.

In addition to data being saved to the "Scheduled" database on the regular time schedule, additional "Scheduled" data is saved for a logic POINT each time its state changes (from high to low, or low to high).

Orbit/SCL Tab

Enter orbit and shaft centerline information on this tab.

The screenshot shows the 'POINT Properties' dialog box with the 'Orbit/SCL' tab selected. The dialog has a title bar with a close button. Below the title bar is a tabbed interface with tabs for 'Speed Alarm', 'Messages', 'Notes', 'Frequencies', 'Images', 'Vector', 'General', 'Setup', 'Orbit/SCL', 'Compliance', 'Filter Keys', and 'Overall'. The 'Orbit/SCL' tab is active. It contains four main sections: 'Channel X settings' with 'X - Input mv/EU' (7.874) and 'X - Sensor angle' (135 degrees); 'Channel Y settings' with 'Y - Input mv/EU' (7.874) and 'Y - Sensor angle' (45 degrees); 'Orbit settings' with 'Top dead center' (TDC), 'Display tachometer angle' (unchecked), 'Shaft rotation' (Counter clockwise), and 'Tacho angle' (0 degrees); and 'Shaft centerline settings' with 'X - Cold gap' (-9 volts), 'Y - Cold gap' (-9 volts), 'Cold gap position' (Bottom), and 'Bearing clearance' (10 micron). At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Figure 3 - 10.
The **POINT Properties** Screen's **Orbit/SCL Tab**.

POINT Properties / Orbit/SCL fields may include:

Channel X and Y Settings

X-Input mv/EU – Enter a number to define the sensitivity of the pickup to be used in taking measurements for channel X.

X-Sensor angle - Specify the angle that defines the X sensors' physical location.

Y-Input mv/EU - Enter a number to define the sensitivity of the pickup to be used in taking measurements for channel Y.

Y-Sensor angle - Specify the angle that defines the Y sensors' physical location.

- The orbit axis may use Scientific or Standard mode for the 0 degree reference point, depending on your **Angular axis view** preference setting. This setting should be taken into account when entering your sensor angles.

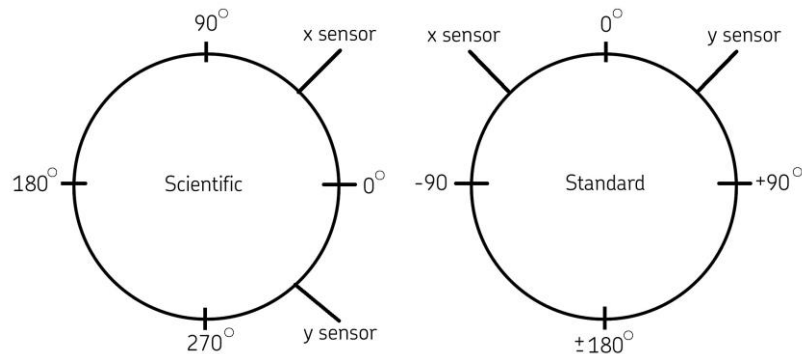


Figure 3 - 11.
Diagram Showing Scientific vs. Standard.

Orbit Settings

Top dead center – Specify the label to display at the top of the **Orbit/SCL** plot.

Display tachometer angle – Enable to allow the tachometer angle to display on the **Orbit/SCL** plot.

Shaft rotation – Specify the shaft rotation direction as either **Bidirectional**, **Clockwise**, or **Counter clockwise** for reference on the **Orbit/SCL** plot.

Tachometer angle – Specify the angle that defines the tachometer's physical location (0 to 359 degrees).

Shaft Centerline Settings

- This section is only available if the POINT uses a displacement probe.

X-Cold gap – Specify the X probe's cold gap value. Together the X and Y probe cold gap values define the distance between the displacement probe and the shaft's position in the bearing when the machine is at rest.

Y-Cold gap – Specify the Y probe's cold gap value.

Cold gap position – Define the cold gap position in the bearing clearance circle when viewing the shaft centerline plot. Choices are **Bottom**, **Center**, **Left**, **Right**, and **Top**.

Bearing clearance – Specify the bearing's clearance value (typically supplied by the manufacturer). The clearance value assumes the shaft is centered in the bearing and defines the physical distance between the shaft and the bearing, multiplied by 2.

Setup Tab (Manual POINTs)

- The **POINT Properties / Setup** tab displays differently, depending on the POINT type. The following **Setup** fields apply to POINTs defined with a manual sensor.

Enter Manual POINT Setup information in this tab.

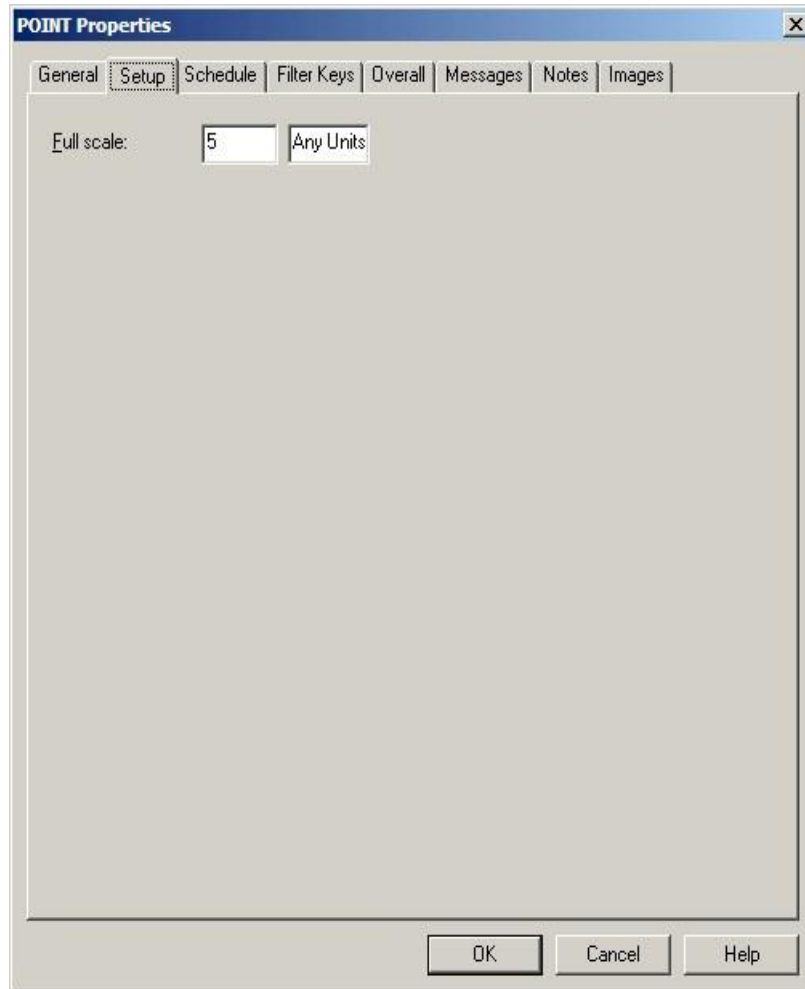


Figure 3 - 12.
The **POINT Properties** Screen's Manual **Setup** Tab.

POINT Properties / Setup fields may include:

- The POINT Setup Validation Screen launches when you enter incompatible or erroneous information on the **Setup** tab. Reference the **POINT Setup Validation** section later in this manual for more information.

Full Scale – Enter a number to define the spectrum's maximum amplitude value.

The **Units** selected on the **DAD/POINT Type Selection** dialog display next to the **Full Scale** field. If **Any Units** was selected, the units may be edited. Adjust the units if necessary.

Setup Tab (DC POINTs)

If the sensor type is **DC**, enter POINT setup information on this tab.

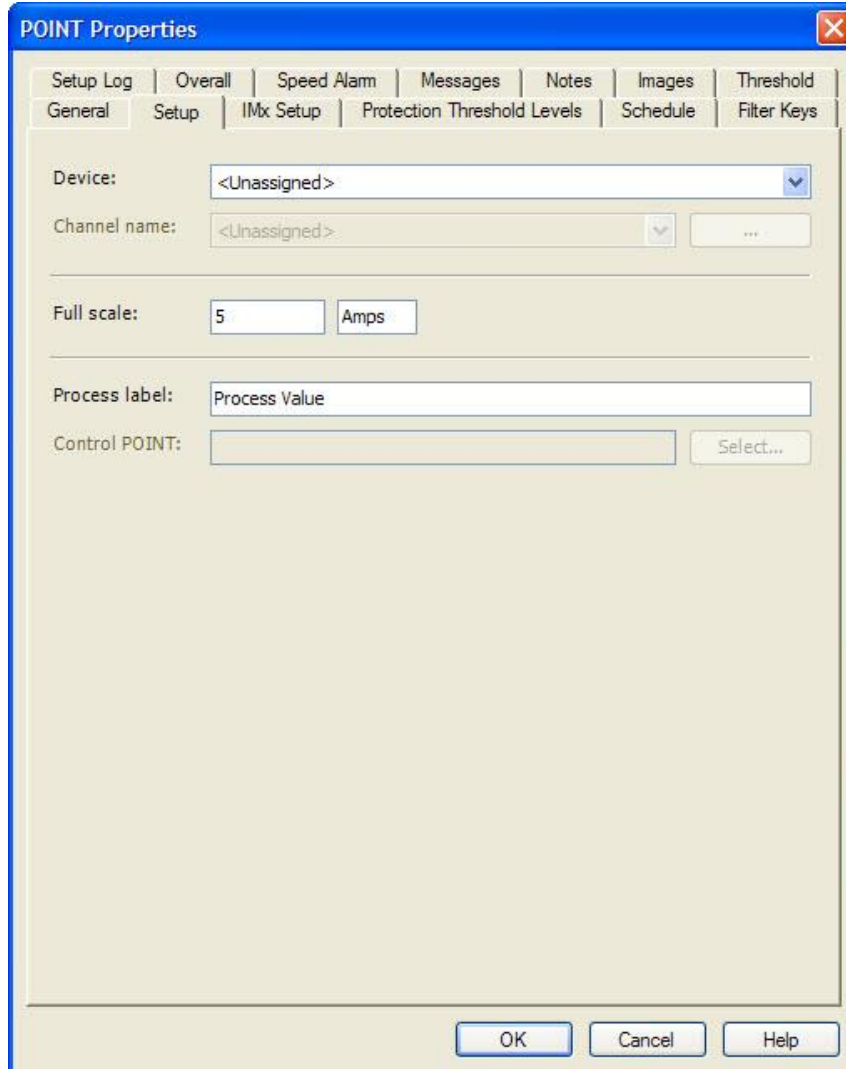
The image shows a screenshot of the 'POINT Properties' dialog box, specifically the 'Setup' tab. The dialog has a blue title bar with a close button. Below the title bar is a tabbed interface with the following tabs: 'Setup Log', 'Overall', 'Speed Alarm', 'Messages', 'Notes', 'Images', 'Threshold', 'General', 'Setup' (selected), 'IMx Setup', 'Protection Threshold Levels', 'Schedule', and 'Filter Keys'. The 'Setup' tab contains several input fields: 'Device:' with a dropdown menu showing '<Unassigned>', 'Channel name:' with a dropdown menu showing '<Unassigned>' and a button with three dots, 'Full scale:' with a text box containing '5' and a unit dropdown showing 'Amps', 'Process label:' with a text box containing 'Process Value', and 'Control POINT:' with a text box and a 'Select...' button. At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Figure 3 - 13.
The **POINT Properties** Screen's DC **Setup** Tab.

Device – Select the appropriate on-line device name from the drop down list. The list contains all available device names.

- Devices may be added or removed in the **Customize** menu's **Online Settings** dialog.

Full Scale – Enter a number to define the measurement's maximum value.

The **Units** selected on the **DAD/POINT Type Selection** dialog display next to the **Full Scale** field. Adjust the units if necessary.

Input mV/EU - Enter a number to define the sensitivity of the pickup to be used in taking measurements.

Channel # - Enter the terminal strip channel input (sensor input) number (1-3) at which the POINT's sensor is connected.

Autorange - (On or Off). Determines whether the POINT's full scale value is autoranging, or determined with the POINT's Full scale field setting.

Zero offset - Enter a value (-1000000000.000 to 1000000000.000) in milivolts to offset the zero point of the measurement.

Process Label - Enter a label to use for the process value.

Control POINT - Displays the name of the current control POINT, if applicable.

- Click the **Select POINT** button to select a control POINT.

Setup Tab (Derived POINTs)

A derived POINT outputs the result of a calculation based on data collected by online systems.

- Derived POINTs are not downloaded to the online data acquisition device. They are calculated after data has been collected from the device and results display in @ptitude Analyst only.

Prior to setting **Setup** tab options, use the **DAD / POINT Type Selection** dialog's setup fields to specify a derived POINT type.

To specify a derived POINT type:

- Select the **Insert** menu's **New POINT** option. The **DAD / POINT Type Selection** dialog displays.
- Select the **DAD type** field's **Derived POINT** option.
- Select the **Sensor** field's **Calculated** option. The **Calculated** setting indicates that POINT data used in a derived POINT calculation is first uploaded to @ptitude Analyst and then automatically "calculated" for the derived POINT during upload data processing.
 - For Derived POINTs, the **DAD / POINT Type Selection** dialog's **Application** field defaults to **General**, and the **Units** field defaults to **Any Units**.

Setup Tab Options

Enter Derived POINT Setup information in this tab. A Derived POINT consists of an operator created formula (expression) using measurement POINT data (variables), fixed numbers (constants; i.e., Pi) and mathematical functions (i.e., sin).

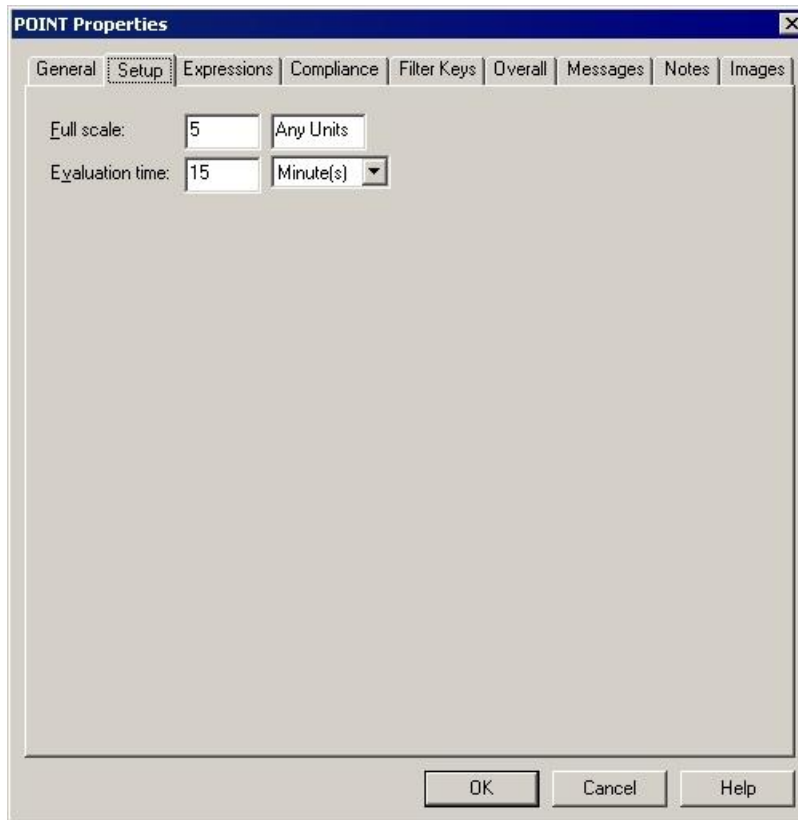


Figure 3 - 14.
The **POINT Properties** Screen's **Setup** Tab for Derived POINTs.

POINT Properties / Setup fields may include:

Full Scale – Enter a number to define the spectrum's maximum amplitude value.

Evaluation time – Ensures relevant variable data. Defines the maximum time range during which all variables (POINTs) must collect measurement data for the derived POINT to calculate. All variables in the expression formula must have data collected within this specified time range, or the derived POINT does not calculate. For example, if the Evaluation time is set to 15 minutes, all variables (POINTs) must be collected within 15 minutes of each other.

Canary Labs Setup Tab

For Canary Labs customers, enter the data historian information on this tab.

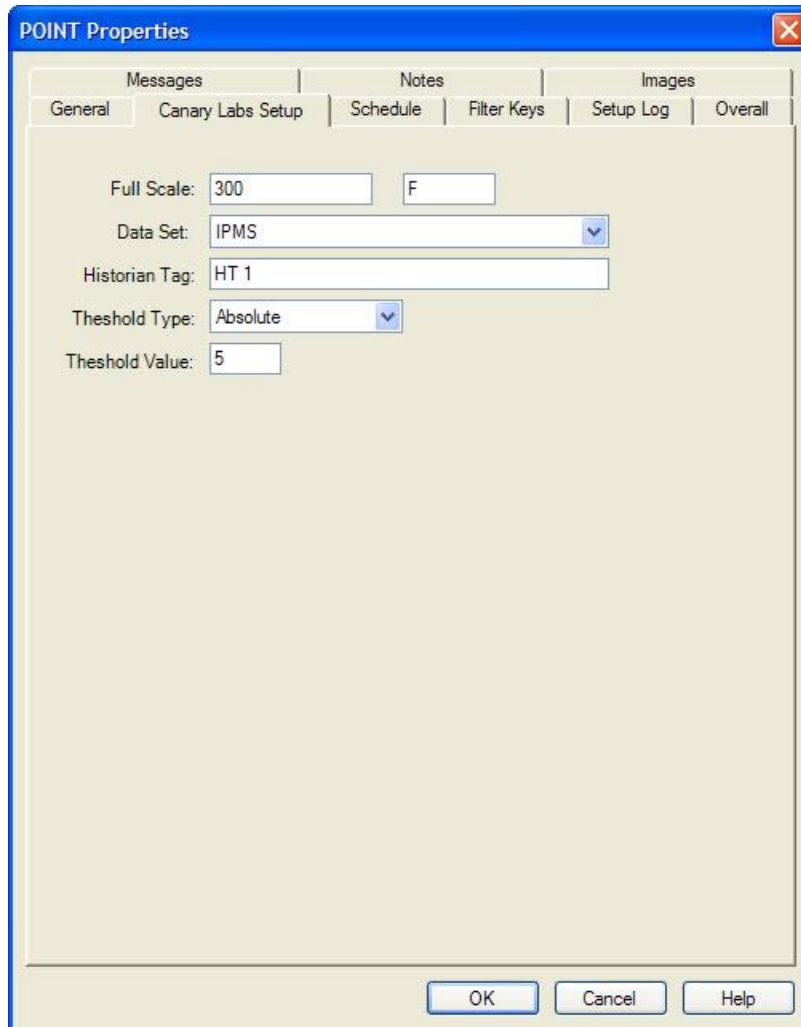
The image shows a screenshot of the 'POINT Properties' dialog box, specifically the 'Canary Labs Setup' tab. The dialog box has a blue title bar with the text 'POINT Properties' and a close button (X). Below the title bar are several tabs: 'Messages', 'Notes', 'Images', 'General', 'Canary Labs Setup' (which is selected), 'Schedule', 'Filter Keys', 'Setup Log', and 'Overall'. The 'Canary Labs Setup' tab contains several input fields: 'Full Scale' with a text box containing '300' and a dropdown menu showing 'F'; 'Data Set' with a dropdown menu showing 'IPMS'; 'Historian Tag' with a text box containing 'HT 1'; 'Threshold Type' with a dropdown menu showing 'Absolute'; and 'Threshold Value' with a text box containing '5'. At the bottom of the dialog box are three buttons: 'OK', 'Cancel', and 'Help'.

Figure 3 - 15.

The **POINT Properties** Screen's **Canary Labs Setup Tab**.

POINT Properties / Canary Labs Setup fields include:

Full Scale - Enter a number to define the measurement's maximum value. If a **Logic** sensor type was selected, the **Full Scale** option will not be available.

Data Set - Select the applicable data set that is defined in the data historian.

Historian Tag - Enter a name for the data historian tag.

Threshold Type - Select the type of threshold to use, **Percent** or **Absolute**, or choose to disable thresholds. If a **Logic** sensor type was selected, the **Threshold Type** will be automatically disabled.

Threshold Value - Enter a value to determine the threshold of the full scale value.

Expressions Tab (Derived POINTs)

- The **POINT Properties / Expressions** tab displays when the Derived POINT type is selected. Use this tab to create or edit the derived POINT's **Expression formula** (the derived POINT's calculation).

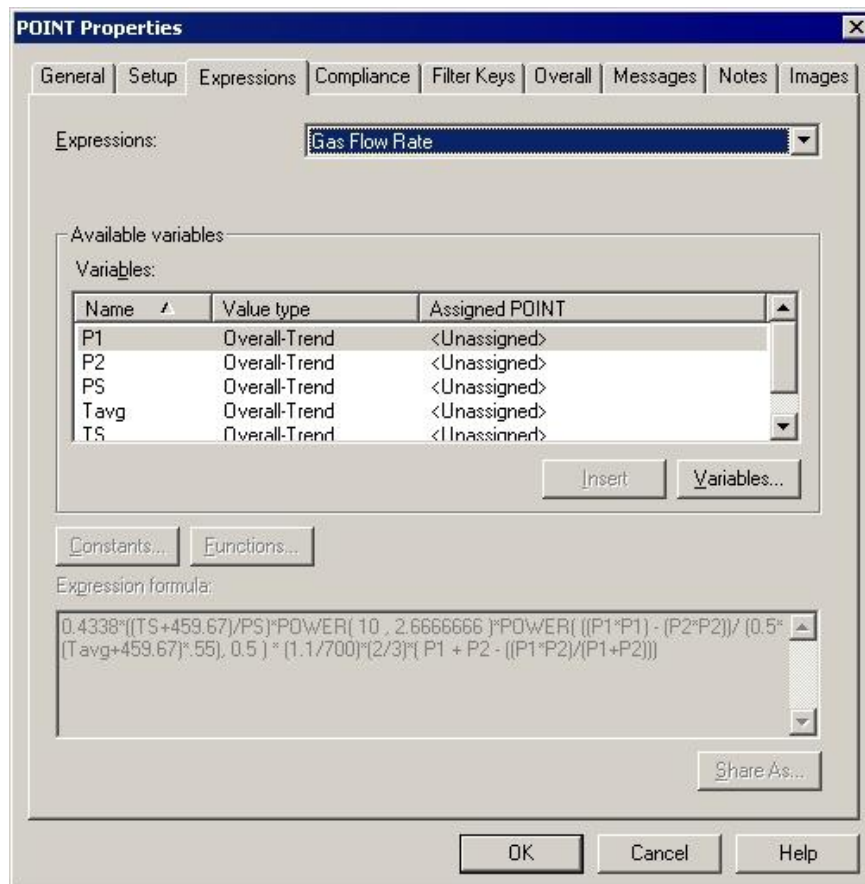


Figure 3 - 16.

The **POINT Properties** Screen's **Expressions** Tab for Derived POINTs.

The **Expressions** drop down list displays all previously created “shared” expression formulas (calculations) and a **<Private Expression>** option. Use this drop down list to specify whether you wish to set up a unique **<Private Expression>** for the current derived POINT only, or specify a previously defined “shared” expression formula (selected by name). If you specify a shared expression, its settings display in subsequent fields.

- Specify either a shared or Private Expression and proceed to configure the tab's expression settings as described below.

Assigning Variables

POINTs used in the derived POINT's calculation are identified as “variables.” Assigned variables list in the **Available Variables** area.

To assign variables for a derived POINT:

- Click the **Variables** button. The **Variables** screen displays.

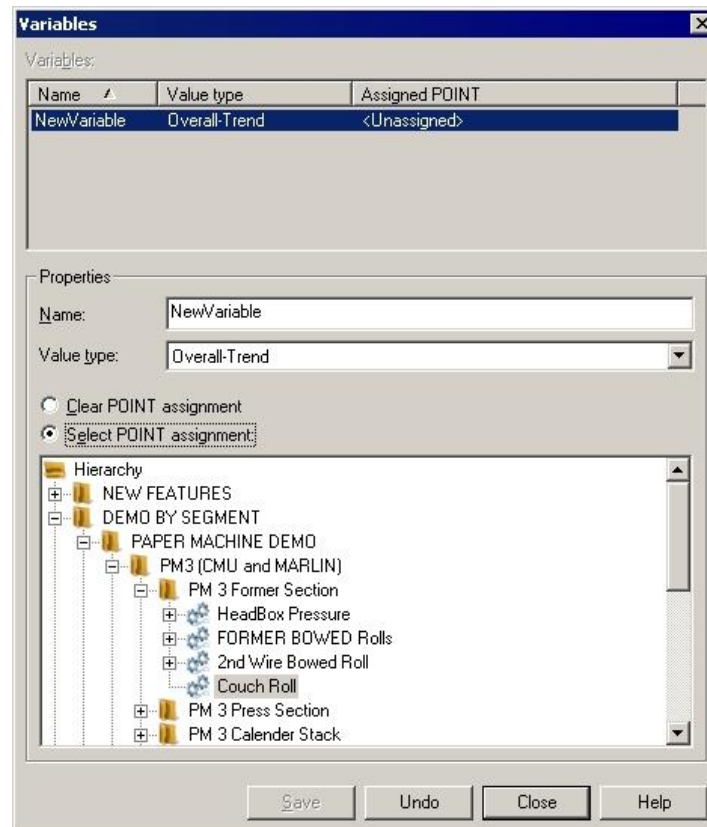


Figure 3 - 17.
The **Variables** Screen.

- In the **Variables** screen, click the **Add** button. The **Variables** area displays the **New Variable** with an “unassigned POINT.” The **Properties** area also displays the **NewVariable**.
- Click the **Select POINT assignment** option button to activate the hierarchy, allowing you to select the POINT to assign to the new variable.
 - Click the **Clear POINT assignment** option to clear the point assigned to the selected variable. Once cleared, **<Unassigned>** displays in the **Assigned POINT** column in the **Variables** list.
- In the hierarchy, select the POINT to assign to the variable.
- In the **Properties** area, type in a name for the new variable. Tip - you may use the same name as the POINT ID.
- Click the **Save** button to save the new variable. Its information displays in the **Variables** area. Repeat the process to **Add** all necessary variables.
 - You may click the **Remove** button to remove a variable from the **Variables** list for the current derived POINT.

- When finished adding variables, click the **Close** button to return to the **POINT Properties / Expressions** tab. The new variables display in the **Available Variables** area.

Once variables have been created for the derived POINT, you can create the POINT's expression formula (calculation). Enter the calculation in the **Expression formula** entry box. An expression formula must contain at least one variable, and may also contain constants and functions. Insert mathematical operators (e.g., +, -, /, *) as necessary.

To insert a variable to the expression formula:

- In the **Expression Formula** area, position the cursor where you wish to insert the variable.
- Select a variable from the **Variables** list and click the **Insert** button. The selected variable appears at the cursor position.

To add a constant to the expression formula:

- In the **Expression formula** field, position the cursor where you would like to insert the constant.
- Click the **Constants** button to display the **Constant** dialog.
- Select a constant, or create a new constant by clicking the **Add** button.

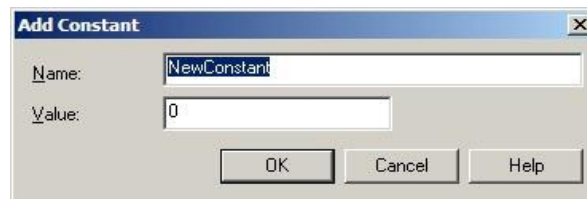


Figure 3 - 18.
The **Add Constant** Dialog.

- Click **OK**. The selected constant appears at the cursor position.

To add a function to the expression formula:

- Place the cursor in the **Expression formula** section where you wish to insert the function and click the **Functions** button. The **Functions** dialog displays.

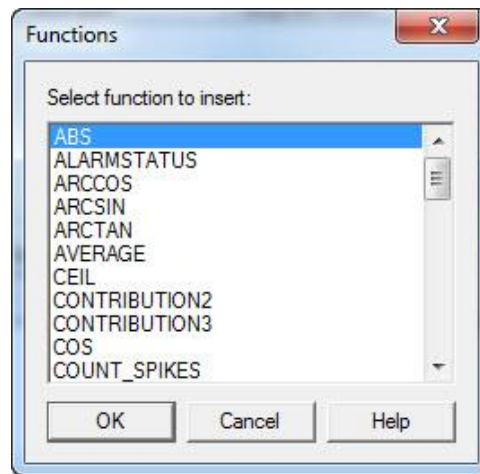


Figure 3 - 19.
The **Functions** Dialog.

- Select a function from the dialog and click **OK**. The selected function is entered at the cursor position in the **Expression formula** section along with the type of input data that is used for the function, shown in parentheses; for example: **AVERAGE(<Variable>, <Length>)**.
- Highlight the input data placeholder (e.g., **<Variable>**) and enter the applicable data, or select a constant to enter by using the **Constants** button. You can also enter a variable by selecting it from the **Variables** section and clicking **Insert**.
 - To calculate more complex formulas, you can enter multiple functions within a single expression formula.

Depending on the function, the type of input data can either be *scalar* data or *dynamic* data.

Scalar data can be derived from:

- Overall trend data from a Microlog Analyzer, Microlog Inspector/MARLIN, WMx/WVT, DMx, IMx, LMU/CMU/TMU
- Inspection results (the calculated formula for inspection results will produce a result of either 0 (not valid) or 1 (valid) based on the inspection result that is entered)
- Manual entry
- Data from XML import (from sources such as the SKF Wireless Machine Condition Sensor, third party developments, etc.)
- OPC from other systems (Digital Control Systems (DCS), Canary Labs and other data historians, etc.)
- Oil Analysis / Trend Oil
- MCD (Enveloped Acceleration, Velocity, or Temperature)
- WMCD
- Derived POINTS themselves

Dynamic data includes:

- Time waveform data
- FFT data

The table below contains a list of the different functions that you can use for an expression formula, along with a description of the function and whether the function is based on scalar or dynamic data.

Function	Description	Type of data
ABS(<Variable>)	Calculates the absolute value of the <Variable> entered.	Scalar
ALARMSTATUS (<Variable>)	Determines and stores the current alarm status for the <Variable> (POINT) entered. Notice that this function does not re-evaluate past alarm conditions and therefore must be operated immediately when new alarm conditions are set for the <Variable> . Returned values are: -1 No alarm level (when the <Variable> has no values, no set alarm) 0 Safe 1 Alert 2 Danger	Scalar Dynamic
ARCCOS(<Radians>)	Calculates the arc cosine of the <Radians> value entered. The value returned is in degrees.	Scalar
ARCSIN(<Radians>)	Calculates the arc sine of the <Radians> value entered. The value returned is in degrees.	Scalar
ARCTAN(<Radians>)	Calculates the arc tangent of the <Radians> value entered. The value returned is in degrees.	Scalar
AVERAGE(<Variable>, <Length>)	Calculates the average of the <Variable> entered using a sliding window of <Length> values entered.	Scalar
AVERAGE(<Dynamic Variable>,<Channel Number>)	Calculates the average of the <Dynamic Variable> entered for the specified <Channel Number> . For non-multi-channel measurements, <Channel Number> should be set to 1.	Dynamic
CEIL(<Param>)	Calculates the smallest (closest to negative infinity) integer that is not smaller than the <Param> value.	Scalar
CONTRIBUTION2 (<Dynamic Variable>, <Speed Multiple>)	Calculates the contribution (in percentage) of the energy periodical to the <Speed Multiple> entered. The <Dynamic Variable> entered is the time waveform. The <Speed Multiple> is specified in multiples of running speed including fractional values.	Dynamic (best for time waveform data)
CONTRIBUTION3 (<Dynamic Variable>, <Speed Multiple>, <Ref Speed>)	Calculates the contribution (in percentage) of the energy periodical to the <Speed Multiple> entered. The <Dynamic Variable> entered is the time waveform. The <Speed Multiple> is specified in multiples of running speed including fractional values. The <Ref Speed> entered is the machine speed value to use. The <Ref Speed> may be a fixed value, an overall value from a trend, or a speed value extracted with Speed() from a time waveform or spectrum.	Dynamic (best for time waveform data)
COS(<Radians>)	Calculates the cosine of the <Radians> value entered.	Scalar

Function	Description	Type of data
COUNT_SPIKES (<i><Dynamic Variable></i> , <i><Channel Number></i> , <i><Threshold></i> , <i><DC></i>)	Counts the number of spikes in the waveform indicated by the <Dynamic Variable> entered for the specified <Channel Number> entered. A spike is defined as a signal level equal or higher than the <Threshold> value entered. The <DC> bias value entered is subtracted from the signal prior to evaluation against the threshold value. Use the Average function to de-trend signals with strong DC bias i.e.: <i>COUNT_SPIKES(<Dynamic Variable>, <Channel Number>, <Threshold>, AVERAGE(<Dynamic Variable>, <Channel Number>))</i> For non-multi-channel measurements, <Channel Number> should be set to 1.	Dynamic (best for time waveform data)
CRESTFACTOR (<i><Dynamic Variable></i>)	Calculates the crest factor. The crest factor is defined as the time waveform's Peak value divided by its RMS value. The <Dynamic Variable> entered is the time waveform. The resulting value is dimensionless.	Dynamic (best for time waveform data)
CTA_PK_PK(<i><Waveform Data></i> , <i><Speed Multiple></i>)	Calculates the Cyclic Time Average of a time waveform using the <Speed Multiple> averaging period. The <Waveform Data> entered is the time waveform. The <Speed Multiple> entered must be in seconds. The returned value is in the same engineering units as the <Waveform Data> and Peak to Peak detection type.	Dynamic (best for time waveform data)
CTA_RMS(<i><Waveform Data></i> , <i><Speed Multiple></i>)	Calculates the Cyclic Time Average of a time waveform using the <Speed Multiple> averaging period. The <Waveform Data> entered is the time waveform. The <Speed Multiple> entered must be in seconds. The returned value is in the same engineering units as the <Waveform Data> and RMS detection type.	Dynamic (best for time waveform data)
CUSUM(<i><Variable></i> , <i><Variable></i>)	Calculates the cumulative difference of the first <Variable> entered against the second <Variable> entered.	Scalar
DEGTORAD(<i><Degrees></i>)	Converts the angle <Degrees> value entered to radians.	Scalar
DELTATIME(<i><Variable></i>)	Calculates the difference in seconds between two adjacent measurements.	Scalar Dynamic
DELTAVALUE(<i><Variable></i>)	Calculates the difference in value between two adjacent measurements.	Scalar
ENERGY_VALUE (<i><Dynamic Variable></i> , <i><Band Number></i>)	Calculates the overall energy found in the specified <Band Number> frequency band. <Band Number> starts at 1. Returns zero when no frequency band exists for the specified <Band Number> . Returns a band overall energy value with the same units and detection type as the <Dynamic Variable> entered.	Dynamic (best for FFT data)
FLOOR(<i><Param></i>)	Calculates the largest (closest to positive infinity) integer that is not greater than the <Param> value.	Scalar
FORECAST_EXP (<i><Variable></i> , <i><Length></i> , <i><Length></i>)	Calculates a forecasted alarm, in days, of the <Variable> entered using a sliding window of specified <Length> values. Uses an exponential fitting function.	Scalar
FORECAST_LIN (<i><Variable></i> , <i><Length></i> , <i><Length></i>)	Calculates a forecasted alarm, in days, of the <Variable> entered using a sliding window of specified <Length> values. Uses a linear fitting function.	Scalar
HAL(<i><Dynamic Variable></i> , <i><Speed Multiple></i>)	Calculates the Harmonic Activity Index for the frequency specified by the <Speed Multiple> entered in the <Dynamic Variable> entered. The <Speed Multiple> must be in orders. The returned value is a dimensionless indicator of the likelihood that a harmonic pattern at the <Speed Multiple> exists.	Dynamic (best for FFT data)

Function	Description	Type of data
KURTOSIS(<Variable>, <Length>)	For overall measurements, calculates the Kurtosis of excess for the <Variable> entered using a sliding window of specified <Length> values. There should be at least three measurements in the POINT referenced by the <Variable> .	Scalar
KURTOSIS(<Dynamic Variable>, <Channel Number>)	Calculates the standard deviation of a dynamic signal (FFT or waveform) for the specified <Channel Number> entered. For non-multi-channel measurements, <Channel Number> should be set to 1.	Dynamic
LN(<Param>)	Calculates the natural logarithm of the <Param> value entered.	Scalar
LOG(<Param>)	Calculates the logarithm of the <Param> value entered.	Scalar
MAX(<Variable>, <Variable>)	Calculates the maximum value between each <Variable> entered. Returns the appropriate <Variable> .	Scalar
MIN(<Variable>, <Variable>)	Calculates the minimum value between each <Variable> entered. Returns the appropriate <Variable> .	Scalar
MOD(<Param>, <Param>)	Calculates the remainder after the division of the first <Param> value entered by the second <Param> value entered; for example: <i>MOD(7, 3) = 1.</i>	Scalar
Operating Time	This function is available only by selecting "Operating Time" for Application Type when creating the POINT. It computes the amount of time an asset has been operative in the time unit specified in the create POINT dialog.	Scalar
PEAK_VALUE(<Dynamic Variable>, <Band Number>)	Calculates the peak value found in the specified <Band Number> frequency band. <Band Number> starts at 1. Returns zero when no frequency band exists for the specified <Band Number> . Returns a peak value with the same units and detection type as the <Dynamic Variable> entered.	Dynamic (best for FFT data)
PERCENTCHANGE (<Variable>)	Calculates the percentage change between two adjacent measurements. What is computed is: $(Value - PreviousValue) / PreviousValue$.	Scalar
POWER(<Base>, <Exponent>)	Raises the <Base> entered to the power of the <Exponent> entered.	Scalar
ROC(<Variable>, <Days Multiple>)	Calculates the rate of change (in days) between two adjacent measurements.	Scalar
ROUND(<Param>)	Calculates the integer closest to the <Param> value.	Scalar
SIN(<Radians>)	Calculates the sine of the <Radians> value entered.	Scalar
SKEW(<Variable>, <Length>)	Calculates the skew for the <Variable> entered using a sliding window of specified <Length> values. There should be at least four measurements in the POINT referenced by the <Variable> .	Scalar
SKEW(<Dynamic Variable>, <Channel Number>)	Calculates the skew of a dynamic signal (FFT or waveform) for the specified <Channel Number> . For non-multi-channel measurements, <Channel Number> should be set to 1.	Dynamic
SMAX(<Dynamic Variable>)	Calculates the maximum vector magnitude of an Orbit. The <Dynamic Variable> value entered must refer to a 2 channel time waveform value.	Dynamic (best for time waveform data)
SPEED(<Dynamic Variable>)	Extracts the machine speed from the <Dynamic Variable> entered. The <Dynamic Variable> must be either a time waveform or spectrum. The returned value is in Hertz.	Dynamic
SQRT(<Param>)	Calculates the square root of the <Param> value entered.	Scalar
STDEV(<Variable>, <Length>)	Calculates the standard deviation of the <Variable> entered using a sliding window of specified <Length> values. There should be at least two measurements in the POINT referenced by the <Variable> .	Scalar

Function	Description	Type of data
STDEV(<Dynamic Variable>, <Channel Number>)	Calculates the standard deviation of a dynamic signal (FFT or waveform) for the specified <Channel Number>. For non-multi-channel measurements, <Channel Number> should be set to 1.	Dynamic
SUMDURATION (<Variable>, <Duration>)	<p>Enter any number of days (for example: 1, 7, 31, etc.) or partial days (for example: 0.5, 3.5, 11.75, etc.) for <Duration>. This function sums the <Variable>'s (POINT's) last measurement with all of its previous measurements found within the specified number of days (or partial days) prior to the last measurement date/time.</p> <p>Sample cases:</p> <p>Enter a <Duration> of 7 to sum the <Variable>'s (POINT's) last measurement with all of its previous measurements starting exactly 7 days prior to the last measurement.</p> <p>Enter a <Duration> of 3.5 to sum the <Variable>'s (POINT's) last measurement with all of its previous measurements starting exactly 3 and one half days prior to the last measurement.</p>	Scalar
SUMPERIOD(<Variable>, <Period>)	<p>Enter a specific <Period> (defined in sample cases, below). This function sums the <Variable>'s (POINT's) last measurement with all of its previous measurements found within the specified <Period> and stamps the result with the period start date/time.</p> <p>SUMPERIOD differs from the other functions in that it always creates a measurement at the start of a period as soon as it begins, even when the source <Variable> (POINT) has not yet collected a measurement. The initial value is 0, and will be updated as the source <Variable> (POINT) collects measurements for that period.</p> <p>Sample cases:</p> <p>Enter a <Period> of Period_Hour to sum the Variable's (POINT's) last measurement with all of its previous measurements within the same hour, starting at the top of the hour (for example 08:00 AM). Alternatively, you can enter the constant 1 as the <Period> value to represent Period_Hour.</p> <p>Enter a <Period> of Period_Day to sum the Variable's (POINT's) last measurement with all of its previous measurements found within the same day, starting at 12:00 AM. Alternatively, you can enter the constant 2 as the <Period> value to represent Period_Day.</p> <p>Enter a <Period> of Period_Week_Sunday to sum the Variable's (POINT's) last measurement with all of its previous measurements found within the same week, starting Sunday at 12:00 AM. Alternatively, you can enter the constant 3 as the <Period> value to represent Period_Week_Sunday.</p> <p>Enter a <Period> of Period_Week_Monday to sum the Variable's (POINT's) last measurement with all of its previous measurements found within the same week, starting Monday at 12:00 AM. Alternatively, you can enter the constant 4 as the <Period> value to represent Period_Week_Monday.</p>	Scalar

Function	Description	Type of data
	<p>Enter a <Period> of Period_Month to sum the Variable's (POINT's) last measurement with all of its previous measurements found within the same month, starting the first day of the month at 12:00 AM. Alternatively, you can enter the constant 5 as the <Period> value to represent Period_Month.</p> <p>Enter a <Period> of Period_Quarter to sum the Variable's (POINT's) last measurement with all of its previous measurements found within the same quarter, starting Jan 1, Apr 1, Jul 1, or Oct 1 at 12:00 AM. Alternatively, you can enter the constant 6 as the <Period> value to represent Period_Quarter.</p> <p>Enter a <Period> of Period_Year to sum the Variable's (POINT's) last measurement with all of its previous measurements found within the same year, starting Jan 1 at 12:00 AM. Alternatively, you can enter the constant 7 as the <Period> value to represent Period_Year.</p>	
SUMSINCE(<Variable>, <Start Date>)	<p>Enter any <Start Date> code (using the format <i>yyyymmdd</i> or, optionally, <i>yyyymmddhhmmss</i>). This function sums all of the <Variable>'s (POINT's) measurements found on or after the specified date/time.</p> <p>Sample cases: Enter a <Start Date> of 20140101 to sum all of the Variable's (POINT's) measurements found on or after Jan 1, 2014 at 12:00 AM.</p> <p>Enter a <Start Date> of 20140101090000 to sum all of the Variable's (POINT's) measurements found on or after Jan 1, 2014 at 09:00 AM.</p>	Scalar
TAN(<Radians>)	Calculates the tangent of the <Radians> value entered.	Scalar
Total Operating Time	This function is available only by selecting "Operating Time" for Application Type when creating the POINT. It computes the total amount of time an asset has been operative in the time unit specified in the create POINT dialog.	Scalar Dynamic
TRUNC(<Param>)	Removes any fractional part from the <Param> value entered.	Scalar
XMAG(<Dynamic Variable>, <Channel Number>, <Channel Number>, <Speed Multiple>)	<p>Computes the cross magnitude value (as opposed to cross phase) between two time waveform signals. The waveform signals are referenced by the <Dynamic Variable> entered and either of the specified <Channel Number> values. The specific frequency the cross magnitude value is computed for is determined by the speed value associated with the measurement and the <Speed Multiple> value entered: $f = 1 / (s * Speed\ Multiple)$.</p> <p>This function operates on multi-channel measurements only.</p>	Dynamic (best for time waveform data)

Function	Description	Type of data
XPHASE(<Dynamic Variable>, <Channel Number>, <Channel Number>, <Speed Multiple>)	<p>Computes the cross phase value (as opposed to cross magnitude) between two time waveform signals. The waveform signals are referenced by the <Dynamic Variable> entered and either of the specified <Channel Number> values. The specific frequency the cross phase value is computed for is determined by the speed value associated with the measurement and the <Speed Multiple> value entered:</p> $f = 1 / (s * \text{Speed Multiple}).$ <p>This function operates on multi-channel measurements only.</p>	Dynamic (best for time waveform data)

- The value entered for the SIN, COS, and TAN functions must be in radians, not degrees. If the value entered is in degrees, the @ptitude Analyst will assume it is in radians, and the calculation will be wrong.

To convert degrees to radians, use the DEGTO RAD function in the formula. For example, if you have a value of 45 degrees, the entered formula may look like this: SIN(DEGTO RAD(45))

When the formula is calculated, 45 degrees is automatically converted into radians.

- Use the DeltaTime function to calculate the difference in seconds between the two most recent measurements for that POINT.
- Use the DeltaValue function to calculate the difference in value between the two most recent measurements for that POINT.
- Use the PercentChange function to calculate the percent change between the two most recent measurements for that POINT. The formula will look like this:
(LastValue – PreviousValue) / PreviousValue

Important – After initial setup of a derived POINT that references variables (POINTS) with existing data records, you must manually calculate the derived POINT to immediately acquire derived POINT data based upon the variable POINTs' historical data records. Reference the Calculating Derived POINTs section later in this chapter for details.

Share As

- Click **Share As** to make the expression a shared expression. The **Enter Name** dialog displays.
- Enter a name for the shared expression and click **OK**.

The new shared expression now appears as an available selection in the dialog's drop down list. Shared expressions are easily assigned to other POINTs to simplify setup and maintenance.

IMx Setup Tab

Assign alarm groups to your IMx POINT on this tab.

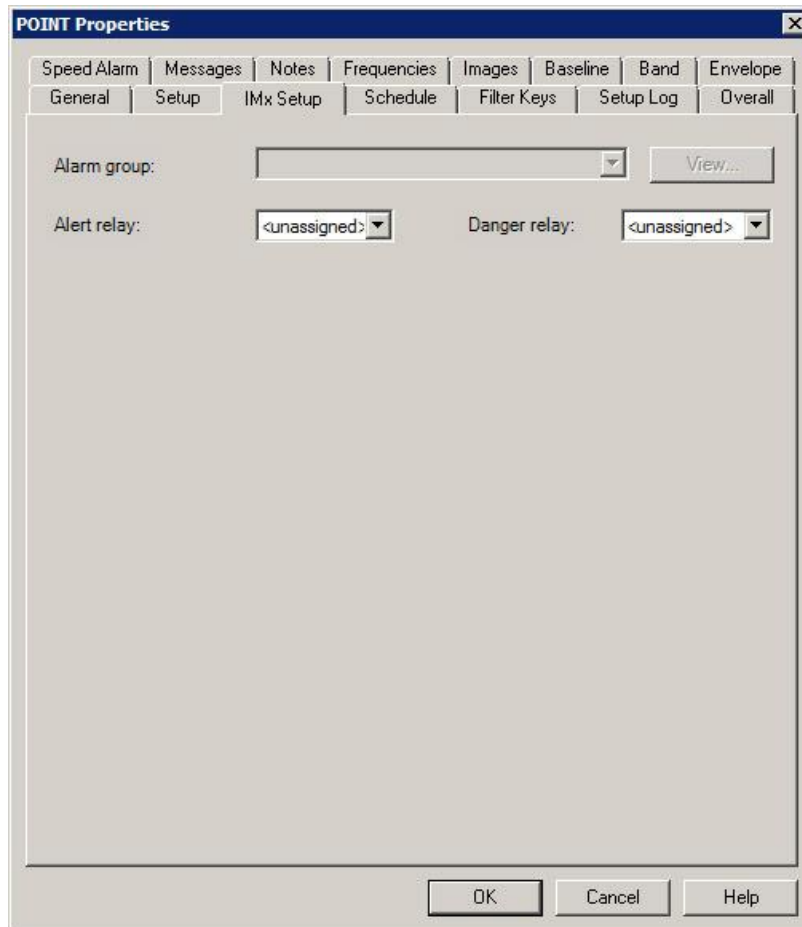


Figure 3 - 20.
The **POINT Properties** Screen's **IMx Setup** Tab.

- The **POINT Properties / IMx Setup** tab displays differently depending on the POINT type. The following **Setup** fields apply to POINTs configured with a **General** application type.
- The IMx-8 supports two alert relays, not four.

Alarm Group – Assign the POINT to an **Alarm Group**. Select an alarm group from the drop down list. To view information about the selected alarm group, click the **View** button. A read-only **Alarm Group** dialog displays.

- Reference the **Customize / Alarm settings** section for information on creating alarm groups.

Alarm Relay – Assign an alarm relay to the POINT. If collected data from this POINT causes an alarm condition, the selected relay activates.

Danger Relay – Assign a danger relay to the POINT. If collected data from this POINT causes a danger condition, the selected relay activates.

Threshold Tab

Assign reference POINTs to your IMx / WMx / DMx POINTs on this tab.

- The **POINT Properties / Threshold** tab displays differently depending on the DAD and POINT type.

POINT Properties

Setup Log | Overall | Speed Alarm | Messages | Notes | Frequencies | Images
General | Setup | IMx Setup | Orbit/SCL | Schedule | Filter Keys
Baseline | Waveform | Phase | Band | Envelope | Vector | **Threshold**

Speed gating

Speed reference: \Transient \Orbit tests \BTP TEST IMx-M \Speed **Select...**

Speed ratio: 1

☒ Enable active range

Min: 120 Max: 5000 Delta: 0 Units: RPM

Process gating

Process reference: **Select...**

☐ Enable active range

Min: 1000 Max: 3000 Delta: 0 Units:

Self gating

☐ Enable active range

Min: 0 Max: 1000000000 Units: micron

Digital gating

Digital reference: **Select...**

☐ Active state: Low

OK **Cancel** **Help**

Figure 3 - 21.
The POINT Properties Screen's Threshold Tab.

Speed Collection – Enter speed collection information in the fields below:

Speed reference - To assign a POINT for speed tag reference, click the **Select...** button to browse POINTs.

Speed Ratio – Enter a numerical value for the desired multiple in the **Ratio** field.

Enable active range – Click to enable data collection for specified range.

Min / Max - Enter the **Min / Max** range at which data collection occurs.

Delta – Enter a value to specify the threshold for acceptable change during data collection. If difference is greater than the **Delta** value, data collection does not occur.

Unit – Enter the unit of measurement.

Process Collection – Enter process collection information in the fields below:

Process reference – To assign a POINT for process reference, click the **Select...** button to browse POINTs.

Enable active range – Click to enable data collection for specified range.

Min / Max – Enter the **Min / Max** range at which data collection occurs.

Delta – Enter a value to specify the threshold for acceptable change during data collection. If difference is greater than the **Delta** value, data collection does not occur.

Units – Enter the units of measurement.

Self Collection – Enter self collection information in the fields below:

- A self collection POINT references its own measurement collection data, rather than another POINT's measurement collection data.

Enable active range – Click to enable data collection for specified range.

Min / Max – Enter the **Min / Max** range at which data collection occurs.

Unit – (read-only) Displays the selected POINT's unit of measurement.

Digital Collection – Enter digital collection information in the fields below:

Digital reference – To assign a POINT for digital reference, click the **Select...** button to browse POINTs.

Enable active range – Click to enable data collection for specified active state.

Active State – Specify whether a **High** or **Low** (on / off) setting must be present for data to be collected.

Protection Threshold Levels tab (IMx-M)

Use the **Protection Threshold Levels** tab to configure an IMx-M process POINT's protection threshold levels for the IMx-M's protection I/O module. The threshold levels can be configured in a variety of ways using the **Protection Threshold Levels** tab's fields.

- These levels should match the levels set in the IMx-M Protection Configurator utility for the protection I/O module. The levels set on this tab are for @ptitude Analyst display purposes only and do not affect the settings in the protection system, alarm status, or reports.
- To display an IMx-M's **POINT Properties** screen for an IMx-M Protection Analog POINT, you must select the **General** application type, and **DC** sensor type on the **DAD / POINT Type Selection** dialog.

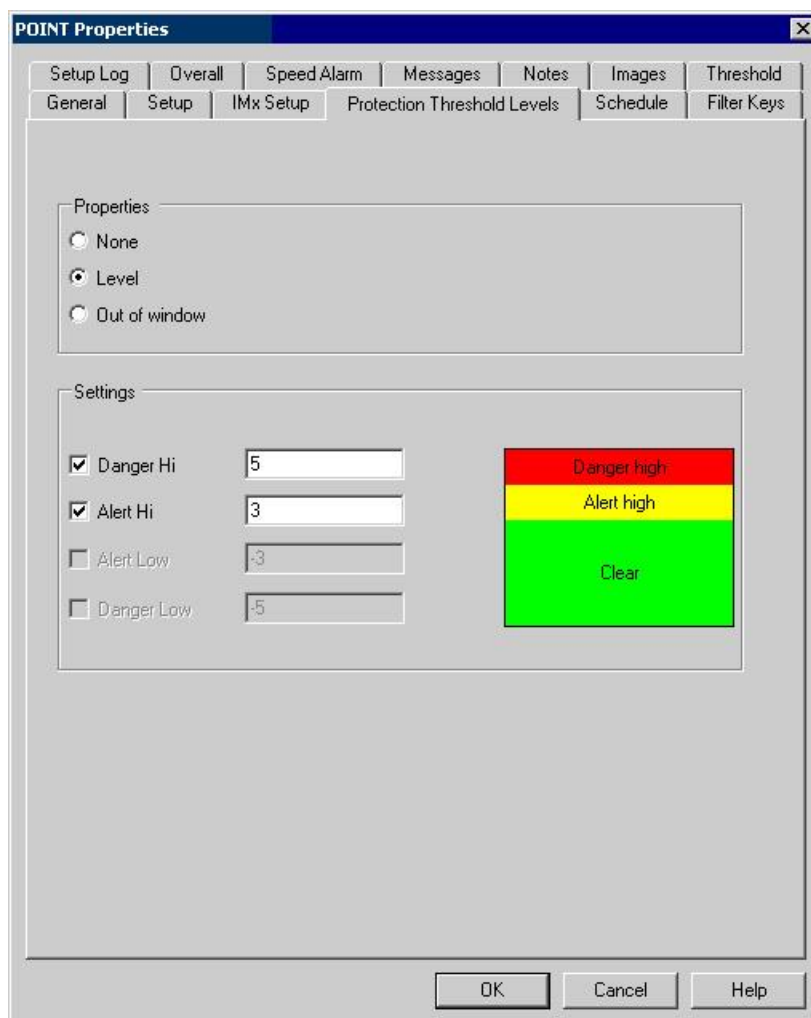


Figure 3 - 22.

The **POINT Properties** Screen's **Protection Threshold Levels** Tab.

The **Properties** area options relate to Alert and Danger alarm detection values specified in the **Settings** area. Select from:

None – No protection threshold is set for the POINT.

Level – Measurements *exceeding* the specified **Settings** display on the trend plot when using the protection threshold limits overlay.

Out of Window – Measurements *falling outside* the specified **Settings** display on the trend plot when using the protection threshold limits overlay.

Gating Tab

Use the POINT Properties / Gating tab to specify Extended Logic POINTs.

- The **POINT Properties / Gating** tab displays differently depending on the DAD and POINT type.
- Reference **Appendix C, Data Collection Gating** for more information about gating.

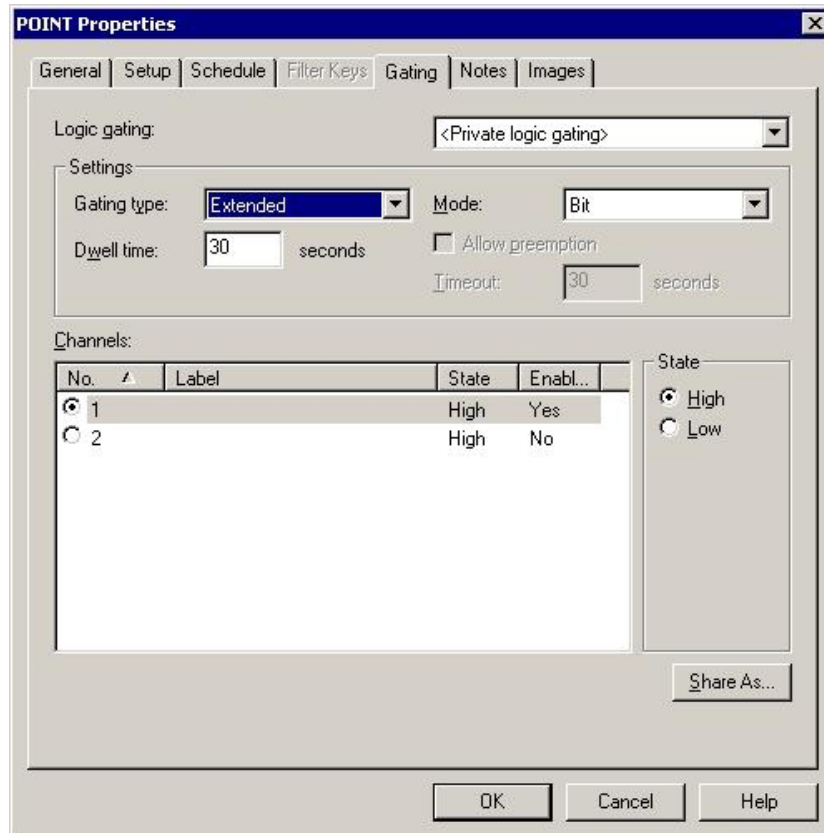


Figure 3 - 23.
The **POINT Properties** Screen's **Gating** Tab.

Logic Gating Definition – Displays all previously created “shared” gating definitions and a <Private Logic Gating Definition> option. Use this drop down list to specify whether you wish to set up a unique <Private Logic Gating Definition> for the current POINT only, or specify a previously defined “shared” gating definition.

Gating type – Specify the gating type:

- For WMx devices, only the **Disabled** (default) or **Triggered** gating options are available.

Triggered – If the specified condition occurs during the specified timeout period for that POINT, data is collected for that measurement POINT. However, if the condition does not occur during the specified timeout period, no data is collected.

Extended – After data collection, the device checks that the condition is the same before saving collected data. For example, if the machine that data is being collected for shuts down during data collection, the data would not be saved because the condition has changed since the start of data collection.

Triggered Preemptive / Extended Preemptive – Preemptive POINTs take precedence over all other POINTs. If a condition occurs for a preemptive POINT during data collection for a non-preemptive POINT, that data will be discarded, and the preemptive POINT will collect data instead.

Mode – Specify the mode to define the gating conditions that control when data is collected.

Bit – Specifies that only one condition must be present for data to be collected.

Byte – Specifies that all conditions must be present for data to be collected.

Combi - (extended gating only) Specifies that a combination of conditions must be present for data to be collected.

Allow Preemption – Enables a timeout to occur for a preemptive POINT.

Timeout value – Specify how many seconds a POINT will wait for the specified condition to occur before moving on to the next POINT.

Dwell time – (preemptive POINTs only) Specify how many seconds the POINT must wait to collect data in order to allow for another preemptive POINT to collect data if its condition occurs. For example, POINT 1 and POINT 2 are both preemptive POINTs, and POINT 1 has a dwell time setting of 5 seconds. If during that 5 seconds, a condition occurs that POINT 2 must collect data for, data will be collected for POINT 2 instead of POINT 1.

Channels – This section works with the **State** option buttons to configure whether a high or low setting must be present on specified channel(s) for data to be collected. (See **State** below for details.) The box lists all channels available on the device.

Selection of channels varies depending on your choice in the **Mode** field.

If **Bit** is selected in the **Mode** field, the list displays option buttons. Select the single channel you would like to configure and set the state using the **State** option buttons.

If **Byte** is selected in the **Mode** field, all channels are used in gating. Highlight each channel in turn and set the state using the **State** option buttons, or double click to toggle the state.

If **Combination** is selected in the **Mode** field, the list displays check boxes. Select any combination of channels to use with gating and set the state using the **State** option buttons.

- **State** – Specify whether a **High** or **Low** (on / off) setting must be present for data to be collected. Settings may be configured in the **Online Settings / Device** tab in the **Customize** menu.

Shared Gating

Gates initially created as private gating may be converted into shared gating. To share a newly created Private gate, select the new Private gate and click the tab's **Share As** button.

The **Enter Name** dialog specifies the gate as a shared gate. When the **Enter Name** dialog displays, you will be prompted to give the shared gate a unique name for easy identification.

- Enter a name for the shared gate and click the **OK** button.

The new shared gate now appears as an available selection in the drop down list. Shared gates are easily assigned to other POINTs to simplify POINT setup and maintenance.

Schedule Tab

Use the **Schedule** tab to enter data collection and archiving scheduling information.

@ptitude Analyst allows you to archive collected data using its **Scheduler** feature, its **Monitor** application, or **Manually**. To archive with @ptitude Analyst's Scheduler wizard or with the Monitor application, you must set archive parameters in the **POINT Properties / Scheduler** tab and in the Scheduler wizard or Monitor application respectively.

The screenshot shows the 'POINT Properties' dialog box with the 'Schedule' tab selected. The dialog has a title bar with a close button (X). Below the title bar are several tabs: 'Speed Alarm', 'Messages', 'Notes', 'Frequencies', 'Images', 'Band', 'Envelope', 'General', 'Sensor Setup', 'Setup', 'Schedule' (selected), 'Filter Keys', 'Overall', 'Digital Output', and 'Gating'. The 'Schedule' tab contains four sections with input fields and dropdown menus:

- Data collection:**
 - 'Take data every:' field with value '24' and a dropdown menu set to 'Hour(s)'.
 - 'Keep current data for:' field with value '24' and a dropdown menu set to 'Week(s)'.
- Short term archive:**
 - 'Archive data every:' field with value '1' and a dropdown menu set to 'Week(s)'.
 - 'Keep archive for:' field with value '24' and a dropdown menu set to 'Month(s)'.
- Long term archive:**
 - 'Archive data every:' field with value '12' and a dropdown menu set to 'Month(s)'.
 - 'Keep archive for:' field with value '5' and a dropdown menu set to 'Year(s)'.
- Unscheduled data:**
 - 'Keep for:' field with value '2' and a dropdown menu set to 'Year(s)'.

At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Figure 3 - 24.
The **POINT Properties** Screen's **Schedule** Tab.

- **IMPORTANT - Keep current data for, Short term archive, and Long term archive** settings operate ONLY with the **Scheduler's** archive process or when using the **Monitor** application's archive feature. They do not apply to Manual archives.

Data collection specifies the POINT's data collection schedule, and the overdue for collection status.

Fields in the **data collection** portion of the **Schedule** tab include:

Take data every – Enter a numerical value to indicate how often data should be collected and select the appropriate units from list box options (**Second(s)**, **Minute(s)**, **Hour(s)**, **Day(s)**).

- For WMx POINTs, this field is based on the selected device's wake-up schedule, which is determined in the View menu's WMx Device's / Device Properties screen. Reference **Chapter 2, Setting Up Your WMx Device** for details.
- In addition to setting the collection schedule, this option provides feedback in case a device fails to collect data as scheduled. The POINT is tagged as overdue for data collection if the time range between the current date (today) and the last data collection date is longer than the specified **Take data every** setting.

Keep current data for – Enter a value to indicate how long to keep (store) the measurement record in the database's "current data" bin and select the appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). When the specified time from data collection elapses, and a Scheduled or Monitor archive process is performed, the measurement is typically moved from the "current data" bin into the "short term archive" bin (or discarded) as specified in the **Short term archive / Archive data every** field.

- The **Keep current data for** field determines the length of time a measurement is kept before it is archived.

Example - Using an IMx DAD, you may select to Take data every <30 days> and Keep current data for <1 Yr>. If you use @ptitude Analyst's Scheduler feature to schedule an archiving process every month, no archiving will take place for the first year. After the first year, on a monthly basis, all measurement records in the "current data" bin whose date / timestamp is older than 1 year from the current date will either be placed in the "short term archive" bin (if short term criteria are met) or discarded.

Short term archive (optional, but typically enabled)

Fields in the **short term archive** section include:

Archive data every – Determines whether data leaving the "current data" bin is archived in the "short term archive" bin. Enter numerical value to indicate how often data leaving the "current data" bin is stored in the "short term archive" bin and select appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). As scheduled archives occur, measurements leaving the "current data" bin are accepted into the "short term archive" bin only if this **Archive data every** setting has expired since the last measurement was stored in the "short term archive" bin. Otherwise, they are discarded.

Example - To continue with our example of a scheduled monthly archive. If we set this **Archive data every** setting to *three months*, on the 13th month of data collection, the measurement(s) leaving the “current data” bin are placed in the “short term archive” bin as there is no data yet stored in the “short term archive” bin. On months 14 and 15, measurement(s) that exceed the **Keep for** setting and leaving the “current data” bin are discarded, as three months have not expired since the last “short term archive” data was stored. On month 16, measurement(s) leaving the “current data” bin are *three months* newer than the last measurement stored in the “short term archive” bin, and are therefore stored in the “short term archive” bin. Thus, by configuring this setting to three months, you are able to “thin” the data stored in the “short term archive” bin (store short term archive data every three months instead of every month).

Keep archive for – Enter a value to indicate how long to keep (store) the measurement record in the “short term archive” bin and select appropriate units (**Wk(s), Mo(s), Yr(s)**). When the specified time of storage elapses, and a scheduled archive process performed, the measurement is typically moved from the “short term archive” bin into the “long term archive” bin (or discarded) as specified in the **Long term archive** fields.

Fields in the **long term archive** section include:

Archive data every – Determines whether data leaving the “short term archive” bin is archived in the “long term archive” bin. Enter numerical value to indicate how often data leaving the “short term archive” bin is stored in the “long term archive” bin and select appropriate units (**Wk(s), Mo(s), Yr(s)**). As scheduled archives occur, measurements leaving the “short term archive” bin are accepted into the “long term archive” bin if this **Archive data every** setting has expired since the last measurement was stored in the “long term archive” bin.

Keep archive for – Enter value to indicate how long to keep (store) the measurement record in the “long term archive” bin and select appropriate units (**Wk(s), Mo(s), Yr(s)**). When the specified time of storage elapses, and a scheduled archive process is performed, the measurement is discarded.

Unscheduled data

The last section of the tab schedules alarm data. In on-line DAD systems, alarm data is automatically placed in the “Unscheduled data” bin. This setting determines how long alarm data is stored in the alarm data bin before it is discarded. Fields include:

Keep for – Specify value to indicate the desired length of time to store alarm data and select appropriate units (**Wk(s), Mo(s), Yr(s)**). After the specified storage time elapses, the alarm data is discarded.

Filter Keys Tab

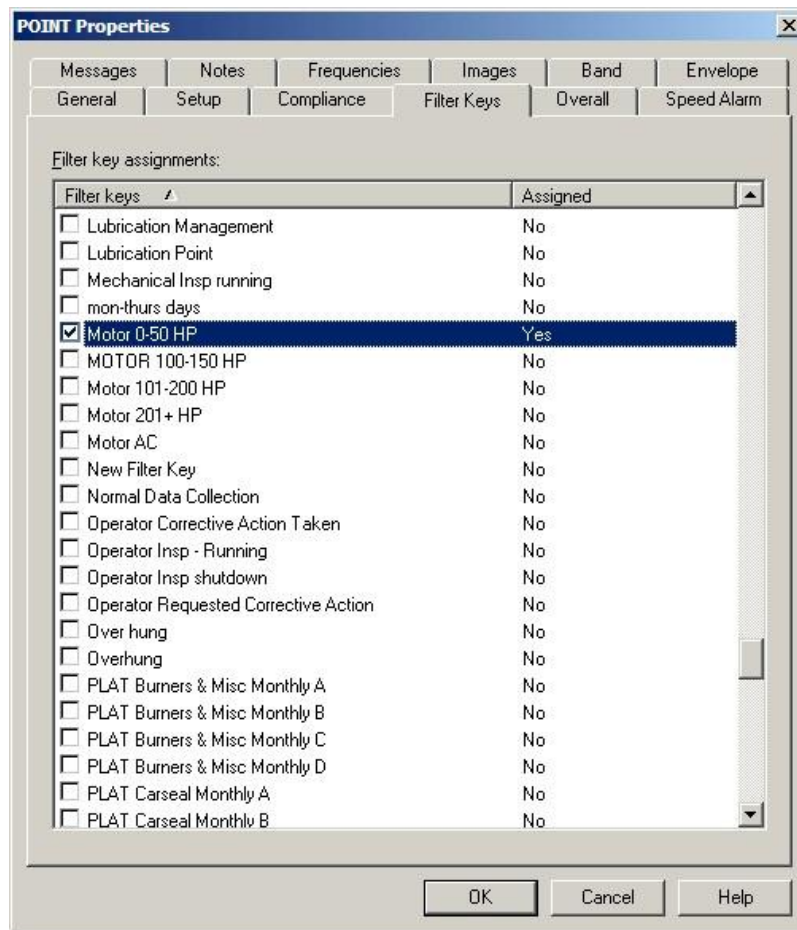


Figure 3 - 25.
The **POINT Properties** Screen's **Filter Keys** Tab.

@ptitude Analyst allows you to create **Filter Keys** which can be associated with POINTs and Machines for automated filtering purposes. For example, if you activate a "Pump" filter key for a Group and later filter a hierarchy list using the **Filter Key / Pump**, then all Groups with active Pump filter keys display in the filtered Workspace.

➤ Filter key creation is discussed later in this chapter.

Filter key searches list all POINTs or Machines sharing a specified filter key (or multiple filter keys). The **Filter Key** tab lists all created filter keys and indicates whether or not they are currently assigned.

- Click a specific filter key's checkbox to associate it to the current POINT.
 - The checkbox appears gray if the filter key is enabled for a parent hierarchy item.
- Click the **Filter Key** dialog's **OK** button to save your filter key assignments.

Overall Tab

Setting Alarms – Overview

By setting alarms on your vibration measurements, the hierarchy's alarm status indicators allow you to quickly know if any of your monitored components / machines moved into an alarm condition. If you do not specify measurement alarm settings, overall vibration level alarms are set to factory defaults.

@ptitude Analyst offers many ways to alarm on machinery vibration levels:

- Overall vibration alarms
- Spectral enveloping (narrow band) alarms
- Spectral band alarms
- Phase alarms

Of the above, overall vibration alarms are, by far, the most frequently used alarm type for detection of machinery faults. Overall vibration is the total vibration energy measured within a specific frequency range. Measured numerically, a higher than normal overall value provides an indication that "something" is causing the machine or component to vibrate more. Below we describe how to go about setting your initial overall vibration alarm levels. However, the same logic may be used to set alarm levels for other types of alarms.

If yours is a new system and no vibration measurement history exists for the monitored machinery, the ISO 10816-1 Standard provides guidance for evaluating overall velocity vibration measurement severity in machines operating in the 10 to 200 Hz (600 to 12,000 RPM) frequency range. Examples of these types of machines are small, direct coupled, electric motors and pumps, production motors, medium motors, generators, steam and gas turbines, turbo compressors, turbo pumps and fans.

It is possible for a machine to be in the early stages of wear or damage and still meet the criteria in these ISO 10816-1 guidelines. While the Standard can provide a quick indication of machines that are in serious trouble; long term overall vibration level trending and experience with a machine's history provide much more accurate information on where to set your machinery vibration alarm levels.

Once you have collected enough measurement data (e.g., six data sets), SKF @ptitude Analyst can display meaningful trends of each measurement's data. Over time, when you are convinced that the measurement's trending vibration level indicates the component's known good condition, you may designate it as the measurement's "baseline" vibration level, upon which you set two overall vibration alarm levels for detection of machinery faults, the "alert" level and the "danger" level. Where to set these two overall alarm levels is the question.

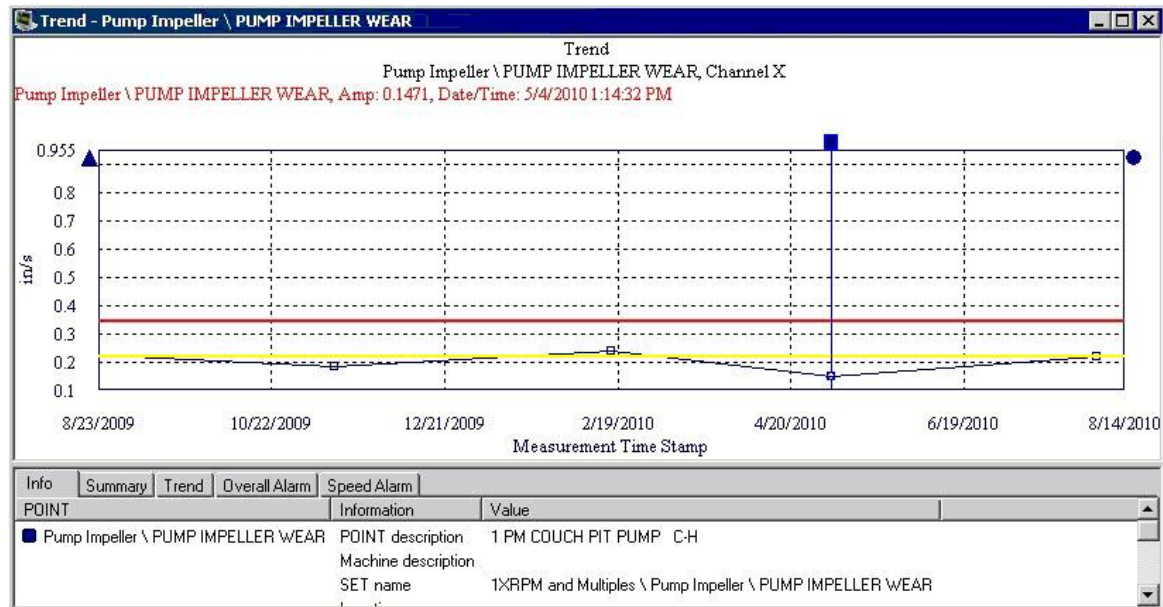


Figure 3 - 26.
Example Trend Plot with Alert (Yellow) and Danger (Red) Alarm Levels.

In general, it is most desirable to specify alert alarm settings high enough to minimize extraneous alarms, yet conservative enough to not miss a critical excursion in machine condition. In addition, initially you should set “loose” alarm levels so as to avoid false alarms. False alarms significantly degrade confidence in the condition monitoring system’s accuracy. Over time, as you continue to better understand your machinery’s vibration levels and gain confidence in the accuracy of your vibration measurements, you may “tighten” the initial alarm levels to acquire earlier detection of machine faults.

A general rule of thumb is to initially set alert alarm levels at one and a half to twice the baseline levels for measurements. This “alert” alarm level should indicate that a problem has developed and more frequent monitoring and analysis should occur. Fault analysis should be initiated and the severity and root cause of the problem should be established. In addition, analysis results should determine whether necessary repair parts are ordered, and the date for repair should be established based on minimum production interruption.

The initial “danger” level alarm is typically set from two and a half to three times the baseline vibration level. In general, if the danger alarm is reached on a critical machine, it should be scheduled for repairs as soon as possible. Again, over time, after more experience with said machine and your vibration measurements, the alarm level can be adjusted to better fit the specific component / machine.

On bearing measurements, an accurate enveloped acceleration measurement alert alarm indicates that a bearing is approaching the end of its usable lifetime. Upon such an alarm, you should more closely monitor the bearing using spectrum analysis with bearing fault frequency markers to verify the bearing fault and determine proactive maintenance measures, or to plan the most efficient bearing replacement during a scheduled machine outage.

Once a good operating baseline is established and sufficient data and experience have been acquired for you to set your initial alert and danger overall vibration alarm levels, SKF @ptitude Analyst provides a *Statistical Overall Alarms Wizard* that guides you through a process that automatically generates overall alarm settings based upon historical measurement data (reference the **Statistical Alarms Wizard** section later in this chapter for details).

The **Overall** tab allows you to re-apply previously defined “shared” overall alarms, eliminating the need to define alarms individually, saving time and database space.

Use the **Overall** tab to set a process POINT’s overall alarm settings. The alarm can be configured in a variety of ways using the **Overall** tab’s fields.

The current alarm appears in the **Overall alarm** field. The current alarm’s values display below in the tab’s **Properties** and **Settings** areas.

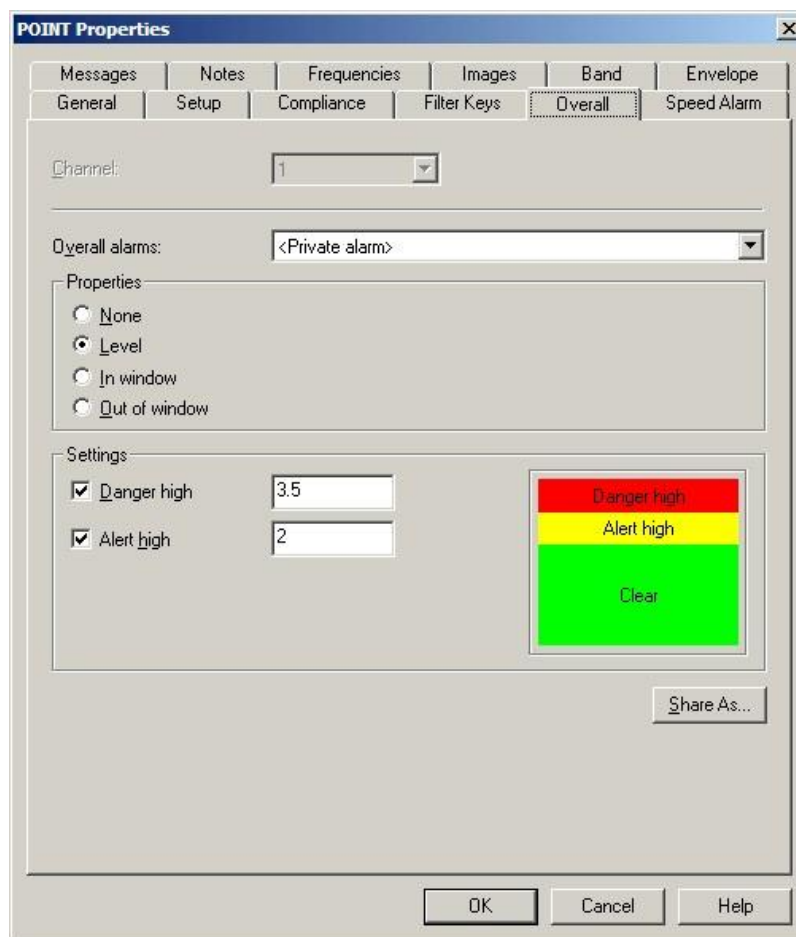


Figure 3 - 27.
The **POINT Properties** Screen’s **Overall** Tab.

The **Overall alarms** drop down list displays all previously created overall alarms and a **<Private Alarm>** option. Use this drop down list to specify whether you wish to set up a unique **<Private Alarm>** for the current POINT only, or specify a previously defined “shared” alarm (selected by name). If you specify a shared alarm, its alarm settings automatically display in subsequent fields. If you specify a Private Alarm, proceed to configure the tab’s alarm settings as described below.

The **Properties** area options relate to Alert and Danger alarm detection values specified in the **Settings** area. Select from:

None – No overall alarm is set for the POINT.

Level – Measurements *exceeding* the specified **Settings** will result in an alarm condition.

In Window – Measurements *falling within* the specified **Settings** will result in an alarm condition.

Out of Window – Measurements *falling outside* the specified **Settings** will result in an alarm condition.

To assign a shared alarm to the current POINT:

- Select the shared alarm from the drop down list and click the **OK** button. Shared alarms may be applied to an unlimited number of POINTs.

Shared Alarm

Alarms initially created as private alarms may be converted into shared alarms. To share a newly created Private alarm, select the new Private alarm and click the tab’s **Share As** button.

The **Share As** dialog specifies the alarm as a shared alarm. When the **Share As** dialog displays, you will be prompted to give the shared alarm a unique name for easy identification.

- Enter a name for the shared alarm and click the **OK** button.

The new shared alarm now appears as an available selection in the drop down list. Shared alarms are easily assigned to other POINTs to simplify POINT setup and maintenance.

Variable Speed Alarms

As a machine’s speed increases, the overall vibration increases. In order to accurately determine if measurements are in alarm, alarm levels should be adjusted based on the machine’s speed levels. @ptitude Analyst’s variable speed alarms allow you to customize overall and band alarm levels based on machine speed.

Variable speed alarms are available for IMx / WMx dynamic POINTs that reference a speed POINT.

The **POINT Properties / Speed Alarm** tab allows you to specify the POINT’s alarm adjustments for each speed region.

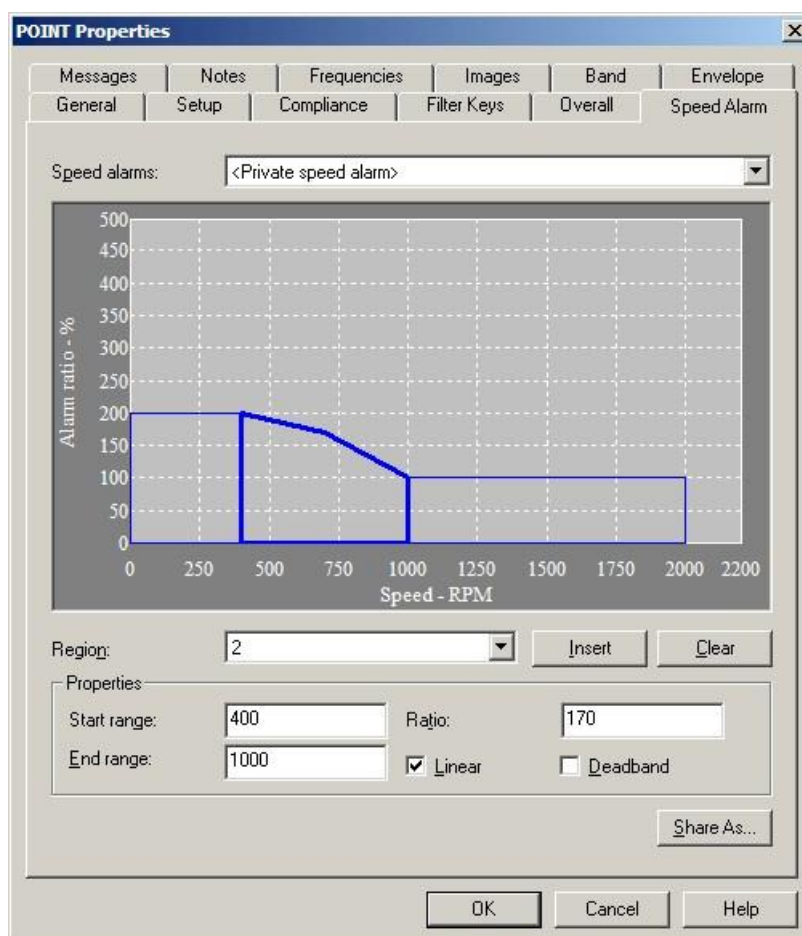


Figure 3 - 28.
The **POINT Properties' Speed Alarm** Tab.

Speed alarm fields include:

Speed Alarm – Specify a private or shared alarm from the drop down list.

Range – Select the speed regions for which the **Properties** settings will apply. You may select the region from the **Range** drop down list, or by clicking on the specific region on the speed alarm display. The values in the **Properties** fields update to reflect the specified speed region.

- Click **Insert** to add a new region to the speed alarm.
- Click **Clear** to remove the selected speed region.

Start / End Range– Enter each region's start and end RPMs (i.e., 0 to 1000, 1000 to 2000, 2000 to 3000, etc.).

Ratio – Enter the adjustment to overall and band alarm levels. The normal running speed region's ratio will be 100. If the next higher speed range is expected to produce vibration levels 10% higher than the nominal running speed, then the next speed range ratio would be set to 110.

Linear – (always enabled for IMx / WMx POINTs) This option allows for either a flat, rectangular definition of the adjustment (if disabled, the entire region will have the same

ratio), or a more linear definition of the ratio (if enabled, the ratio will start from the level defined in the previous speed region and rise throughout the region until it reaches the next speed region's level).

Deadband – When enabled, no alarm processing will occur for this region. This is mainly to be used when the machine reaches its resonant speed, at which vibration will be indeterminately high. When enabled, **Ratio** and **Linear** fields are disabled.

The variable speed alarm settings produce a table of speed ratios for the POINT. When data is collected, the overall alarm value is multiplied by the speed ratio before it is compared to the overall value returned from the sensor to determine whether the POINT is in alarm. When viewing a trend display, the variable speed alarm overlay adjusts based on the speed of the measurement.

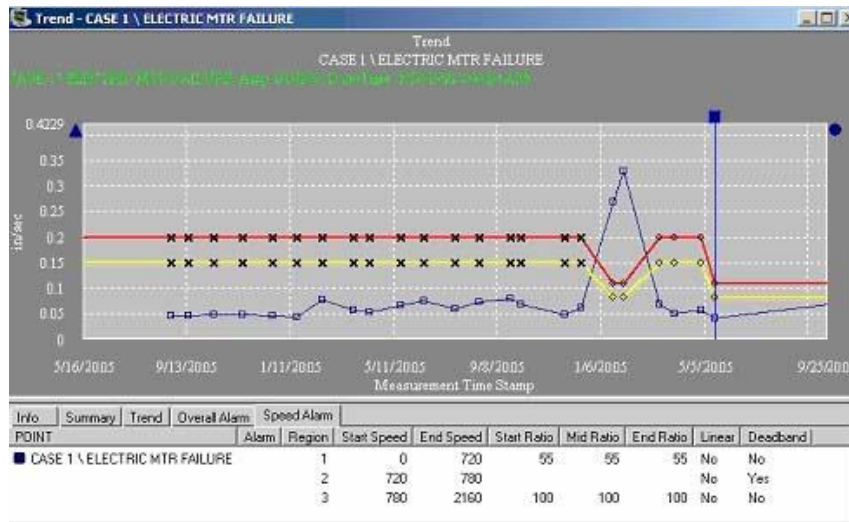


Figure 3 - 29.
Trend Display with Variable Speed Alarm Overlay.

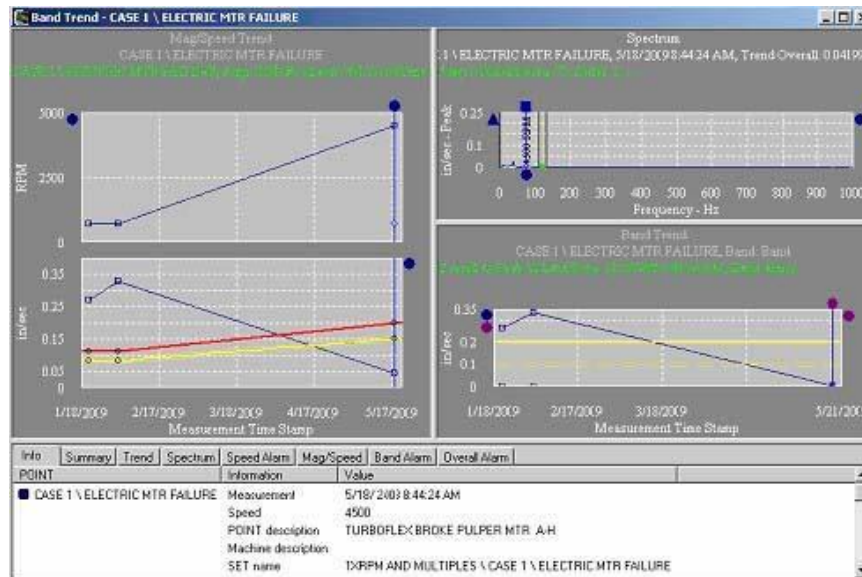


Figure 3 - 30.
Band Trend Display with Variable Speed Alarm Overlay.

Shared Alarm

Variable speed alarm adjustments initially created as private definitions may be converted into shared definitions. To share a newly created Private definition, select the new Private definition and click the tab's **Share As** button.

The **Share As** dialog specifies the definition as a shared definition. When the **Share As** dialog displays, you will be prompted to give the shared definition a unique name for easy identification. Enter a name for the shared definition and click the **OK** button.

The new shared definition now appears as an available selection in the drop down list. Shared definitions are easily assigned to other POINTs to simplify POINT setup and maintenance.

Messages

The **Messages** tab allows you to apply previously defined “shared” alarm messages, and to create new alarm messages for various overall alarm levels.

The screenshot shows the 'POINT Properties' dialog box with the 'Messages' tab selected. The dialog has a title bar with a close button. Below the title bar are several tabs: 'General', 'Setup', 'Compliance', 'Filter Keys', 'Overall', 'Speed Alarm', 'Messages', 'Notes', 'Frequencies', 'Images', 'Band', and 'Envelope'. The 'Messages' tab is active, displaying a 'Messages context:' table with columns 'Context', 'Purpose', and 'Name'. The table lists four entries: 'Overall Alert High' (Alarm, <Private>), 'Overall Alert Low' (Alarm, Change Oil Within a Week), 'Overall Danger High' (Alarm, Change Immediately !!!), and 'Overall Danger Low' (Alarm, Check Again Soon). Below the table is a 'Properties' section with three fields: 'Messages:' (a dropdown menu showing '<Private>'), 'Format:' (a dropdown menu showing 'Free form'), and 'Summary:' (a text box containing 'INFORM BOARD OPERATOR'). Below these is a 'Content:' section with a large text area containing the text 'Inform lead operator of E-4 with issue and initiate work request.' and a 'Share As...' button. At the bottom of the dialog are 'OK', 'Cancel', and 'Help' buttons.

Context	Purpose	Name
Overall Alert High	Alarm	<Private>
Overall Alert Low	Alarm	Change Oil Within a Week
Overall Danger High	Alarm	Change Immediately !!!
Overall Danger Low	Alarm	Check Again Soon

Properties

Messages: <Private>

Format: Free form

Summary: INFORM BOARD OPERATOR

Content:

Inform lead operator of E-4 with issue and initiate work request.

Share As...

OK Cancel Help

Figure 3 - 31.
The **POINT Properties** Screen's **Messages** Tab.

@ptitude Analyst's **POINT Properties / Messages** feature allows you to create and assign four alarm messages corresponding to the four overall alarm levels; **Overall Alert High, Overall Alert Low, Overall Danger High, and Overall Danger Low**. The **Messages context** area displays the message context available for message assignment and any existing alarm messages already applied. You can assign a created public alarm message to one or more alarm levels, or create a new private alarm message and apply it to the selected POINT.

The **Name** drop down list displays all previously created alarm messages and a **<Private>** option. Use this drop down list to specify whether you wish to set up a unique **<Private>** message for the current POINT only, or specify a previously defined "shared" message (selected by name). If you specify a shared message, its format, summary, and content automatically display in subsequent fields. If you specify a Private message, proceed to configure the message settings as described below.

- For more information on creating and managing public alarm messages, refer to the **Customize / Database Operations** section later in this chapter.

Format – This drop down list allows you to specify your alarm message's format.

Free form – Allows you to manually type in the summary and content for your alarm message.

Summary – Type in text summarizing your alarm message for easy recognition. For example, if you have an alarm message that details shut down instructions in the case of an overall danger high alarm level, your summary may read, "Emergency Shut Down Instructions."

Content – Enter your complete alarm message in the content text area. Using the above example, your alarm message content would include detailed shut down instructions, and any other pertinent information required in the case of the triggered alarm type.

To assign a shared message to the current POINT:

- Select the shared message from the drop down list and click the **OK** button. Shared messages may be applied to an unlimited number of POINTs.

Shared Message

Alarm messages initially created as private messages may be converted into shared (public) messages. To share a newly created Private message, select the new Private message and click the tab's **Share As** button.

The **Enter Name** dialog specifies the message as a shared (public) message. When the **Enter Name** dialog displays, you will be prompted to give the shared message a unique name for easy identification.

- Enter a name for the shared message and click the **OK** button.
- The new shared message **now** appears as an available selection in the dialog's drop down list. Shared messages are easily assigned to other POINTs to simplify POINT setup and maintenance.

Frequencies Tab

The **POINT Properties** screen's **Frequencies** tab allows you to re-apply previously defined **Frequency Sets**, or configure a new fault **Frequency Set** to attach to the current POINT.

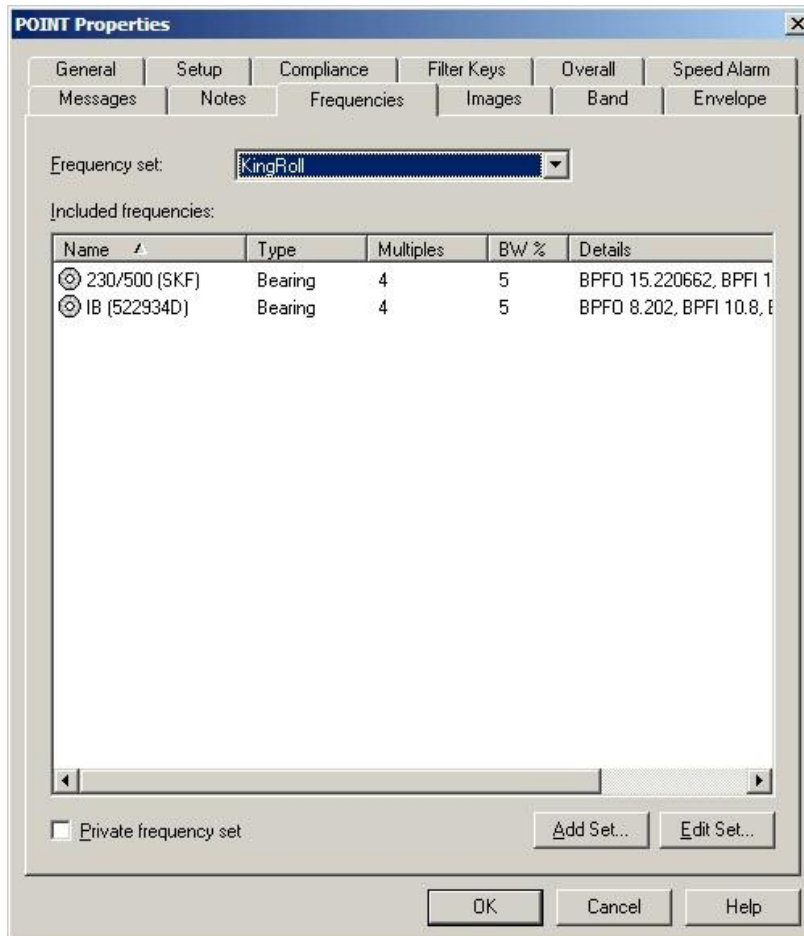


Figure 3 - 32.
The **POINT Properties** Screen's **Frequencies** Tab.

You can select a frequency shared with other POINTs or create a private frequency set for use with the current POINT *only*.

To assign a shared frequency set to the current POINT:

- Select the shared frequency set from the **Frequency Set** drop down list. The corresponding included frequencies appear in the tab's **Included frequencies** area.
- Click **OK** to assign the selected set to the current POINT.

Use the **Frequency** tab to create a private set for use with the current POINT *only*.

- Check the **Private frequency set** checkbox. **<Private frequencies>** displays in the tab's **Frequency Set** field.
- Click the **Edit Set** button. The **Frequency Sets Editor** dialog opens automatically.
- Complete edits and click **OK**.

The **Frequencies** tab also allows you to create a private set based on an existing shared set. This is convenient when your new frequency set is only slightly different from an existing frequency set.

- When a shared frequency set is made private, changes made to the shared set will not be reflected in private sets.

To edit a shared set for private use:

- Select the shared frequency set you wish to modify from the **Frequency Set** drop down list.
- Click the **Private Frequency** set box. The **Frequency Sets Editor** dialog opens.
- Complete edits and click **OK**.
 - Refer to the **Frequency Sets** section in this chapter for more information on Frequency Sets.

Notes Tab

The **POINT Properties / Notes** tab allows you to attach a text note to the POINT along with a date / time stamp. This feature conveniently stores and records relevant POINT information such as maintenance history.

- Coded notes uploaded from the on-line device for the current Machine display in the **Notes** tab.
- Click the **Notes** tab's **Add** button to add a new note and date / time stamp.
- Click the **Save** button to save edits made to a note.
- Click the **Undo** button to cancel edits made to a note.
- Click the **Remove** button to remove the selected note from the display.

POINT Properties / Notes fields include:

Date – Select the current date from the drop down list.

Time – Select the current time.

The selected date and time appear in the tab's left **Notes** field.

Text – Type in desired note text in the text field.

- Click the tab's **OK** button to save all entries.

HAL Alarms Tab

HAL (harmonic activity locator) alarms provide alert and danger alarms on Harmonic Activity Index (HAL) indicators for designated frequencies. Use the **HAL Alarms** tab to configure HAL alarms for a dynamic measurement POINT.

POINT Properties

Channel: Channel X Copy to All Channels

☐ None

☐ HAL Alarms for all frequencies

☐ Danger High: 8

☐ Alert High: 5

☒ HAL Alarms for individual frequencies

Name	Frequency		Danger		Alert
01B507 (COOPER) BPFI	9.067 x RPM	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	5
01B507 (COOPER) BPFO	6.933 x RPM	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	5
01B507 (COOPER) BSF	3.683 x RPM	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	5
01B507 (COOPER) FTF	0.433 x RPM	<input type="checkbox"/>	8	<input type="checkbox"/>	5
2xRPM	2 x RPM	<input type="checkbox"/>	8	<input type="checkbox"/>	5
3xRPM	3 x RPM	<input type="checkbox"/>	8	<input type="checkbox"/>	5
7414B (SKF) BPFI	6.070011 x RPM	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	5
7414B (SKF) BPFO	3.929989 x RPM	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	5
7414B (SKF) BSF	1.707838 x RPM	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	5.000
7414B (SKF) FTF	0.392999 x RPM	<input type="checkbox"/>	8	<input type="checkbox"/>	5

Copy Paste Copy to All Frequencies

OK Cancel Help

Figure 3 - 33.
HAL Alarms Tab.

If you are working with a multi-channel POINT, first select a **Channel**. Any existing HAL alarm settings that display and any existing or new HAL alarm settings you configure are for the selected **Channel** only.

- At any time, you can click **Copy to All Channels** to apply the selected **Channel**'s settings to all channels.

To exclude all frequencies from HAL alarm analysis on the selected channel:

- Select (mark) the **None** radio button.
 - If no frequencies are defined for the POINT, **None** is the only available option. To associate a frequency set with the POINT, go to the **Frequencies** tab.

To set the same HAL alarms for all frequencies on the selected channel:

- Select (mark) the **HAL Alarms for all frequencies** radio button.
 - At least one frequency must be defined for the POINT before you can select this radio button.
- Select (check) the **Danger High** checkbox and enter a value to represent the HAI value danger alarm threshold. Any calculated HAI values for any of the frequencies on this channel that are greater than or equal to the value entered will trigger a danger alarm.
 - The default value is “8.”
- Select (check) the **Alert High** checkbox and enter a value to represent the HAI value alert alarm threshold. Any calculated HAI values for any of the frequencies on this channel that are greater than or equal to the value entered but less than the **Danger High** threshold value will trigger an alert alarm.
 - The default value is “5.”

To set HAL alarms individually per frequency on the selected channel:

- Select (mark) the **HAL Alarms for individual frequencies** radio button.
 - At least one frequency must be defined for the POINT before you can select this radio button.

Each row in the grid represents an individual frequency on the selected channel and contains the **Name** assigned to the frequency, the **Frequency** value itself, the **Danger** alarm threshold, and the **Alert** alarm threshold.

- Select (check) a row's **Danger** checkbox and enter a value to represent the HAI value danger alarm threshold for the frequency. Any calculated HAI value for this frequency on this channel that is greater than or equal to the value entered will trigger a danger alarm.
- Select (check) a row's **Alert** checkbox and enter a value to represent the HAI value alert alarm threshold for the frequency. Any calculated HAI value for this frequency on this channel that is greater than or equal to the value entered but less than the frequency's **Danger** threshold value will trigger an alert alarm.

To copy one frequency's HAL alarm settings to other individual frequencies on a channel:

- Select the entire source frequency row and click **Copy**.
- Select the entire destination frequency row and click **Paste**.
 - To copy the source frequency's thresholds to all frequencies on this channel, click **Copy to All Frequencies** instead of **Paste**.
- If you wish to disable an alarm for any frequency, deselect (uncheck) the appropriate checkbox.

If you are working with a multi-channel POINT, select each **Channel** and proceed with any of the appropriate steps described above. When you click **OK** to save all changes on

the POINT Properties screen, the system saves all settings you have configured or updated for each applicable channel on this tab.

Contribution Tab

To configure the combination contribution bar chart and profile plot display, the **POINT Properties** provides the **Contribution** tab. The list of frequencies presented on the **Contribution** tab is always based on the frequencies currently associated with the POINT on the **Frequency** tab. Any frequency types that are not supported on the **Contribution** plot are excluded from the **Contribution** tab. The **Contribution** tab displays two types of frequencies:

- Frequencies from bearings
- Non-bearing RPM multiple frequencies
 - Unsupported frequencies are: Non-bearing Constant, Non-bearing Offset and Non-bearing Sideband

Use the **Contribution** tab to choose which frequencies to include in the contribution bar graph and roundness profile plot display, as well as to select an external source to use as the **Speed Reference**.

Important! Upon opening, the Contribution tab list of frequencies will update to match changes made to the Frequency tab list. If frequencies from bearings or non-bearing RPM-multiple frequencies were edited on the Frequencies tab, the list on the Contribution tab will update to match those changes. Any frequencies of the relevant types (from bearings or Non-bearing RPM multiple frequencies) that were deleted are removed from the Contribution tab list. Any frequencies of the relevant types that were added are also added to the Contribution tab list. They are set to their default settings: unchecked, with the speed reference set to the current point.

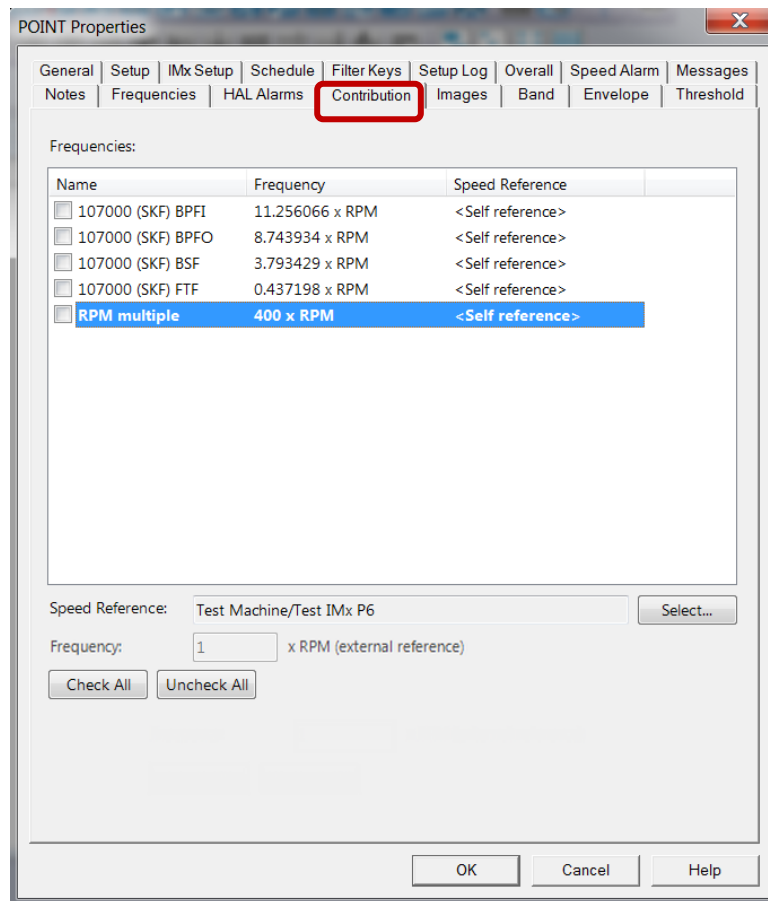


Figure 3 - 34.
POINT Properties, Contribution Tab.

The columns and features on the **Contribution** tab are described below:

Name – If the checkbox in the **Name** column is selected, that frequency will be displayed in the POINT's contribution bar graph and roundness profile plot display. Click **Check All** to select and include all the frequencies. Click **Uncheck All** to deselect all the frequencies.

Frequency – This column displays the frequency as $\langle F \rangle \times \text{RPM}$. The value of F depends on the frequency type, the **Speed reference** and **Frequency: $\langle \text{value} \rangle \times \text{RPM}$ (external reference)** values. If the frequency is for a bearing, the numeric value substituted for F will be the Fundamental frequency for the row (for example, BPFO, BPFI etc.).

- Bearing frequencies do not support external Speed References or Frequency: $\langle \text{value} \rangle \times \text{RPM}$ (external reference) values.

Speed Reference – Each frequency has its own speed reference. The default speed reference is the current POINT itself, shown in the column as $\langle \text{Self reference} \rangle$. If the frequency is for a non-bearing RPM multiple and no external speed reference is set, F is the value of the **Frequency formula** of the row.

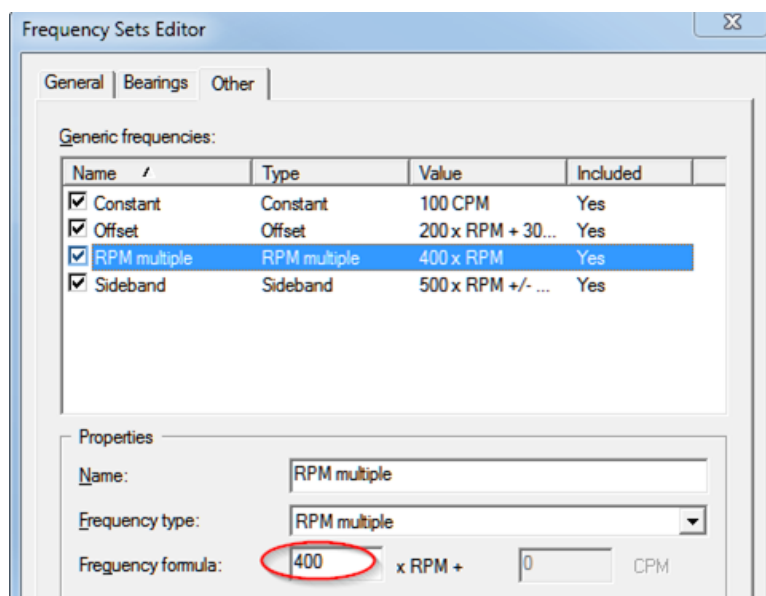


Figure 3 - 35.

Frequency Sets Editor > Other Tab, Frequency Formula Field.

The speed reference value for a non-bearing RPM multiple frequency can be changed to an external speed reference (for example, a tachometer signal), as detailed in the procedure below.

To change the speed reference POINT for the selected frequency:

- Highlight the frequency you want to modify. The **Speed Reference** field displays the speed reference point that will be used to derive the speed for calculations made in contribution graphs for this point.
- Click the **"Select..."** button. The **POINT Selection** dialog opens.

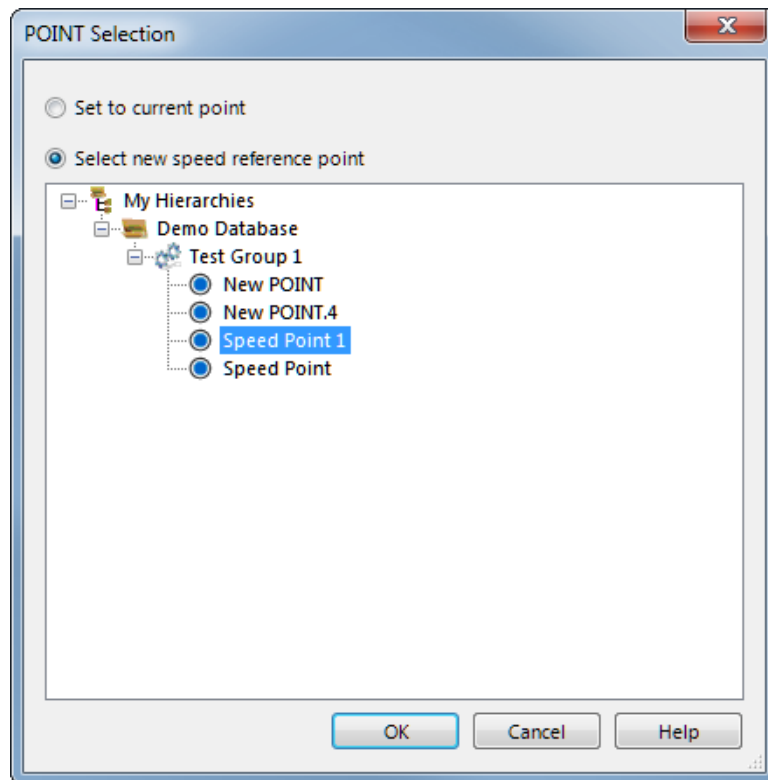


Figure 3 - 36.

POINT Selection Dialog for Selecting a New Speed Reference Point.

If the speed reference for the current frequency is set to the default, the **Set to current point** option button will be selected and the machine for the current POINT will be displayed in the item hierarchy presented.

- Select the option button **Select new speed reference point**.
- Browse to the POINT in the hierarchy that you want to use as the speed reference. (See the section *About Speed References*, below.)
- When the correct POINT is highlighted, click **OK**.
 - To return the speed reference to its default, select the option button **Set to current point**, and then press **OK**.

You are returned to the **Contribution** tab. The new reference for the selected row displays in the **Speed Reference** field as "<Machine>/<Point>".

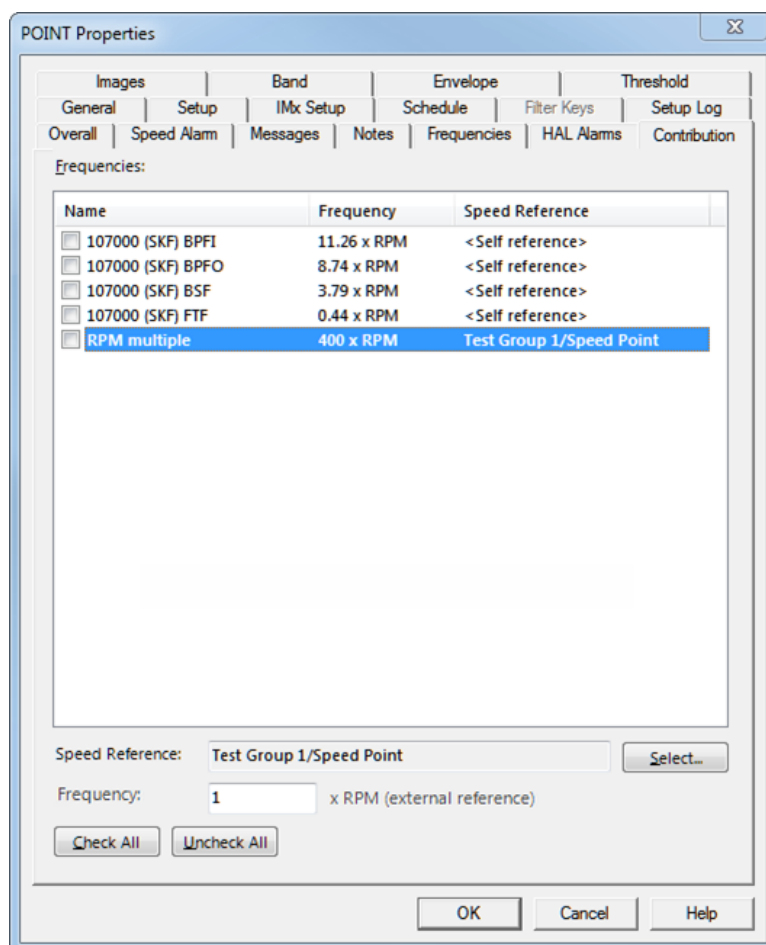


Figure 3 - 37.
Contribution Tab Showing One External Speed Reference.

Frequency: <value> x RPM (external reference) is enabled when the selected row is using an external speed reference. The **Frequency: <value> x RPM (external reference)** value is used in conjunction with the frequency to calculate the speed for the frequency on the Contribution plot. The default value is 1.0. Enter the **Frequency: <value> x RPM (external reference)** value (as a multiple of the external speed reference).

- If the Frequency: <value> x RPM (external reference) value is not 1.0, *F* is the value of the Frequency: <value> x RPM (external reference) field.
- If the **Frequency: <value> x RPM (external reference)** is 1.0, *F* is the value of the Frequency formula of the row (the same as no external reference).
- If the speed reference is set back by using the **Set to current point** option button, then the **Frequency: <value> x RPM (external reference)** returns to its default value of 1.0.

OK – Click **OK** to save changes. Settings changed on the **Contribution** tab are saved only when one of the following conditions is met:

- At least one frequency is checked, or
- At least one **Speed Reference** or **Frequency: <value> x RPM (external reference)** value is set to something other than the default.

More about Speed References

Valid speed references can be any POINT (static or dynamic). For static measurements, the overall value is to be taken as the speed reference. For dynamic measurements which are speed stamped, the speed stamp will be used as the external reference. OPC provided speeds, as well as MODBUS provided speeds, are also supported.

The date/time stamp (DTS) of the incoming measurement and DTS of the tachometer/speed reference must be within a user-defined window of time (in seconds) or else a warning message will be displayed on the Contribution plot. The message states: Speed reference out of range.

The initial size of this window is set in a pair of Plot preferences: Speed Reference Time Window (Unit) and Speed Reference Time Window (Value). Go to **Customize > Preferences > Plot** tab to set these preferences.

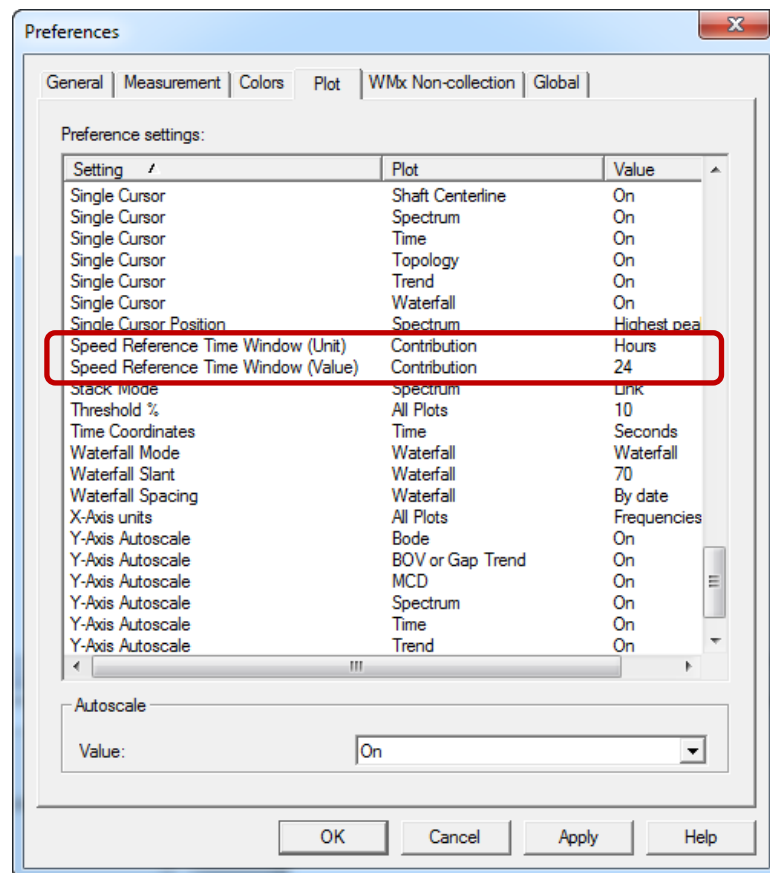


Figure 3 - 38.
Contribution Plot Preferences for Speed Reference Time Window.

You can change the Speed Reference Time Window values from within the Contribution plot by right-clicking to open the context menu. Select **Settings** to open the **Contribution Plot Settings** dialog. The default is 24 hours; the maximum is 48 hours.

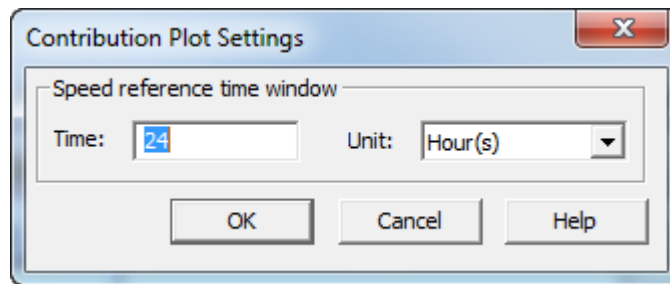


Figure 3 - 39.
Contribution Plot Settings Dialog.

Images Tab

Scanned photographs or digital images can be added to a particular POINT, stored in the Hierarchy, and viewed from the **Images** tab. Images help identify SETs / machines, organize similar equipment, and document known defects.

POINT Properties / Images fields include:

Image – All attached images display in the drop down list.

Description – Enter text to identify the image. Click the **Save** button to save your description entry. If saved, the new description replaces the filename in the **Images** list.

To add a new image:

- Click the **Add** button to add a new image. The Windows' **Open** dialog displays. Select desired image and click **Open** to add or **Cancel** to undo.
 - Added images use the filename as the default description.

To replace the current image file with a newer image:

- Click the **Browse** button.
- Select a replacement image file. The new image displays on the tab.
 - The image name and description of the old image are retained for the replacement image.
- Click **Save** to confirm the image replacement.
- Click **Cancel** to undo the image replacement.

To export an image to a specific location:

- Select the image to export.
- Click the **Export** button.
- When prompted, enter the desired export location and filename and click **OK**.

The image is copied and saved to the specified location, but still remains attached to the assigned POINT.

Baseline Tab

A **Baseline** is a measurement taken when the machine is in “known good” operating condition. Baseline spectra are used for analysis comparison with future spectral measurement results.

- The **POINT Properties / Baseline** tab is available only when the current POINT has stored spectral data. If there is no collected FFT or overall data, the **Baseline** tab does not appear.

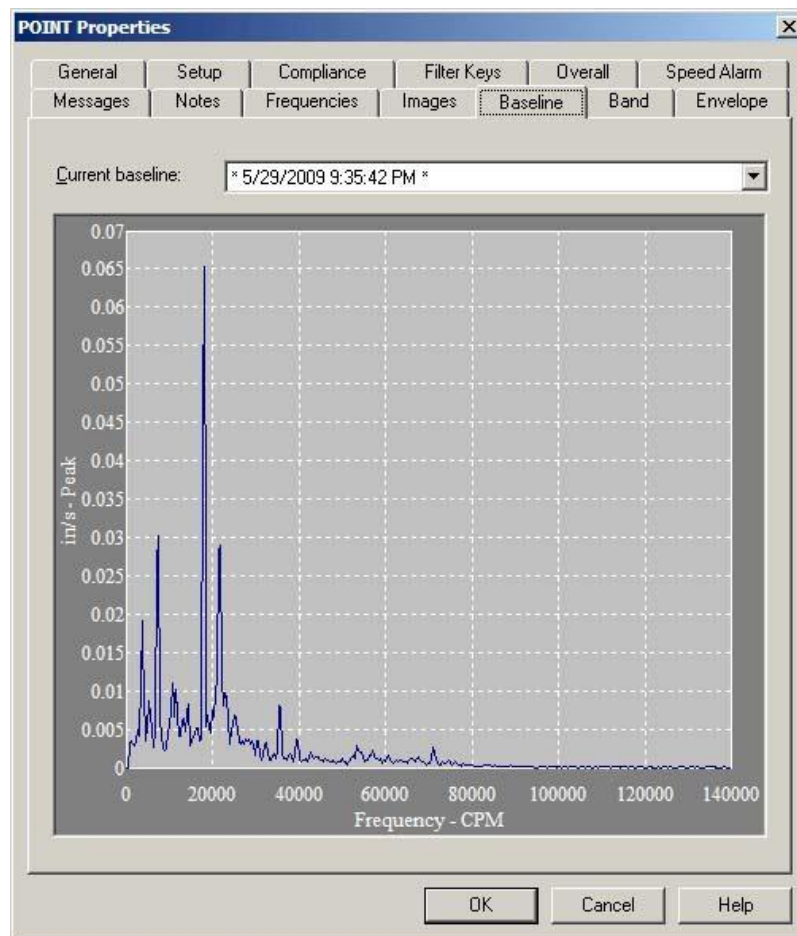


Figure 3 - 40.
The **POINT Properties** Screen's **Baseline** Tab.

To specify a POINT's baseline spectrum:

- Select the POINT in the hierarchy list.
- Right-click to display the POINT's context menu and select the **Properties** option. The **POINT Properties** screen displays.
- Select the **Baseline** tab.

Current Baseline

The **Current baseline** field lists measurement record timestamps for the POINT's stored measurements. Click to specify the measurement to use as the baseline spectrum. The specified measurement's spectrum displays graphically in the tab's lower area.

- A **No baseline** option appears in the drop down list as the default, and to clear the current baseline selection.
- In the drop down list, the assigned baseline is tagged for easy recognition.

All measurements with FFT or overall data for the current POINT appear with a time/date stamp in the **Current Baseline** drop down list. The last assigned baseline is tagged for easy recognition. The current baseline value is indicated by " ___ date / ___ time" in the **Current baseline** field.

Phase Tab

- This tab is available only if the POINT has stored phase data.

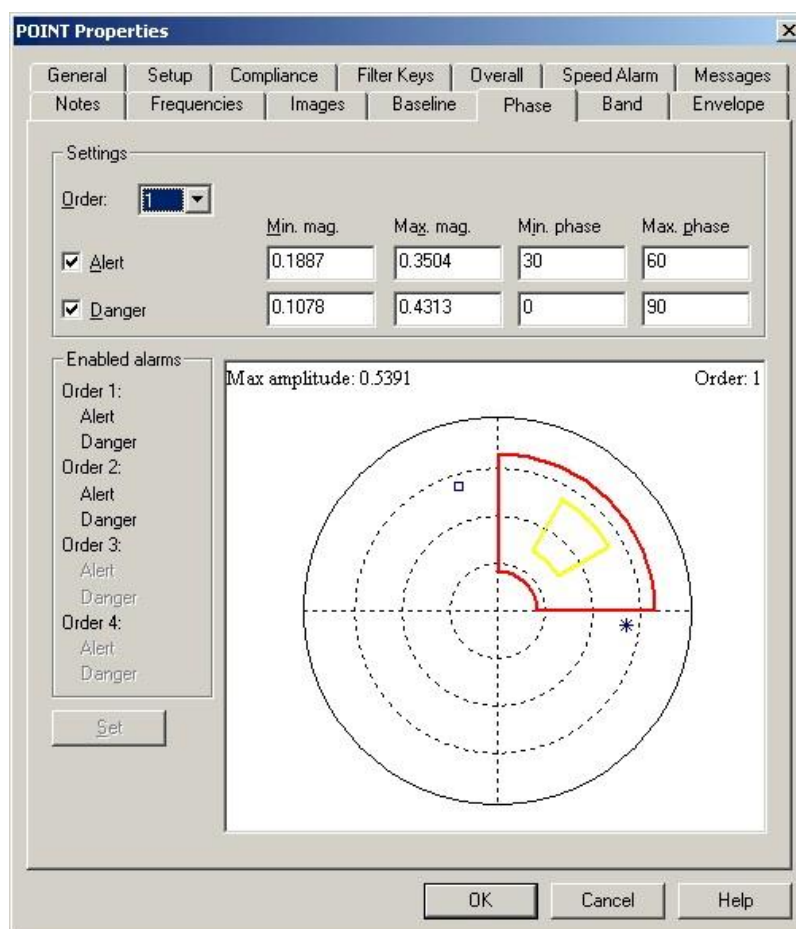


Figure 3 - 41.
The **POINT Properties** Screen's **Phase** Tab.

Polar vector plots show vibration amplitude and phase. The phase angle is the angle the shaft travels from the start of a triggering event to when the point at which the sensor experiences maximum positive force. This relationship provides valuable information on shaft orbit and shaft position and is used for analysis, balancing, and shaft orbital analysis.

The **POINT Properties / Phase** tab set up area specifies polar vector alarm settings, and provides a graphical display of the defined alert and danger acceptance regions.

Orders are multiples of running speed. Use the **Order** drop down list box to assign new acceptance regions to a specific order of the phase measurement (1X, 2X, 3X, 4X).

Alert / Danger alarm fields

- Click the **Alert** or **Danger** checkbox to enable set-up of an alert or danger acceptance region.
- Use text box operations to enter **Min Mag.**, **Max Mag.**, **Min Phase**, and **Max Phase** polar vector settings.

A summary of **Enabled alarms** displays vertically in the tab's lower left column. Alarm settings may also be defined graphically with drag and drop operations.

To define graphically:

- Move the mouse cursor over the line to be modified.
- Depress and hold the left mouse button and drag the line to its new location before releasing the mouse button.
- Click the **SET** button to apply alarm settings.

Band Tab

Band Alarms provide alert and danger alarms on both peak and spectral values within a defined frequency band. Use the **Band** tab to **Add** new band alarms for the POINT, or **Load** existing "shared" and "private" band alarms for the POINT.

- Loaded band alarms may not be edited from this tab. Use the **Customize** menu's **Alarm Settings** option to edit "shared" and "private" alarm parameters.

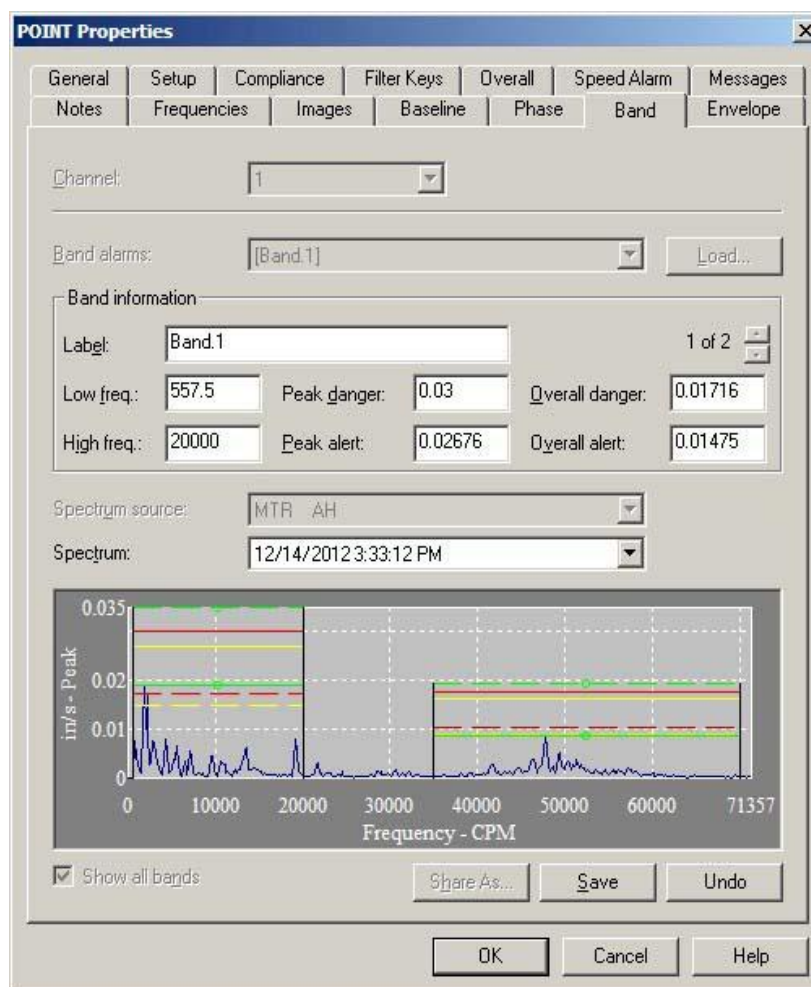


Figure 3 - 42.
The **POINT Properties** Screen's **Band** Tab.

The current band alarm name appears in the **Band alarms** field. All available band alarms are listed in the drop down list.

To Load “shared” and “private” alarms to the selected POINT:

- Click the **Band** tab's **Load** button, the **Load Band Alarms** dialog displays all available “shared” and “private” band alarms by name. Enable all band alarms to assign to the POINT and click **OK**. The names of the enabled band alarms appear in the **Band** tab's **Band Alarms** drop down list.

To add a new band alarm for the POINT:

- You may mix added band alarms with loaded band alarms. However, only added band alarms may be edited from this tab.
- Click the **Band** tab's **Add** button, the tab's **Band Information** fields become available.

Edit and view alarm values in the tab's **Band information** area. The band name appears in the **Label** field.

The following fields are available for viewing set values or editing:

Label – Enter band name.

Low freq – View or edit the low frequency value or multiple of running speed.

High freq – View or edit the high frequency value or multiple of running speed.

- In **Low** and **High Frequency** fields, you may specify a multiple of running speed by adding **x** to the end of the number. For example, enter “1.5x” for 1.5 times running speed.

Peak danger – View or edit the peak danger value or % Full Scale value.

Peak alert – View or edit the peak alert danger value or % Full Scale value.

- In **Peak** and **Overall** alarm fields, you may specify the alarm setpoint as a percentage of full scale by adding “%” to the end of the entered number. For example, enter “10%” to set the alarm at 10 percent of the full scale value.

Overall danger – View or edit the overall danger value or % Full Scale value.

Overall alert – View or edit the overall alert value or % Full Scale value.

- The tab's spectrum graphic display automatically updates as edits are made.

Download to IMx – Enable to download band alarm to the IMx. The IMx supports a total of four band alarms per POINT. If more than four band alarms are defined for the POINT, select the four band alarms you wish to download to the IMx. The remaining band alarms are evaluated by @ptitude Analyst during post-processing. An asterisk (*) displays next to each band alarm's name if the band alarm is enabled to download to the IMx.

Edits may be made on the tab's spectrum graphic display.

To edit the band graphically:

Spectrum source - If two or more POINTs are currently active, specify the POINT whose spectrum you wish to graphically display.

Spectrum - using its time record, specify the spectrum measurement to display.

Once the proper spectrum is displayed, specify the band alarm to edit from the **Band Alarms** drop down list. Notice the mouse pointer changes when positioned over a band alarm parameter (line) on the graphic.

- Click on the line of the band to edit and drag the line to its new position. The value in the affected field automatically updates to reflect your setting.
- Use the **Save** or **Undo** buttons to save or undo changes for the *current* band alarm edit. After editing all necessary band alarms, use the tab's **OK** or **Cancel** buttons to save all edited band alarms with the POINT, or cancel all edited and new band alarm efforts.

The total number of band alarms appears in the upper right corner of the tab's **Band information** area. Use the up and down arrow buttons to navigate between band alarms.

- Click the **Show all bands** checkbox to display all available band alarms on the spectrum display. The checkbox is not available when editing a band.
- Click **Share As** to make the current band alarm a shared alarm. The **Enter Name** dialog displays. Enter a name and click **OK**.
- Click **Add** to create a new band alarm.
- Click **Remove** to remove the current band alarm. A confirmation dialog displays.
- Confirm action. The band alarm is deleted.
 - A band alarm may not be removed if it is currently assigned.

Load Band Alarms

Use the **Load Band Alarms** dialog to select “shared” and “private” band alarm(s) for the active POINT. All available “shared” and “private” band alarms display.

- Click the checkbox to select alarm(s) to be included / assigned to the active POINT.
 - “Private” alarms appear within square brackets.
- Click **OK** to select, **Cancel** to close dialog without saving selections.
 - You may sort the available “shared” and “private” alarms by band alarm name, inclusion status (included or excluded), or frequency range.

Envelope Tab

Use the POINT Properties' Envelope tab to specify a “total spectrum” envelope alarm for the POINT. You can select from a list of previously created envelope alarms or edit a private (unique) alarm for the current POINT.

- Only IMx firmware version 0.97 and newer supports enveloped alarms for filters 1, 2, and 3 only. @ptitude Analyst evaluates any defined alarms during post-processing.

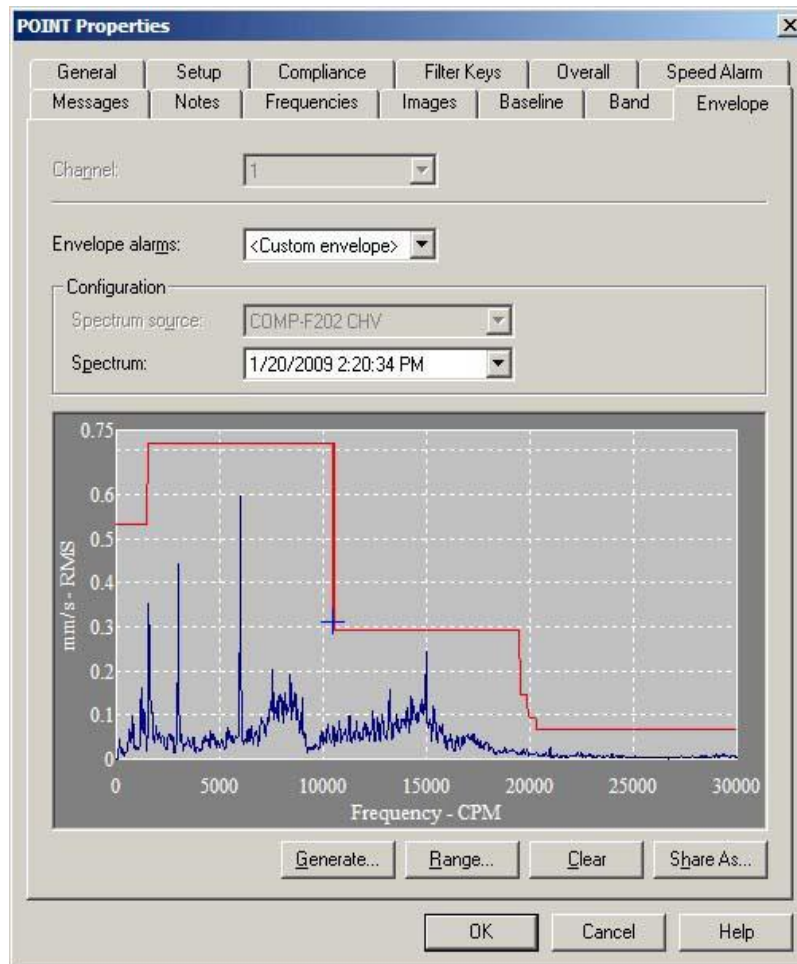


Figure 3 - 43.
The **POINT Properties** Screen's **Envelope** Tab.

All available envelope **alarms** display in the Envelope alarm drop down list, or you may generate a new envelope alarm.

Shared envelope alarms may not be edited from this tab (use the Customize menu's Alarm Database option to edit "shared" alarm parameters).

- First, select the FFT spectrum to which the envelope alarm will conform, using:

Spectrum source – specifies from which POINT to graphically display the spectrum if two or more POINTs are currently active.

Spectrum – displays all available time record measurements for the active POINT (typically the baseline measurement) in a drop down list. The current spectrum displays graphically below.

To assign a "shared" envelope alarm to the POINT:

- On the **Envelope** tab, select the desired shared envelope alarm's name from the **Envelope Alarms** drop down list, the tab fields display the specified alarm's settings and the specified envelope appears on the displayed spectrum.

To generate a new envelope alarm for the POINT:

- Select the **Envelope Alarms** drop down list's **<Custom envelope>** option.
- Click the **Generate** button. The **Generate Envelope Alarm** dialog displays.

Use the **Generate Envelope Alarm** Dialog to create an envelope alarm based on your entered values.

% Overdrive – Enter the percent of the POINT's full scale value to determine the height of the envelope alarm above the spectral peak. The smaller the number specified, the tighter the comparison envelope conforms to the designated spectrum.

Spreading % – Enter percent of full scale (or center frequency) to increase the width of the envelope alarm around spectral peaks. The smaller the number specified, the tighter the envelope conforms to the sides of the peaks in the specified spectrum.

Spreading Type – (either **Center Frequency** or **Full Scale**). If **Center Freq.** is selected, the bandwidth about each center frequency increases with higher frequencies. If **Full Scale** is selected, the bandwidth about each center frequency is constant, based on a percent of the full scale frequency.

Threshold – Enter % of the POINT's full scale value, or an absolute value. The threshold value provides an opportunity to eliminate false alarms due to vibration "noise." It also establishes the envelope alarm's low amplitude "threshold" on the displayed spectrum. The envelope alarm conforms around all peaks whose amplitudes are higher than the established threshold as per the **Overdrive %**, **Spreading %**, and **Spreading Type** settings. All peaks below the established threshold are ignored by the envelope alarm. The **Threshold %** default value is set using the **Customize** menu's **Preferences / Plot** tab.

- Click **OK** to generate an envelope alarm based on your entries. Click **Cancel** to close the dialog without creating an envelope alarm.

Editing the Envelope Alarm

After you have generated an envelope alarm, you can edit it graphically using your mouse, or enter numeric envelope parameters using the **Set Frequency Range** dialog.

To graphically edit the envelope alarm:

- Click anywhere inside the **Envelope** dialog's spectrum window. The cursor appears as an up arrow.
- Click the mouse on the portion of the envelope alarm line to be edited. A square icon identifies where the line will be drawn.
- Drag the mouse to draw the line to create the new envelope alarm.
- Click the dialog's **OK** button to save your changes.

Tip – You can use your keyboard's Insert key to begin drawing the envelope alarm line. Then, use the arrow keys to move the line, and the Insert key again to stop drawing the line.

To edit the envelope alarm using numeric frequency ranges:

- Click the **Set Range** button. The **Set Frequency Range** dialog displays.
- Use the **Set Frequency Range** dialog to enter low frequency, high frequency, and level values to edit an existing envelope alarm.

To numerically edit an envelope alarm:

- Enter the desired low frequency, high frequency, and level value.
- Click **OK**. The displayed envelope alarm automatically conforms to your entries.

Share As

- Click **Share As** to make the envelope alarm a shared alarm. The **Enter Name** dialog displays.
- After completing the POINT's envelope alarm setup, click the **OK** button to save the envelope alarm with the POINT.

Setup Log

The **POINT Properties' Setup Log** tab records changes made to the POINT's configuration.

POINT Properties / Setup Log fields include:

Date/Time – Displays the date/time stamp when the change occurred.

User – Displays the user's name that made the change.

Category – Displays the POINT properties tab to which changes were made.

Previous Value – Displays the previous value before the current change occurred.

Reason – Displays the user entered reason for making a change to the POINT's configuration. If no reason is required or entered, this column is empty.

- When you make a change to a POINT's properties, you are requested to enter a reason for the change. Reference **Chapter 2 - Setting Your @ptitude Analyst Preferences** in the **SKF @ptitude Analyst Introduction and Global Features** user manual for details.

Save As – Click to save a copy of the log file to your computer's hard drive.

Print – Click to print a copy of the log file.

Setting Up a Control POINT

To choose a control POINT for the POINT being configured:

Click the **Control POINT Select** button on the **POINT Properties** screen's **Setup** tab to bring up the **Control POINT Selection** dialog.

- The control POINT and its dependent POINT do not need to be in the same online device, but must be in the same Hierarchy.

In the list, click to select the POINT's control POINT (or select **None**, for no control POINT).

Gating - POINT Configuration Rules

There are three rules for setting up control and dependent POINTs.

Rule 1. There is no limit to how many dependent POINTs a control POINT can have, as all evaluation is done in the WMx / IMx Service and not downloaded to the device.

Rule 2. A dependent POINT can have only one control POINT.

In the figure below, data is collected for control POINT A prior to collecting data on each dependent POINT. Data will be collected for a dependent POINT only if control POINT A's alarm criteria are met.

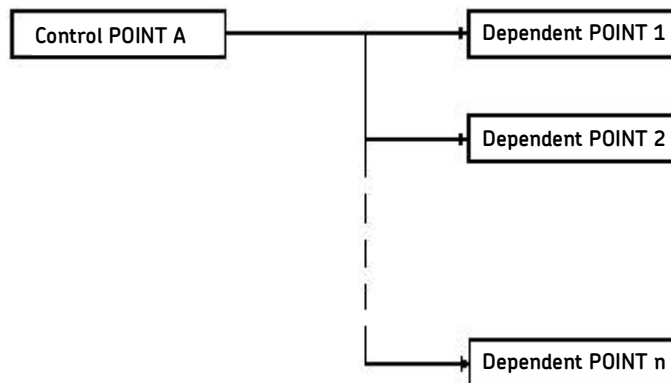


Figure 3 - 44.
Gating Rules 1 and 2.

Rule 3. A control POINT can also be a dependent POINT, that is, it can also be controlled.

- The calculation of a derived POINT cannot be a dependent of a POINT that is in alarm.

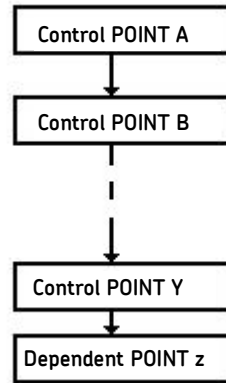


Figure 3 - 45.
Gating Rule 3.

In the figure above, data is collected for control POINT A prior to collecting data on its dependents (control POINTs B through Z). If control POINT A's alarm criteria are met, data will be collected on control POINT B. If control POINT B's alarm criteria are met, data will be taken on its dependent POINT and so on down to dependent POINT Z. This implies that all of the conditions of control POINTs A through Y must be met to collect data on dependent POINT Z.

The figure below is an example of a combination of the three rules for setting up control and dependent POINTs.

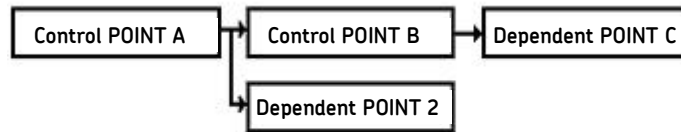


Figure 3 - 46.
A Combination of Gating Rules 1, 2, and 3.

If control POINT A's alarm criteria are met, data will be collected on control POINT B and dependent POINT 2. If control POINT B's alarm criteria are met, data will be collected on dependent POINT C. The possible combinations are endless.

POINT Setup Validation Dialog

The POINT Setup Validation Dialog launches when you enter incompatible or erroneous information on the **Setup** or **Expressions** tabs.

The **POINT Setup Validation** dialog displays both errors and recommendations. For recommendations, a message box displays prior to the **POINT Setup Validation** dialog, which allows you to ignore or view the **POINT Setup Validation** dialog.

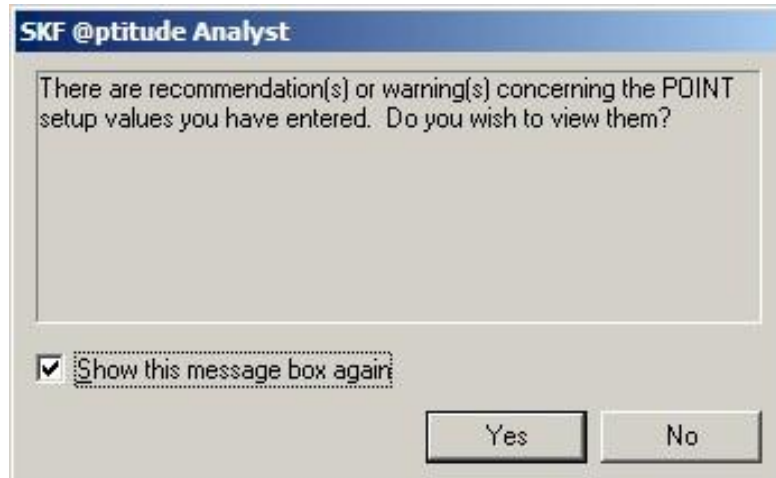


Figure 3 - 47.

The POINT Setup Validation Recommendation Message Box.

- If you do not wish to see the POINT Setup Validation Message Box for recommendations or warnings, uncheck and disable the **Show this message box again** checkbox.
 - You may also modify this preference from the **Customize** menu's **Preferences** screen.
- Press **Yes** to view the **POINT Setup Validation** dialog.
 - Press **No** if you wish to close the message box without viewing the recommendation details.

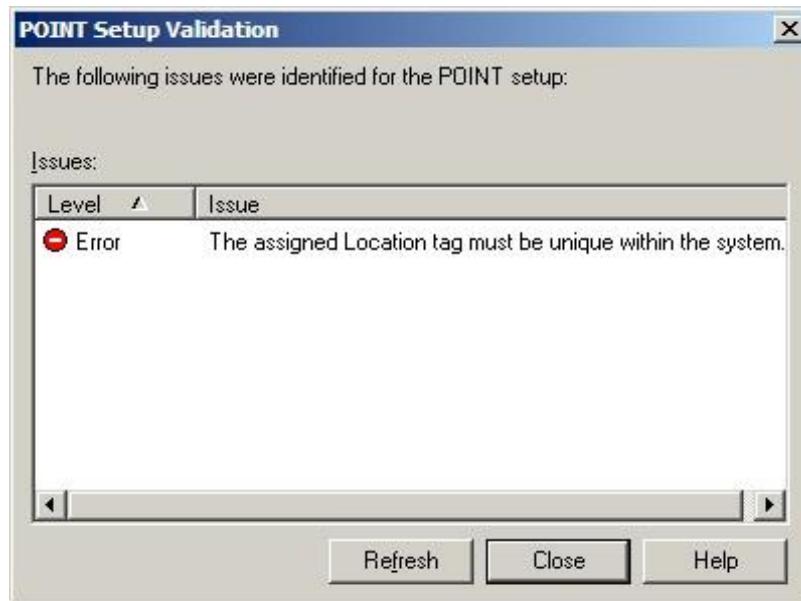


Figure 3 - 48.
The **POINT Setup Validation** Dialog for the **Setup** Tab.

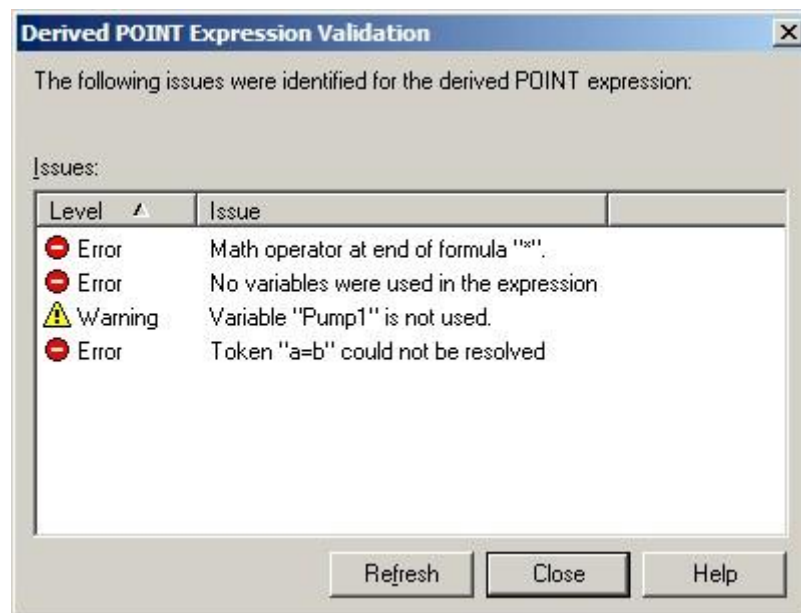


Figure 3 - 49.
The **POINT Setup Validation** Dialog for the **Expressions** Tab.

- The **POINT Setup Validation** dialog displays automatically for settings in error, and after the message box for settings that are recommendations or warnings.

You may edit POINT setup information while the **POINT Setup Validation** dialog is displayed. Simply move the dialog out of the way, and make any changes to your **POINT Properties / Setup** or **Expressions** tab while referencing the errors or recommendations.

- Press the **Refresh** button if you have made corrective changes to your **POINT Properties / Setup** or **Expressions** tab in the background. If you have eliminated the error or recommendation, they will no longer display in the **POINT Setup Validation** dialog.
- Press the **Close** button to close the **POINT Setup Validation** dialog and return to the **POINT Properties Setup** or **Expressions** tab.

Multiple POINT Properties

The **Multiple POINT Properties** screen is available when more than one POINT is selected. This screen provides a set of tabs to view and modify set-up parameters common among the set of selected POINTs. The type of POINTs selected determine which tabs display in the **Multiple POINT Properties** screen.

- Configured parameters overwrite each selected POINT's previous settings.

Schedule Tab

The **Schedule** tab allows you to set a common schedule for all the currently selected POINTs.

Fields in the **data collection** portion of the **Schedule** tab include:

Take data every – Enter a numerical value to indicate how often data should be collected and select the appropriate units from list box options (**Second(s)**, **Minute(s)**, **Hour(s)**, **Day(s)**). The POINT is tagged as overdue for data collection if the time range between the current date (today) and the last data collection date is longer than the specified **Take data every** setting.

- The **Take data every** field is used to determine if a POINT is overdue for data collection.

Keep current data for – Enter a value to indicate how long to keep (store) the measurement record in the database's "current data" bin and select the appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). When the specified time from data collection elapses, and a Scheduled or Monitor archive process is performed, the measurement is typically moved from the "current data" bin into the "short term archive" bin (or discarded) as specified in the **Short term archive / Archive data every** field.

- The **Keep current data for** field determines the length of time a measurement is kept before it is archived.

Short term archive (optional, but typically enabled)

Fields in the **short term archive** section include:

Archive data every – Determines whether data leaving the "current data" bin is archived in the "short term archive" bin. Enter numerical value to indicate how often data leaving the "current data" bin is stored in the "short term archive" bin and select appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). As scheduled archives occur, measurements leaving the "current data" bin are accepted into

the “short term archive” bin only if this **Archive data every** setting has expired since the last measurement was stored in the “short term archive” bin. Otherwise, they are discarded.

Keep archive for – Enter a value to indicate how long to keep (store) the measurement record in the “short term archive” bin and select appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). When the specified time of storage elapses, and a scheduled archive process performed, the measurement is typically moved from the “short term archive” bin into the “long term archive” bin (or discarded) as specified in the **Long term archive** fields.

Fields in the **long term archive** section include:

Archive data every – Determines whether data leaving the “short term archive” bin is archived in the “long term archive” bin. Enter numerical value to indicate how often data leaving the “short term archive” bin is stored in the “long term archive” bin and select appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). As scheduled archives occur, measurements leaving the “short term archive” bin are accepted into the “long term archive” bin if this **Archive data every** setting has expired since the last measurement was stored in the “long term archive” bin.

Keep archive for – Enter value to indicate how long to keep (store) the measurement record in the “long term archive” bin and select appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). When the specified time of storage elapses, and a scheduled archive process is performed, the measurement is discarded.

Unscheduled data

The last section of the tab schedules alarm data. In on-line DAD systems, alarm data is automatically placed in the “Unscheduled data” bin. This setting determines how long alarm data is stored in the alarm data bin before it is discarded. Fields include:

Keep for – Specify value to indicate the desired length of time to store alarm data and select appropriate units (**Wk(s)**, **Mo(s)**, **Yr(s)**). After the specified storage time elapses, the alarm data is discarded.

Filter Keys Tab

@ptitude Analyst allows you to create **Filter Keys** which can be associated with POINTs and Machines for automated filtering purposes. For example, if you activated a “Pump” filter key for a Group and later filtered by **Filter Key / Pump**, the group would display.

➤ Filter key creation is discussed later in this chapter.

Filter key searches list all POINTs or Machines sharing a specified filter key (or multiple filter keys). The **Filter Key** tab displays all created filter keys and indicates whether or not they are currently assigned.

- Click a specific Filter Key’s checkbox to associate it with the current Group.
- Click the **Filter Key** tab’s **OK** button to save your filter key assignments.
 - The checkbox appears gray if the filter key is assigned to the current group only because it was assigned to the group’s parent.

- Click the **Filter Key** tab's **OK** button to save your filter key assignments.

Overall Tab

The **Overall** tab allows you to re-apply previously defined “shared” overall alarms, eliminating the need to define alarms individually, saving time and database space.

The screenshot shows the 'Multiple POINT Properties' dialog box with the 'Overall' tab selected. The 'Channel' dropdown is set to '1'. The 'Overall alarms' dropdown is set to '<Private alarm>'. Under the 'Properties' section, the 'Level' radio button is selected. Under the 'Settings' section, both 'Danger high' and 'Alert high' are checked, with values of 120 and 100 respectively. A color-coded alarm indicator shows 'Danger high' in red, 'Alert high' in yellow, and 'Clear' in green. A 'Share As...' button is located at the bottom right of the dialog. At the very bottom are 'OK', 'Cancel', and 'Help' buttons.

Figure 3 - 50.
The **Multiple POINT Properties** Screen's **Overall** Tab.

Use the **Overall** tab to set POINTs' overall alarms. The alarm can be configured in a variety of ways using the **Overall** tab's fields.

The current alarm appears in the **Overall alarm** field. The current alarm's values display below in the tab's **Properties** and **Settings** areas.

The **Overall alarms** drop down list displays all previously created overall alarms and a **<Private Alarm>** option. Use this drop down list to specify whether you wish to set up a unique **<Private Alarm>** for the current POINTs only, or specify a previously defined “shared” alarm (selected by name). If you specify a shared alarm, it's alarm settings automatically display in subsequent fields. If you specify a **<Private Alarm>**, proceed to configure the tab's alarm settings as described below.

The **Properties** area displays alarm detection options. Select from:

None – No overall alarm is set for the POINTs.

Level – Measurements *exceeding* the set levels will result in an alarm condition.

In Window – Measurements *falling within* the set levels will result in an alarm condition.

Out of Window – Measurements *falling outside* the set levels will result in an alarm condition.

To assign a shared alarm to the current POINTs:

- Select the shared alarm from the drop down list and click the **OK** button. Shared alarms may be applied to an unlimited number of POINTs.

Shared Alarm

Alarms initially created as private alarms may be converted into shared alarms. To share a newly created Private alarm, select the new Private alarm and click the tab's **Share As** button.

The **Share As** dialog specifies the alarm as a shared alarm. When the **Share As** dialog displays, you will be prompted to give the shared alarm a unique name for easy identification.

- Enter a name for the shared alarm and click the **OK** button.

The new shared alarm now appears as an available selection in the drop down list. Shared alarms are easily assigned to other POINTs to simplify POINT setup and maintenance.

Frequencies Tab

The **Multiple POINT Properties** screen's **Frequencies** tab allows you to reapply previously defined **Frequency Sets**, or configure a new fault **Frequency Set** to attach to the current POINT.

The **<Private Alarm>** is used to set the same alarm values for all currently selected POINTs, yet making the alarm definition private for each POINT. This option may be used when you know all the selected POINTs will have unique alarm values, but the initial settings will be the same.

To assign a shared frequency set to the current POINTs:

- Select the shared frequency set from the drop down list. The corresponding included frequencies appear in the **Included frequencies** portion of the tab.
 - Two additional options are available, **<No selection made>** and **<No frequencies>**. Use the **<No selection made>** option when no changes to the current frequency setting for the POINTs are needed. Use the **<No frequencies>** option to clear all frequency settings for all selected POINTs.
- Click **OK** to assign the selected set to the current POINT.

Band Tab

Band Alarms provide alert and danger alarms on both peak and spectral values within a defined frequency band. Use the **Band** tab to **Add** new band alarms for the active POINTs, or **Load** existing “shared” band alarms for the POINTs.

- Loaded band alarms may not be edited from this tab. Use the **Customize** menu’s **Alarm Database** option to edit “shared” alarm parameters.

The current band alarm name appears in the **Band alarms** field. All available band alarms are listed in the drop down list.

To Load “shared” alarms to the selected POINTs:

- Click the **Band** tab’s **Load** button, the **Load Band Alarms** dialog displays all available “shared” band alarms by name. Enable all band alarms to assign to the POINT and click **OK**. The names of the enabled band alarms appear in the **Band** tab’s **Band Alarms** drop down list.

To Add a new band alarm for the POINTs.

- You may mix added band alarms with loaded band alarms. However, only added band alarms may be edited from this tab.
- Click the Band tab’s Add button, the tab’s Band Information fields become available.

Edit and view alarm values in the tab’s **Band information** area. The band name appears in the **Label** field.

The following fields are available for viewing set values or editing:

Label – Enter band name.

Low freq – View or edit the low frequency value or multiple of running speed.

High freq – View or edit the high frequency value or multiple of running speed.

- In **Low** and **High Frequency** fields, you may specify a multiple of running speed by adding **x** to the end of the number. For example, enter “1.5x” for 1.5 times running speed.

Peak danger – View or edit the peak danger value or % Full Scale value.

Peak alert – View or edit the peak alert danger value or % Full Scale value.

Overall danger – View or edit the overall danger value or % Full Scale value.

Overall alert – View or edit the overall alert value or % Full Scale value.

- In **Peak** and **Overall** alarm fields, you may specify the alarm setpoint as a percentage of full scale by adding “%” to the end of the entered number. For example, enter “10%” to set the alarm at 10 percent of the full scale value.
- The tab’s spectrum graphic display automatically updates as edits are made.

Edits may also be made on the tab’s spectrum graphic display.

To edit the band graphically:

Spectrum source - If two or more POINTs are currently active, specify the POINT whose spectrum you wish to graphically display.

Spectrum - using its time record, specify the spectrum measurement to display.

Once the proper spectrum is displayed, specify the band alarm to edit from the **Band Alarms** drop down list. Notice the mouse pointer changes when positioned over a band alarm parameter (line) on the graphic.

- Click on the line of the band to edit and drag the line to its new position. The value in the affected field automatically updates to reflect your setting.
- Use the **Save** or **Undo** buttons to save or undo changes for the *current* band alarm edit. After editing all necessary band alarms, use the tab's **OK** or **Cancel** buttons to save all edited band alarms with the POINT, or cancel all edited and new band alarm efforts.

The total number of band alarms appears in the upper right corner of the tab's **Band information** area. Use the up and down arrow buttons to navigate between band alarms.

- Click the **Show all bands** checkbox to display all available band alarms on the spectrum display. The checkbox is not available when editing a band.
- Click **Share As** to make the current band alarm a shared alarm. You will be prompted to assign the band alarm a unique name. Enter a name and click **OK**.
- Click **Add** to create a new band alarm.
- Click **Remove** to remove the current band alarm. A confirmation dialog displays.
- Confirm action. The band alarm is deleted.
 - A band alarm may not be removed if it is currently assigned.

Load Band Alarms

Use the **Load Band Alarms** dialog to select "shared" band alarm(s) for the active POINTs. All available "shared" band alarms display.

- Click the checkbox to select alarm(s) to be included / assigned to the active POINTs.
- Click **OK** to select, or **Cancel** to close dialog without saving selections.
 - You may sort the available "shared" alarms by band alarm name, inclusion status (included or excluded), or frequency range.

Envelope Tab

Use the POINT Properties' Envelope tab to specify a "total spectrum" envelope alarm for the POINT. You can select from a list of previously created envelope alarms or edit a private (unique) alarm for the current POINT.

All available envelope **alarms** display in the Envelope alarm drop down list, or you may generate a new envelope alarm.

Shared envelope alarms may not be edited from this tab (use the Customize menu's Alarm Database option to edit "shared" alarm parameters).

- First, select the FFT spectrum to which the envelope alarm will conform, using:

Spectrum source – specifies from which POINT to graphically display the spectrum if two or more POINTs are currently active.

Spectrum – displays all available time record measurements for the active POINT (typically the baseline measurement) in a drop down list. The current spectrum displays graphically below.

To assign a "shared" envelope alarm to the POINT:

- On the **Envelope** tab, select the desired shared envelope alarm's name from the **Envelope Alarms** drop down list, the tab fields display the specified alarm's settings and the specified envelope appears on the displayed spectrum.

To generate a new envelope alarm for the POINT:

- Select the **Envelope Alarms** drop down list's **<Custom envelope>** option.
- Click the **Generate** button. The **Generate Envelope Alarm** dialog displays.

Use the **Generate Envelope Alarm** Dialog to create an envelope alarm based on your entered values.

% Overdrive – Enter the percent of the POINT's full scale value to determine the height of the envelope alarm above the spectral peak. The smaller the number specified, the tighter the comparison envelope conforms to the designated spectrum.

Spreading % – Enter percent of full scale (or center frequency) to increase the width of the envelope alarm around spectral peaks. The smaller the number specified, the tighter the envelope conforms to the sides of the peaks in the specified spectrum.

Spreading Type – (either **Center Frequency** or **Full Scale**). If **Center Freq.** is selected, the bandwidth about each center frequency increases with higher frequencies. If **Full Scale** is selected, the bandwidth about each center frequency is constant, based on a percent of the full scale frequency.

Threshold – Enter % of the POINT's full scale value, or an absolute value. The threshold value provides an opportunity to eliminate false alarms due to vibration "noise." It also establishes the envelope alarm's low amplitude "threshold" on the displayed spectrum. The envelope alarm conforms around all peaks whose amplitudes are higher than the established threshold as per the **Overdrive %**, **Spreading %**, and **Spreading Type** settings. All peaks below the established threshold are ignored by the envelope alarm. The **Threshold %** default value is set using the **Customize** menu's **Preferences / Plot** tab.

- Click **OK** to generate an envelope alarm based on your entries. Click **Cancel** to close the dialog without creating an envelope alarm.

Editing the Envelope Alarm

After you have generated an envelope alarm, you can edit it graphically using your mouse, or enter numeric envelope parameters using the **Set Frequency Range** dialog.

To graphically edit the envelope alarm:

- Click anywhere inside the **Envelope** tab's spectrum window. The cursor appears as an up arrow.
- Click the mouse on the portion of the envelope alarm line to be edited. A square icon identifies where the line will be drawn.
- Drag the mouse to draw the line to create the new envelope alarm.
- Click the tab's **OK** button to save your changes.

Tip - You can use your keyboard's Insert key to begin drawing the envelope alarm line. Then, use the arrow keys to move the line, and the Insert key again to stop drawing the line.

To edit the envelope alarm using numeric frequency ranges:

- Click the **Set Range** button. The **Set Frequency Range** dialog displays.
- Use the **Set Frequency Range** dialog to enter low frequency, high frequency, and level values to edit an existing envelope alarm.

To numerically edit an envelope alarm:

- Enter the desired low frequency, high frequency, and level value.
- Click **OK**. The displayed envelope alarm automatically conforms to your entries.

Modify by Attribute

@ptitude Analyst's **Modify by Attribute** feature allows you to make similar changes for one or more machines or POINTs by allowing you to change specific attributes (for example, alarm values, collection schedules, etc.) all at once.

- POINT setup changes made in Modify by Attribute are not incorporated into POINT Properties.
- If you use Modify by Attribute to make changes to DMx POINTs, you must either select the **Refresh Monitor** option on the DMx Monitor status indicator, or stop and restart @ptitude Analyst Monitor for the changes to be recognized.

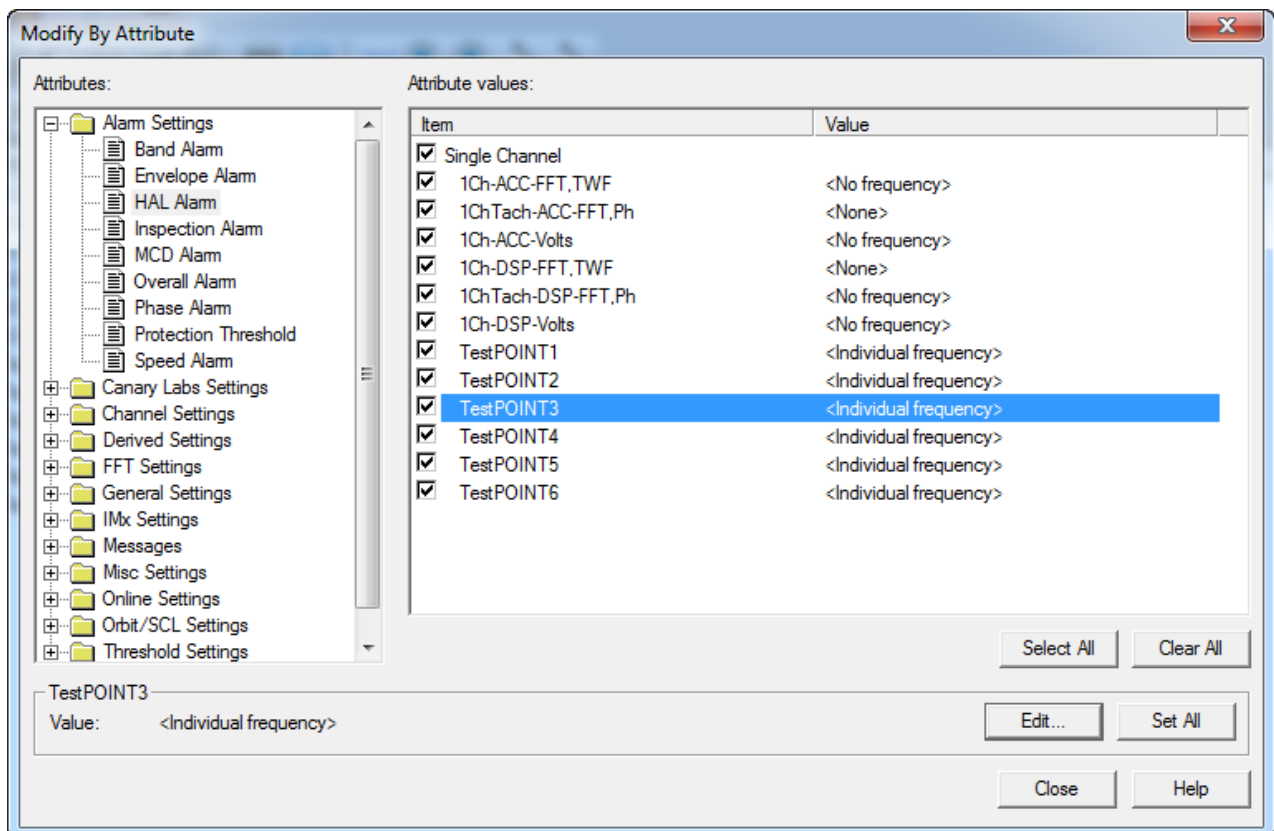


Figure 3 - 51.
The **Modify by Attribute** Screen.

To Modify Settings:

- Select the hierarchy group (SET / Machine) that contains POINTs whose attributes you wish to modify.
 - All Groups and POINTs branching from the specified Group display in the **Modify by Attribute** screen.
- Select the **Edit** menu's **Attributes** option. The **Modify by Attribute** screen displays.

The **Modify by Attribute** screen is split into two panels:

Right panel - displays the selected hierarchy items and their value for the currently selected attribute in the left panel.

- Click to highlight the POINT for which you wish to modify the selected attribute. Its current setting / value displays in an area beneath the panels.

Left panel - displays the attributes available for modification organized into nine categories: Alarm Settings, Channel Settings, Derived Settings, FFT Settings, General Settings, IMx Settings, Messages Settings, Misc. Settings, Online Settings, Orbit/SCL Settings, and Threshold settings.

- Open the appropriate category's folder to view its attributes, then click to specify the attribute you wish to modify. The right panel updates to show the selected attribute's current setting for each item.
- Edit the setting.
- Click the **Set** button to update the attribute setting for the selected POINT only, or click the **Set All** button to update the attribute setting for all POINTs in the right panel.
 - Use the **Set All** feature to quickly modify an attribute value for multiple items simultaneously. For example, if you want to set all **Averages** to an identical value, select **Averages** from the **Attributes** list. Attribute values display for all items in the tab's **Attribute values** area. Select an individual item, enter the desired value, and click the **Set All** button. All items will now have the specified number of averages.
- After completing attribute modifications for all POINTs, click the **OK** button to save the settings in the database.

Measurement Properties

General Tab

The **Measurement Properties** screen displays properties for individual measurement data records.

To view / edit a measurement's properties:

- Select the measurement record.
- Select the **Edit** menu's **Properties** option, or use the Properties toolbar button. The **Measurement Properties** screen displays.

The current measurement's time and date appears in the **Date** and **Time** fields of the **Measurement Properties / General** tab.

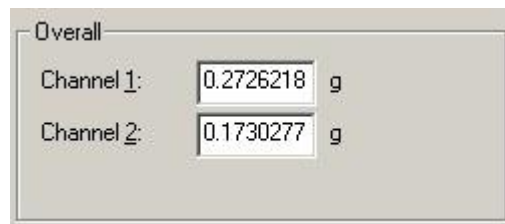
Measurement Properties fields include:

Date - View or edit the measurement record's data collection date. Select a new date from the drop down list.

Time - View or edit the measurement record's data collection time. Use the arrows to adjust the time.

- This feature should only be used to edit an incorrect date or time.

Overall / Channel # - View or edit the measurement record's overall value. Values are displayed for **Channel 1** and/or **Channel 2** as applicable.



The screenshot shows a window titled 'Overall' with a light gray background. Inside, there are two rows of data. The first row is labeled 'Channel 1:' followed by a text input field containing the number '0.2726218' and the unit 'g'. The second row is labeled 'Channel 2:' followed by a text input field containing the number '0.1730277' and the unit 'g'. The input fields have a thin border and the text is in a standard sans-serif font.

Figure 3 - 52.

The **Measurement Properties** Screen's **General** Tab's **Overall** Area.

- This feature should only be used to edit an incorrect overall value.
- If necessary, the measurement's alarm status will automatically update for the new measurement value.

Exclude measurement - Enables / disables the measurement record for inclusion in statistical calculations.

Readings - Displays which readings correspond to the current measurement on the indicated date / time.

Alarm status will be automatically updated for the new current measurement, if necessary.

The overall value for the current Process measurement's indicated date / time appears in the tab's **Overall** area. Values are displayed for **Channel 1** and/or **Channel 2** as applicable. These values may be edited in the **General** tab. Enter a new value in the appropriate channel's text box.

- This feature should only be used to edit an incorrect overall value.

The tab's **Readings** area displays which readings correspond to the current measurement on the indicated date / time.

- Click the **Exclude measurement** checkbox to exclude the current measurement from being included in statistical calculations.
- After editing all necessary properties, click the **OK** button to save changes.
- Click **Cancel** to close the screen without saving changes.

Set Baseline

Use the **Edit** menu's **Set Baseline** screen to specify the selected POINT's (or multiple POINTs') baseline. This feature allows you to quickly reset baselines within a database after a change is made to the machinery.

- In the hierarchy list, select one or more POINTs (or a hierarchy branch) whose baseline you wish to set as the oldest measurement record or the newest measurement record, or to clear the baseline altogether..
- Select the **Edit** menu's **Set Baseline** option.
- Using the screen's option buttons, specify whether to use the **Oldest measurement** or **Newest measurement** record as the baseline for the selected POINT(s), or select **Clear baseline** to remove the current baseline for the selected POINT(s).
 - A baseline spectrum is a vibration spectrum taken when a machine is in good operating condition. It is used as a reference for monitoring and analysis.
- Click **OK** to save setting.
- Click **Cancel** to undo.

Set Speed (Multiple)

Use the Set Speed (Multiple) feature to set the same measurement speed for multiple FFT measurements:

- Starting from a hierarchy, ROUTE, or workspace, expand the appropriate machine. Beneath the machine in the hierarchy, right-click on the measurement POINT you wish to use as a reference and select **Set Speed (Multiple)** from the resulting context menu.

OR

- Starting from a hierarchy, ROUTE, or workspace, expand the appropriate machine. Beneath the machine in the hierarchy, click on the appropriate measurement POINT to display its measurements in the right panel. Then, right-click on the single measurement you wish to use as a reference and select **Set Speed (Multiple)** from the resulting context menu.

OR

- Starting from an FFT measurement plot, right-click on the single cursor and select **Set Speed (Multiple)** from the resulting context menu.

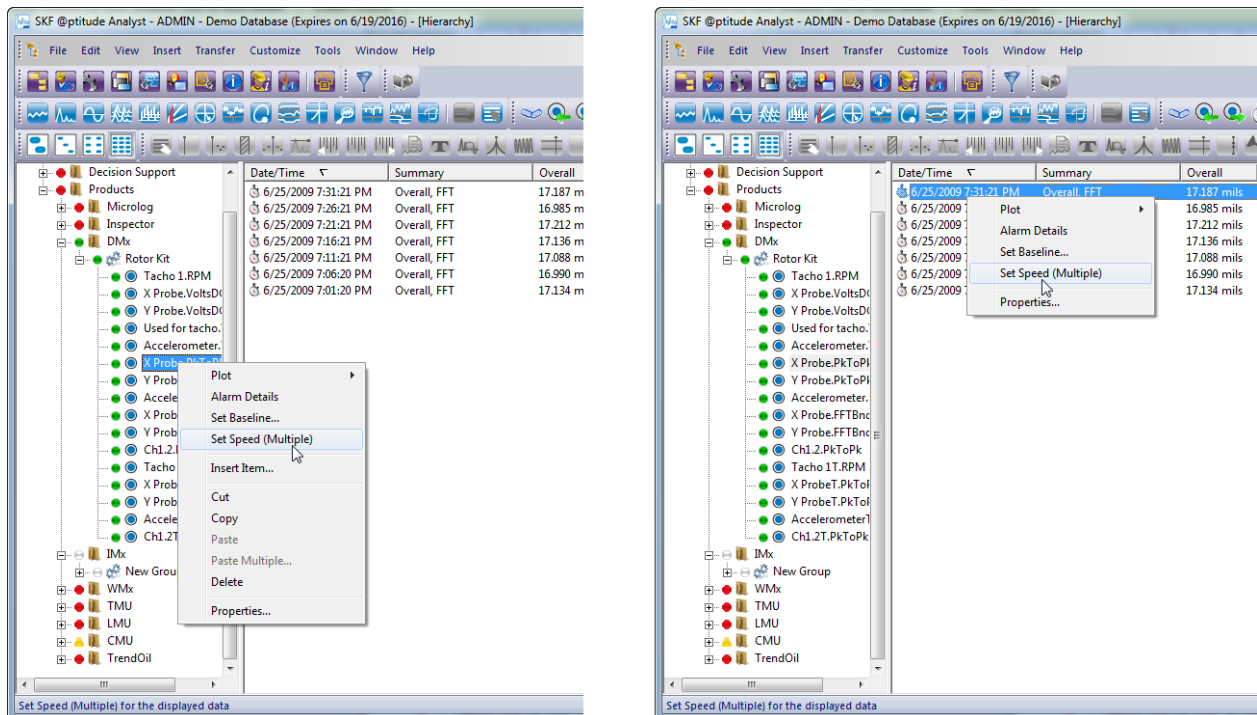


Figure 3 - 53.

Selecting **Set Speed (Multiple)** from a POINT Versus from a Measurement within a Hierarchy.

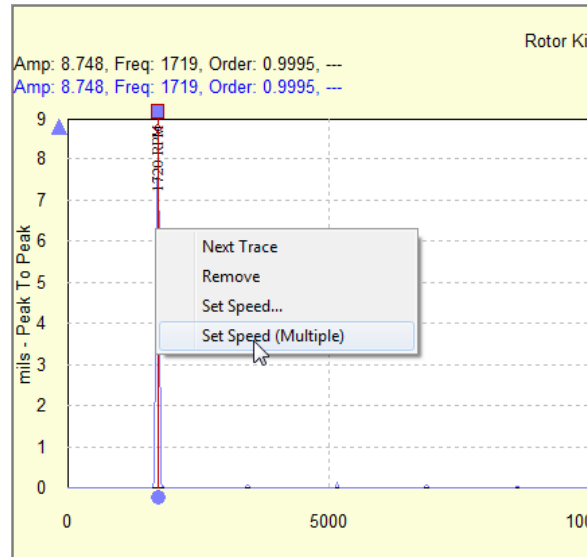


Figure 3 - 54.
Selecting **Set Speed (Multiple)** from an FFT Measurement Plot.

The **Set Speed (Multiple)** window appears.

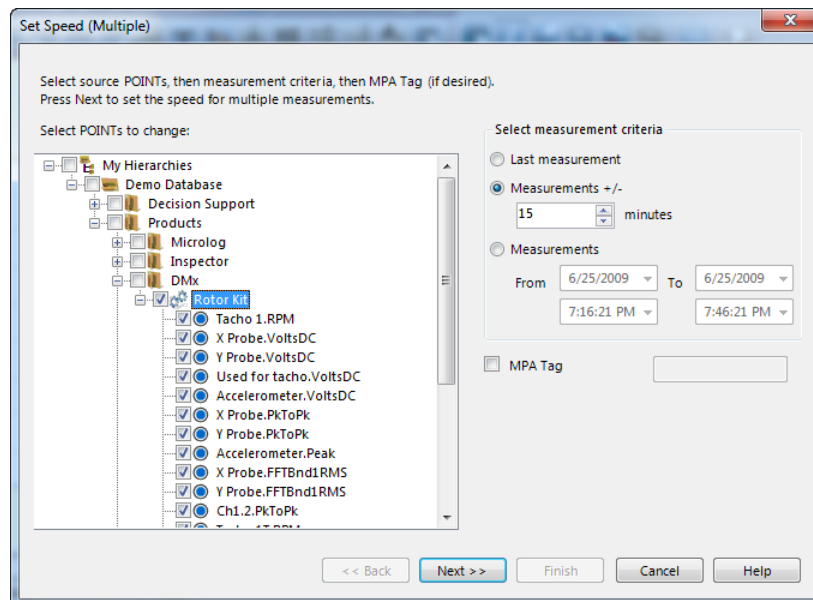


Figure 3 - 55.
Set Speed (Multiple) Window.

- Expand the machine in the **Set Speed (Multiple)** window's hierarchy view and deselect (remove checks from) any POINTs for which you do *NOT* intend to set a measurement speed value. By default, all POINTs are selected (checked) for adjustment.
- Specify the range of measurements for which you intend to set a measurement speed value:

Last measurement – Select to work only with the last measurement collected for each selected POINT.

Measurements + / - ... minutes – Select, then specify x number of minutes to work only with measurements collected within the range starting x minutes prior to and ending x minutes following the basis date and time.

- If you selected a POINT as the reference (launched this window from a POINT), the basis date and time are equal to the date/time stamp of the POINT's last measurement. If you selected a single measurement as the reference (launched this window from a single measurement or from an FFT plot), the basis date and time are equal to the date/time stamp of that measurement.
- The system will remember the specified number of minutes when you launch this dialog again.

Measurements... From... To... – Select, then specify starting and ending dates and times to work only with measurements collected within that range.

- By default, this range starts x minutes prior to and ends x minutes following the basis date and time, based on the current **Measurements + / - ... minutes** setting.
- Select, then enter an **MPA Tag** value to work only with measurements that contain that value in their Description (Point Properties > General tab).
- Click **Next>>**. The **Set Speed (Multiple) Measurement List** window appears, displaying a list of all measurements for the applicable POINTs that meet the criteria established.

The **Set Speed (Multiple) Measurement List** window displays a list of all measurements for the applicable POINTs that meet the criteria established in the **Set Speed (Multiple)** window.

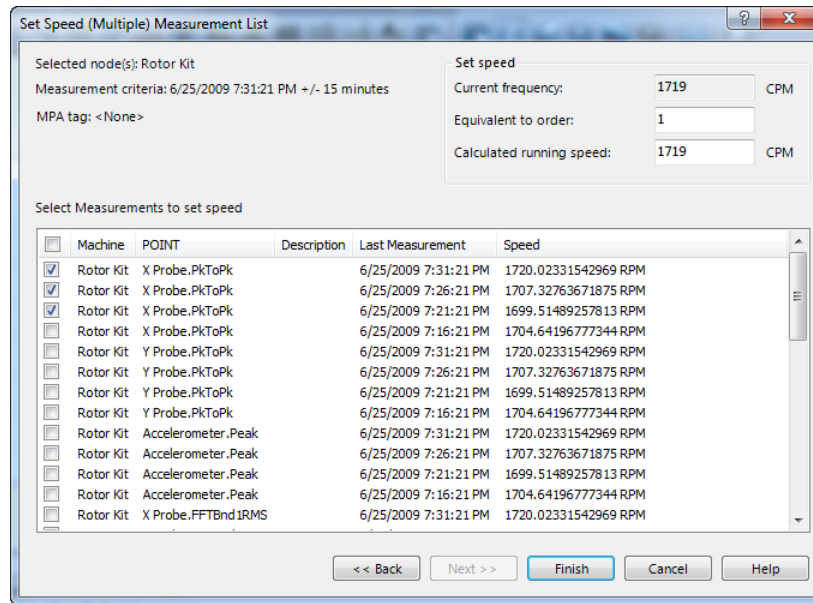


Figure 3 - 56.
Set Speed (Multiple) Measurement List Window.

- From the measurement list, select (check) each measurement to which you intend to apply the reference POINT's measurement speed.
 - Select (check) the checkbox in the list header to select all measurements.
 - To change the criteria established in the previous window that determine the measurements in this list, click <<Back.
 - Click on any column header to sort the list according to that column.

- Verify and/or enter **Set Speed** values.

Current Frequency – The speed value from the reference POINT measurement.

- If you initially selected a POINT as the reference, this speed value comes from the POINT's last measurement. If you initially selected a single measurement as the reference, this speed value comes from that measurement. If you launched this function from an FFT plot, this speed value is the frequency value of the single cursor on that FFT plot.

Equivalent to order – If the speed value entered is at a known harmonic, then you can use this value to factor the **Calculated running speed** to its 1x component.

Calculated running speed – Enter the speed value you wish to apply to all selected (checked) measurements.

- Click **Finish**. The system applies the **Calculated running speed** and **Equivalent to order** values to all measurements selected (checked) in this list.

Calculate Derived POINTs

You must manually calculate derived POINTs upon the initial creation of a derived POINT, or after editing a derived POINT's expression settings. Once the initial calculation has been performed manually, @ptitude Analyst automatically calculates the derived POINT during data upload processing.

- Upon the initial creation of a derived POINT, if the assigned variables do not have existing measurement data, it is not necessary to manually calculate the derived POINT. It is necessary to manually calculate a derived POINT only when the assigned variables already have measurement data.

To manually calculate a derived POINT:

- Select the newly created or recently edited derived POINT from the Hierarchy.
- Select the **Edit** menu's **Calculate Derived POINTs** option to quickly calculate measurement values for the derived POINT.
- The **Calculate Derived POINTs** message dialog displays. Select **Yes** to calculate the selected derived POINT.
 - If calculating a newly created derived POINT, new measurement data displays in the Hierarchy's right panel. Existing measurement data for the assigned variables is used in the calculation to create measurement data records for the derived POINT.
 - If calculating a recently edited derived POINT, all existing derived POINT measurement values previously calculated for the selected derived POINT(s) are deleted and replaced with new derived POINT measurements.

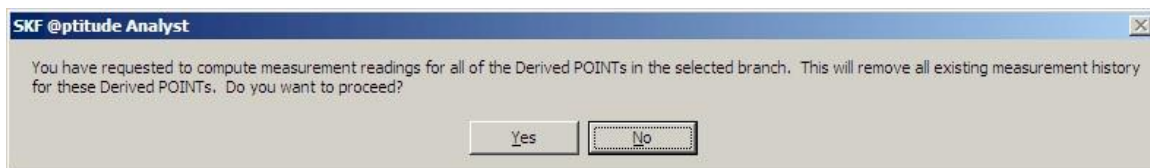


Figure 3 - 57.

The **Edit** menu's **Calculate Derived POINTs** Message Dialog.

After manual calculation of a derived POINT, @ptitude Analyst automatically calculates any newly uploaded data for the derived POINT during data upload processing. The newly calculated data displays along with the existing derived POINT data measurement records in the right panel.

- For a multi-user environment, @ptitude Analyst Monitor calculates the new data for derived POINTs. If @ptitude Analyst Monitor is not running, then the derived POINTs will not be calculated.

Manual Archive

@ptitude Analyst's **Manual Archive** feature adds flexibility as it allows you to specify POINTs to archive, and allows you to archive the newest data in addition to the oldest data.

The **Manual Archive** process differs from a Scheduled or Monitor archive process in several ways.

Manual Archive:

- Takes place immediately.
- Archives only POINTs branching from the selected hierarchy item (or specified measurement records).
- Only archives measurements from the "current data" bin (unless a specific measurement record from another bin is specified).
- Allows you to specify whether to archive each selected POINT's **Oldest** or **Newest** measurement record from the current data bin.
- Allows you to specify the archive bin in which to place the archived measurements.

Use **Manual Archive** to change the archive status for any or all hierarchy items.

Manual Archive is useful to manually set a measurement's archive status, bypassing automatic archive schedule (if applicable).

To use manual archive:

- In the hierarchy list, select a hierarchy item(s) whose measurements you wish to manually archive. All POINTs branching from the selected item are archived.
- Select the **File** menu's **Manual Archive** option. The **Manual Archive** screen displays.

The screen's top area displays a warning if the selected data is tagged as **baseline**. Baseline data cannot be modified.

Change archive status in the screen's **Store measurements as** area. Select from:

Current data bin (available only when archiving a measurement record from other bins)

Unscheduled data bin

Short term archive data bin

Long term archive data bin

The screen's bottom area displays **Archive measurements**. If working from a POINT or above on the hierarchy branch, select from:

Oldest Measurement – Each selected POINT's oldest measurement in the current data bin.

Newest Measurement – Each selected POINT's newest measurement in the current data bin.

- Manual Archive does **not** utilize "scheduled" archive settings

@ptitude Analyst Scheduler

Current Scheduled Events

The **Scheduler** feature allows you to configure the software to perform scheduled functions based on specific conditions. A scheduled event consists of a system event and an action to be executed whenever that event occurs. For example, you can use **Scheduler** to configure the software to display a message when a specific operation completes (action) when a DAD has completed processing (system event).

- Select the **Customize** menu's **Scheduler** option. The **Scheduler** screen displays.

The **Scheduler** screen displays all current scheduled events and the action assigned to each event. Use the **Scheduler** screen to add new events and maintain existing events.

To add an event:

- Click the **Add** button to define an event. The **Event Scheduler Wizard** launches automatically.

You can also add an event by copying an existing event, then modifying the copy as necessary.

To copy an event:

- Highlight the event you would like to copy and click **Copy**. The **Event Scheduler Wizard** launches. As you navigate the wizard, options default to the settings from the copied event. You may modify the settings as necessary.

To edit an event:

- Highlight the event you would like to modify and click **Edit**. The **Event Scheduler Wizard** launches with the settings from the event you are editing.
- Navigate the wizard to the settings you wish to modify and edit the event as necessary.

To remove an event:

- Click the **Remove** button to delete a scheduler entry.
 - Scheduled entries remain in effect until they are removed.

Event Scheduler Wizard

A scheduled event consists of a system event and an action to be executed whenever that event occurs.

The **Event Scheduler Wizard** guides you through the process of scheduling events.

- Click the **Next** button to continue.
- Select the event you want the system to monitor and that will cause the scheduled action to be performed. All available events appear in the **Select an event** window.

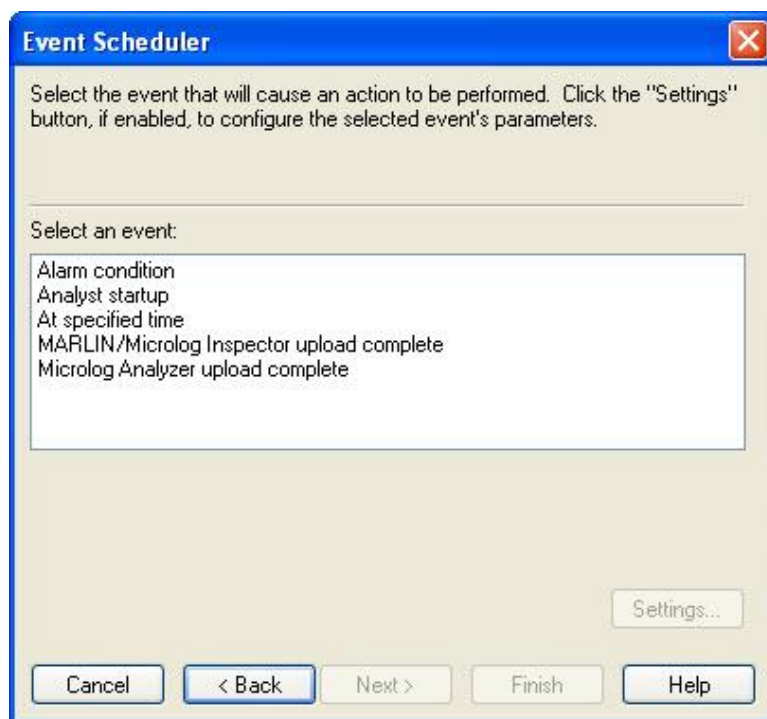


Figure 3 - 58.
The **Event Scheduler** Wizard's First Screen.

Some events require specific settings that further define the event. When settings are required, the **Settings** button is enabled. You must specify the required **Settings** before the **Next** button is enabled.

- Complete all **Settings** entries, if required.
- Click the **Next** button.
 - Individual events are detailed later in this section.

All available actions display in the **Select an action** area.

- Select the action you wish the system to perform when the indicated event occurs

Some actions require specific settings that further define the action. When settings are required, the **Settings** button is enabled. You must specify the required **Settings** before the **Next** button is enabled.

- Complete all **Settings** entries, if required.
- Click the **Next** button.
 - Individual actions are detailed later in this section.

By default, scheduled events only execute if the user who created the event performs the triggering action. (For example, a report set to run on @ptitude Analyst startup only runs when the user who created the event logs in.)

If the user creating the scheduled event is an administrator, an additional dialog displays providing the option of assigning the event to another user, or delegating it to the Transaction Server.

The **Select Users** list shows all @ptitude Analyst users.

- Select the user who should trigger this event.
 - Events scheduled to trigger at a specified time only occur if the user with whom the event is associated is logged into @ptitude Analyst. This applies to both users who are assigned an event by an administrator and non-administrator users who create an event for themselves. For example, if the event is scheduled for three a.m., the specified action will not be performed if the designated user is shut down at three a.m., and it will not be automatically performed when the program is restarted.

Alternatively, if you have selected to generate a report at a specified time with this scheduled event, **Delegate to Transaction Server** enables. The transaction server is a process that stays running in the background at all times. If your triggering event is a specified time, the report runs at that time, regardless of whether the associated user is logged in.

- The report is generated to a file in the path specified in the **Report Location** field on the **Report Generator's Assign** tab. If the **Delegate to Transaction Server** option is selected and the report location path references a local hard drive, the report is written to the Transaction Server host computer. It is recommended that you set the report location to a network drive and make sure the Transaction Server has read / write access to that location.
- Enable **Delegate to Transaction Server** to have the transaction server generate the report, rather than a specified user.
- Click the **Next** button.

The **Event Scheduler Wizard** displays a summary of the new scheduled event settings.

- Click the **Finish** button to save the scheduled event.
- Click the **Back** button to modify the scheduled event.
- Click the **Cancel** button to cancel.

Scheduler Events

Alarm condition

This event is used to schedule an action to be performed when specific alarms occur.

- Click the **Settings** button to specify the data source, alarm condition, and alarm type for which this event should occur. The **Alarm Condition Settings** dialog displays.

Data source –Select the Hierarchies, SETs, Machines, POINTs, ROUTEs, and / or Workspaces to monitor for alarm conditions.

Alarm Conditions –Select the alarm condition (**In alert**, **In danger**, or **Both**) to monitor.

Alarm Type – Select one or more alarm types to monitor.

- Click **OK** to save settings.
- Click **Cancel** to discard settings.

Analyst startup

This event is the application's start up. Performs an action as soon as the application completes its start up process.

At specified time

Schedules a task to be performed at a specific time.

- Click the **Settings** button to specify the time that this event should occur. The **Time Event Settings** dialog appears.

Start Date - Select the date on which the scheduled event should run for the first time.

Start Time – Select the time at which the scheduled event should run for the first time.

Specify the interval for the event. Options are:

Hourly – Select to run the event **Every X hour(s)**. Enter the hourly time increment in the field (e.g., every 8 hours).

Daily - Select to run the event **Every X day(s)**. Enter the number of days in the field (e.g., every 3 days).

Weekly – Select to run the event **Every X week(s)**. Enter the number of weeks in the field, and enable the check box(es) for the day(s) of the week on which the event should run. (e.g., Every 2 weeks on Monday and Wednesday)

Monthly – Select to run the event on a monthly basis. Select the day of the month (1-31) and the frequency of the event in month(s) (e.g., Day 15 of every 2 month(s)); or select a day of the week and the **1st**, **2nd**, **3rd**, **4th**, or **last** week of the month, and the frequency of the event in month(s). (e.g., The 2nd Friday of every 1 month(s))

Yearly – Select to run the event on a yearly basis. Select the month / day and the frequency of the event in year(s). (e.g., January 1st of every 1 year(s)); or select a day of the week, the **1st**, **2nd**, **3rd**, **4th**, or **last** week of the month, the month, and the frequency of the event in year(s). (e.g., The 2nd Friday of January every 2 year(s))

- Click **OK** to save settings.
- Click **Cancel** to discard settings.
 - The **Scheduler** feature is user specific and may only be applied to data uploaded by the current user.

Scheduler Actions

Display a message

Select the “display message” action to display your specified message text when the associated event occurs.

- Click the **Settings** button to enter your message text.
- The **Display Message Action Settings** dialog appears.
- Type in the desired text.
- Click the **OK** button to save.
- Click the **Cancel** button to discard changes.

Generate Report

Select the **Generate Report** action to generate a specified report type when the associated event occurs.

To select report type:

- Select **Generate Report** from the dialog’s **Select an action** area.
- Click the **Settings** button. The **Generate Report** dialog appears.

Generate Report Settings

Description – Enter descriptive text to identify this report in the **Scheduler**.

Report – Select the desired report type from the drop down list.

Data Source – Select the data source for the report. This section varies, depending on whether the **Report can specify data sources from multiple hierarchies** option was enabled on the **Report Editor’s General** tab for the selected report.

If **Report can specify data sources from multiple hierarchies** was enabled, all of your @ptitude Analyst hierarchies display. Select multiple hierarchies, groups, and POINTs to include in your report.

If **Report can specify data sources from multiple hierarchies** was not enabled, available options include:

Primary Hierarchy – Use the POINTs from the currently selected primary hierarchy as the report’s source.

Last Upload – Use the POINTs last uploaded from the data collector as the report’s source.

ROUTEs (all available) – Enable the check box next to each ROUTE you would like to include.

Workspaces (all available) – Enable the check box next to each Workspace you would like to include.

- If the Data Source is a Filtered Workspace, the Workspace will not be filtered again before report generation. The report is based on the Workspace in its current state.

Destination – Select the desired report destination from the drop down list. Available options include:

Email – Automatically sends an email of the report in HTML and PDF format to selected email recipients. Click the **Select** button to display the **Recipient Selection** dialog and select one or more contacts or groups of contacts.

HTML – Save to the subdirectory as an HTML file.

Open Window – Window opens automatically, displaying the report.

Printer / Landscape – Automatically prints in landscape mode.

Printer / Portrait – Automatically prints in portrait mode.

- The **Destination** selection is not used if the report is delegated to the Transaction Server, unless the **Email** option is selected as the destination. Otherwise, the report is always generated to HTML.
- Click **OK** to save report settings.
 - Refer to the SKF @ptitude Analyst Introduction and Global Features User Manual, Chapter 2, Getting Around in @ptitude Analyst / Contact Information section for details on how to set up contacts and groups.

Measurement Management / Archive

Select the **Measurement Management / Archive** action to schedule the **Monitor** application to perform measurement management and archiving. This action checks the measurements in the current database, and either archives old data to the short term or long term status, or deletes old data from the database. This action is performed on measurements in the current database only. Refer to the **SKF @ptitude Analyst Monitor Application** section in the **SKF @ptitude Analyst Introduction and Global Features User Manual** for more information on the **Monitor's** functions, including archiving data.

Send Message

Select the **Send message** action to send an email or text message to selected recipients when the associated event occurs.

- Click the **Settings** button to configure your message settings.

The **Send Message Settings** dialog appears.

- In the **Subject** text box, type the subject of the event's email message.
- In the **Message text** area, type the event's message to be sent as email and/or text messages.
 - Text messages are often limited to a maximum number of characters. Check with the recipient's service provider to understand text message limitations.

- Click the **Select** button to display the **Recipient Selection** dialog and select one or more recipients from the list of available contacts and groups.
 - Refer to the SKF @ptitude Analyst Introduction and Global Features User Manual, Chapter 2, Getting Around in @ptitude Analyst / Contact Information section for details on how to set up contacts and groups.
- If you wish to include an HTML file with your email message, use the **Browse** button next to the **HTML content** text box and select an HTML file to include.
 - HTML content is not supported by text messaging.
- If you wish to include any other type of attachment with your email message, select the **Browse** button next to the **Attachments** text box to select the file you wish to include.
 - Attachments are not supported by text messaging.
- Enable the **Allow content from triggering event** check box to allow the default alarm message to override the **Message text** message when a triggering event occurs.
- Enable the **Send email** check box to send the message to the selected recipients as an email.
- Enable the **Send text to phone** check box to send the message to the selected recipients as a text message.
 - Texting limitations depend on the recipient's service provider.
- Click the **OK** button to save the message settings.
- Click the **Cancel** button to discard changes.

Customize / Database Operations

The **Database** screen allows you to create custom group types and to define filter keys, coded notes, and operator names.

Creating Custom Group Types

Use the powerful **Customize / Database** screen's **Group Types** tab to create custom Group Types to conveniently organize your machines, SETs, and POINTs to fit your application.

To create a custom Group Type:

- Select the **Customize** menu's **Database** option. The **Database** screen displays.
- Select the **Group Types** tab.

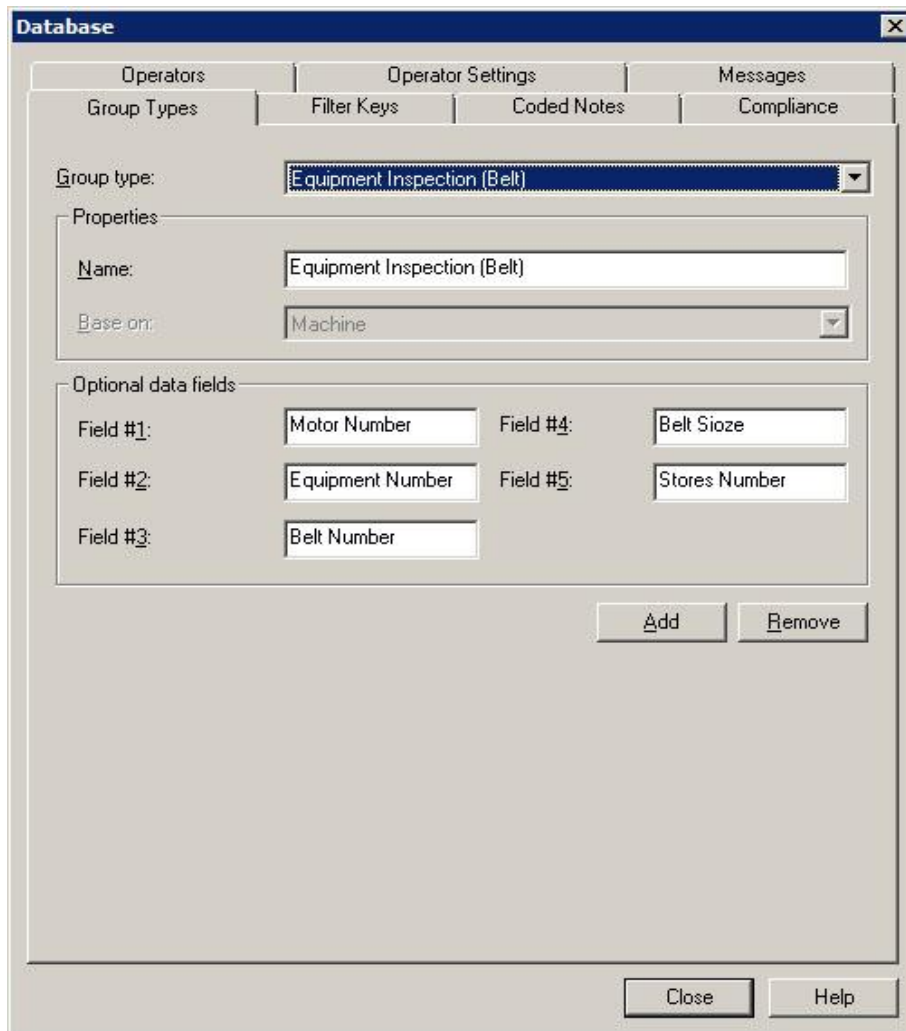


Figure 3 - 59.
The **Database** Screen's **Group Types** Tab.

- Click the **Group Types** tab's **Add** button. The tab enters edit mode.
- Specify appropriate information into the following fields:

Group Type – This field is unavailable if you are adding a new Group Type. In the **Group type properties** area, the following fields are available:

Name – Specify a name to define your custom group type. For example, you may want to create a custom Group type named “pumps,” for easy organization of all pump machinery.

Base on – Select a type to base the new group type on (SET or Machine).

- Once a Group Type has been “based on” a SET or Machine, the setting cannot be edited.

Once defined, the new Group Type will be available as a selection in the **Group Properties** screen's **Type** list.

Optional data - Provides up to five fields to enter titles for additional data. Text entered in these fields appears as prompts for data entry when new Groups are created. This feature allows you to store detailed information with your Groups.

- Specify prompt titles that will appear in the **Group Properties / Details** tab.
 - Examples are “serial number,” “manufacturer,” “operator name,” etc.
- Click the **Save** button to save the new Group Type and add it to the available types.
- Click the **Undo** button to undo changes.
- Click **Remove** to remove the current Group Type.
 - Group types currently in use cannot be removed.

Creating Filter Keys

Custom filter keys can be assigned to POINTs and/or Machines or SETs.

To add a new filter key:

- Select the **Customize** menu's **Database** option. The **Database** screen displays.
- Select the **Filter Keys** tab.

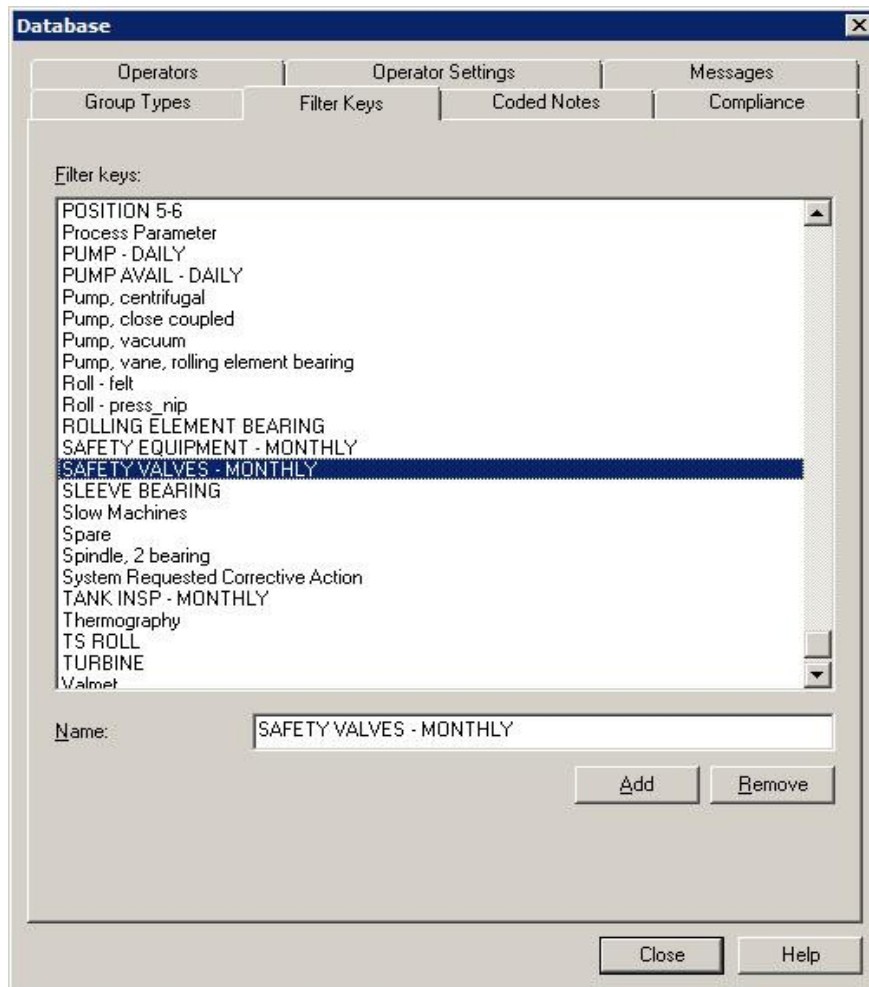


Figure 3 - 60.
The **Database** Screen's **Filter Key** Tab.

- Click the screen's **Add** button. The screen enters edit mode.
Fields include:
Filter keys – Displays all previously defined filter keys.
Name – Specify filter key text.
- Click the **Save** button. The new filter key is now available for assignment.

Frequency Sets

Frequency Sets allow you to quickly assign fault frequency markers to a POINT. When the POINT's FFT measurements display in a spectral plot, you may overlay its assigned fault frequency markers to easily determine if spectral peaks appear at anticipated fault frequencies.

Select the **Customize / POINT Attributes** menu's **Frequency Sets** option to display the **Frequency Sets** screen.

All shared frequency sets appear in the **Frequency sets** area.

Available options include:

Add – Click to add a new frequency set. The **Frequency Sets Editor** dialog launches automatically.

Copy – Click to make a copy of an existing shared frequency set. This option is useful when you are creating a new frequency set that is a slight modification of an existing frequency set. The **Frequency Sets Editor** dialog launches automatically.

Edit – Click to edit an existing frequency set. The **Frequency Sets Editor** dialog launches automatically.

Remove – Remove the selected frequency set.

Frequency Sets Editor

The **Frequency Sets Editor** screen contains three tabs; **General**, **Bearings**, and **Other**. Each tab is detailed below.

The screenshot shows the 'Frequency Sets Editor' dialog box with the 'General' tab selected. The 'Name' field contains '703 INPUT' and the 'Description' field contains '703 INPUT GMF & BRG'. Below these fields is a table titled 'Included frequencies:' with the following data:

Name	Type	Multiples	BW %	Details
1XGMF	Other	5	5	26 x RPM
22314 C3 (SKF)	Bearing	4	5	BPFO 2.6264, BPF
22318C (SKF)	Bearing	4	5	BPFO 6.18, BPFI 8

At the bottom of the dialog, there are 'Display adjustments' for 'Multiples' and 'Band width %', each with a text input field. The 'OK', 'Cancel', and 'Help' buttons are at the bottom right.

Figure 3 - 61.
The **Frequency Sets Editor** Screen's **General** Tab.

General Tab

Displays the current frequency set's name and description. Included frequencies appear with their Name, Type, Multiples, Bandwidth%, and Details.

Name - Displays current frequency set name.

Description - Displays current frequency set description.

Included frequencies - Displays all frequencies included in the current frequency set, with their:

Name – Displays the frequency name.

Type – Displays the type of frequency.

Multiples – Displays the multiple of frequency markers to display on the plot.

Bandwidth % - Displays the frequency range boundaries used by the frequency marker to locate a peak.

Details – Displays fault frequency settings for the bearing's components.

- Click on a frequency to select it.

Display Adjustments – Allows you to edit the **Multiples** and **Bandwidth%** settings for the selected frequency.

- Click **OK** to save changes.
- Click **Cancel** to close screen without saving changes.

Bearings Tab

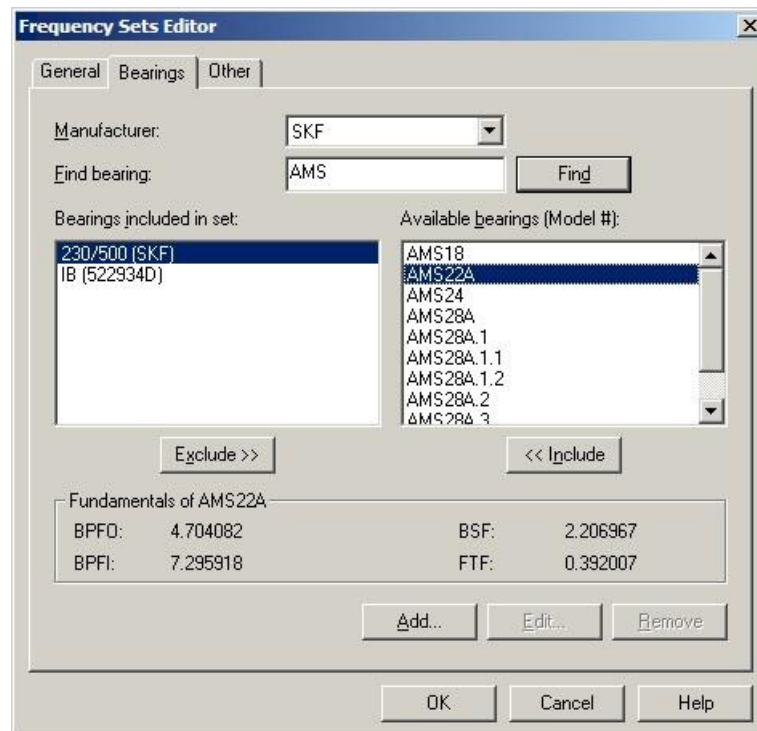


Figure 3 - 62.
The **Frequency Sets Editor** Screen's **Bearings** Tab.

The **Frequency Sets Editor / Bearings** tab allows selection and/or de-selection of bearings included in the current set.

Select manufacturer - Use the drop down list to select the desired bearing manufacturer.

Find bearing - Specify the bearing name and click the **Find** button. @ptitude Analyst locates bearings matching your entry, and displays them in the **Available bearings (Model #)** window.

Bearings included in set - Displays bearings currently included in the frequency set.

Available bearings (Model #) - Displays bearings from the selected manufacturer that match the entered criteria.

- Use the **<< Include** button to *include* the selected bearing(s) in the frequency set (move selected bearing(s) from the **Available bearings (Model #)** column to the **Bearings included in set** column).
- Use the **Exclude >>** button to *exclude* the selected bearing(s) from the frequency set (move selected bearing(s) from the **Bearings included in set** column to the **Available bearings (Model #)** column).

Fundamentals of - Displays the fault frequency settings for the selected bearing's components.

- Click **Add** to add bearings to the database, or **Edit** to modify an existing bearing. The **Bearing Editor** window displays in both cases.
- Click **Remove** to remove a bearing from the bearing database.

Bearing Editor

- The **Bearing Editor** window displays in either "edit" or "add" mode, depending on your previous selection in the **Frequency Sets Editor**.

Bearing Editor

Identity

Bearing model #: Bearing1

Manufacturer: SKF

Description:

Dimensions

Number of balls: 7 Pitch diameter: 0.625

Ball diameter: 0.156 Contact angle: 0

Calculate

Fundamentals

BPF0: 4.704082 BSF: 2.206967

BPF1: 7.295918 FTF: 0.392007

OK Cancel Help

Figure 3 - 63.
The **Bearing Editor** Window.

The **Bearing model #** and **Manufacturer** fields in the window's **Identity** area cannot be modified when in "edit" mode.

Bearing Editor fields include:

Identity area - Enter the identification characteristics in the following fields:

Bearing model #: - Displays the model number. Cannot be modified in "edit" mode.

Manufacturer: - Displays the bearing's manufacturer. Cannot be modified in "edit" mode.

Description - Specify up to 32 characters that identify the new bearing.

Dimensions - Specify the appropriate values in the following fields:

Number of balls

Ball diameter

Pitch diameter

Contact angle

- Click the **Calculate** button. @ptitude Analyst automatically calculates and enters the **Fundamentals** values.

Fundamentals - Manually specify appropriate values in the available fields:

BPF0: (Ball Pass Freq. Outer race)

BPF1: (Ball Pass Freq. Inner race)

BSF: (Ball Spin Freq.)

FTF: (Fundamental Train Freq. / Cage Freq.)

- Click **OK** to save changes.

- Click **Cancel** to close the window without saving changes.

Other Tab

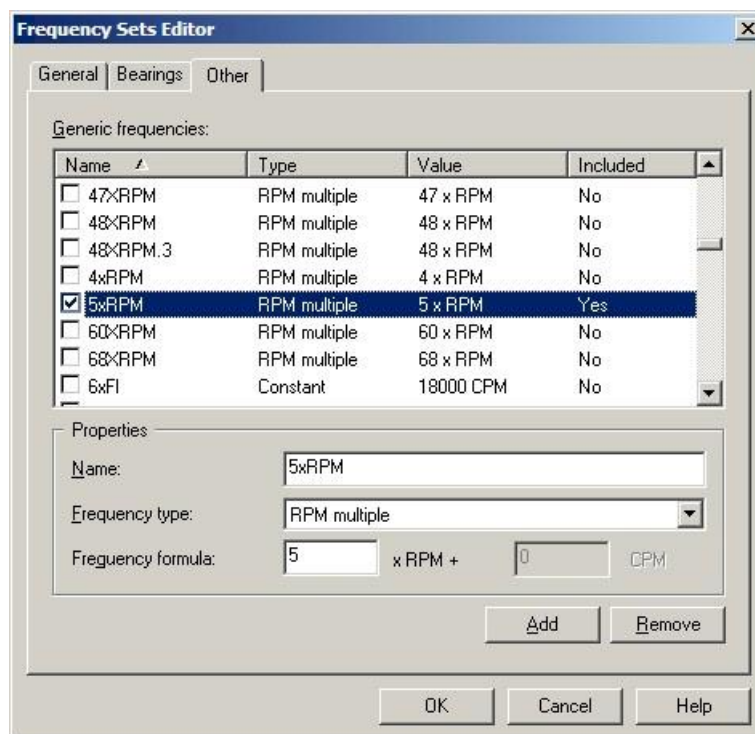


Figure 3 - 64.

The **Frequency Sets Editor** Screen's **Other** Tab.

Use the **Frequency Sets Editor / Other** tab to select a generic frequency to include in the current Frequency Set, or to add, edit, or remove a generic frequency.

The **Other** tab displays all **included generic frequencies**.

To include a frequency in the current frequency set:

- Click the frequency's checkbox in the **Included generic frequencies** area. The checkbox toggles the **Included** status between **Yes** and **No**.

To add a new frequency:

- Click the **Add** button. A new frequency displays with default settings that may be edited.

To remove a frequency:

- Select the desired frequency from the **Included generic frequencies** windows so that the frequency information is visible in the **Properties** area
- Click the **Remove** button.
 - You cannot remove a frequency that is currently used within any frequency set. You must remove all associations with frequency sets before you can remove a frequency.

Properties- Displays the selected frequencies attributes. You may edit these attributes:

Name: - The selected frequency's name.

Frequency type: - The selected frequency's frequency type.

Frequency formula: - Specific fields based on the frequency type.

To edit frequency properties:

- Enter a descriptive name (up to 32 characters).
- Select the desired frequency type option from the drop down list.

Frequency type options include:

Constant - Constant frequency value. (Example: 10 Hz)

Offset - Multiple of running speed and offset (+) by constant frequency value.
(Example: $4.00 \times \text{RPM} + 10 \text{ Hz}$)

RPM - Multiple of running speed. (Example: $4.00 \times \text{RPM}$)

Sideband - Multiple of running speed and offset (+ and -) by constant frequency value. (Example: $4.00 \times \text{RPM} + / - 10 \text{ Hz}$)

- Edit the applicable **Frequency formula** fields.
 - Specific **Frequency formula** edit options are available according to the current **frequency type** selection. If enabled, the first field is a running speed, or RPM value. The second field is a fixed frequency in Hz or CPM.

For example, with an RPM multiple frequency type, entering a 4 in the first field indicates that the frequency would show up at 4 times the running speed.
- Click the tab's **Save** button to save changes.
- Click **Undo** to undo changes.
- Click the **OK** button to close the tab. You will be prompted to save any unsaved changes.

Online Settings

@ptitude Analyst's **Online Settings** screen allows you to add or remove devices and sensors, and configure Gating options.

Devices

- Select the **Customize** menu's **Online Settings** option. The **Online Settings** screen displays the **Devices** tab.

The screenshot shows the 'Online Settings' dialog box with the 'Devices' tab selected. The dialog has three tabs: 'Devices', 'Sensor Setup', and 'Gating'. The 'Available hardware devices' dropdown is set to 'IMX'. The 'Properties' section shows 'Device name' as 'IMX', 'DAD type' as 'IMX.P', and 'IMx service' as 'IMx Service'. There are 'Config...' and 'Hosts...' buttons next to the 'DAD type' and 'IMx service' dropdowns respectively. The 'Settings' section includes 'Communication type' (Ethernet (TCP/IP)), 'DAD #' (1), 'Data collection method' (Live & scheduled), 'Compression method' (Uncompressed), 'Communication timeout' (0 Minute (s)), 'Always connected' (Connected), 'Reference time' (1:10:04 PM), and 'Time zone' ((GMT) Casablanca, Monrovia, Rey). At the bottom right are 'Save', 'Undo', 'Close', and 'Help' buttons.

Figure 3 - 65.
The **Online Settings** Screen's **Devices** Tab.

All available devices display in the **Available hardware devices** drop down list. When a device from this list is selected, its entered **Properties** and **Settings** display in the tab's other fields.

- When you select a WMx / WVT from the **Available hardware devices** drop down list, the **Properties** area displays the **Device Name** and **DAD type** in read-only format. To manage WMx devices, use the **View** menu's **WMx Device** screen. Reference **Chapter 2, Setting Up Your WMx Device** for details.

To add a new device:

- Click the tab's **Add** button. By default, the name "New Device.#" displays.

Fields include:

Device Name - Assign the new device a unique name by typing it in the **Device name** field.

Host - Identifies the computer that controls the device. Select the appropriate host from the drop down list. If the appropriate host is not available in the drop down list, click the **Hosts** button to display the **Hosts** dialog. Use this dialog to add, edit, or remove host computers.

Dad Type - Select the appropriate DAD type. Different fields display depending on the device type selected.

IMX Service - Select the appropriate name of the IMx Service connected to the IMx.

- Set up IMx Service using the SKF Multilog IMx Configurator. Reference the SKF Multilog IMx Configurator User Manual for details.

Config - Click the **Config** button to configure the digital output and input labels, to configure the analog and digital channel properties, and assign channels to the IMx.

- For more information on configuring your device, reference the **Configuring the Device** section below.

Communication Type - Select the appropriate communication type.

DAD # - Select the appropriate DAD number (1 – 255 for IMx). DAD #s are unique for Host / Communication type combination.

Communication timeout - The IMx initiates communication with @ptitude Analyst. Enter the number of minutes to determine how long @ptitude Analyst waits for communication from the IMx before indicating it is overdue.

Always connected - Determines the IMx's connection status. Click the **Always Connected** checkbox to enable connection to the IMx. When the IMx is connected, the IMx continuously sends data to @ptitude Analyst. When the IMx is not connected, the IMx wakes up periodically to send data to @ptitude Analyst.

Connection Interval - Specify how often the IMx wakes up to send data to @ptitude Analyst when the IMx is not connected.

Reference time - Set the time to offset the data upload cycle on the IMx System. This allows a system with multiple IMxs to stagger data upload by the specified reference time so IMxs do not attempt to upload simultaneously.

Time zone - Select the current time zone of the IMx device. Data is always collected in local time.

Once you have made changes, the **Save** and **Undo** buttons appear. Click **Save** to save your new device settings. Click **Undo** to clear the entered settings.

To remove a device:

- Select the device you wish to remove from the **Available Hardware Devices** drop down list.
 - Only devices without assigned POINTs can be removed.
- Click the **Remove** button.
- When prompted, confirm you wish to remove the selected device by clicking **Yes**.

Configuring the Device

To configure your device, click the **Config** button. The configuration screen displays differently depending on the type of DAD selected.

Configure IMx Channel

Analog

The IMx has 16 analog channels, except the IMx-8, which has eight analog channels. Configure each channel on the **Channel Properties / Analog** tab.

Channel Properties - IMx-8

Units system: Metric

Analog channels:

#	Name	Enabled	Sensor Type	Sensitivity	Unit	Current Sh...	Zero Offset	OK Status	Lower	Upper	Notes	ICP
1	Channel 1	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Disable	8	16		Internal
2	Channel 2	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Enable	8	16		Internal
3	Channel 3	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Enable	8	16		Internal
4	Channel 4	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Enable	8	16		Internal
5	Channel 5	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Enable	8	16		Internal
6	Channel 6	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Enable	8	16		Internal
7	Channel 7	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Enable	8	16		Internal
8	Channel 8	Yes	Accelerometer	10.197266	mV/m/s^2	Disable	0	Enable	8	16		Internal

Properties

Channel name: Channel 1 ☒ Channel enabled

Sensor type: Accelerometer Sensitivity: 10.197266 mV/m/s^2

Current shunt: Disable Zero offset: 0 Volts

☐ Check sensor OK status ☒ Enable ICP

Lower limit: 8 Volts Upper limit: 16 Volts

Sensor notes:

Figure 3 - 66.
The **Channel Properties** Screen's **Analog** Tab.

Analog channels – Lists all analog channels. Highlight a channel to edit the channel's properties.

Properties area – When a channel is selected in the **Analog channels** list, the channel properties display for editing purposes. Edit the following fields to make changes to a channel's settings:

Channel name – Assign the channel a unique name.

Channel Enabled – Click the **Channel Enabled** checkbox to enable a channel on the IMx. If the channel is disabled, the IMx skips the POINTs assigned to that channel during data collection.

Sensor type – Specify the type of sensor used by the selected channel.

Sensitivity – Enter a value for the sensitivity of the sensor to be used in making the measurement.

Current shunt – (IMx-8 / IMx-P / IMx-M) If a resistor of 220 ohms is added to a channel input, select **Enable** to display the correct input unit for this particular channel.

- Only IMx-8 devices include both the **Current Shunt** and **Enable ICP** options.

Zero offset – Enter a value to offset the zero point of the measurement.

Autoset button – Click the **Autoset** button to adjust the sensitivity and zero offset calculation using the **Offset Calculator**. The **Offset Calculator** allows you to set the sensitivity and offset values for scaling the IMx process input using two signal levels and their corresponding engineering units.

Enable ICP – Click to enable the support of ICP-type sensors (for example, accelerometers) with internal power from the IMx.

Check sensor OK status – Click to enable this option. When enabled, @ptitude Analyst will check the sensor status, and will display the sensor status in **Device status** and **Online Data View** dialogs. If data is outside specified range, the IMx does not collect the data.

Upper Limit – Type in the BOV upper limit value.

Lower Limit – Type in the BOV lower limit value.

Sensor notes – Type in any additional information you would like to store with the selected sensor settings.

To edit channel properties:

- Select the channel you wish to edit from the **Analog channels** list.
- In the **Properties** area, edit channel name, enable / disable the channel, and edit the sensor information.
 - When you start to edit a field in the **Properties** area, the **Analog channels** list turns gray, allowing you to only make changes to the selected channel. Also, the **Save** and **Undo** buttons become available.
- To cancel changes to the selected channel, click **Undo**.
- When you have finished editing the channel properties, click **Save** to save your changes.

- Use the **Copy / Paste** function to copy the selected channel's properties and paste to another channel. To copy channel properties to multiple channels, use Shift+Click and Ctrl+click keyboard functions to select multiple items, then click **Paste**.
 - Channel name and sensor notes are not copied to other channels.
- Click **OK** to apply any changes and return to the **Online Settings / Devices** screen.

Digital

The IMx has eight digital channels, except the IMx-8, which has two digital channels. Configure each channel on the **Channel Properties / Digital** tab.

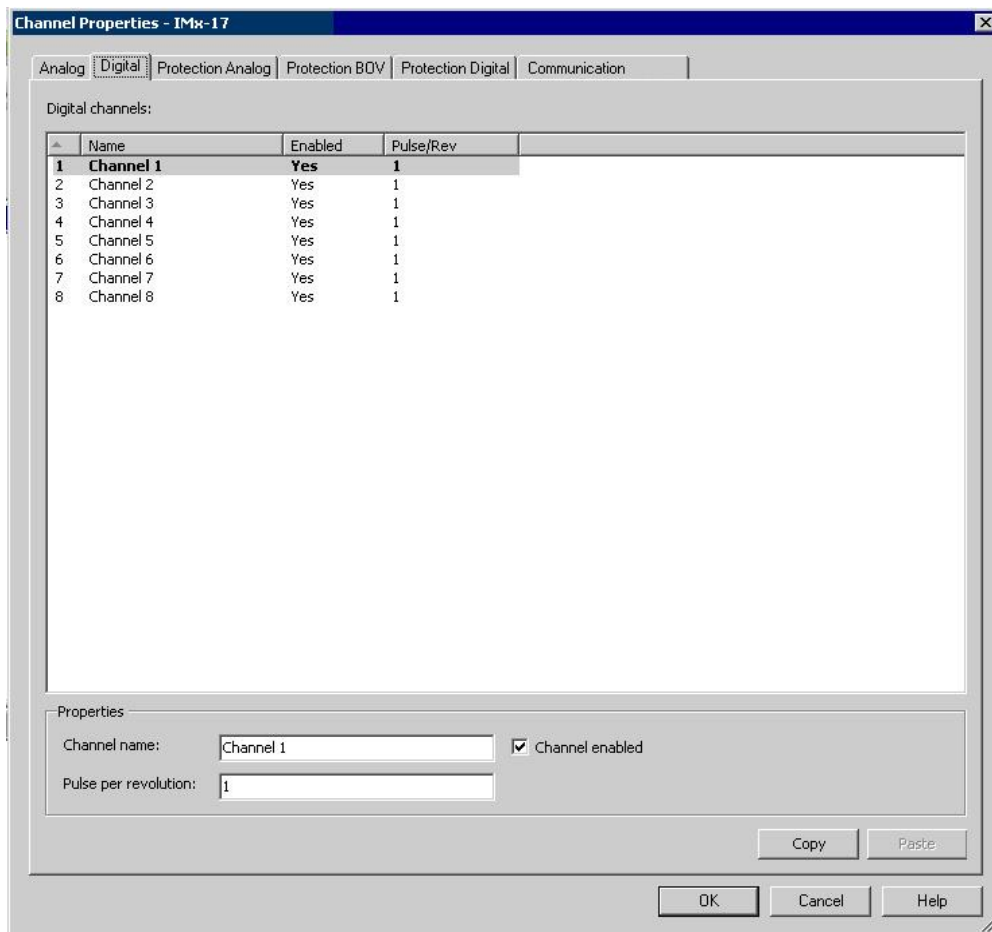


Figure 3 - 67.
The **Channel Properties** Screen's **Digital** Tab.

Digital channels – Lists all digital channels. Highlight a channel to edit the channel's properties.

Properties area– When a channel is selected in the **Digital channels** list, the channel properties display for editing purposes. Edit the following fields to make changes to a channel's settings:

Channel name – Assign the channel a unique name.

Channel Enabled – Click the **Channel Enabled** checkbox to enable a channel on the IMx. If the channel is disabled, the IMx skips the POINTs assigned to that channel during data collection.

Pulse per revolution – Enter the number of pulses the IMx unit receives per shaft revolution.

To edit channel properties:

- Select the channel you wish to edit from the **Digital channels** list.
- In the **Properties** area, edit channel name, enable / disable the channel, and edit the sensor information.
 - When you start to edit a field in the **Properties** area, the **Digital channels** list turns gray, allowing you to only make changes to the selected channel. Also, the **Save** and **Undo** buttons become available.
- To cancel changes to the selected channel, click **Undo**.
- When you have finished editing the channel properties, click **Save** to save your changes.
- Use the **Copy / Paste** function to copy the selected channel's properties and paste to another channel. To copy channel properties to multiple channels, use Shift+Click and Ctrl+click keyboard functions to select multiple items, then click **Paste**.
 - Channel name and sensor notes are not copied to other channels.
- Click **OK** to apply any changes and return to the **Online Settings / Devices** screen.

Protection Channels (IMx-M only) .

The IMx-M's protection channels get data from the analog, BOV, and digital channels on the IMx-M's protection I/O module through internal IMx-M communication. Changes made to the **Protection Analog**, **Protection BOV**, and **Protection Digital** tabs do not affect the physical protection I/O module's settings. These channels help detect critical issues that the IMx-M's CPU module's analog and digital channels do not detect.

Protection Analog

The IMx-M has 16 protection analog channels. Configure each channel on the **Channel Properties / Protection Analog** tab.

	Name	Enabled	Zero Offset	Min S...	Max ...	Sensitivity	Notes
1	Protection Channel1	Yes	0	0	10	3276.7	
2	Protection Channel2	No	0	0	0	0	
3	Protection Channel3	No	0	0	0	0	
4	Protection Channel4	No	0	0	0	0	
5	Protection Channel5	No	0	0	0	0	
6	Protection Channel6	No	0	0	0	0	
7	Protection Channel7	No	0	0	0	0	
8	Protection Channel8	No	0	0	0	0	
9	Protection Channel9	No	0	0	0	0	
10	Protection Channel10	No	0	0	0	0	
11	Protection Channel11	No	0	0	0	0	
12	Protection Channel12	No	0	0	0	0	
13	Protection Channel13	No	0	0	0	0	
14	Protection Channel14	No	0	0	0	0	
15	Protection Channel15	No	0	0	0	0	
16	Protection Channel16	No	0	0	0	0	

Properties

Channel name: ☒ Channel enabled

Min scale: Zero offset:

Max scale:

Sensor notes:

Copy Paste

OK Cancel Help

Figure 3 - 68.

The **Channel Properties** Screen's **Protection Analog** Tab.

Protection Analog channels – Lists all protection analog channels. Highlight a channel to edit the channel's properties.

Properties area – When a channel is selected in the **Protection Analog channels** list, the channel properties display for editing purposes. Edit the following fields to make changes to a channel's settings:

Channel name – Assign the channel a unique name.

Channel Enabled – Click the **Channel Enabled** checkbox to enable a channel on the IMx. If the channel is disabled, the IMx skips the POINTs assigned to that channel during data collection.

Min / Max Scale – Enter the minimum and maximum magnitude scale values in the designated text boxes. Set this value to the same scale value that is configured for the protection I/O module in the IMx-M Protection Configurator.

- These values should not be confused with the channel sensitivity values that are configured in the IMx-M Configurator.

Zero offset – Enter a value to offset the zero point of the measurement.

Sensor notes – Type in any additional information you would like to store with the selected sensor settings.

To edit channel properties:

- Select the channel you wish to edit from the **Protection Analog channels** list.
- In the **Properties** area, edit channel name, enable / disable the channel, and edit the sensor information.
 - When you start to edit a field in the **Properties** area, the **Protection Analog channels** list turns gray, allowing you to only make changes to the selected channel. Also, the **Save** and **Undo** buttons become available.
- To cancel changes to the selected channel, click **Undo**.
- When you have finished editing the channel properties, click **Save** to save your changes.
- Use the **Copy / Paste** function to copy the selected channel's properties and paste to another channel. To copy channel properties to multiple channels, use Shift+Click and Ctrl+click keyboard functions to select multiple items, then click **Paste**.
 - Channel name and sensor notes are not copied to other channels.
- Click **OK** to apply any changes and return to the **Online Settings / Devices** screen.

Protection BOV

The IMx-M has 16 protection BOV channels. Configure each channel on the **Channel Properties / Protection BOV** tab.

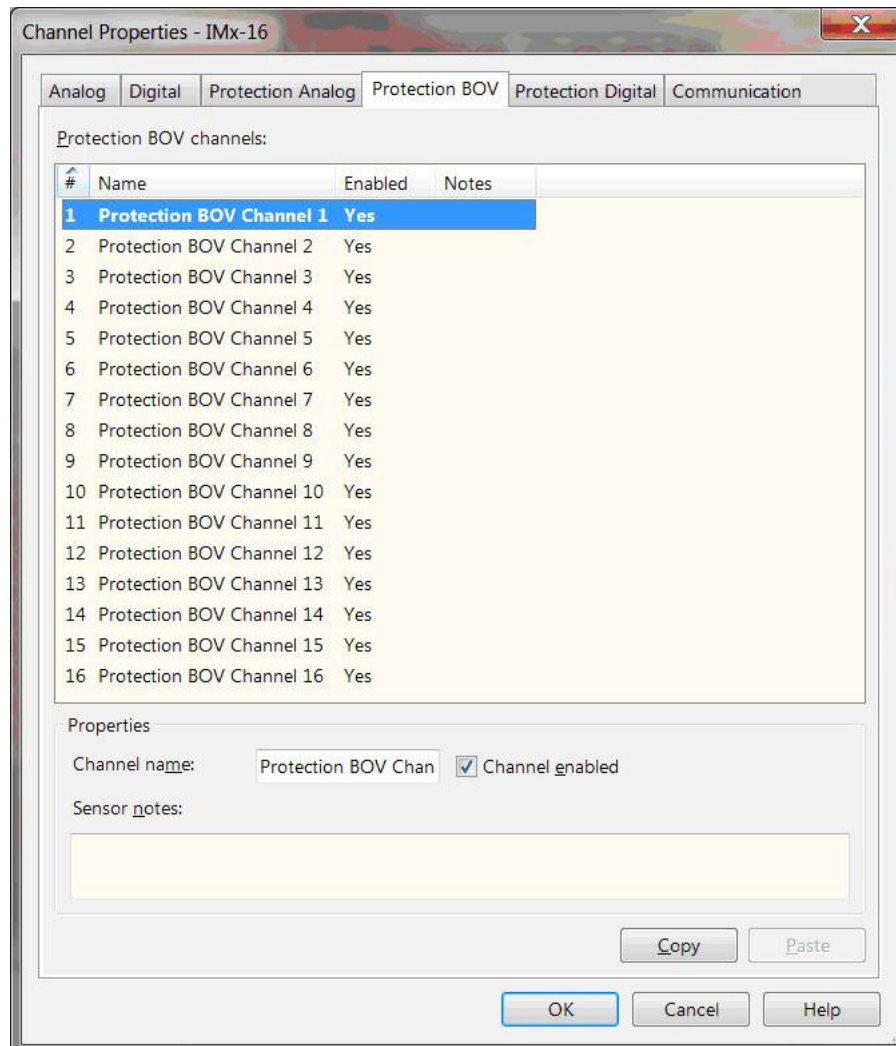


Figure 3 - 69.
The **Channel Properties** Screen's **Protection BOV** Tab.

Protection BOV channels – Lists all protection BOV channels. Highlight a channel to edit the channel's properties.

Properties area – When a channel is selected in the **Protection BOV channels** list, the channel properties display for editing purposes. Edit the following fields to make changes to a channel's settings:

Channel name – Assign the channel a unique name.

Channel Enabled – Click the **Channel Enabled** checkbox to enable a channel on the IMx. If the channel is disabled, the IMx skips the POINTs assigned to that channel during data collection.

Sensor notes – Type in any additional information you would like to store with the selected sensor settings.

To edit channel properties:

- Select the channel you wish to edit from the **Protection BOV channels** list.
- In the **Properties** area, edit channel name, enable / disable the channel, and edit the sensor information.
 - When you start to edit a field in the **Properties** area, the **Protection BOV channels** list turns gray, allowing you to only make changes to the selected channel. Also, the **Save** and **Undo** buttons become available.
- To cancel changes to the selected channel, click **Undo**.
- When you have finished editing the channel properties, click **Save** to save your changes.
- Use the **Copy / Paste** function to copy the selected channel's properties and paste to another channel. To copy channel properties to multiple channels, use Shift+Click and Ctrl+click keyboard functions to select multiple items, then click **Paste**.
 - Channel name is not copied to other channels.
- Click **OK** to apply any changes and return to the **Online Settings / Devices** screen.

Protection Digital

The IMx has eight protection digital channels. Configure each channel on the **Channel Properties / Protection Digital** tab.

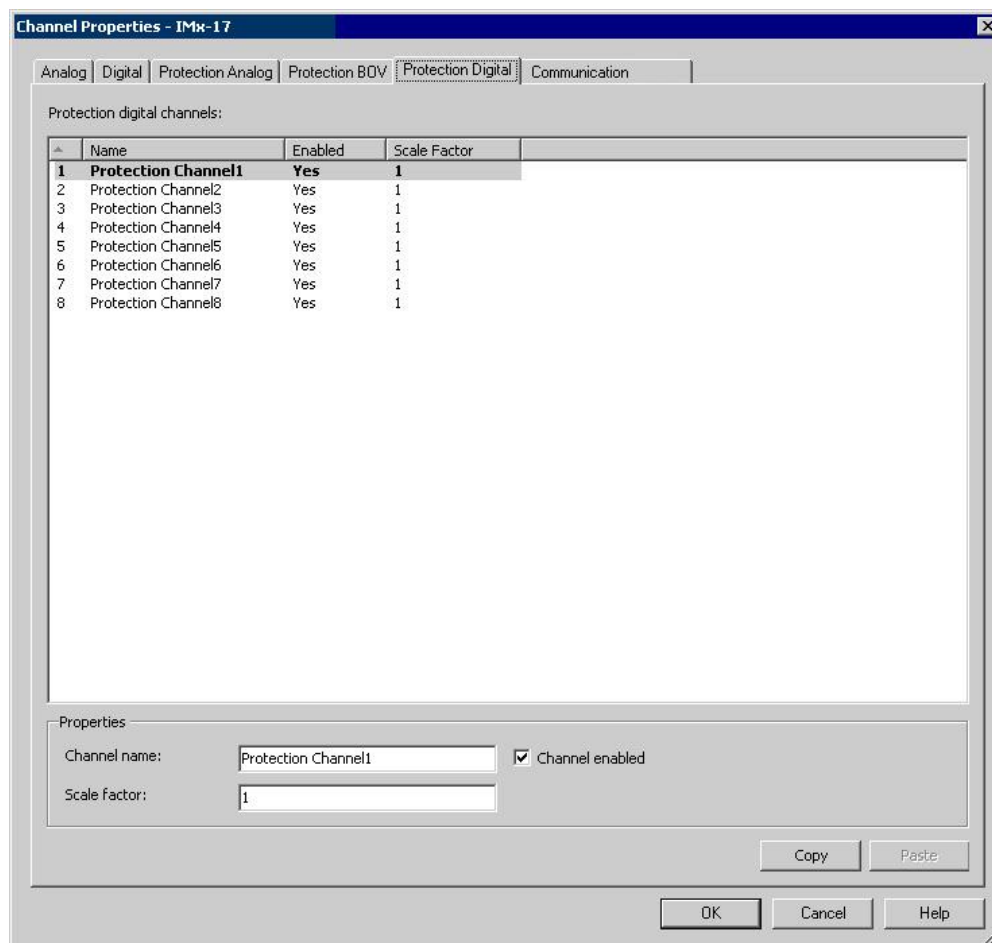


Figure 3 - 70.
The **Channel Properties** Screen's **Protection Digital** Tab.

Protection Digital channels – Lists all protection digital channels. Highlight a channel to edit the channel's properties.

Properties area– When a channel is selected in the **Protection Digital channels** list, the channel properties display for editing purposes. Edit the following fields to make changes to a channel's settings:

Channel name – Assign the channel a unique name.

Channel Enabled – Click the **Channel Enabled** checkbox to enable a channel on the IMx. If the channel is disabled, the IMx skips the POINTs assigned to that channel during data collection.

Scale factor – Enter a scale factor to adjust the monitored reading to a scaled value, when necessary. For example, if the machine's running speed is 3,000 RPM, but the sensor's location is capturing a running speed of 1,500 RPM, a

scale factor of two will capture the actual running speed of the machine for the sensor's location.

To edit channel properties:

- Select the channel you wish to edit from the **Protection Digital channels** list.
- In the **Properties** area, edit channel name, enable / disable the channel, and edit the sensor information.
 - When you start to edit a field in the **Properties** area, the **Protection Digital channels** list turns gray, allowing you to only make changes to the selected channel. Also, the **Save** and **Undo** buttons become available.
- To cancel changes to the selected channel, click **Undo**.
- When you have finished editing the channel properties, click **Save** to save your changes.
- Use the **Copy / Paste** function to copy the selected channel's properties and paste to another channel. To copy channel properties to multiple channels, use Shift+Click and Ctrl+click keyboard functions to select multiple items, then click **Paste**.
 - Channel name and sensor notes are not copied to other channels.
- Click **OK** to apply any changes and return to the **Online Settings / Devices** screen.

Communication

The **Communication** tab enables you to activate the communication between the IMx-M's protection I/O module and CPU module, or communication between the IMx-8, IMx-S or IMx-T and CPU module using a Modbus communication protocol.

To activate communication between the IMx-M's protection I/O module and CPU module:

- Select **Protection** to enable external communication with the protection I/O module. By default, the **Protection** option is enabled.
- Select **None** if you wish to disable communication (i.e., for maintenance purposes, or to replace cards on the CPU module).
 - If **None** is selected, no data is stored from the device for these protection channels.

A Note About Modbus RTU and Modbus TCP

Communication can be enabled via Modbus protocols for IMx-8, IMx-S or IMx-T devices. The Modbus protocol is currently implemented using serial transmission lines (RTU) or TCP over Ethernet and Modbus Plus. Modbus RTU (remote terminal unit) is communication between devices using binary data. Modbus TCP (transmission control protocol) is a Modbus protocol with a TCP wrapper that uses Ethernet to transfer data between master and slave devices.

- Standard TCP port 502 is used for communication.
- TCP protocol uses big endian format.
- For existing Modbus RTU devices a gateway is required to convert from physical layer RS485 (or others) to Ethernet.
- The Modbus standard specifies only 16-bit integers. Floating points and 32-bit integers are vendor extensions that use multiple registers.

A Note About Master-Slave Communication Rules

There can be only one master but there can be one or more slaves. The master controls the communication with the different slaves. The master sends the messages and the slave answers them. The slaves are limited to returning the information requested by the master.

To activate communication for IMx-8, IMx-S or IMx-T via Modbus RTU protocol with the IMx configured as a Modbus master:

- From the Settings (**None**, **Protection**, **Modbus RTU** or **Modbus TCP**), select **Modbus RTU** to enable communication using this Modbus protocol.

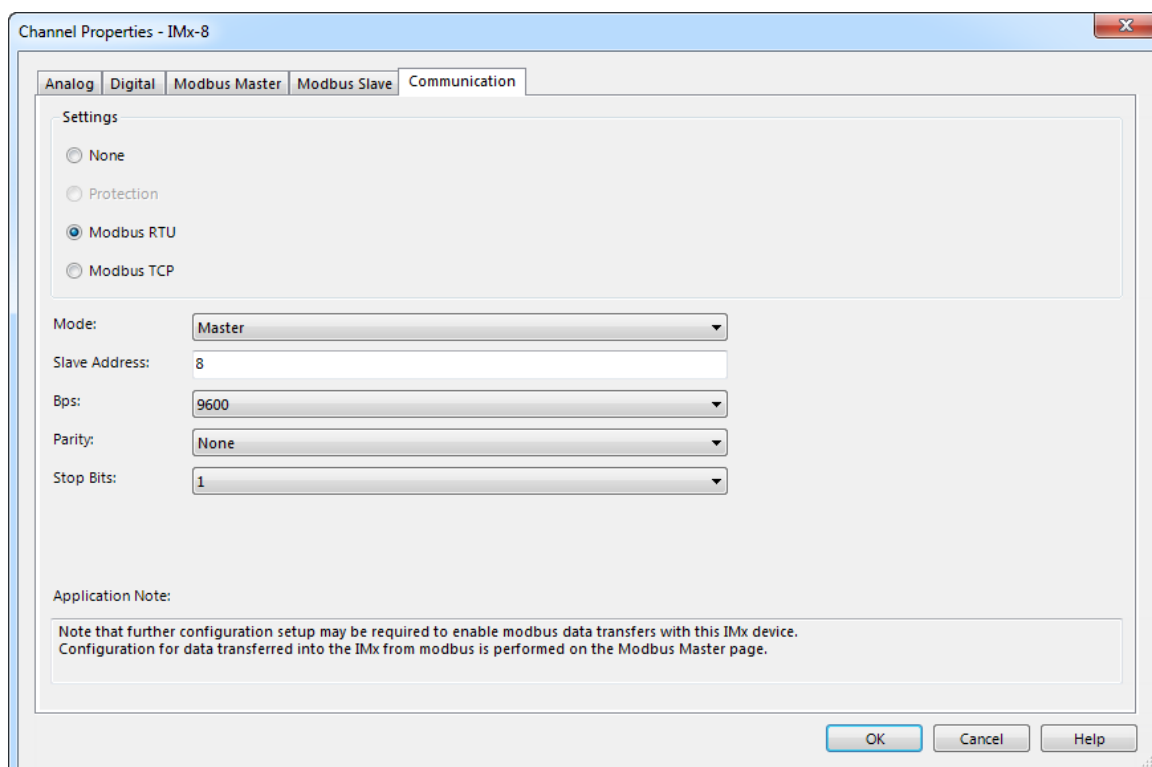


Figure 3 - 71.
The **Channel Properties** Screen's **Communication** Tab, Modbus RTU Master.

- Select **Master** as the **Mode** for Modbus communication.
 - When you set this IMx as a Modbus master, you can configure and enable virtual channels (via the **Modbus Master** tab) to support the following Modbus data transfers:
 - An external Modbus master writing data to this IMx (configured as a Modbus slave).
 - This IMx (configured as a Modbus master) reading data from an external Modbus slave.
 - This IMx (configured as a Modbus master) reading data from another IMx configured as a Modbus slave.
- Enter the **Slave Address** number of the Modbus Slave with which this Modbus Master will connect and communicate.
 - The exact **Slave Address** number is to be entered when creating the Modbus Master to identify the Modbus Master-Slave pair.
- Check that the other parameters – **Bps** (Bits per second, or Baud rate), **Parity**, **Stop Bits** – are set appropriately or modify as needed.

Bps defines the speed of Modbus, transfer rate in bps.

Parity can be set to None, Even or Odd.

Stop Bits defines the number of stop bits in use. It can be 1 or 2.

- Click **OK** to save the settings. The Channel Properties window closes.

To activate communication for IMx-8, IMx-S or IMx-T via Modbus TCP protocol with the IMx configured as a Modbus master:

- From the Settings (**None**, **Protection**, **Modbus RTU** or **Modbus TCP**), select **Modbus TCP** to enable communication using this Modbus protocol.

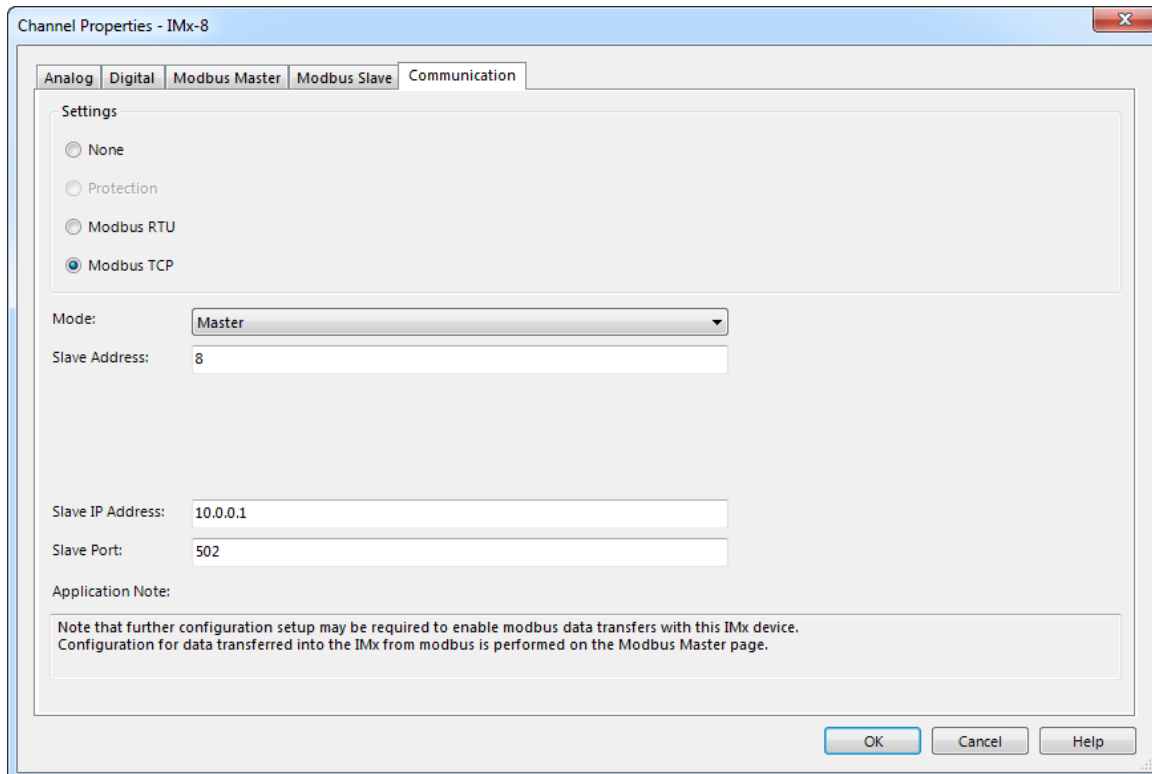


Figure 3 - 72.

The **Channel Properties** Screen's **Communication** Tab, Modbus TCP Master.

- Select **Master** as the **Mode** for Modbus communication.
 - When you set this IMx as a Modbus master, you can configure and enable virtual channels (via the **Modbus Master** tab) to support the following Modbus data transfers:
 - An external Modbus master writing data to this IMx (configured as a Modbus slave).
 - This IMx (configured as a Modbus master) reading data from an external Modbus slave.
 - This IMx (configured as a Modbus master) reading data from another IMx configured as a Modbus slave.
- Enter the **Slave Address** number of the Modbus Slave with which this Modbus Master will connect and communicate.

- The exact **Slave Address** number is to be entered when creating the Modbus Master to identify the Modbus Master-Slave pair.
- Enter the **Slave IP Address** of the Modbus Slave with which this Modbus Master will connect and communicate.
- Enter the **Slave Port** (the default is 502).
- Click **OK** to save the settings. The Channel Properties window closes.

To activate communication for IMx-8, IMx-S or IMx-T via a Modbus RTU protocol with the IMx configured as a Modbus slave:

- Select **Modbus RTU** to enable communication using the Modbus protocol.

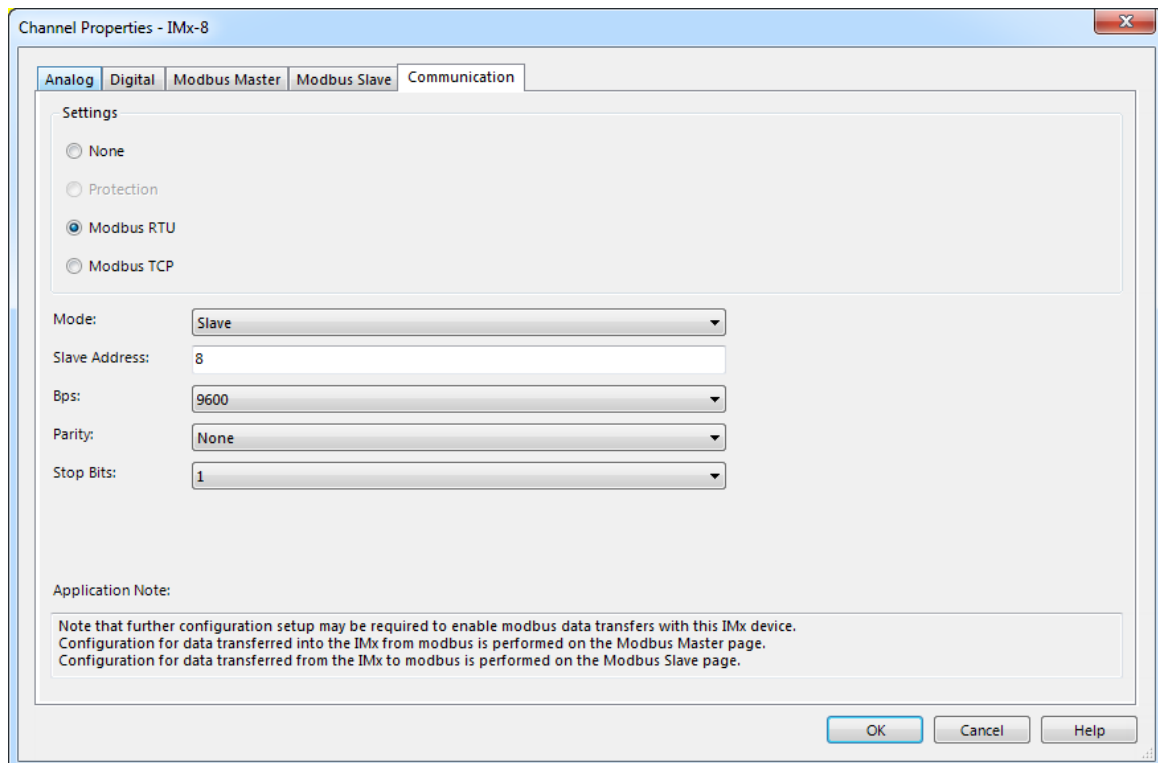


Figure 3 - 73.
The **Channel Properties** Screen's **Communication** Tab, Modbus RTU Slave.

- Select **Slave** as the **Mode** for Modbus communication.
 - When you set this IMx as a Modbus slave, you can configure and enable virtual channels (via the **Modbus Slave** tab) to support the following Modbus data transfers:
 - An external Modbus master reading data from this IMx (configured as a Modbus slave).
 - Another IMx configured as a Modbus master reading data from this IMx (configured as a Modbus slave).

- Enter the **Slave Address** matching the setup on your physical IMx that connects to the Modbus source. **Slave Address** becomes the Modbus address of this Slave. This Slave address number is the address with which the Modbus Master will connect and communicate.
 - This exact **Slave Address** number is to be entered when creating a Modbus Master if the Master will be communicating with this Slave and become a Modbus Master-Slave pair.
- Check that the other parameters – **Bps** (Bits per second, or Baud rate), **Parity**, **Stop Bits** – are set appropriately or modify as needed.

Bps defines the speed of Modbus, transfer rate in bps.

Parity can be set to None, Even or Odd.

Stop Bits defines the number of stop bits in use. It can be 1 or 2.
- Click **OK** to save the settings. The Channel Properties window closes.

To activate communication for IMx-8, IMx-S or IMx-T via a Modbus TCP protocol with the IMx configured as a Modbus slave:

- Select **Modbus TCP** to enable communication using the Modbus protocol.

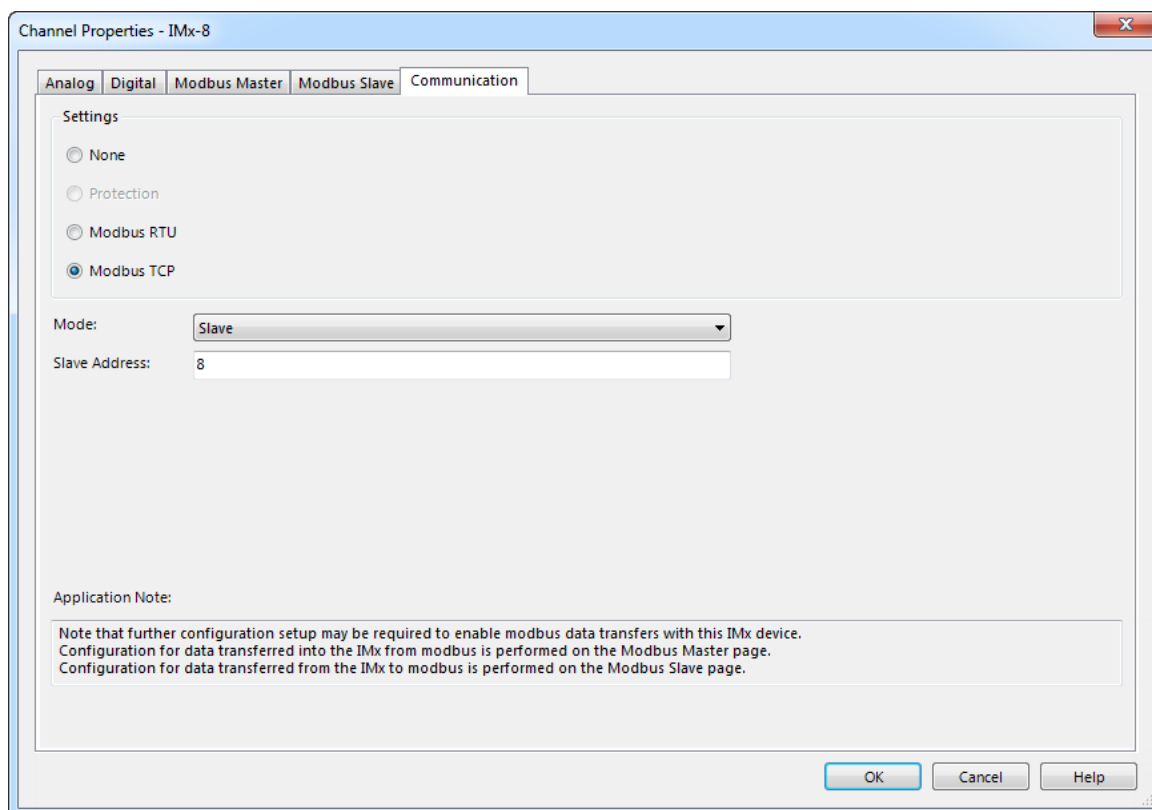


Figure 3 - 74.

The **Channel Properties** Screen's **Communication** Tab, Modbus TCP Slave.

- Select **Slave** as the **Mode** for Modbus communication.
 - When you set this IMx as a Modbus slave, you can configure and enable virtual channels (via the **Modbus Slave** tab) to support the following Modbus data transfers:
 - An external Modbus master reading data from this IMx (configured as a Modbus slave).
 - Another IMx configured as a Modbus master reading data from this IMx (configured as a Modbus slave).
- Enter the **Slave Address** matching the setup on your physical IMx that connects to the Modbus source. **Slave Address** becomes the Modbus address of this Slave. This Slave address number is the address with which the Modbus Master will connect and communicate.
 - This exact **Slave Address** number is to be entered when creating a Modbus Master if the Master will be communicating with this Slave and become a Modbus Master-Slave pair.
- Click **OK** to save the settings. The Channel Properties window closes.

With Modbus communication enabled and the Slave and Master pair configured, the next step is to set up the Modbus import and/or export properties for IMx-8, IMx-S and IMx-T units.

Modbus Import

On the **Modbus Master** tab, you can configure and enable virtual channels to support the following Modbus data transfers:

- An external Modbus master writing data to this IMx (configured as a Modbus slave).
- This IMx (configured as a Modbus master) reading data from an external Modbus slave.
- This IMx (configured as a Modbus master) reading data from another IMx configured as a Modbus slave.

Channel Properties - IMx-8

Modbus channels:

#	Name	Enabled	Zero Offset	Lower	Upper	Sensitivity	Regis...	Regis...	Data ...	Notes
1	Modbus Channel 1	Yes	0	0	50	655.34	1	Input	S16	
2	Modbus Channel 2	Yes	0	0	50	655.34	2	Input	S16	
3	Modbus Channel 3	Yes	0	0	50	655.34	3	Input	S16	
4	Modbus Channel 4	Yes	0	0	50	655.34	4	Input	S16	
5	Modbus Channel 5	Yes	0	0	0	0	5	Holdi...	S16	
6	Modbus Channel 6	No	0	0	0	0	6	Holdi...	S16	
7	Modbus Channel 7	No	0	0	0	0	7	Holdi...	S16	
8	Modbus Channel 8	No	0	0	0	0	8	Holdi...	S16	
9	Modbus Channel 9	No	0	0	0	0	9	Holdi...	S16	
10	Modbus Channel 10	No	0	0	0	0	10	Holdi...	S16	
11	Modbus Channel 11	No	0	0	0	0	11	Holdi...	S16	
12	Modbus Channel 12	No	0	0	0	0	12	Holdi...	S16	
13	Modbus Channel 13	No	0	0	0	0	13	Holdi...	S16	

Properties

Channel name: ☒ Channel enabled

Lower limit: Zero offset:

Upper limit:

Register number:

Register type:

Data type:

Sensor notes:

Copy Paste

OK Cancel Help

Figure 3 - 75.
Modbus Master Tab with **Channel Enabled**.

The summary table at the top displays existing Modbus channels and their properties.

- Select the channel you wish to edit from the Modbus channels list.
- Enter a unique **Channel name**.
- Click the **Channel enabled** checkbox to enable a channel on the IMx. If the channel is enabled, enter the following values.
 - In order to know which Lower limit, Upper limit and Zero offset values to configure, refer to the configuration of the Modbus device that will interface with the IMx, that is, the Programmable Logic Controller (PLC), Digital Control System (DCS) or sensors.
 - If the channel is disabled, the IMx skips the channel and points assigned to that channel during data collection.
- Enter the **Lower limit** value.
- Enter the **Upper limit** value.
- In **Zero offset**, enter a value to offset the zero point of the measurement.
- **Register number** – enter the register number from which the data will be read.
- **Register type** – select **Input** (read only) or **Holding** (read/write).
- **Data type** – select **S16** (16-bit signed integer value) or **Float**.
- In **Sensor notes**, type in any additional information you would like to store with the selected sensor settings.
 - When you start to edit a field in the **Properties** area, the **Save** and **Undo** buttons become available.
- When you have finished editing the channel properties, click **Save** to save your changes.
 - To cancel changes to the selected channel, click **Undo**.
- Use the **Copy / Paste** function to copy the selected channel's properties and paste them to another channel. Select a single channel and click the **Copy** button. The **Paste** button then becomes active. You can select a single channel as the target for the pasted channel properties, or use Shift+Click and Ctrl+click keyboard functions to select multiple items. Click **Paste**.
 - Channel name and sensor notes are not copied to other channels.
- Click **OK** to apply any changes and return to the **Online Settings** window.

Modbus Export

The Modbus export feature in SKF @ptitude Analyst applies to IMx-8, IMx-S and IMx-T only. It is supported by IMx firmware version 5.0 or later. If you are using an earlier IMx firmware version, some Modbus export features, such as the Filter Criteria and Assign All, will be unavailable in SKF @ptitude Analyst.

On the **Modbus Slave** tab, you can configure and enable virtual channels to support the following Modbus data transfers:

- An external Modbus master reading data from this IMx (configured as a Modbus slave).
- Another IMx configured as a Modbus master reading data from this IMx (configured as a Modbus slave).

The tab enables you to map @Analyst points to specific Modbus registers and save the desired configuration into the @Analyst database.

Channel Properties - IMx-8

Analog Digital Modbus Master Modbus Slave Communication

Modbus Exported Points:

Register No.	Channel No.	Point Type	Full Scale	Multi Chan	Floating Po...	Point
1	Analog Channel 1	Vibration	50 m/s^2	Yes	Yes	\Demo Database\IMx-8 (Master)\Vib (Ch1)
2						<Assigned to floating point>
3						<Unassigned>
4						<Unassigned>
5						<Unassigned>
6						<Unassigned>
7						<Unassigned>
8						<Unassigned>
9						<Unassigned>
10						<Unassigned>

Point Assignment

Exported point: \Demo Database\IMx-8 (Master)\Vib (Ch1)

Filter Criteria

Channel: <All Analog> Point type: <All>

Attributes

Register number: 1 Channel number: Analog Channel 1

Point type: Vibration Multi Channel:

Full scale range (-/+): 50 m/s^2 ☒ Floating point output

Assign all Unassign all Export CSV Import CSV Save Undo

OK Cancel Help

Figure 3 - 76.
Modbus Slave Tab.

The summary table at the top displays existing Modbus export configuration settings from the @Analyst database along with all known register assignments. If there are no existing Modbus register assignments, the Point column displays <Unassigned>. Each line shows information from a single record in the database table that associates a Modbus register with a specific point in @Analyst.

The critical action to take is to assign an **Exported point** to the selected **Register number**. You can use one of two methods to assign a point to the register number:

- The **Exported point** drop-down list with optional filter criteria
- The **Assign All** automated function

Both methods are presented below in detail.

Multi Channel – If the **Exported point** is a multi channel point, it will be identified as CH X or CH Y (2-channel point) or CH Z (3-channel point).

Full scale range (-/+) – enables you to enter a value for the full scale range of measurement values for the selected point. This range will be from the negative of the value entered to the value.

Floating point output – click the check box to enable/disable floating point format. Floating point representations are 32 bit numbers, which support a much wider range of values than fixed point.

With this format enabled, for every measurement a pair of registers is needed (that is, measurement 1 on registers 1 and 2, measurement 2 on registers 3 and 4, and so on). The point name is displayed in register 1 and register 2 displays <Assigned to floating point>.

- The floating point format is available with firmware version 6.0 or later.

Buttons

Save – Saves any modified configuration information from the lower edit fields to the summary table.

- It is the **OK** button rather than the **Save** button that saves the configuration data to the @ptitude Analyst database.

Undo – Discards any modifications made to configuration information in the lower edit fields and returns values to what they were before the modifications were made.

- When **Modbus Slave** first opens, the **Save** and **Undo** buttons are unavailable and appear dimmed. When you have made entries or edits in the fields, these buttons will activate.

At any time during the configuration process, you have the option to use the following buttons:

Assign all – assigns all exported points to a register automatically.

Unassign all – Clears all existing assignments from the summary table and sets all entries to <Unassigned>.

Export CSV – exports the summary table as a CSV file.

Import CSV – browse to a CSV file and import it into Analyst.

OK – Saves the Modbus export register configuration information shown in the summary table to the @ptitude Analyst database and closes the **Modbus Slave** tab.

Cancel – Discards any recent edits and closes the **Modbus Slave** tab.

Help – Opens help window providing guidance on how to use the **Modbus Slave** tab.

Method 1 – Assign an Exported Point with optional Filter Criteria

Follow the steps below to assign an export point. The filter criteria features are optional.

- Highlight a register in the summary table. The number selected for configuration is reflected in the **Register number** field in the **Attributes** section below.
- Use the **Exported point** drop-down arrow and select a point from the drop-down list.

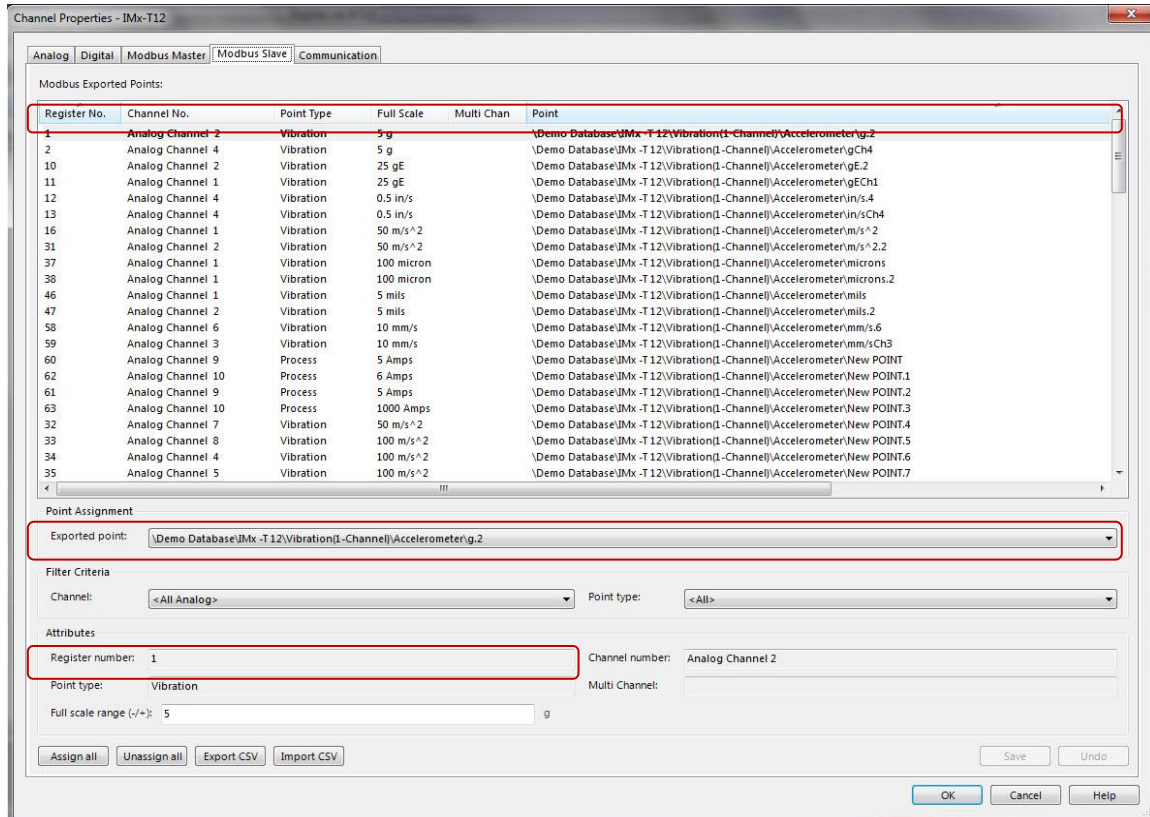


Figure 3 - 77.
Register Number and Exported Point.

All of the available points associated with the current IMx device in the Analyst database are displayed in the **Exported point** list unless you use the **Filter Criteria** to reduce the points displayed, as described below.

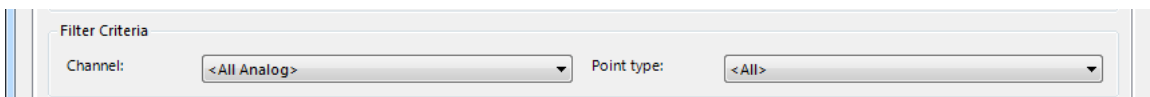


Figure 3 - 78.
Filter Criteria.

- To limit the exported point options to a specific channel number, click the **Channel** drop-down arrow and select the desired channel. Only points related to that channel will display in the **Exported point** options.

- To limit the point options to a specific type of point, click the **Point Type** drop-down arrow and select the type. Only points of the selected type will display in the **Exported point** options.
 - More than one filter criterion may be used to further reduce the number of available points listed in the **Exported point** options.

The **Attributes** section in the lower part of the page displays information about the selected **Exported point**.

Full scale range (-/+) enables you to enter a value for the full scale range of measurement values for the selected point. This range will be from the negative of the value entered to the value.

- Click **Save** to save your changes from the lower edit fields to the summary table.
- When you are satisfied with the resulting summary table, click **OK** to save the Modbus export register configuration information shown in the summary table to the @ptitude Analyst database and close the **Channel Properties** window.

Method 2 – Assign points by using the Assign All and optional CSV functions

Instead of selecting an exported point, you can use **Assign All**, an automatic assignment function. **Export CSV** and **Import CSV** are additional functions that work with **Assign All**. We'll describe how this works below.

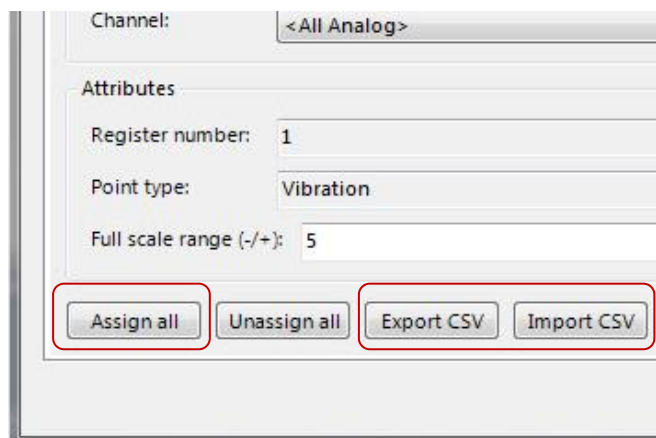


Figure 3 - 79.
Assign All, Export CSV, and Import CSV.

- If you click **Assign All**, an informational dialog warns you that continuing with automatic Modbus register assignment will clear all existing configuration information from the summary table.
- If you agree to **Continue**, the summary table is populated with Modbus register assignments with all supported IMx points found to be associated with the current IMx device configuration.

- The **Exported points** drop-down list will no longer display any points available for assignment.

You will probably want to establish the order of the register assignments and/or the assigned points. You can export the data into a CSV (comma separated values) format file. Then, open the file and reorder the assigned register numbers in another application, such as Microsoft Excel, that can facilitate this process.

- To export the summary table, click **Export CSV**. In the Windows dialog, specify the folder location and file name.
- Click **OK**. The Windows dialog closes and a CSV formatted file that contains the current Modbus register assignments is generated.
- After using the file to establish the register number/measurement POINT pairings you want, save the revised data in CSV format to import it.
- Click **Import CSV**. In the Windows dialog, browse to the updated CSV file and select it for import into SKF @ptitude Analyst.
- Click **OK**. The Windows dialog closes and the summary table is then updated with the imported Modbus export register configuration information.

Sensor Settings

- Select the **Customize** menu's **Online Settings** option.
- Select the **Sensor Settings** tab.

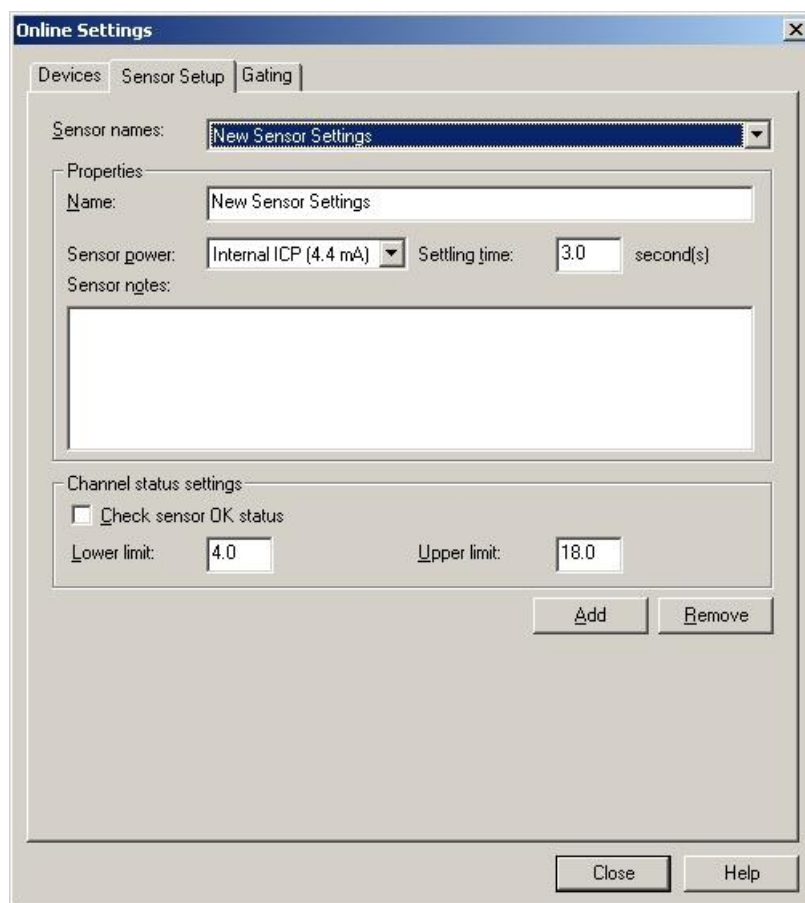


Figure 3 - 80.
The **Online Settings** Screen's **Sensor Setup** Tab.

All available sensors display in the **Sensor Names** drop down list. When a sensor from this list is selected, its entered **Properties** and **Settings** display in the tab's other fields.

To add a new sensor:

- Click the tab's **Add** button. By default, the name "New Sensor Settings.#" displays.

Fields include:

Name - Assign the new sensor a unique name by typing it in the **Name** field.

Sensor Power - Select the appropriate sensor power setting. Options include **Charge Converter**, **External Power**, and **Internal ICP (4.4 mA)**.

Settling Time - Type in the appropriate settling time in seconds.

Sensor Notes - Type in any additional information you would like to store with the selected sensor settings.

The **Channel status settings** area provides options relating to BOV gating.

Check Sensor OK Status – Click to enable this option. When enabled, @ptitude Analyst software will check the sensor status, and will display sensor status in **Device status** and **Online Data View** dialogs.

Lower Limit – Type in the BOV lower limit value.

Upper Limit – Type in the BOV upper limit value.

To remove a sensor:

- Select the sensor you wish to remove from the **Sensor Names** drop down list.
 - Only sensors without assigned POINTs can be removed.
- Click the **Remove** button.
- When prompted, confirm you wish to remove the selected device by clicking **Yes**.

Gating

- Select the **Customize** menu's **Online Settings** option.
- Select the **Gating** tab.

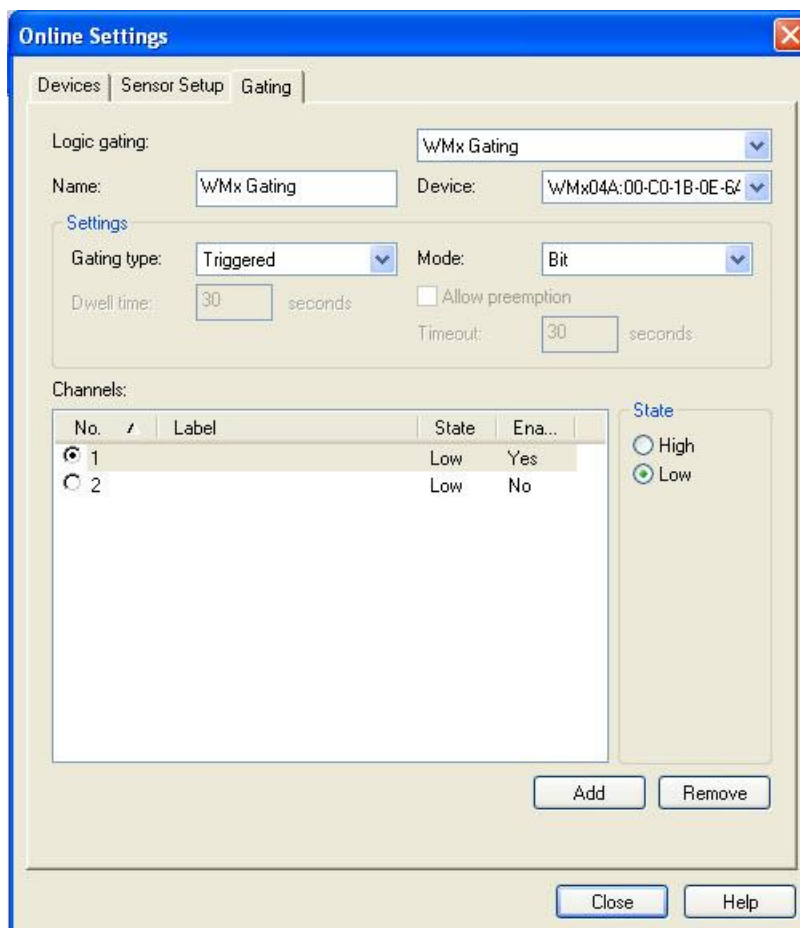


Figure 3 - 81.
The **Online Settings** Screen's **Gating** Tab.

Use this tab to configure shared gating definitions that can be assigned to POINTs on the **POINT Properties** screen's **Gating** tab.

- Reference the **Appendix C, Data Collection Gating** for more information about gating.

To add a new gating definition:

- Click the tab's **Add** button. By default, the name "New Logic Gating" displays.

Fields include:

Name – Assign the new sensor a unique name by typing it in the **Name** field.

Device – Select the device to apply the gating definition to.

Gating Type – Specify the gating type.

- Gating type is always **Triggered** for WMx devices.

Mode – Specify the mode to define the gating conditions that control when data is collected.

Dwell Time – (preemptive POINTs only) Specify how many seconds the POINT must wait to collect data in order to allow for another preemptive POINT to collect data if its condition occurs.

Allow preemption – Enables a timeout to occur for a preemptive POINT.

Timeout value – Specify how many seconds a POINT will wait for the specified condition to occur before moving on to the next POINT.

Channels – This section works with the **State** option buttons to configure whether a high or low setting must be present on specified channel(s) for data to be collected. (See **State** below for details.) The box lists all channels available on the device. Selection of channels varies depending on your choice in the **Mode** field.

If **Bit** is selected in the **Mode** field, the list displays option buttons. Select the single channel you would like to configure and set the state using the **State** option buttons.

If **Byte** is selected in the **Mode** field, all channels are used in gating. Highlight each channel in turn and set the state using the **State** option buttons, or double click to toggle the state.

If **Combination** is selected in the **Mode** field, the list displays check boxes. Select any combination of channels to use with gating and set the state using the **State** option buttons.

State – Specify whether a **High** or **Low** (on/off) setting must be present for data to be collected.

To remove a device:

- Select the gating definition you wish to remove from the **Logic Gating** drop down list.
 - Only gating definitions without assigned POINTs can be removed.

- Click the **Remove** button.
- When prompted, confirm you wish to remove the selected device by clicking **Yes**.

Alarm Settings

Use the **Alarm Settings** to create alarms that can be assigned to one or more POINTs. Created alarms can be re-assigned and edited.

Setting Alarms – Overview

By setting alarms on your vibration measurements, the hierarchy's alarm status indicators allow you to quickly know if any of your monitored components / machines moved into an alarm condition. If you do not specify measurement alarm settings, overall vibration level alarms are set to factory defaults.

@ptitude Analyst offers many ways to alarm on machinery vibration levels:

- Overall vibration alarms
- Spectral enveloping (narrow band) alarms
- Spectral band alarms
- Phase alarms

Of the above, overall vibration alarms are, by far, the most frequently used alarm type for detection of machinery faults. Overall vibration is the total vibration energy measured within a specific frequency range. Measured numerically, a higher than normal overall value provides an indication that "something" is causing the machine or component to vibrate more. Below we describe how to go about setting your initial overall vibration alarm levels. However, the same logic may be used to set alarm levels for other types of alarms.

If yours is a new system and no vibration measurement history exists for the monitored machinery, the ISO 10816-1 Standard provides guidance for evaluating overall velocity vibration measurement severity in machines operating in the 10 to 200 Hz (600 to 12,000 RPM) frequency range. Examples of these types of machines are small, direct coupled, electric motors and pumps, production motors, medium motors, generators, steam and gas turbines, turbo compressors, turbo pumps and fans.

It is possible for a machine to be in the early stages of wear or damage and still meet the criteria in these ISO 10816-1 guidelines. While the Standard can provide a quick indication of machines that are in serious trouble; long term overall vibration level trending and experience with a machine's history provide much more accurate information on where to set your machinery vibration alarm levels.

Once you have collected enough measurement data (e.g., six data sets), SKF @ptitude Analyst can display meaningful trends of each measurement's data. Over time, when you are convinced that the measurement's trending vibration level indicates the component's known good condition, you may designate it as the measurement's "baseline" vibration level, upon which you set two overall vibration alarm levels for detection of machinery faults, the "alert" level and the "danger" level. Where to set these two overall alarm levels is the question.

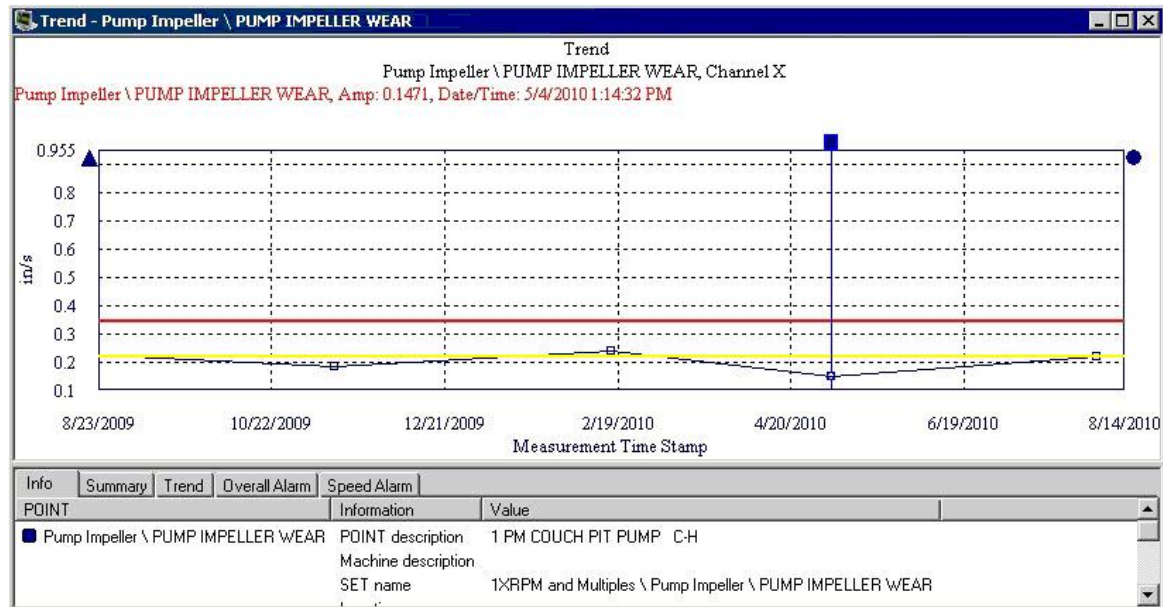


Figure 3 - 82.
Example Trend Plot with Alert (Yellow) and Danger (Red) Alarm Levels.

In general, it is most desirable to specify alert alarm settings high enough to minimize extraneous alarms, yet conservative enough to not miss a critical excursion in machine condition. In addition, initially you should set “loose” alarm levels so as to avoid false alarms. False alarms significantly degrade confidence in the condition monitoring system’s accuracy. Over time, as you continue to better understand your machinery’s vibration levels and gain confidence in the accuracy of your vibration measurements, you may “tighten” the initial alarm levels to acquire earlier detection of machine faults.

A general rule of thumb is to initially set alert alarm levels at one and a half to twice the baseline levels for measurements. This “alert” alarm level should indicate that a problem has developed and more frequent monitoring and analysis should occur. Fault analysis should be initiated and the severity and root cause of the problem should be established. In addition, analysis results should determine whether necessary repair parts are ordered, and the date for repair should be established based on minimum production interruption.

The initial “danger” level alarm is typically set from two and a half to three times the baseline vibration level. In general, if the danger alarm is reached on a critical machine, it should be scheduled for repairs as soon as possible. Again, over time, after more experience with said machine and your vibration measurements, the alarm level can be adjusted to better fit the specific component / machine.

On bearing measurements, an accurate enveloped acceleration measurement alert alarm indicates that a bearing is approaching the end of its usable lifetime. Upon such an alarm, you should more closely monitor the bearing using spectrum analysis with bearing fault frequency markers to verify the bearing fault and determine proactive maintenance measures, or to plan the most efficient bearing replacement during a scheduled machine outage.

Once a good operating baseline is established and sufficient data and experience have been acquired for you to set your initial alert and danger overall vibration alarm levels,

SKF @ptitude Analyst provides a *Statistical Overall Alarms Wizard* that guides you through a process that automatically generates overall alarm settings based upon historical measurement data (reference the **Statistical Alarms Wizard** section earlier in this chapter for details).

To access the Alarm Settings screen:

- Select the **Customize** menu's **Alarm Settings** option. The **Alarm Settings** screen displays.

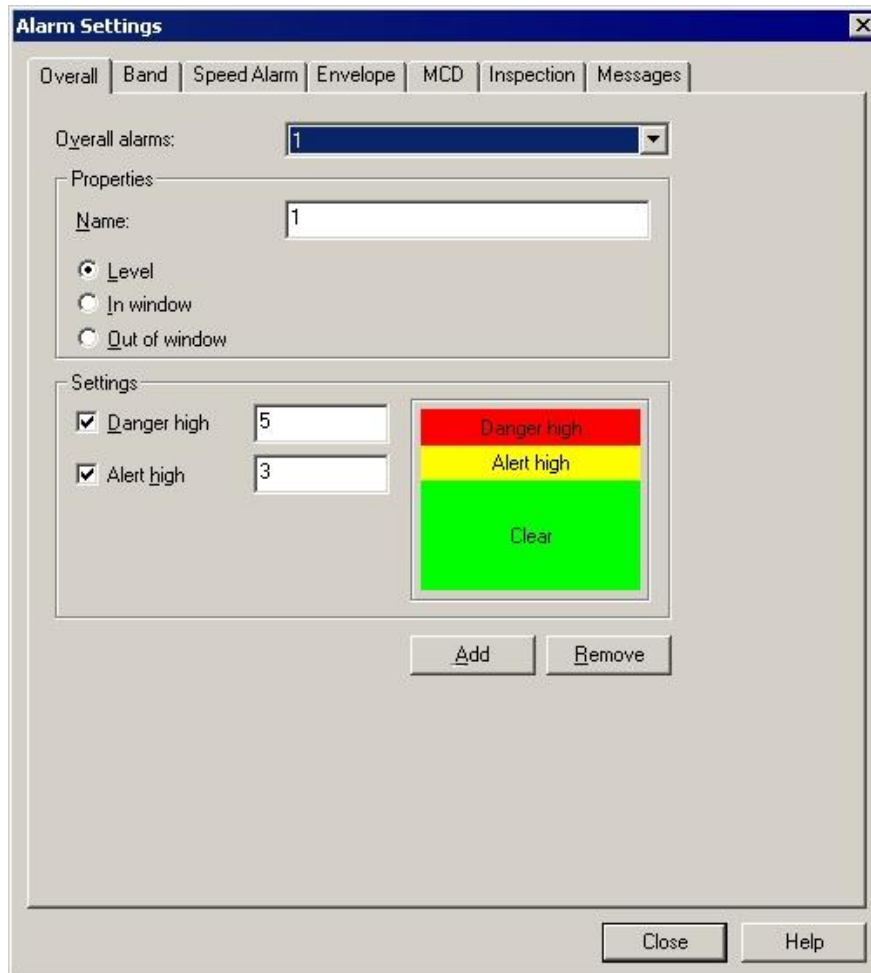


Figure 3 - 83.
The **Alarm Settings** Screen's **Overall** Tab.

Alarm Settings - Overall

Existing alarms may be edited or removed from the database. The **Overall** tab allows you to create, edit, or remove shared Overall alarms.

To create a new alarm:

- Click the tab's **Add** button. The **Overall alarms** field displays "**New Overall Alarm**" to indicate that you have created a new alarm.
- In the **Name** field, assign the new alarm a unique name.

- Once the editing process begins, the **Overall alarms** field is no longer accessible. You must complete and **Save** your edits or cancel them by clicking the **Undo** button.
- Click **Save**. The **Overall alarms** field now displays the new alarm name you specified.

You can also adjust the alarm's **Properties** and **Settings** in this tab. The current settings graphically display in the tab's **Settings** area.

To edit or create Overall Alarm Properties and Settings:

Properties – Select the type of Overall Alarm by clicking the desired option button.
Choose from:

Level - Measurements *exceeding* the specified alert and danger **Settings** will result in an alarm condition.

In Window - Measurements *falling within* the specified alert low, danger, and alert high **Settings** will result in an alarm condition.

Out Of Window - Measurements *falling outside* the specified danger low, alert low, alert high, and danger high **Settings** will result in an alarm condition.

Settings – Select the levels you wish to include by clicking each checkbox.

- The availability of the levels, their checkboxes, and their text fields is based on the type of Overall Alarm selected in the **Properties** area.
- Enter the desired values for each available alarm level.
- Click the **Save** button to save your alarm settings.

To remove an existing alarm from the database:

- Select the desired alarm from the drop down list.
- Click the **Remove** button. A confirmation dialog displays.
- Confirm removal. The selected alarm is permanently removed from the database.
 - An alarm cannot be removed if it is currently assigned to one or more POINT. A warning dialog displays if you attempt to remove a currently assigned alarm.

Alarm Settings – Band

Band Alarms provide alert and danger alarms on both peak and spectral values within a defined frequency band. Use the **Band** tab to edit and/or specify POINTs' bands and to manage shared band alarms.

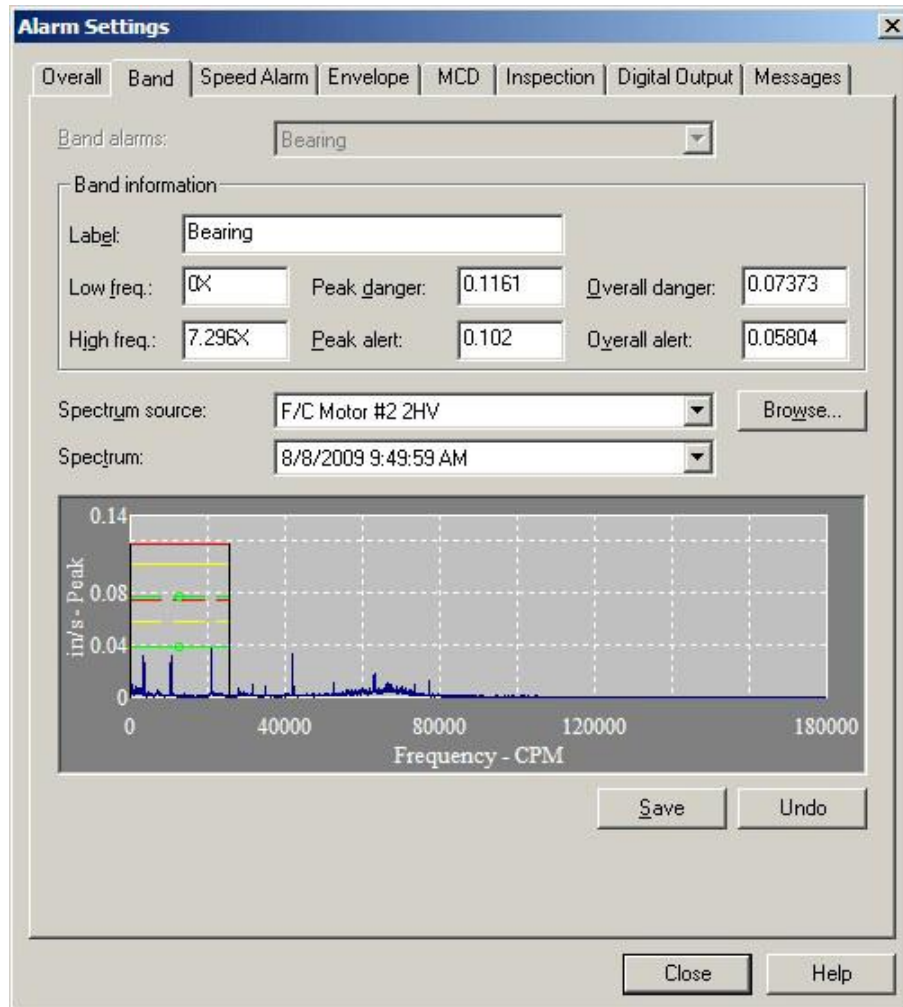


Figure 3 - 84.
The **Alarm Settings** Screen's **Band** Tab.

Band alarms – Displays the current band alarm. All available band alarms list in the drop down list.

Band information – Edit and view alarm values.

The following fields are available for viewing set values or editing:

Label – Displays the band name.

Low freq – View or edit the low frequency value or multiple of running speed.

High freq – View or edit the high frequency value or multiple of running speed.

- To make the value a multiple of running speed, add an "x" to the end of the entered number. For example, enter "1.5x" for 1.5 times running speed.

Peak danger – View or edit the peak danger value or % Full Scale value.

Peak alert – View or edit the peak alert danger value or % Full Scale value.

Overall danger – View or edit the overall danger value or % Full Scale value.

Overall alert – View or edit the overall alert value or % Full Scale value.

- To make the value a percentage of the full scale, add a "%" to the end of the entered number. For example, enter "10%" for 10 percent of the full scale value at the time the band is used.
- The tab's spectrum graphic display automatically updates as edits are made.

The **Spectrum source** field displays the source of the spectrum if two or more POINTs are currently active.

The **Spectrum** field displays all available spectra for the active POINT in a drop down list. The current spectrum displays graphically below.

- The tab's spectrum graphic display automatically updates as edits are made

Browse – Click to select a POINT to use as the source of the spectrum readings viewed while editing the band alarm. The **POINT Selection** dialog displays. Select a POINT to use to define a shared alarm. The hierarchy displays. Select the desired POINT and click **OK**.

- Bands defined in the **Alarm Database** are **not** assigned to the POINTs used to create them.

Edits may be made on the tab's spectrum graphic display.

To edit the band graphically:

- Click on the portions of the graphic band to edit. Notice the mouse cursor changes when over a portion of the band.
- Drag the band piece to a new position. The value in the edit field updates.
 - When editing, you may **Save** or **Undo** changes for the current alarm.
- Click **Add** to create a new band alarm.
- Click **Remove** to remove the current band alarm. A confirmation dialog displays.
- Confirm action. The band alarm is deleted.
 - A band alarm may not be removed if it is currently assigned.

Alarm Settings – Speed Alarm

Speed alarms allow you to customize overall and band alarm levels based on machine speed. Use the **Speed Alarm** tab to edit and/or specify the POINTs' alarm adjustments for each speed region.

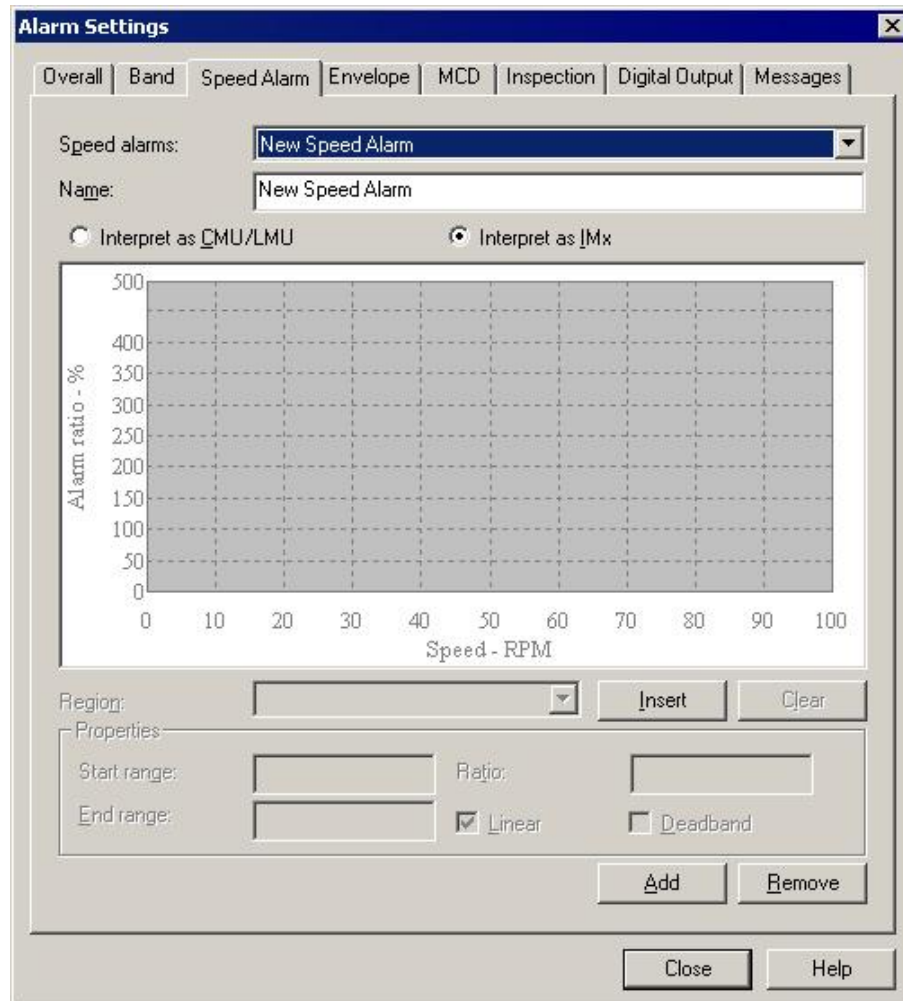


Figure 3 - 85.
The Alarm Settings / Speed Alarm Tab.

Speed alarm – Displays the current speed alarm. All available speed alarms list in the drop down list.

Name – Displays the speed alarm name.

Interpret as IMx – Select to display a preview of the speed alarm as it is interpreted for an IMx POINT.

- Interpretation is for display purposes only. **Point Properties / Setup** not affected by this setting.

Range – Select the speed regions for which the **Properties** settings will apply. You may select the region from the **Range** drop down list, or by clicking on the specific region on the speed alarm display. The values in the **Properties** fields update to reflect the specified speed region.

- Click **Insert** to add a new region to the speed alarm.
- Click **Clear** to remove the selected speed region.

Properties – Edit and view alarm values.

The following fields are available for viewing set values or editing:

Start / End Range – Enter each region's starting and stopping RPMs (i.e., 0 to 1000, 1000 to 2000, 2000 to 3000, etc.).

Ratio – Enter the adjustment to overall and band alarm levels. The normal running speed region's ratio will be 100. If the next higher speed range is expected to produce vibration levels 10% higher than the nominal running speed, then the next speed range ratio would be set to 110.

Linear – This option allows for either a flat, rectangular definition of the adjustment (if disabled, the entire region will have the same ratio), or a more linear definition of the ratio (if enabled, the ratio will start from the level defined in the previous speed region and rise throughout the region until it reaches the next speed region's level).

- IMx POINTs always use linear region.

Deadband – When enabled, no alarm processing will occur for this region. This is mainly to be used when the machine reaches its resonant speed, at which vibration will be indeterminately high. When enabled, **Ratio** and **Linear** fields are disabled.

- The tab's spectrum graphic display automatically updates as edits are made.
- IMx does not support deadband; however, @ptitude Analyst supports deadband for IMx POINTs in post-processing.
- Click **Add** to create a new speed alarm.
- Click **Remove** to remove the current speed alarm. A confirmation dialog displays.
- Confirm action. The speed alarm is deleted.
 - A speed alarm may not be removed if it is currently assigned.

Alarm Settings – Envelope

Use the **Envelope** tab to manage and edit shared envelope alarms. All available envelope alarms display in the **Envelope alarms** drop down list.

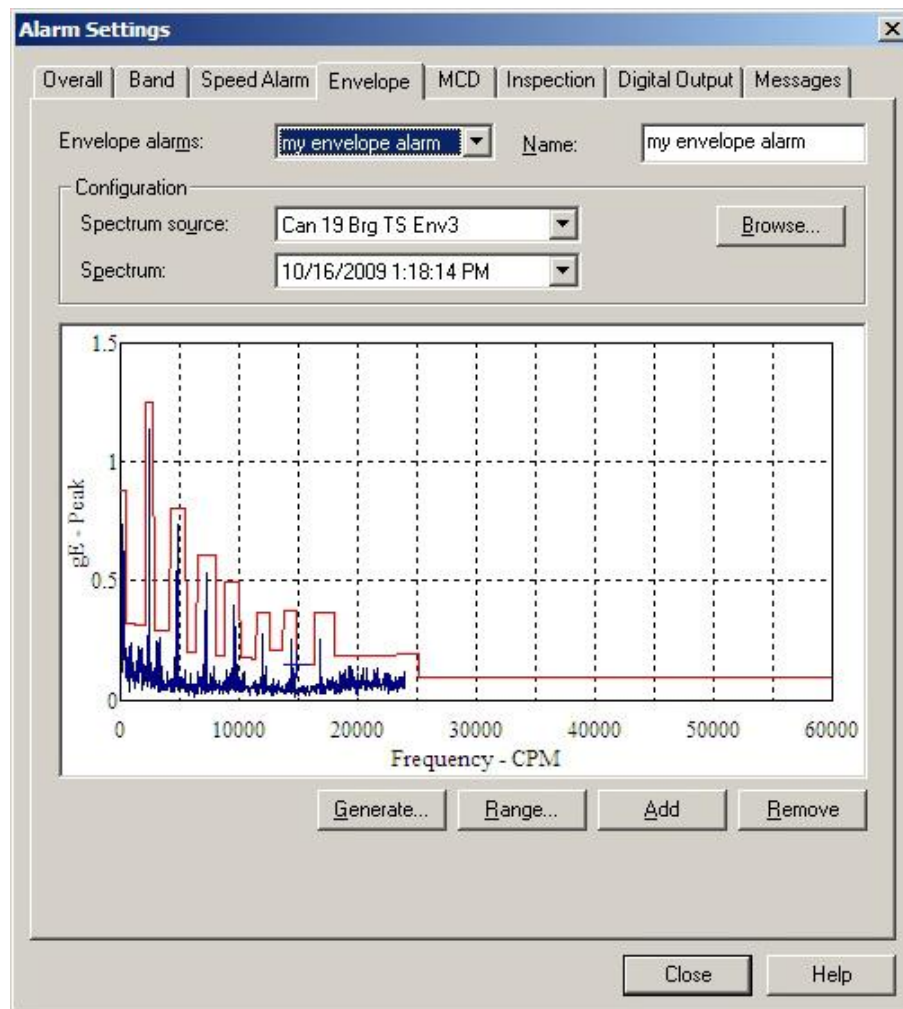


Figure 3 - 86.
The **Alarm Settings** Screen's **Envelope** Tab.

All available envelope **alarms** display in the Envelope alarm drop down list, or you may generate a new envelope alarm.

Shared envelope alarms may not be edited from this tab (use the Customize menu's Alarm Database option to edit "shared" alarm parameters).

- First, select the FFT spectrum to which the envelope alarm will conform, using:

Spectrum source – specifies from which POINT to graphically display the spectrum if two or more POINTs are currently active.

Spectrum – displays all available time record measurements for the active POINT (typically the baseline measurement) in a drop down list. The current spectrum displays graphically below.

To assign a "shared" envelope alarm to the POINT:

- On the **Envelope** tab, select the desired shared envelope alarm's name from the **Envelope Alarms** drop down list, the tab fields display the specified alarm's settings and the specified envelope appears on the displayed spectrum.

To generate a new envelope alarm for the POINT:

- Select the **Envelope Alarms** drop down list's **<Custom envelope>** option.
- Click the **Generate** button. The **Generate Envelope Alarm** dialog displays.

Use the **Generate Envelope Alarm** Dialog to create an envelope alarm based on your entered values.

% Overdrive – Enter the percent of the POINT's full scale value to determine the height of the envelope alarm above the spectral peak. The smaller the number specified, the tighter the comparison envelope conforms to the designated spectrum.

Spreading % – Enter percent of full scale (or center frequency) to increase the width of the envelope alarm around spectral peaks. The smaller the number specified, the tighter the envelope conforms to the sides of the peaks in the specified spectrum.

Spreading Type – (either **Center Frequency** or **Full Scale**). If **Center Freq.** is selected, the bandwidth about each center frequency increases with higher frequencies. If **Full Scale** is selected, the bandwidth about each center frequency is constant, based on a percent of the full scale frequency.

Threshold – Enter % of the POINT's full scale value, or an absolute value. The threshold value provides an opportunity to eliminate false alarms due to vibration "noise." It also establishes the envelope alarm's low amplitude "threshold" on the displayed spectrum. The envelope alarm conforms around all peaks whose amplitudes are higher than the established threshold as per the **Overdrive %**, **Spreading %**, and **Spreading Type** settings. All peaks below the established threshold are ignored by the envelope alarm. The **Threshold %** default value is set using the **Customize** menu's **Preferences / Plot** tab.

- Click **OK** to generate an envelope alarm based on your entries. Click **Cancel** to close the dialog without creating an envelope alarm.

Editing the Envelope Alarm

After you have generated an envelope alarm, you can edit it graphically using your mouse, or enter numeric envelope parameters using the **Set Frequency Range** dialog.

To graphically edit the envelope alarm:

- Click anywhere inside the **Envelope** tab's spectrum window. The cursor appears as an up arrow.
- Click the mouse on the portion of the envelope alarm line to be edited. A square icon identifies where the line will be drawn.
- Drag the mouse to draw the line to create the new envelope alarm.
- Click the tab's **OK** button to save your changes.

Tip - You can use your keyboard's **Insert** key to begin drawing the envelope alarm line. Then, use the arrow keys to move the line, and the **Insert** key again to stop drawing the line. Refer to **Appendix B, SKF @ptitude Analyst Keyboard Support** of the accompanying Introduction manual for more information on using your keyboard to edit your envelope alarm.

To edit the envelope alarm using numeric frequency ranges:

- Click the **Set Range** button. The **Set Frequency Range** dialog displays.
- Use the **Set Frequency Range** dialog to enter low frequency, high frequency, and level values to edit an existing envelope alarm.

To numerically edit an envelope alarm:

- Enter the desired low frequency, high frequency, and level value.
- Click **OK**. The displayed envelope alarm automatically conforms to your entries.

Alarm Settings – Alarm Group

Alarm groups allow you to group POINTs together. Use the **Alarm Group** tab to create new alarm groups.

- POINTs are added to an alarm group from the **Point Properties / IMx Setup** tab.

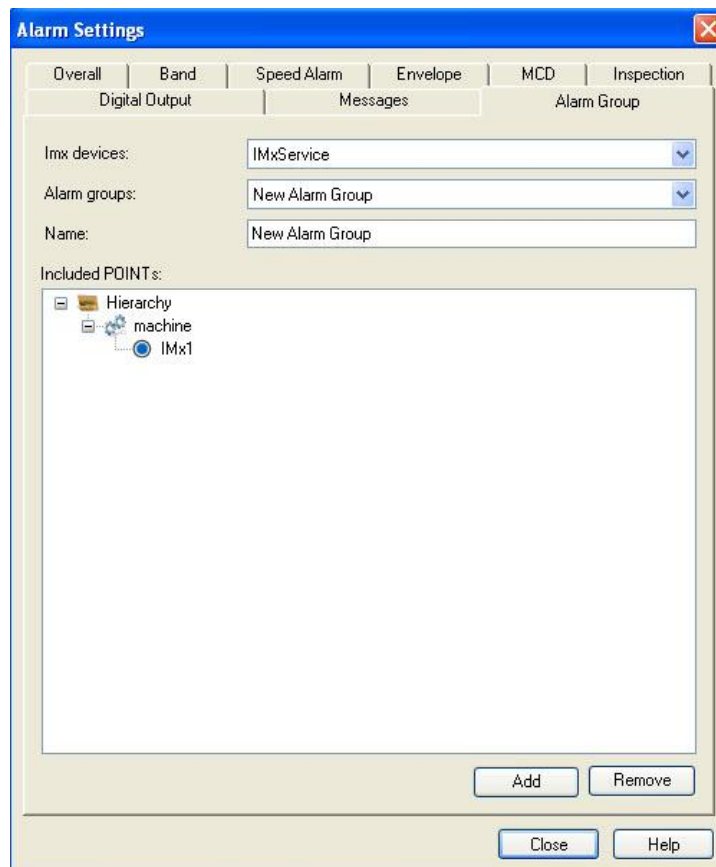


Figure 3 - 87.
The **Alarm Settings** Screen's **Alarm Group** Tab.

To create a new alarm group:

- Select an **IMx device** from the drop-down list.
- Click the **Add** button and enter a name for the alarm group in the **Name** text entry box.

For existing alarm groups, you may view the POINTs that have been added to the alarm group in the **Included POINTs** area. This is a read-only field. To add or remove POINTs from the alarm group, you must edit the POINT's properties on the **POINT Properties / IMx Setup** tab.

To remove an alarm group:

- Select the alarm group you wish to remove from the **Alarm Groups** drop-down list.
 - If POINTs are included in this alarm group you must first remove them by editing the POINT's properties on the **POINT Properties / IMx Setup** tab.
- Click the **Remove** button.

Messages

Use the **Customize / Alarm Settings** screen's **Messages** tab to create shared (public) alarm messages to assign to machines and POINTs to automatically display important alarm information.

All previously defined alarm messages appear in the **Alarm messages** drop down list.

To create a public Message:

- Select the **Customize** menu's **Alarm Settings** option. The **Alarm Settings** screen displays.
- Select the **Messages** tab.
- Click the **Messages** tab's **Add** button. The tab enters edit mode.
- Specify appropriate information into the following fields:

Name – Specify a name to define your custom message.

Format – Select the message format from the drop down list. Available options include:

Free form – Allows you to manually type in the summary and content for your message.

Summary – Type in text summarizing your alarm message for easy recognition. For example, if you have an alarm message that details shut down instructions in the case of an overall danger high alarm level, your summary may read, "Emergency Shut Down Instructions."

Content – Enter your complete alarm message in the content text area. Using the above example, your alarm message content would include detailed shut down instructions, and any other pertinent information required in the case of the triggered alarm type.

- Click the **Save** button to save the new message and add it to the available public messages.
- Click the **Undo** button to undo changes.
- Click **Remove** to remove the current message.
 - Messages currently in use cannot be removed.

Statistical Overall Alarms Wizard

Overview

For POINTs in a **Workspace** window, the **Statistical Overall Alarms Wizard** guides you through a process that automatically generates overall alarm settings based upon historical measurement data.

- The Statistical Overall Alarms Wizard only operates on an active Workspace window.

To initiate the wizard:

- Open the desired Workspace window.
- Select the **Customize** menu's **Alarm Attributes / Statistical Overall...** option. The wizard's Introduction screen displays.

Introduction

The **Introduction** screen is the first screen in the **Statistical Overall Alarms Wizard**. The measurement data used to generate the alarm values is generated from the POINTs included in the selected Workspace (identified in the **Workspace** field).

- From the **Workspace** drop down list, select the Workspace containing POINTs for which you would like to generate the alarm values.
- From the **Full scale units** drop down list, select a measurement unit. The **Full scale units** drop down list displays a list of the full scale units for POINTs in the selected workspace. Only POINTs with the selected measurement unit are used to generate alarm values.
- Click the Save processing details to "Statistical Overall Alarms.log" check box to create and save a log file.
- Click **Next** to continue.

Alarm Assignment

Select the calculation method to use to determine alarm values.

Individual POINTs – Select to use each POINT's readings to generate a unique set of alarm values for the POINT. The resulting values are assigned to each POINT as a *private* alarm.

- This operation generates and assigns a private alarm for **each** POINT.

Across all POINTs – Select to use the readings for all the POINTs to generate one set of alarm values that is assigned to each POINT included in the calculation. The resulting values are saved as a *shared* alarm.

- If **Across all POINTs** is selected, a **Review** window displays before alarms are applied, allowing verification and confirmation.
- Click **Next** to continue.

- Click **Back** to return to the previous screen.
- Click **Cancel** to exit the wizard.

Measurement Selection

Determine the method for selecting the measurement data to generate overall alarm values.

All measurements – Select to use all measurement data to generate the overall alarm values.

Measurements in this date range – Select and enter a date range to use all measurements in the indicated date range to generate the overall alarm values.

Last fixed number of measurements – Select and enter number of measurements to use the specified number of measurements to generate overall alarm values.

Limits – Allow you to filter abnormal measurements from the calculation:

Max. Amplitude – Enter the maximum amplitude of the overall value to include in calculation.

Min. Amplitude – Enter the minimum amplitude of the overall value to include in calculation.

Min Measurements – Enter the minimum number of the POINT's measurements to be included in calculation.

- Only POINTs that have the number of indicated minimum measurements (or more) are included in the calculation.
- Min. Measurements field is not available if measurement selection is "**Last fixed number of measurements.**"

Channel – Enter the channel number of multi-channel POINTs to include in the calculation.

Enable outlier removal – An "outlier" refers to data that is not typical, or is outside a specified data measurement range. When the **Enable outlier removal** check box is enabled, measurement values that fall outside the outlier range are excluded from the calculation.

- Outlier detection only occurs if the number of measurements is greater than or equal to the **Min Measurements** specification.

Outlier threshold factor – Enter a threshold factor (1.0 to 5.0) to calculate the lower and upper limits of the outlier range (outlier threshold). The threshold factor is multiplied by the standard deviation to calculate the outlier threshold. The default threshold factor is 3.0.

- Click **Next** to continue.
- Click **Back** to return to the previous screen.
- Click **Cancel** to exit the wizard.

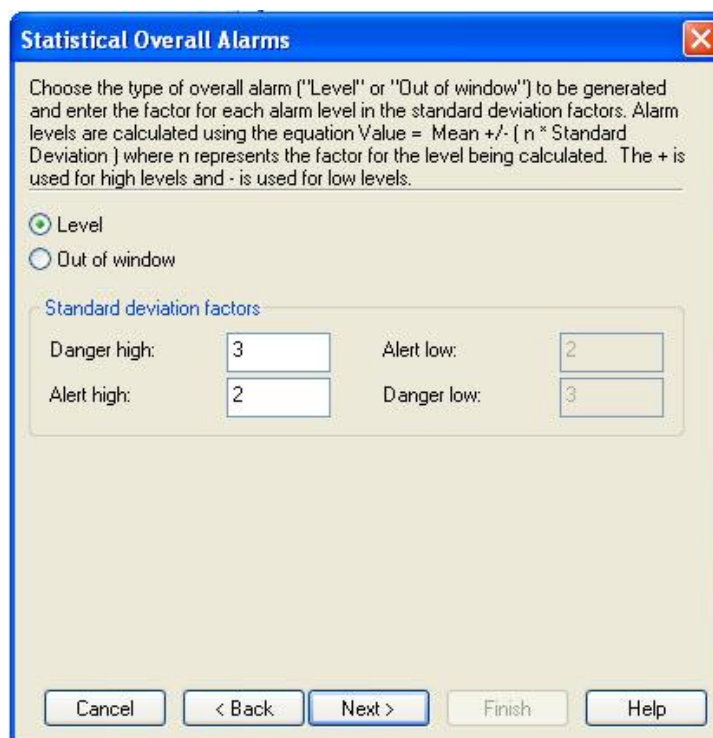
Alarm Type

Select the type of overall alarm to generate:

Level – Provides two alarm levels (**Alert High** and **Danger High**). An appropriate alarm registers if the measured value is greater than either of the alarm levels.

Out of Window – Provides four alarm levels (**Danger High, Alert High, Alert Low, Danger Low**). An appropriate alarm registers if the measured value progresses out of the alarm window (does not fall between the alert high and alert low alarm settings).

Generation Parameters



The image shows a Windows-style dialog box titled "Statistical Overall Alarms". It contains a text box with instructions: "Choose the type of overall alarm ('Level' or 'Out of window') to be generated and enter the factor for each alarm level in the standard deviation factors. Alarm levels are calculated using the equation Value = Mean +/- (n * Standard Deviation) where n represents the factor for the level being calculated. The + is used for high levels and - is used for low levels." Below this, there are two radio buttons: "Level" (selected) and "Out of window". Under the heading "Standard deviation factors", there are four input fields: "Danger high:" with value 3, "Alert low:" with value 2, "Alert high:" with value 2, and "Danger low:" with value 3. At the bottom, there are five buttons: "Cancel", "< Back", "Next >", "Finish", and "Help".

Figure 3 - 88.

The **Statistical Overall Alarms Wizard's** Generation Parameters Screen.

Note that you need not perform the standard deviation math. The wizard's default values have been selected to produce overall alarms that work well for most situations. However, if you wish to conform the overall alarms closer, enter smaller numbers. To conform the overall alarms further away, enter higher numbers. After completing the wizard, view your trend plots and make adjustments as necessary.

- If necessary, edit the standard deviation information to be used in the overall alarm calculations.

Standard deviation factors

Danger High – Value to be multiplied by the standard deviation to establish the danger high level.

Alert High - Value to be multiplied by the standard deviation to establish the alert high level.

Alert Low – Value to be multiplied by the standard deviation to establish the alert low level.

Danger Low – Value to be multiplied by the standard deviation to establish the danger low level.

- Click **Next** to continue.
- Click **Back** to return to the previous screen.
- Click **Cancel** to exit the wizard.

Minimum Alarm Values

Set the minimum alarm values to be used in the calculation. If the standard deviation is small, the minimum alarm values allow you to set a wider range, minimizing the chance for bad alarms to occur.

Enter the minimum values for **Danger High**, **Alert High**, **Alert Low**, and **Danger Low**.

- Click **Next** to continue.
- Click **Back** to return to the previous screen.
- Click **Cancel** to exit the wizard.

Process

Click the **Next** button to begin the overall alarm calculations. Process progress displays along with the number of POINTs processed.

- Click **Next** to continue.
- Click **Back** to return to the previous screen.
- Click **Cancel** to exit the wizard.

Review

- This screen only displays if **Across all POINTs** was selected on the wizard's **Alarm Assignment** screen.

Statistical Overall Alarms

The statistically derived overall alarm results from the calculation are specified below. You can manually alter these numbers, if desired.

Alarm set name: SDA 4/3/2008 10:13:15 AM

Calculated alarm values:

☒ Danger high: 0.6029 ☐ Alert low:

☒ Alert high: 0.443 ☐ Danger low:

POINTs processed for input criteria:

POINTs included: 13 POINTs excluded: 17

Cancel < Back Next > Finish Help

Figure 3 - 89.

The **Statistical Overall Alarms Wizard**'s Review Screen.

The statistically derived overall alarm results display on this screen. These numbers may be edited, if necessary.

Fields include:

Alarm set name – Specify a unique name for the alarm.

Calculated alarm values – Edit values as needed.

- **Calculated alarm values** fields are available based on overall alarm type selection.

POINTs processed for input criteria – Number of POINTs selected as candidates for processing.

POINTs included – Number of included POINTs.

POINTs excluded – Number of excluded POINTs.

- Alarms are still applied to the POINTs excluded from calculation functions.
- Click **Next** to continue.
- Click **Back** to return to the previous screen.
- Click **Cancel** to exit the wizard.

Finish

- Click the **Finish** button to assign the statistically derived overall alarm to all POINTs in the specified workspace. Process progress displays on the screen.
- Click **Back** to return to the previous screen.
- Click **Cancel** to stop the operation without changing the POINTs.

Statistical Band Alarms Wizard

Overview

For POINTs in a **Workspace** window, the **Statistical Band Alarms Wizard** guides you through a process that automatically generates band alarm settings based upon historical measurement data.

- The Statistical Band Alarms Wizard only operates on an active Workspace window—not on a Route.

To initiate the wizard:

- Select the **Customize** menu's **Alarm Attributes / Statistical Band** option. The wizard's first screen displays.

To complete the wizard:

- On each screen, enter values and select options as appropriate.
- Click **Next** to proceed to the next screen.
 - Alternatively, you can click **Back** to return to the previous screen or **Cancel** to exit the wizard.

Choose a Workspace

Choose a Workspace is the first screen you encounter in the **Statistical Band Alarms Wizard**. On this screen, you select the Workspace for which you intend to create band alarms. The measurement data used to generate the alarm values come from the applicable POINTs within the **Workspace** you select.

- The POINTs must have an existing band alarm setup that specifies the spectra frequency range for the new alarm levels. If no band alarm exists, the wizard will have nothing to calculate.

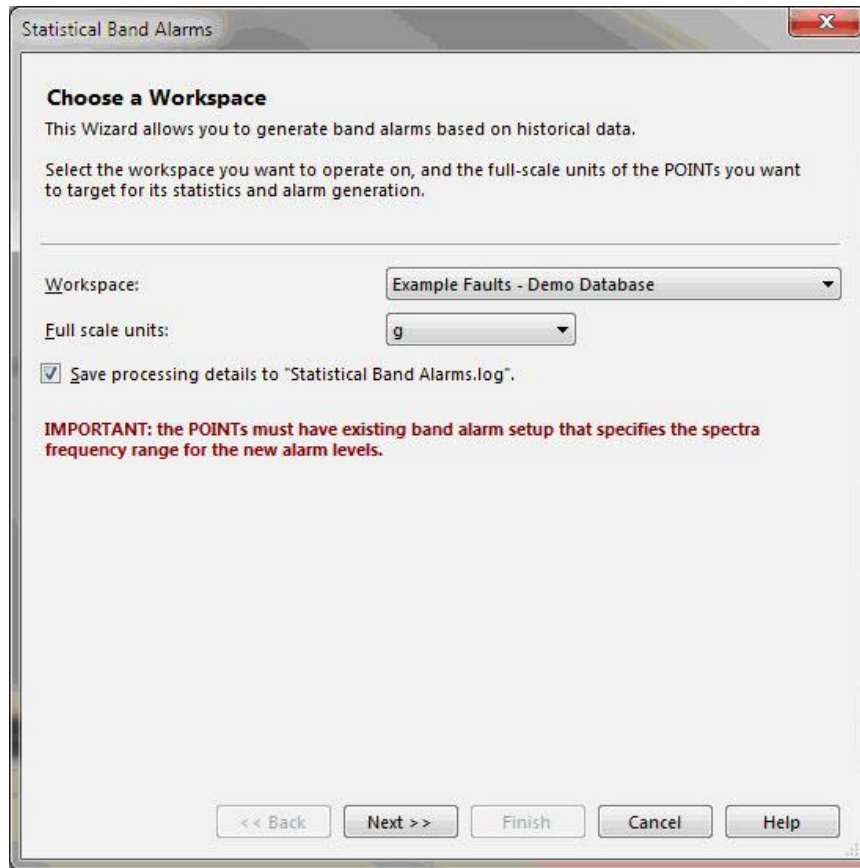


Figure 3 - 90.

The Statistical Band Alarms Wizard's **Choose a Workspace** Screen.

- From the **Workspace** drop down list, select the Workspace containing POINTs for which you would like to generate the alarm values.
- From the **Full scale units** drop down list, select a measurement unit. The **Full scale units** drop down list displays a list of the full scale units for POINTs in the selected workspace. Only POINTs with the measurement unit you select are used to generate alarm values.
- Click the **Save processing details to “Statistical Band Alarms.log”** check box to create and save a log file.
- Click **Next** to continue to the **Choose Calculation Method** screen.

Choose Calculation Method

The wizard calculates statistical band alarms based on POINTs measurements only. On this screen, you select the calculation method to use to determine how alarm values will be generated and applied to those POINTs.

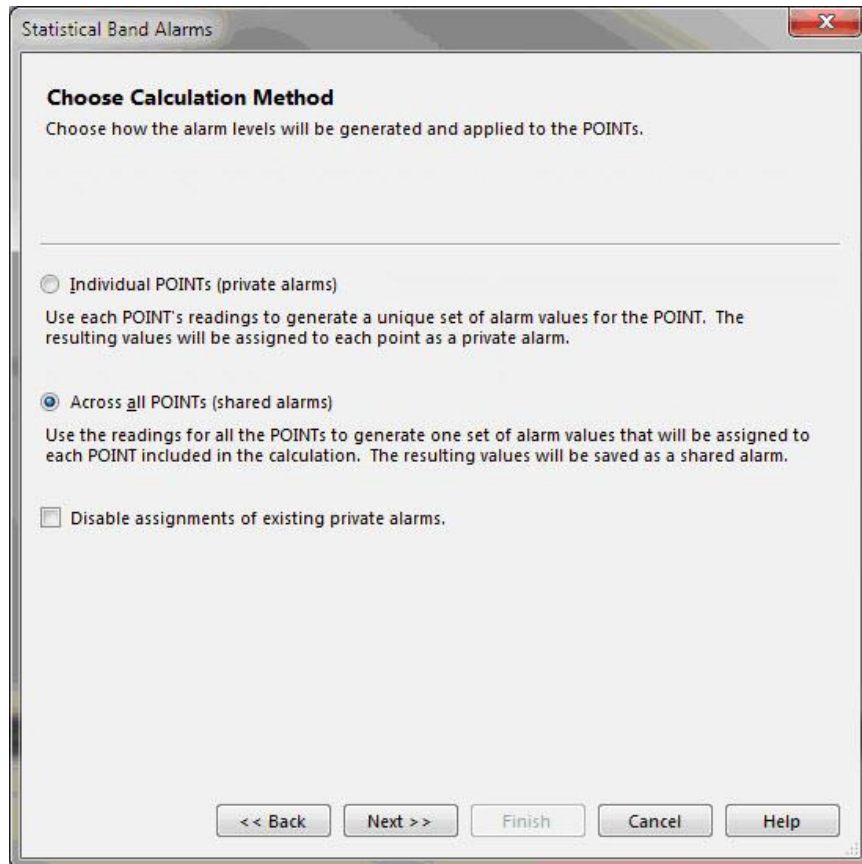


Figure 3 - 91.

The Statistical Band Alarms Wizard's **Choose Calculation Method** Screen.

- Select a calculation method:
 - Individual POINTs** – Select to use each POINT's readings to generate a unique set of alarm values for the POINT. The resulting values are assigned to each POINT as a *private* alarm.
 - This operation generates and assigns a private alarm for **each** POINT. It replaces POINTs' existing private alarms with new, statistically derived private alarms on the same frequency band. Any shared alarm assignments remain the same.
 - Across all POINTs** – Select to use all readings from all POINTs to generate one set of alarm values that is assigned to each POINT included in the calculation. The resulting values are saved as a *shared* alarm.
 - If **Across all POINTs** is selected, the **Disable assignments of existing private alarms** checkbox becomes editable. Select this checkbox to ignore (disable) existing private alarm assignments.

- This operation replaces existing shared alarms with new, statistically derived shared alarms on the same frequency band, which is calculated only on the measurements of the POINTs to which an alarm is assigned. Any private alarm assignments remain the same.
- Click **Next** to continue to the **Specify Input Criteria** screen.

Specify Input Criteria

On this screen, you specify the historical measurements to use for the statistical data set, the minimum measurement count for a POINT, the peak and overall ranges (measurements outside of which are to be excluded), and the outliers (the sigma distance from the mean value).

The screenshot shows a window titled "Statistical Band Alarms" with a sub-header "Specify Input Criteria". Below the sub-header is a descriptive text: "Specify which historical measurements to use for the statistical data set, and the minimum measurement count for a POINT. Specify the peak/overall range to exclude measurements that are outside the range and the outliers, defined as the sigma distance from the mean value." The form contains several input fields and checkboxes. Under "Specify which historical measurements to use", there are three radio buttons: "All measurements" (selected), "Measurements from" (with date pickers for "1/21/2014" and "to 1/21/2014"), and "Last" (with a text input for "10" and the label "measurements"). Below this, there are fields for "Min. measurements:" (10) and "Channel:" (X). Further down, there are four fields for ranges: "Max peak:" (99999), "Max overall:" (99999), "Min peak:" (0), and "Min overall:" (0). At the bottom, there is a checked checkbox for "Enable outlier removal" and a field for "Outlier threshold factor:" (3) followed by "x standard deviation". At the very bottom are five buttons: "<< Back", "Next >>" (highlighted with a blue border), "Finish", "Cancel", and "Help".

Figure 3 - 92.

The Statistical Band Alarms Wizard's **Specify Input Criteria** Screen.

- Select the historical measurements to use:
 - All measurements** – Select to use all measurement data to generate the band alarm values.
 - Measurements from/to** – Select, then enter a date range to use all measurements in the indicated date range to generate the band alarm values.

Last ___ measurements – Select, then enter a number of measurements to use the specified number of measurements to generate band alarm values.

- Use the remaining fields to filter abnormal measurements from the calculation:

Min measurements – Enter the minimum number of the POINT's measurements to be included in calculation.

- Only POINTs that have the number of indicated minimum measurements (or more) are included in the calculation.
- The **Min. Measurements** value cannot be greater than the **Last ___ measurements** value, if one has been entered.

Channel – Select the channel number of multi-channel POINTs to include in the calculation.

Max peak – Enter the maximum peak of the band value to include in calculation.

Min peak – Enter the minimum peak of the band value to include in calculation.

Max overall – Enter the maximum overall band value to include in calculation.

Min overall – Enter the minimum overall band value to include in calculation.

Enable outlier removal – An “outlier” refers to data that is not typical, or is outside a specified data measurement range. When the **Enable outlier removal** check box is enabled, measurement values that fall outside the outlier range are excluded from the calculation.

There are two passes of outlier removal. The first is a simple exclusion of measurements whose peaks and overall values are outside of the range specified by the min/max peak and min/max overall input. The second is the removal of measurements by calculating the normal distribution of both peak and overall values and excluding measurements whose values are beyond the specified factor of standard deviation of the data. You can turn off the second pass if it is not desired.

- Outlier detection only occurs if the number of measurements is greater than or equal to the **Min measurements** specification.

Outlier threshold factor – Enter a threshold factor (1.0 to 5.0) to calculate the lower and upper limits of the outlier range (outlier threshold). The threshold factor is multiplied by the standard deviation to calculate the outlier threshold. The default threshold factor is 3.0.

- Click **Next** to continue to the **Set Alarm Level Factors** screen.

Set Alarm Level Factors

On this screen, you specify the standard deviation factors to be used in calculating alarm levels. Alarm levels are calculated using the equation $Value = Mean + (n * Standard\ Deviation)$, where n represents the factor for the level to be calculated.

The screenshot shows a window titled "Statistical Band Alarms" with a sub-header "Set Alarm Level Factors". Below the sub-header is a descriptive text: "Enter the factor for each alarm level in the standard deviation factors. Alarm levels are calculated using the equation $Value = Mean + (n * Standard\ Deviation)$ where n represents the factor for the level being calculated." The form contains four rows of input fields, each with a checked checkbox, a label, a text box, and a multiplier "x standard deviation". The rows are: "Peak danger:" with value "3", "Peak alert:" with value "2", "Overall danger:" with value "3", and "Overall alert:" with value "0". At the bottom of the window are five buttons: "<< Back", "Next >>", "Finish", "Cancel", and "Help".

Figure 3 - 93.

The Statistical Band Alarms Wizard's **Set Alarm Level Factors** Screen.

- To use a standard deviation factor in an alarm level's calculation, select that alarm level's checkbox and enter the appropriate n value:

Peak danger – Value to be multiplied by the standard deviation to establish the peak danger level. An appropriate alarm registers if the measured peak value is greater than $mean + (the\ number\ entered * standard\ deviation)$.

Peak alert – Value to be multiplied by the standard deviation to establish the peak alert level. An appropriate alarm registers if the measured peak value is greater than $mean + (the\ number\ entered * standard\ deviation)$.

Overall danger – Value to be multiplied by the standard deviation to establish the overall danger level. An appropriate alarm registers if the measured overall value is greater than $mean + (the\ number\ entered * standard\ deviation)$.

Overall alert – Value to be multiplied by the standard deviation to establish the overall alert level. An appropriate alarm registers if the measured overall value is greater than $mean + (the\ number\ entered * standard\ deviation)$.

- Click **Next** to continue to the **Set Alarm Level Limits** screen.
 - To continue, you must set at least one alarm level's standard deviation factor.

Set Alarm Level Limits

On this screen, you set minimum and maximum alarm level ranges to guard against unacceptably narrow statistically derived alarm levels. You can enter each alarm range as an absolute value (e.g. "5"), as an offset relative to the calculated mean (e.g. "5+"), or as a percentage factor to be multiplied by the mean (e.g. "100%").

The screenshot shows a window titled "Statistical Band Alarms" with a close button (X) in the top right corner. The main title is "Set Alarm Level Limits". Below the title is a descriptive text: "You can guard against unacceptably narrow statistically derived alarm levels by setting minimum and maximum alarm level ranges. These alarm ranges may be entered as an absolute value, as an offset relative to the calculated mean (offset+), or as a percentage factor to be multiplied by the mean (factor%)."

The form is divided into two sections: "Minimum levels" and "Maximum levels".

Minimum levels:

- ☒ **Peak danger:** 2
- ☐ **Overall danger:** 0
- ☒ **Peak alert:** 1
- ☐ **Overall alert:** 0

Maximum levels:

- ☐ **Peak danger:** 99999
- ☒ **Overall danger:** 101
- ☐ **Peak alert:** 99999
- ☒ **Overall alert:** 100

At the bottom of the window are five buttons: "<< Back", "Next >>", "Finish", "Cancel", and "Help".

Figure 3 - 94.

The Statistical Band Alarms Wizard's **Set Alarm Level Limits** Screen.

- To set a level, select its checkbox and enter the appropriate absolute value, offset, or percentage factor:

Minimum Levels – Set the minimum alarm values to be used in the calculation. If the standard deviation is small, the minimum alarm values allow you to set a wider range, minimizing the chance for bad alarms to occur.

Peak danger – Value to be applied to establish the peak danger low level.

Peak alert – Value to be applied to establish the peak alert low level.

Overall danger – Value to be applied to establish the overall danger low level.

Overall alert – Value to be applied to establish the overall alert low level.

Maximum Levels – Set the maximum alarm values to be used in the calculation. If the standard deviation is large, the maximum alarm values allow you to set a wider range, minimizing the chance for bad alarms to occur.

Peak danger – Value to be applied to establish the peak danger high level.

Peak alert – Value to be applied to establish the peak alert high level.

Overall danger – Value to be applied to establish the overall danger high level.

Overall alert – Value to be applied to establish the overall alert high level.

- Click **Next** to continue to the **Start Calculation Process** screen.

Start Calculation Process

On this screen, you begin the band alarm calculation process.

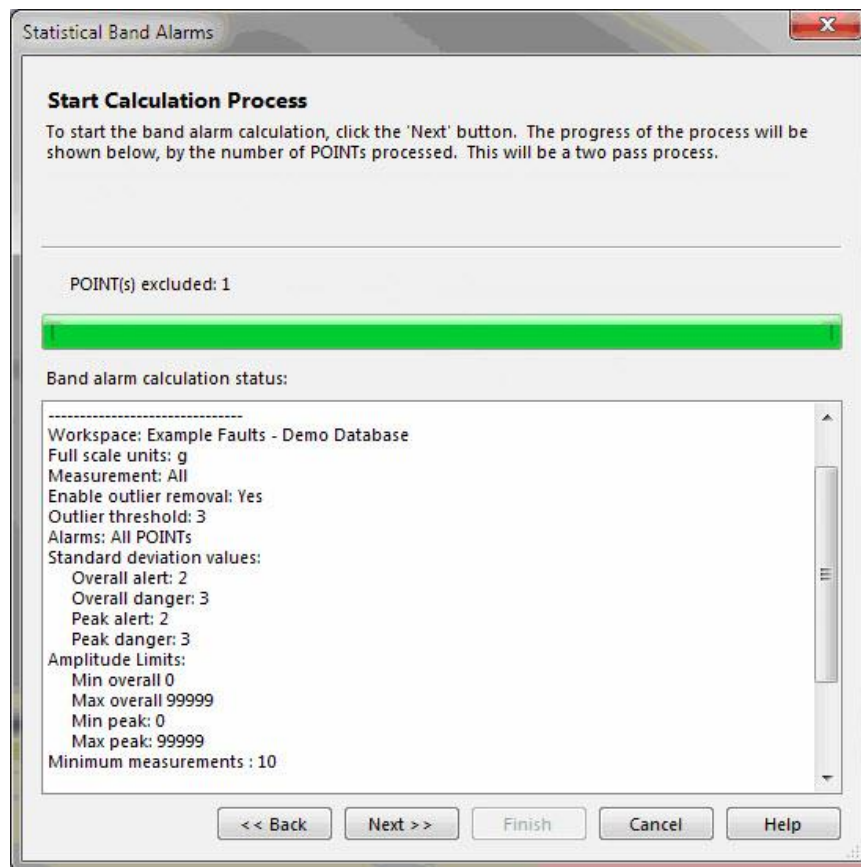


Figure 3 - 95.

The Statistical Band Alarms Wizard's **Start Calculation Process** Screen.

- Click **Next** to begin the band alarm calculations. The screen displays information about the process progress, the number of POINTs processed, etc.
 - This information will appear in the log file.
- Click **Next** to continue to the **Apply New Alarms** screen.

Apply New Alarms

On this screen, you apply alarm assignments.

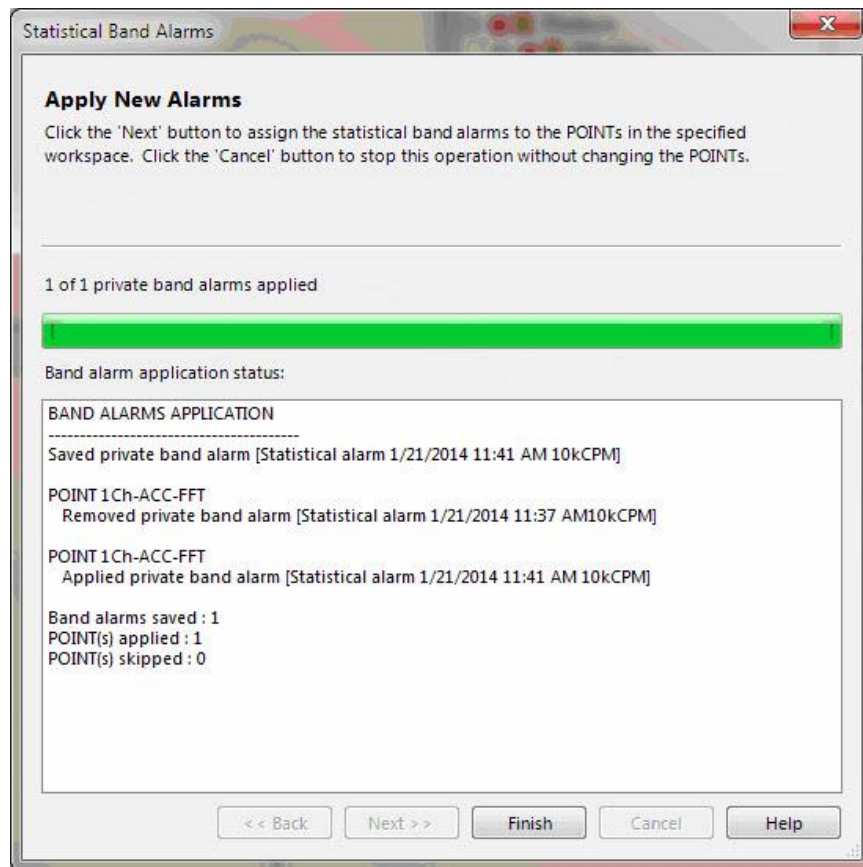


Figure 3 - 96.

The Statistical Band Alarms Wizard's **Apply New Alarms** Screen.

- Click **Next** to assign the statistically derived band alarms to the POINTs in the specified workspace. The screen displays information about the process progress.
- Click **Finish** to close the screen.

Once the alarm assignments have been applied, you can go to any of the POINTs' **POINT Properties / Band** tab to view the new statistical band and statistical alarm values (see figure on following page).

- To revert back to a previous alarm band, click **Load** from the **Band** tab and select a different alarm band.

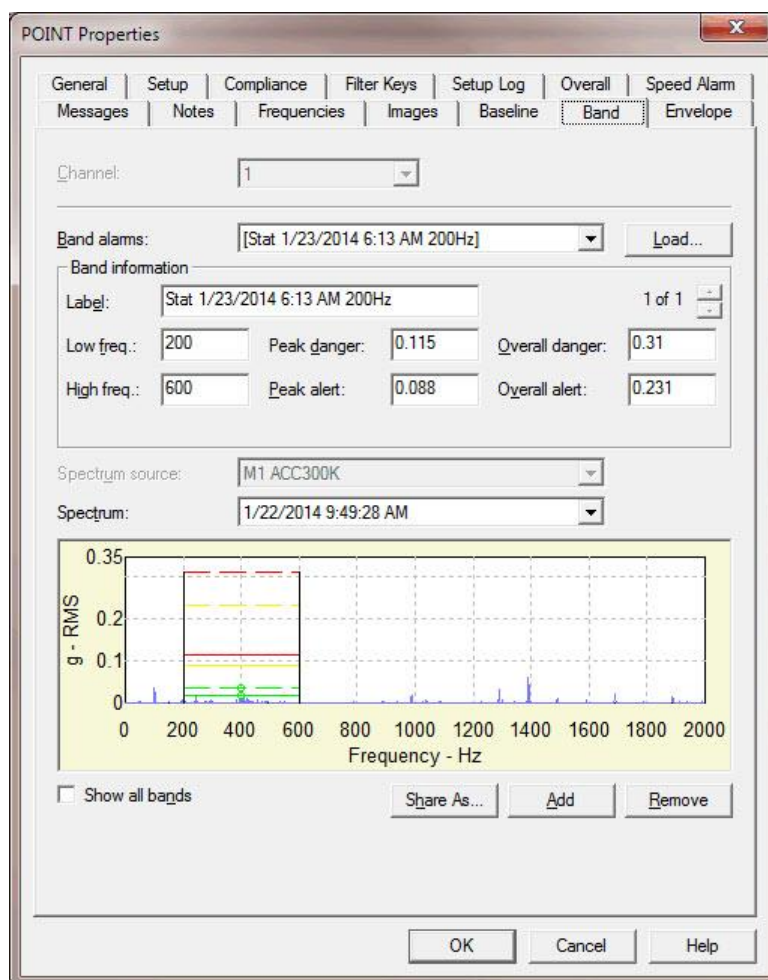


Figure 3 - 97.
The **POINT Properties** Screen's **Band** Tab.

Templates

Templates save time, contribute to consistent organization, and allow you to make bulk entries. For example, you can quickly set the machine speed for all POINTs beneath a machine with a template. Templates allow you to define custom organizational structures for repeated use when building or defining your hierarchy.

- The same template may be used across many different hierarchies.

Managing Templates

To add a new template:

- Select the **Customize** menu's **Template** option. The **Template** dialog displays.

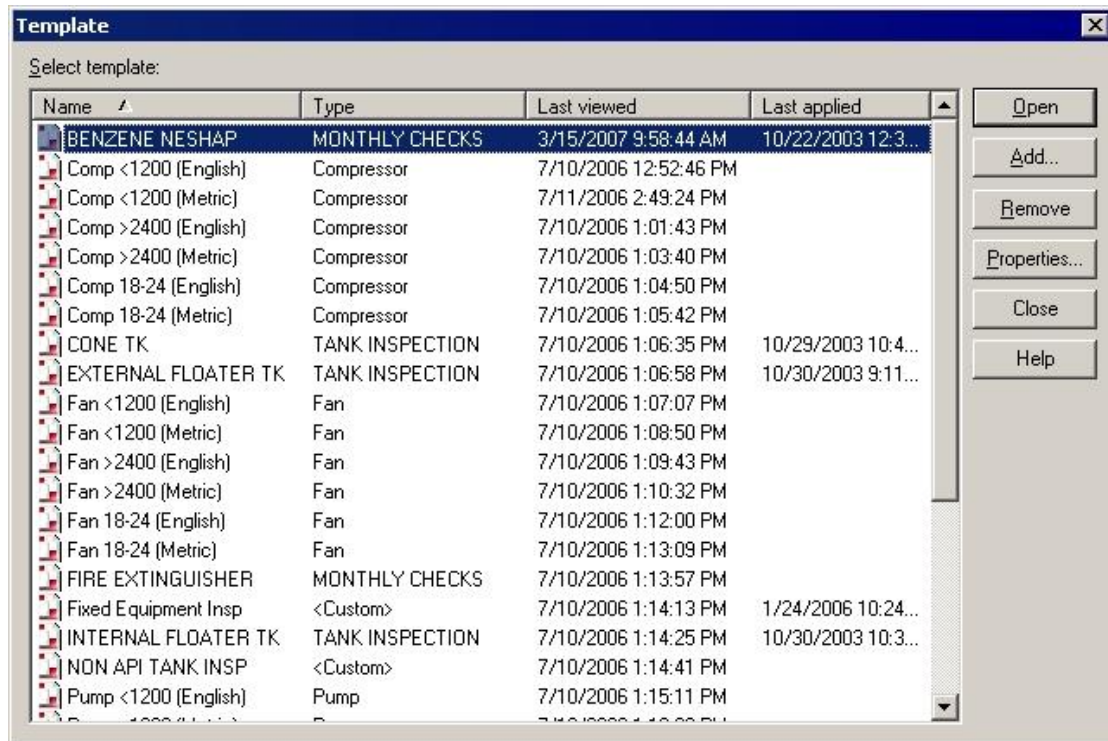


Figure 3 - 98.
The **Template** Dialog.

- Click the dialog's **Add** button. The **Template Properties** dialog displays.
- Enter the new template's **Name** and **Description**.
- Select the template's **Type** from the drop down list. Select a previously created template or **<Custom>**.
 - If you need a new template that is only slightly different from a previously created template, you can select a previous template as your **Type** and then edit only the necessary items.
- Click the dialog's **OK** button. The new template window displays.

In the template window, insert new Groups and POINTs to build the new template's hierarchy structure.

- Using the **Insert** menu, insert desired structure elements (groups and POINTs) in the desired configuration into the template window.
 - You may also use **Copy**, **Paste**, and **Paste Multiple** to build your template's structure.

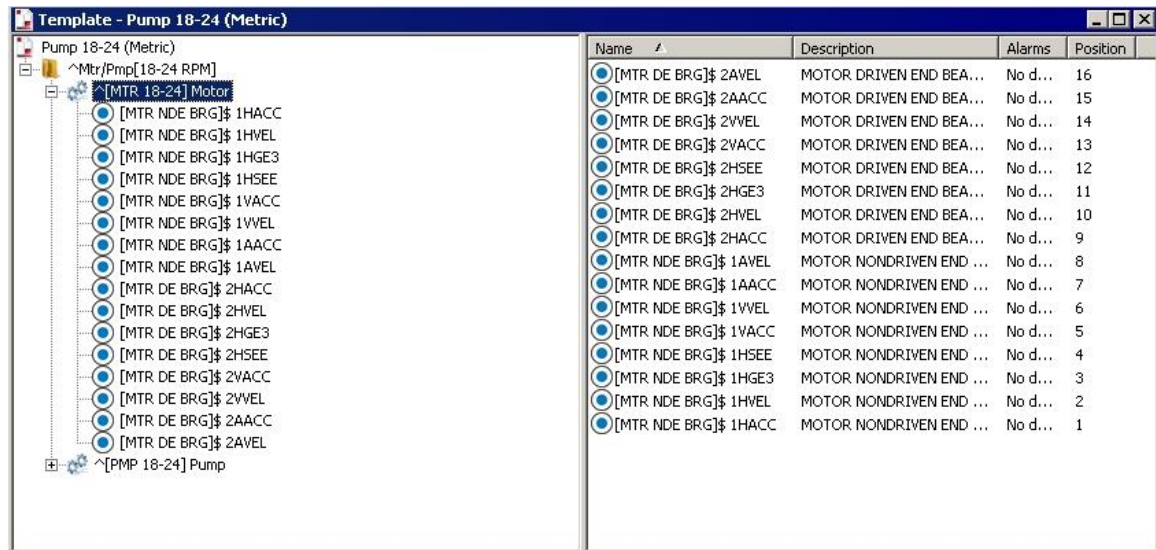


Figure 3 - 99.
Template Window with Custom Structure.

When building your template structure, you may also set up custom names using “special” characters in the name fields.

When applying a template, the template wizard assists with naming hierarchy items whose template name includes “special” characters

Custom Names

Templates hierarchy items may be inserted in your database:

- With the name specified in the template, or
- With the Template wizard prompting you to enter a name for items inserted in your database, or
- With custom names created by the Template wizard that are based upon your existing database.

The last two options are accomplished by special characters within your template hierarchy names.

- When a new item is inserted into the Template, its **Properties** dialog displays.
 - You may also access the **Properties** dialog by right-clicking to access the context menu, or using the **Properties** toolbar button.

You can configure the custom naming feature to prompt you to input a unique name for the specified item as the template is applied. You can also set up your template to automatically name structure items based on your entered parameters.

To set up name prompt:

- In the Properties dialog’s **Name** field, enter a “^” as the first character. During the application of the template, the template wizard will prompt you to either accept the item’s name as it appears after the “^”, or enter a new name for the hierarchy item as the template is being processed.

Use of special characters enables automatic naming during template application. Based on your entries, the new items take their name from the portions of the parent item's name.

To set up automatic naming:

- In the **Properties** dialog's **Name** field, use a "\$" to cause the inserted template item (child) to use a portion of the target hierarchy parent's name. Each "\$" in the template item's name is replaced by a sequential word from the target hierarchy parent's name. Use as many "\$"s as necessary. For example, if the parent item's name is "Dryer Section," you might apply a template item named "\$ \$ Felts." This will insert the template item (child) and name it "Dryer Section Felts."
- Also, square brackets ("[]") may be used to strip items from the final name. This allows you to use "[]"s and "\$"s together to use some portions of the parent's name while skipping others. For example, if the parent's name is "FD Fan", and you wish to remove the "FD" prefix, place "[]"s around the dollar sign representing the "FD" ([\$]\$). The inserted item will be named "Fan." You can also use "[]"s to include comments that are visible when viewing the template and as the template is applied. The comment text does not appear in the final name. To do so, enter your auto-naming characters followed by your comment text enclosed in brackets. For example, using the earlier "FD Fan" example, the entry "[[\$]\$[left env]" would result in the item being named "Fan." The comment text, "left env" is visible to you when you view the template, and as the template is applied, but is deleted from the item's name in the hierarchy list.

To open an existing template:

- In the **Template** window, select the template to open.
- Click the window's **Open** button. The selected template window displays.

To remove an existing template:

- In the **Template** window, select the template to remove.
- Click the window's **Remove** button. When prompted, confirm action.

The selected template is removed.

To add a Template Type:

- In the **Template** window, click **Add**, or select an existing template and click **Edit**. The **Template Properties** dialog displays.
- In the **General** tab's **Type** field, place your cursor in the drop down list and enter the new type name.
- Click **OK** to save the new template type and apply it to the current template.

Applying Templates

To apply a template:

- In your target **Hierarchy**, select the item under which you wish the template items to branch.
- Select the **Insert** menu's **Apply Template** option. The **Apply Template** screen displays.

The **Apply Template** screen lists all available templates.

- Select desired template and click **Apply** to launch the **Apply Template Wizard**.

Introduction Screen

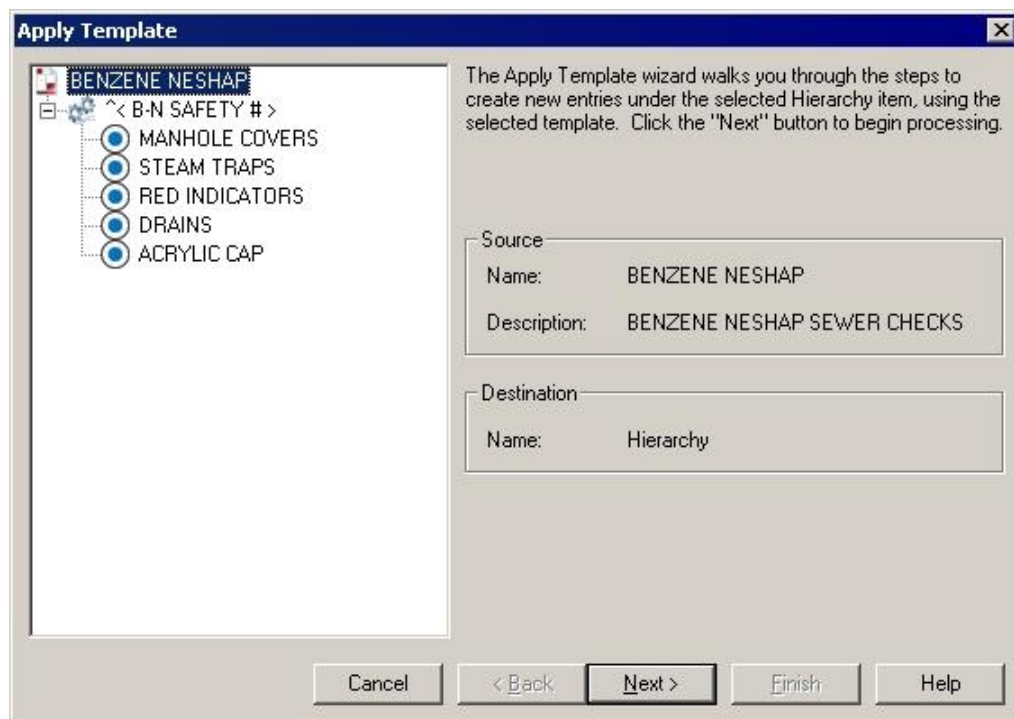


Figure 3 - 100.
The **Apply Template Wizard** Screen.

The **Apply Template Wizard** guides you through the required steps to create new entries under the selected hierarchy item, using the selected template.

The introduction screen displays the following information about the selected template:

Name – Displays the name of the template being applied.

Description – Displays the description provided for the template.

Destination – Displays the location in the hierarchy to which the template will be applied.

Before continuing, ensure the template name is correct, and ensure the destination is accurate.

- Click **Next** to continue.

Configuration Screen

The template application process begins on the **Configuration** screen. This screen walks through the template, gathering information as needed:

Name - If necessary, you will be prompted to specify the name of the item being processed.

Running speed - Specify the machine speeds for the highlighted machine. This speed will be used to set the speed of each POINT beneath the machine.

- The processing stops to allow you to enter necessary information.

Custom Naming

- You will be prompted to enter a name if you set your template up using the special name-prompt character “^.” Your structure elements will be automatically named if you set up your template using auto-name characters.
- Click **Next** to continue.

When the template processing is complete, click **Next** to continue to the build screen.

- View the template's progress in the screen's progress bar.
- Click **Back** to return to the wizard's last stopping point.

Build Screen

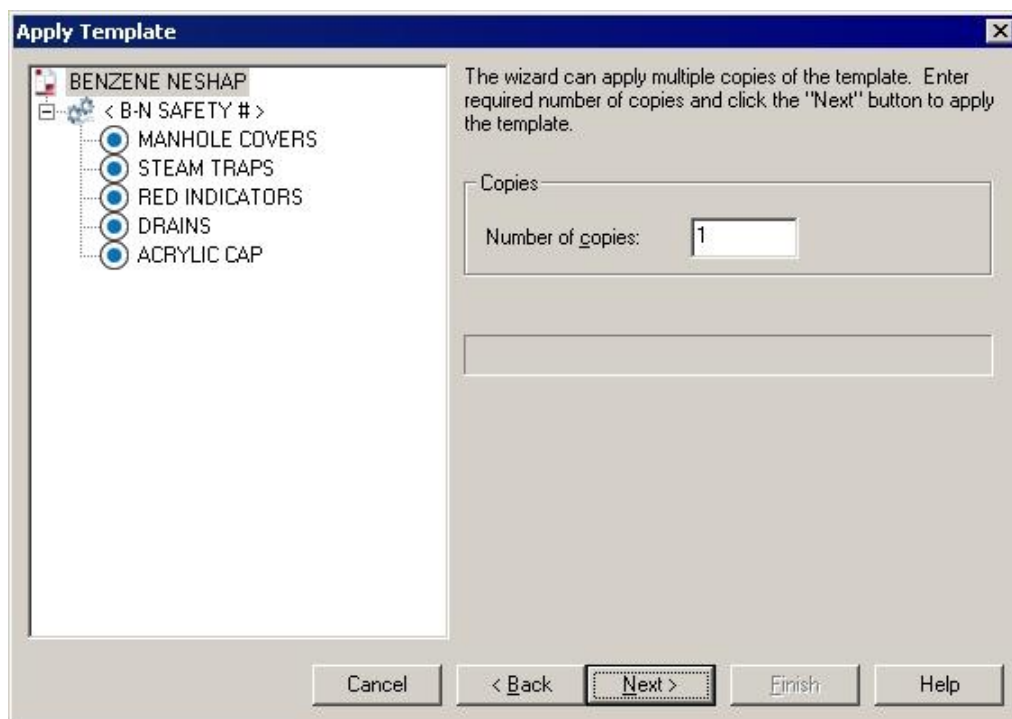


Figure 3 - 101.
The **Apply Template Wizard** Screen.

This screen uses the template to build the template hierarchy items within the specified target hierarchy item.

- The wizard is capable of generating multiple copies of the template.
- Specify the number of copies required.
- Click **Next** to build the hierarchy.
- Click **Finish** to close the wizard.

Working with Filters

Filters allow you to setup and apply filter criteria that determine which POINTs display in a new filtered **Workspace** window. Filtered workspaces group together POINTs and Groups (based on your filter input) in one window for easy comparison and analysis.

Managing Filters

Use the **Customize** menu's **Filters** option to manage (add, copy, edit, and remove) filters. This allows you to define reusable filters.

To add a new filter:

- Select the **Customize** menu's **Filters** option. The **Filters** screen displays.
- Click the **Add** button. The **Filter Editor** screen displays.

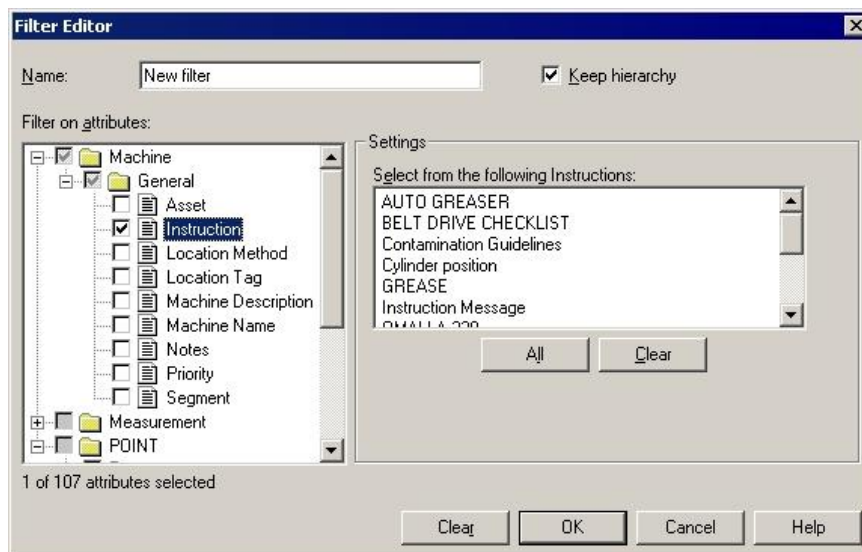


Figure 3 - 102.
The **Filter Editor** Screen.

Name - Specify the new filter's name.

- It is helpful to give the filter a name based on its criteria for easy recognition. For example, if you need to sort Groups based on their priority setting, you may want to create and name a filter specifically for **Priority**.

Keep hierarchy – Click the checkbox to determine whether the hierarchy Groups appear with their filtered POINTs in the filtered workspace, or whether only the filtered POINTs appear in the filtered workspace. If disabled, filtered POINTs appear beneath the filtered machine without the original hierarchical format. The filtered workspace lists all filtered POINTs under a “Filtered Machine” hierarchy item.

Filter on attributes – Define which attributes to filter on. Attributes are categorized by machine, measurement, POINT, data type, and/or attribute type. Select an attribute group to modify its individual settings.

Settings – Displays current individual attribute settings for the specified attribute category. Use the edit fields to view and/or edit attributes as necessary.

- When one or more attribute within an attribute category is included in the current filter, a checkmark displays next to the attribute category folder.
- Use the **All** and **Clear** buttons to quickly include all or none of the displayed attributes (rather than selecting / de-selecting one by one) for the selected attribute category in your current filter.

Include – Specify whether to filter for POINTs that match *every* attribute setting, or filter for POINTs that match at least *one* attribute setting.

Any Selected – Select to filter for POINTs matching **any** individual attribute of the total included in the filter. Only these POINTs display in the Filtered Workspace

All Selected - Select to filter for POINTs matching **all** attributes included in the filter. Only these POINTs display in the Filtered Workspace.

- The number of attributes selected and the total number of available attributes displays in the screen's lower left corner.
- Click the **OK** button to create a new workspace based on the defined criteria of the current filter. A progress bar displays, indicating filter process status.
- Click **Cancel** to close screen without performing filter and without saving filter entries.

To create a new filter based on a copy of an existing filter:

If you need a new filter that is only slightly different from a previously created filter, you can select the previous filter and then edit only the necessary items.

- In the **Filters** screen, select the existing filter you wish to copy and use as a template.
- Click the screen's **Copy** button. The **Filters Editor** screen displays.
- Enter the new filter's name.

- By default, the new filter is given the same name as the copied filter on which it is based, with a numerical suffix.

Filter on attributes - Select additional individual attributes, or edit the existing attributes. When an existing filter is selected, its existing selected attributes display.

- Click **OK** to apply the new filter.

To edit an existing filter:

- In the **Filters** screen, select the existing filter you wish to edit.
- Click the screen's **Edit** button. The **Filters Editor** screen displays.

Filter on attributes – Displays the selected existing filter's selected attributes.

- Perform your edits and click the screen's **OK** button to save the edited filter.

To remove an existing filter:

- In the **Filters** screen, select the existing filter you wish to remove.
- Click the screen's **Remove** button. Confirm removal when prompted. The filter is removed.

Applying Filters

You can create and apply private and shared filters using the **Insert** menu's **Apply Filters** screen. When a filter is applied, the resulting items display in a new Workspace window.

To apply a filter:

- Select the **Insert** menu's **Apply Filter** option. The **Apply Filter** screen displays.

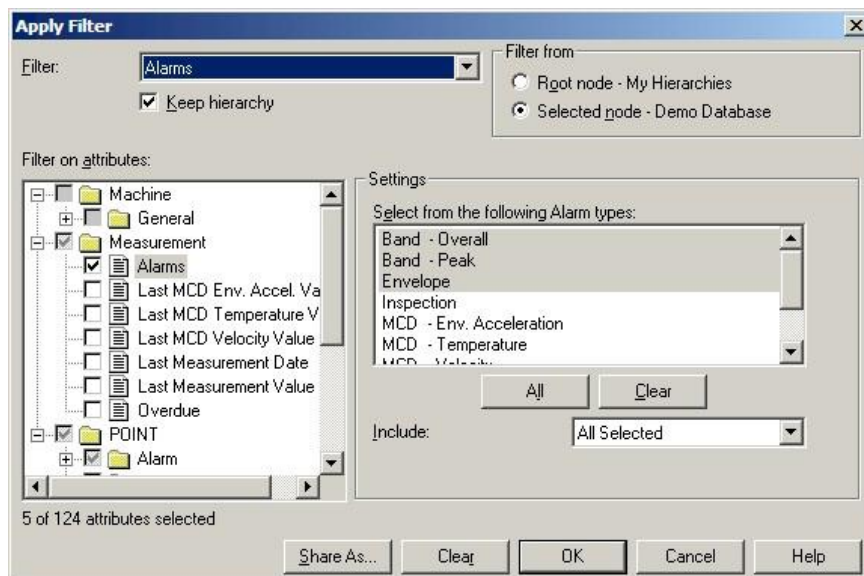


Figure 3 - 103.
The **Apply Filter** Screen.

Filter – Select an existing filter or **<Private Filter>**. This determines what to base your filter on (either a copy of an existing shared filter or to create a new private filter).

Filter on attributes – Displays the selected existing filter's selected attributes.

Keep hierarchy - Click the checkbox to determine whether the hierarchy Groups appear with their filtered POINTs in the filtered workspace, or whether only the filtered POINTs appear in the filtered workspace. If disabled, filtered POINTs appear beneath the filtered machine without the original hierarchical format. The filtered workspace lists all filtered POINTs under a "Filtered Machine" hierarchy item.

- In the screen's **Filter from** area, select **Root node – Hierarchy** to search the entire hierarchy for matching POINTs. Select **Selected node** to search from your selected node and below *only*.
- In the screen's **Filter on attributes** area, define which attributes to filter on. Attributes specific to machine, measurement, POINT, data type, and/or attribute type are grouped together. Select an attribute type to include in the filter.
- Attribute settings for the selected attribute group display in the screen's **Settings** area. View and/or edit attributes as necessary in the displayed input fields.
 - Individual attributes are described in detail in the next section.
 - When one or more attribute within an attribute group is included in the current filter, a checkmark displays next to the attribute group folder.

Include – Specify whether to filter for POINTs that match *every* attribute setting, or filter for POINTs that match at least *one* attribute setting.

Any Selected – Select to filter for POINTs matching **any** individual attribute of the total included in the filter. Only these POINTs display in the Filtered Workspace.

All Selected - Select to filter for POINTs matching **all** attributes included in the filter. Only these POINTs display in the Filtered Workspace.

- The **Include** option may or may not appear, depending on the **Filter on attribute** option that is currently selected.
- The number of attributes selected and the total number of available attributes displays in the screen's lower left corner.
- Click the screen's **OK** button to apply the filter as a private filter
 - When a filter is applied, the resulting items display in a new Workspace window.

To make the filter a shared filter:

- Click **Share As** to assign the current filter a unique name and make it available as a shared filter. The **Enter Filter Name** dialog displays.
- Enter a unique filter name and click **OK**.
- Click the **Apply Filter** screen's **OK** button to create a workspace based on the defined criteria of the current filter. A progress bar displays, indicating filter process status.
- Click **Cancel** to close screen without performing filter and without saving filter entries.

Individual Filter Attributes

All individual filter attributes are described below.

Asset

This attribute is located under **General / Machine**.

Filters for all POINTs under the selected machine with the indicated asset (the physical machinery occupying the segment).

Edit – Enter the asset in the text field.

- Standard wildcard operations are supported.

Machine Description

This attribute is located under **General / Machine**.

Filters for all POINTs under the selected machine with the indicated description.

Edit – Enter the machine description in text field.

- Standard wildcard operations are supported.

Machine Name

This attribute is located under **General / Machine**.

Filters for all POINTs under the selected machine with the indicated name.

Edit – Enter the machine name in the text field.

- Standard wildcard operations are supported.

Priority

This attribute is located under **General / Machine**.

Filters for all POINTs under the selected machine with the indicated priority assignment.

Edit – Select one or more priority assignment(s).

Segment

This attribute is located under **General / Machine**.

Filters for all POINTs under the selected machine with the indicated segment (physical location of a Group).

Edit – Enter the segment in the text field.

- Standard wildcard operations are supported.

Alarms

This attribute is located under **Measurement**.

Filters for all POINTs with a last measurement in the indicated alarm.

Edit – Select one or more alarms from the settings list. Use the **All** button to select all alarms in the settings list. Use the **Clear** button to clear all selections from the alarms in the settings list. Select **Include All Selected** to include POINTs matching *all* alarm selections. Select **Include Any Selected** to include POINTs matching *at least one* alarm selection.

Last Measurement Date

This attribute is located under **Measurement**.

Filters for all POINTs with a last measurement taken between (and including) the specified dates.

Edit – Enter the dates using standard date selection operation.

Last Measurement Value

This attribute is located under **Measurement**.

Filters for all POINTs with an overall value (Channel 1) between and including specified values.

Edit – Enter values in the edit fields.

Overdue

This attribute is located under **Measurement**.

Filters for all POINTs' schedule condition (**Overdue** or **Not Overdue**).

Edit – Select **Overdue** or **Not Overdue**.

Number of Days – Enter the number of days (from now). Filters for POINTs matching the selected status (**Overdue** or **Not Overdue**) within the entered date range.

Band Alarm

This attribute is located under **POINT / Alarm**.

Filters for all POINTs with the selected shared band alarm.

Edit – Select one or more shared band alarm from the settings list. Use the **All** button to select all shared band alarms in the settings list. Use the **Clear** button to clear all selections from the shared band alarms in the settings list.

Envelope Alarm

This attribute is located under **POINT / Alarm**.

Filters for all POINTs with the selected shared envelope alarm.

Edit – Select one or more shared envelope alarm from the settings list. Use the **All** button to select all shared envelope alarms in the settings list. Use the **Clear** button to clear all selections from the shared envelope alarms in the settings list.

HAL Alarm

This attribute is located under **POINT/Alarm**.

If **HAL Alarm Set** is set to “Yes” for the HAL Alarm filter attribute, then when the filter is applied, the workspace will display only POINTs for which HAL alarms are configured.

If **HAL Alarm Set** is set to “No” for the HAL Alarm filter attribute, then when the filter is applied, the workspace will display only POINTs for which HAL alarms are *not* configured.

Overall Alarm

This attribute is located under **POINT / Alarm**.

Filters for all POINTs with the selected shared overall alarm.

Edit – Select one or more shared overall alarm from the settings list. Use the **All** button to select all shared overall alarms in the settings list. Use the **Clear** button to clear all selections from the shared overall alarms in the settings list.

Speed Alarm

This attribute is located under **POINT / Alarm**.

Filters for all POINTs with the selected shared speed alarm.

Edit – Select one or more shared speed alarm from the settings list. Use the **All** button to select all shared speed alarms in the settings list. Use the **Clear** button to clear all selections from the shared speed alarms in the settings list.

Application Type

This attribute is located under **POINT / General**.

Filters for all POINTs configured to collect the indicated application data.

Edit – Select one or more application type from the settings list. Use the **All** button to select all application types in the settings list. Use the **Clear** button to clear all selections from the application types in the settings list.

DAD Type

This attribute is located under **POINT / General**.

Filters for all POINTs with the indicated DAD type.

Edit – Select one or more DAD type from the settings list. Use the **All** button to select all DAD types in the settings list. Use the **Clear** button to clear all selections from the DAD types in the settings list.

Enable / Disable

This attribute is located under **POINT / General**.

Filters for all POINTs enabled or disabled for download.

Edit – Select **Enable** or **Disable**.

Filter Keys

This attribute is located under **POINT / General**.

Filters for all POINTs with the indicated filter key(s).

Edit - Select one or more filter key from the settings list. Use the **All** button to select all filter keys in the settings list. Use the **Clear** button to clear all selections from the filter keys in the settings list. Select **Include All Selected** to include POINTs matching *all* filter key selections. Select **Include Any Selected** to include POINTs matching *at least one* filter key selection.

Frequency Sets

This attribute is located under **POINT / General**.

Filters for all POINTs with the selected shared frequency set.

Edit - Select one or more shared frequency set from the settings list. Use the **All** button to select all shared frequency sets in the settings list. Use the **Clear** button to clear all selections from the shared frequency sets in the settings list.

POINT Description

This attribute is located under **POINT / General**.

Filters for all POINTs with the indicated description.

Edit - Enter POINT description in **POINT Description** field.

POINT Name

This attribute is located under **POINT / General**.

Filters for all POINTs with the indicated name.

Edit - Enter POINT name in **POINT Name** field.

- Wildcard characters are available for use.

Sensor Type

This attribute is located under **POINT / General**.

Filters for all POINTs with the indicated sensor type.

Edit - Select one or more sensor type from the settings list.

Evaluation Time

This attribute is located under **POINT / Derived**.

Filters for all derived POINTs with the indicated evaluation time.

Edit - Enter the evaluation **Units**, and **Minimum** and **Maximum** values in the appropriate fields.

Expression

This attribute is located under **POINTS / Derived**.

Filters for all POINTs with the selected shared expression.

Edit – Select one or more expressions from the settings list. Use the **All** button to select all expressions in the settings list. Use the **Clear** button to clear all selections from the settings list.

Active State

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Active State** setting (**High** or **Low**) (as configured in **POINT Properties / Setup** for Logic POINTs).

Edit – Select the **Active State** setting, **High** or **Low**.

Autorange

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Autorange** setting (**On** or **Off**) (as configured in **POINT Properties / Setup**).

Edit – Select the **Autorange** setting: **On** or **Off**.

Channel Number

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated minimum and maximum **Channel Number** entries.

Edit – Enter the **Minimum** and **Maximum** channel number values.

Control POINT

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Control POINT** selection.

Edit – Select the appropriate **Control POINT** from the displayed hierarchy.

Device

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Device** type (as configured in **POINT Properties / Setup**).

Edit – Select one or more device type from settings list. Use the **All** button to select all device types units in the settings list. Use the **Clear** button to clear all selections from the device types in the settings list.

Downloaded POINTs

This attribute is located under **POINT / Online**.

Filters for all POINTs that have been downloaded to the selected device.

Edit – Select one or more devices from settings list. Use the **All** button to select all devices in the settings list. Use the **Clear** button to clear all selections from the devices in the settings list.

Gain

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Gain** value (as configured in **POINT Properties / Setup**).

Edit – Select the **Gain** value: **1** or **10**.

Sensor Settings

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Sensor Settings** (as configured in **Customize / Online Settings / Sensor Setup**).

Edit – Select one or more sensor setting definitions from settings list. Use the **All** button to select all sensor setting definitions in the settings list. Use the **Clear** button to clear all selections from the sensor setting definitions in the settings list.

Tacho Number

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Tacho number** (as configured in **POINT Properties / Setup**).

Edit – Select one or more tacho number from settings list. Use the **All** button to select all tacho numbers in the settings list. Use the **Clear** button to clear all selections from the tacho numbers in the settings list.

Tacho Enable

This attribute is located under **POINT / Online**.

Filters for all POINTs matching the indicated **Tacho enable** setting (**Enable** or **Disable**) as configured in **POINT Properties / Setup**.

Edit – Select the **Enable Tacho** setting; **Enable** or **Disable**.

DAD Schedule

This attribute is located under **POINT / Schedule**.

Filters for all POINTs with the indicated **Take data every** setting (as configured in **POINT Properties / Schedule**).

Edit – Select units from the drop down list. Enter minimum and maximum number of selected units.

- Units are automatically evaluated for compatibility. For example, an entry of 24 hours will include a POINT with a DAD schedule set to 1 day.

Keep Current Data

This attribute is located under **POINT / Schedule**.

Filters for all POINTs matching the indicated **Keep Current Data** units (as configured in **POINT Properties / Schedule**).

Edit – Select units from the drop down list. Enter minimum and maximum number of selected units.

Keep Unscheduled Data

This attribute is located under **POINT / Schedule**.

Filters for all POINTs matching indicated **Keep Unscheduled Data** units (as configured in **POINT Properties / Schedule**).

Edit – Select units from the drop down list. Enter minimum and maximum number of selected units.

Long Term Archive Keep Data

This attribute is located under **POINT / Schedule**.

Filters for all POINTs matching the indicated **Long Term Archive Keep Data** units (as configured in **POINT Properties / Schedule**).

Edit – Select units from the drop down list. Enter minimum and maximum number of selected units.

Long Term Archive Take Data

This attribute is located under **POINT / Schedule**.

Filters for all POINTs matching the indicated **Long Term Archive Take Data** units (as configured in **POINT Properties / Schedule**).

Edit – Select units from the drop down list. Enter minimum and maximum number of selected units.

Short Term Archive Keep Data

This attribute is located under **POINT / Schedule**.

Filters for all POINTs matching the indicated **Short Term Archive Keep Data** units (as configured in **POINT Properties / Schedule**).

Edit – Select units from the drop down list. Enter minimum and maximum number of selected units.

Short Term Archive Take Data

This attribute is located under **POINT / Schedule**.

Filters for all POINTs matching the indicated **Short Term Archive Take Data** units (as configured in **POINT Properties / Schedule**).

Edit – Select units from the drop down list. Enter minimum and maximum number of selected units.

Autocapture

This attribute is located under **POINT / Setup**.

Filters for POINTs matching the indicated autocapture setting.

Edit – Select the autocapture setting from the settings list. Use the **All** button to select all autocapture settings in the settings list. Use the **Clear** button to clear all selections from the autocapture setting in the settings list.

Averages

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the specified number of averages (as configured in **POINT Properties**).

Edit – Enter minimum and maximum number of averages in edit fields.

Averaging

This attribute is located under **POINT / Setup**.

Filters for all POINTs matching the indicated **Averaging Type (Average, Off, Peak Hold, or Synchronous Time)**

Edit – Select one or more average types from the settings list. Use the **All** button to select all average types in the settings list. Use the **Clear** button to clear all selections from the average types list.

Detection

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the specified detection setting.

Edit - Select detection setting from the settings list. Use the **All** button to select all detection settings in the settings list. Use the **Clear** button to clear all selections from the detection setting in the settings list.

FFT Frequency

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated frequency settings.

Edit – Specify **Fixed span** or **Order track**. Enter the minimum / maximum start (freq or orders) and the minimum / maximum end (freq or orders).

- Enter Minimum and maximum values in frequency or orders, as indicated in **Freq. Type** selection.

Full Scale

This attribute is located under **POINT / Setup**.

Filters for all POINTs whose Full Scale setting falls within the indicated full scale value range.

Edit – Select unit types from the settings list. Use the **All** button to select all unit types in the settings list. Use the **Clear** button to clear all selections from the settings list.

Full Scale Units

This attribute is located under **POINT / Setup**.

Filters for all POINTs matching the indicated **Full Scale Units** type.

Edit – Select full scale unit types from the settings list. Use the **All** button to select all full scale unit types in the settings list. Use the **Clear** button to clear all selections from the full scale units settings list.

Input Filter Range

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated input filter range settings.

Edit – Select input filter range(s) from the settings list. Use the **All** button to select all input filter ranges in the settings list. Use the **Clear** button to clear all selections from the settings list.

Input mV / EU

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated mV / EU settings.

Edit – Enter minimum and maximum mV / EU values in edit fields.

Lines

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated lines setting.

Edit – Select line(s) from the settings list. Use the **All** button to select all lines in the settings list. Use the **Clear** button to clear all selections from the settings list.

Linear Factor

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated linear factor value (as indicated in **POINT Properties / Setup**).

Edit – Enter the minimum and maximum linear factor values.

Linear Speed Units

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated linear speed units (as configured in **POINT Properties / Setup**).

Edit – Select one or more linear speed units type from the settings list. Use the **All** button to select all linear speed units in the settings list. Use the **Clear** button to clear all selections from the linear speed units settings list.

Location

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated location setting.

Edit – Select location(s) from the settings list. Use the **All** button to select all locations in the settings list. Use the **Clear** button to clear all selections from the settings list.

Low Frequency Cutoff

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated low frequency cutoff.

Edit – Enter minimum and maximum frequency values in edit fields.

- Units display in either **CPM** or **Hz**, based on frequency units preference setting (**Preferences / General**).

Orientation

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated orientation.

Edit – Select orientation(s) from the settings list. Use the **All** button to select all orientations in the settings list. Use the **Clear** button to clear all selections from the settings list.

Pulses / Rev

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated minimum and maximum pulses / rev setting (as configured in **POINT Properties / Setup**).

Edit – Enter **Minimum** and **Maximum** pulses / rev values.

Save Data

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated save data setting.

Edit - Select save data setting from the settings list. Use the **All** button to select all save data settings in the settings list. Use the **Clear** button to clear all selections from the settings list.

Speed

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated speed settings.

Edit - Enter minimum and maximum speed values in edit fields.

Speed Ratio

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated speed ratio.

Edit - Enter minimum and maximum speed ratio values in edit fields.

Window

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated window setting.

Edit - Select window setting(s) from the settings list. Use the **All** button to select all window settings in the settings list. Use the **Clear** button to clear all selections from the settings list.

Zero Offset

This attribute is located under **POINT / Setup**.

Filters for all POINTs with the indicated zero offset.

Edit - Enter the minimum and maximum zero offset values in edit fields.

Clear Alarm Non Collection

This attribute is located under **POINT / General**.

Filters for all POINTs with **Clear Alarms for Non-collection last measurements** enabled or disabled.

Edit - Select Enable or Disable.

Exclude Non-Collection From Report

This attribute is located under **POINT / General**.

Filters for all POINTs with **Exclude from reports if last measurement is a Non-collection event** enabled or disabled.

Edit - Select Enable or Disable.

Customize / Derived POINTs

The **Derived POINTs** screen allows you to customize shared expressions, create new expressions, and to edit variables, constants, and the expression formula.

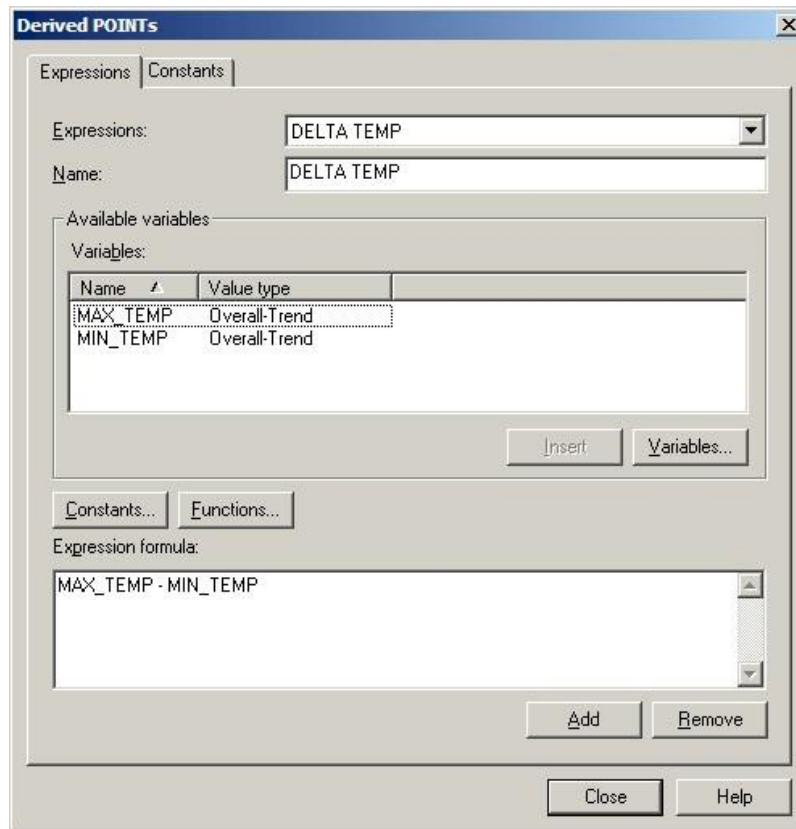


Figure 3 - 104.

The **Customize** Menu's **Derived POINTs** Screen's **Expressions** Tab.

To customize a shared expression:

- Select the expression you wish to edit from the **Expressions** drop down list.

Important - Any changes made to a shared expression affect all other POINTs sharing that expression, and overwrites the currently selected expression

- You may rename the shared expression in the **Name** entry box.
- Click the **Variables** button to edit, add, or remove variables.

- You cannot assign POINTs to the variables from the **Customize / Derived POINTs** screen. Refer to the **POINT Properties / Expressions tab** section earlier in this chapter for details on assigning POINTs to variables.

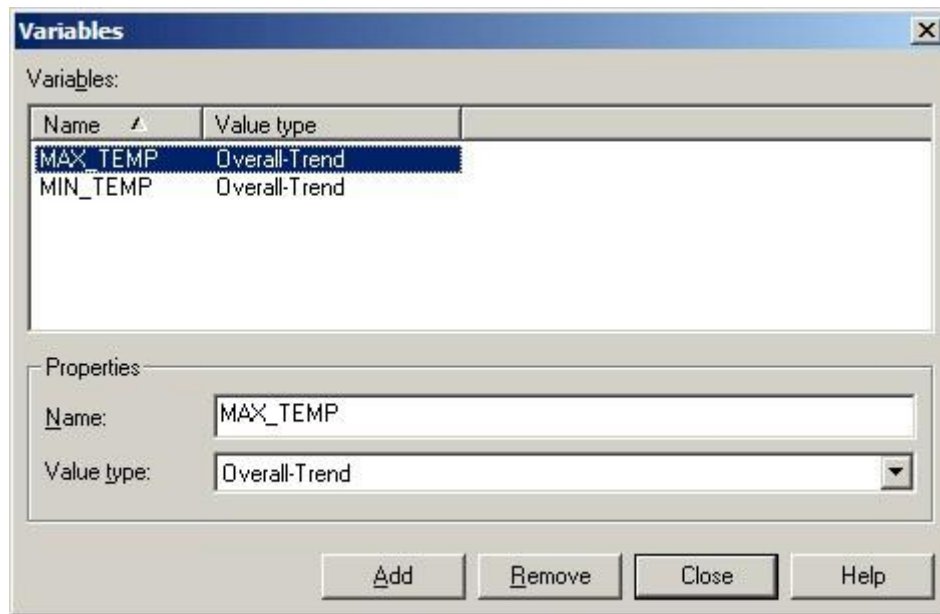


Figure 3 - 105.
The **Variables** Dialog.

- Edit the expression formula by inserting variables, constants, or formulas.
 - To add a new expression, click the **Add** button, and enter settings as previously described in this chapter's **POINT Properties / Expression Tab** section.

To edit constants:

There are two ways to edit shared constants. You can edit constants using the **Expressions** tab's **Constants** button, or by using the **Constants** tab. Both methods are described below.

- From the **Expressions** tab, click the **Constants** button to add a new constant to the **Constants** list. In the **Constants** dialog, click the **Add** button.

Or

- Click the **Constants** tab to add or remove a constant, or to edit pre-existing constants.
- Click the **Add** button to create a new constant, or select a constant from the **Constants** list and edit the **Name** and **Value** in the **Constant properties** area.
- Click the **Remove** button to remove the selected constant from the **Constants** list.

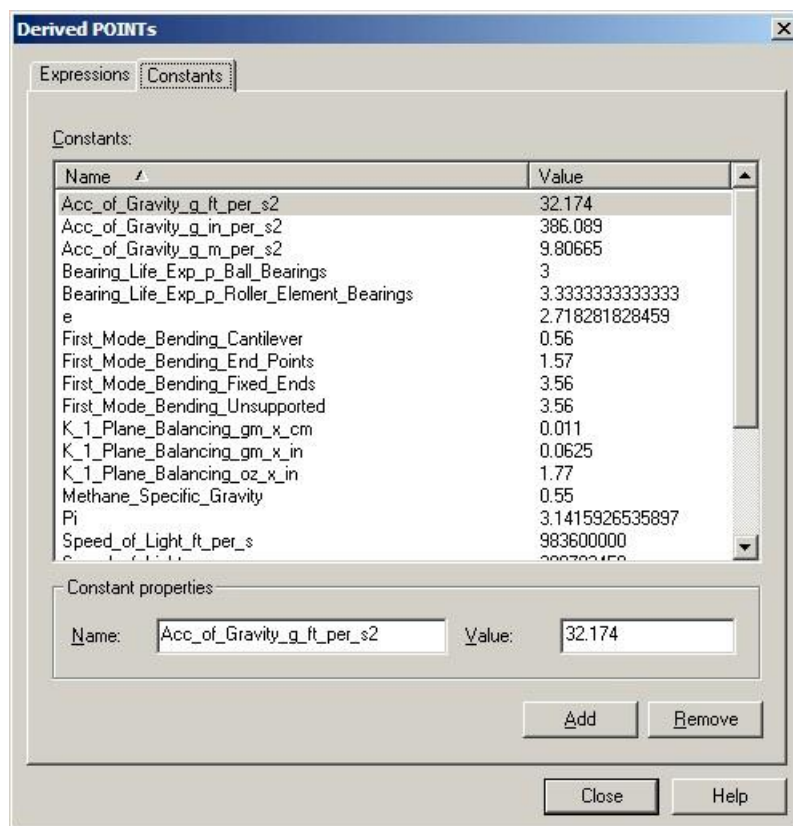


Figure 3 - 106.
The **Customize** menu's **Derived POINTs Constants** Tab.

Important – After editing a derived POINT, you must manually calculate the derived POINT to update the POINT's existing data records. Reference the Calculating Derived POINTs section earlier in this chapter for details.

Canary Lab Settings

For Canary Lab customers, use the **Canary Lab Settings** to define historian data sets to be available when setting up Canary Labs POINT properties.

- The IPMS data set comes preloaded; if you do not recognize this data set, you can safely remove it.

To add a new Canary Lab data set:

- Select the **Customize** menu's **Canary Lab Settings** option. The **Data Set Settings** dialog displays.

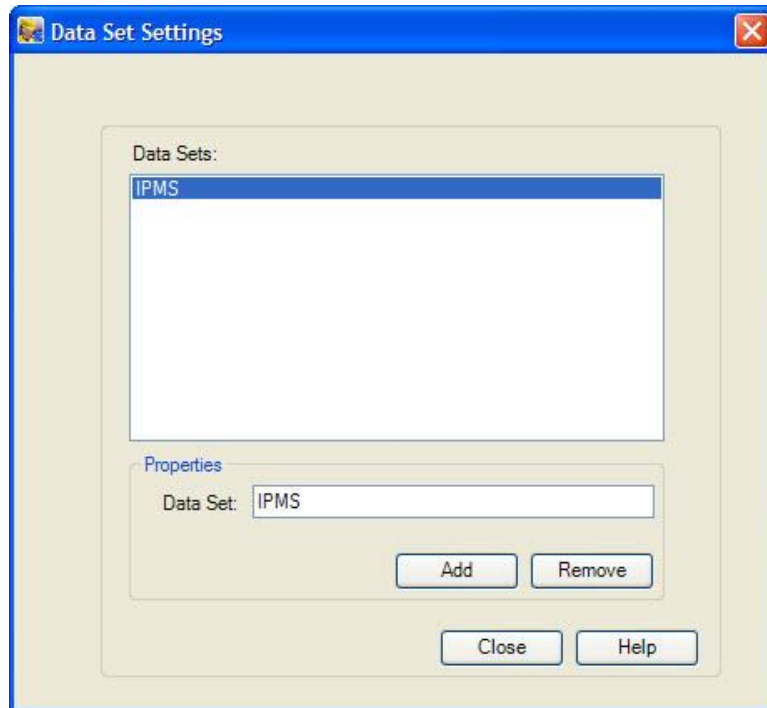


Figure 3 - 107.
The **Data Set Settings** Dialog.

- Enter the name of the data set in the **Data Set** field and click **Add**. The new data set will display in the **Data Sets** section, along with any other available data sets.
- When finished adding the data sets, click **Close**.

To remove a data set:

- From the **Data Set Settings** dialog, click the data set to remove from the **Data Sets** section and click **Remove**. The selected data set will no longer be available.
- When finished removing the data sets, click **Close**.

Data Collection ROUTEs and Other Data Transfer Operations

Overview

After establishing your hierarchy's POINTs, you are ready to create your collection ROUTEs.

- It is not imperative that you create @ptitude Analyst ROUTEs to download POINTs to the data acquisition device. Downloading directly from a plant hierarchy list is discussed later in this chapter.

A ROUTE is a measurement POINT collection sequence. ROUTEs are downloaded to a DAD to provide orderly collection of measurement data on a timely basis.

ROUTEs are first created on paper. You simply walk through your facility and list (in a logical, efficient collection sequence) the equipment and pre-defined POINTs you plan to collect at a given time. For example, list the measurements you plan to perform weekly (e.g., every Tuesday) as "Tuesday's ROUTE", and/or list the measurements you plan to perform monthly as the "monthly ROUTE."

Take time to organize your collection ROUTE paper copy thoroughly. A complete and organized paper copy collection ROUTE makes building @ptitude Analyst ROUTEs much easier.

After establishing your paper copy ROUTE(s), your next task is to use your paper copy ROUTE to create a @ptitude Analyst ROUTE.

How to Build ROUTEs

- This section is not applicable to DMx systems.

@ptitude Analyst's method for creating ROUTEs is simple.

Using your paper copy ROUTE, open the Hierarchy, ROUTE, or Workspace window for those measurement POINTs you wish to have in the ROUTE, and copy selected items (machines with their POINTs, SETs with their machines and POINTs, Custom Groups with their machines and POINTs, or the entire hierarchy) from the open **Hierarchy** window to the new **ROUTE** window, creating the new ROUTE's hierarchy list.

You may also insert (**Insert** menu) Groups directly into a ROUTE window, then select POINTs from a **Hierarchy**, **ROUTE**, or **Workspace** window, and copy them to your new **ROUTE**, organized beneath your newly inserted Groups.

If necessary, move hierarchy items in the **ROUTE** window to match the most efficient collection sequence (detailed on your paper copy ROUTE).

- **IMPORTANT** - In a ROUTE window, changes to a POINT's placement in the list, and POINT deletions do not affect the Hierarchy window. *However, changes to individual POINT setup settings (POINT Properties) **do apply** to the hierarchy and reflect in Hierarchy window.*

Changes to Group item Properties *do not* affect the Hierarchy window.

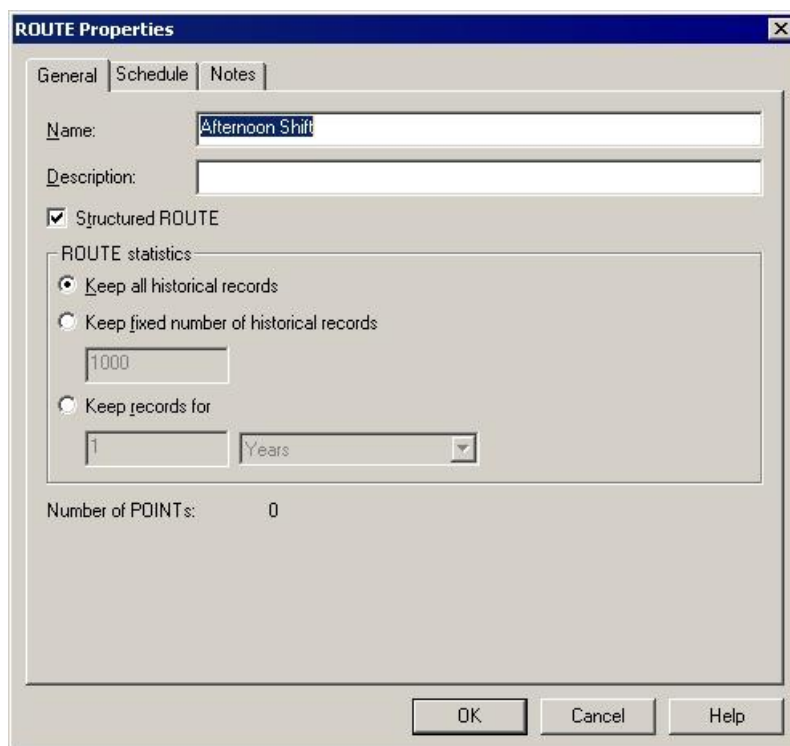
To open an existing ROUTE:

- Select the **View** menu's **ROUTE** command. The **ROUTE** screen displays.
- Select an existing ROUTE and click the **Open** button. The selected ROUTE window opens.

To add a new ROUTE:

- Click the **ROUTE** screen's **Add** button. The **ROUTE Properties** screen displays.

ROUTE Properties / General



The screenshot shows the 'ROUTE Properties' dialog box with the 'General' tab selected. The 'Name' field contains 'Afternoon Shift' and the 'Description' field is empty. The 'Structured ROUTE' checkbox is checked. Under 'ROUTE statistics', the 'Keep all historical records' radio button is selected. The 'Keep fixed number of historical records' option has a value of '1000' in its text box. The 'Keep records for' option has a value of '1' in its text box and 'Years' in its dropdown menu. The 'Number of POINTs' is set to '0'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Figure 4 - 1.
The **ROUTE Properties** Screen's **General** Tab.

ROUTE Properties screen's **General** tab's fields include:

- Name** – Enter a new ROUTE name.
- Description** – Enter a new description.

The **ROUTE Statistics** area allows you to make your ROUTE a structured ROUTE, and determine the type of historical information to keep. If historical record settings are entered, then ROUTE statistics, such as collection time duration, start and stop times, and operator ID, are recorded with the ROUTE. If the ROUTE is designated as a structured ROUTE, then data must be collected in the order in which the POINTs are listed in the ROUTE.

To create a structured ROUTE:

- Click the **Structured ROUTE** checkbox to designate the selected ROUTE as a structured ROUTE.

To enter ROUTE statistic settings:

- Click an option button to specify the amount of historical records to keep. Included in each historical record are the ROUTE's collection time duration, start and stop times, and Operator ID. Options include:

Keep all historical records – Saves all historical ROUTE collection statistics for the selected ROUTE.

Keep fixed number of historical records – Enter the number of historical records to save for the selected ROUTE.

Keep records for – Enter a time duration value for storing historical records. For example, enter **6** in the text box and select **weeks** from the drop down list to save historical records for 6 weeks.

The number of POINTs included in the selected ROUTE display at the bottom of the screen.

- The **ROUTE Properties Schedule** tab is not applicable to ROUTEs for online data.

ROUTE Properties / Notes

ROUTE Properties / Notes fields include:

ROUTE instruction notes – Allows you to create, edit, and store instructions / notes relating to the ROUTE. ROUTE instructions are downloaded to the data acquisition device along with the ROUTE, and may be viewed on the DAD's LCD panel.

- Enter appropriate ROUTE properties and click **OK**. The new ROUTE's window displays.
- Use drag and drop or copy and paste operations to copy selected Groups and POINTs, from the Hierarchy or Workspace windows into the new ROUTE's window to create the new ROUTE's hierarchy list.

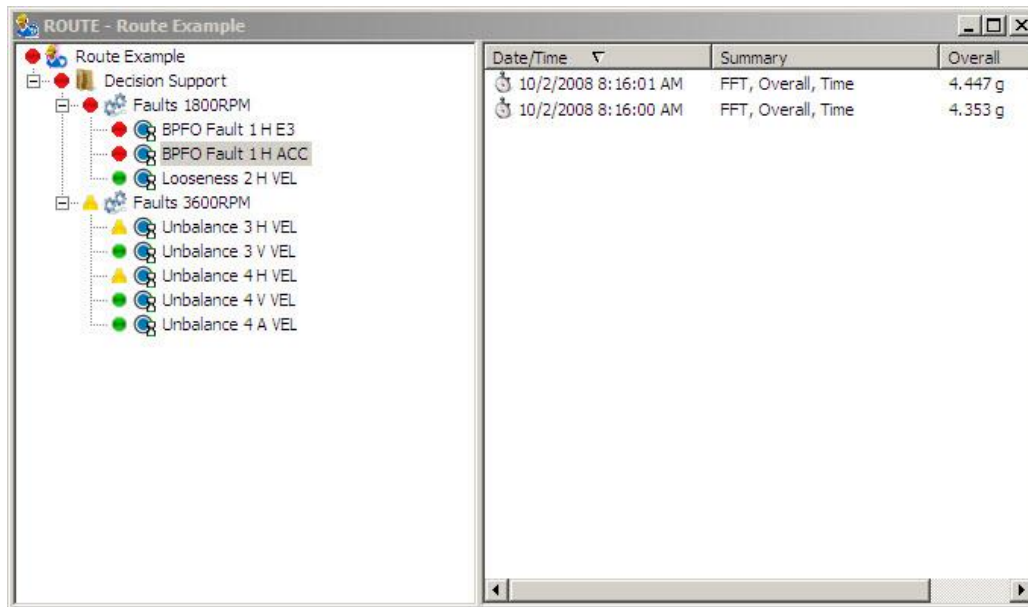


Figure 4 - 2.
The **ROUTE** Window With Copied Items.

To remove an unnecessary ROUTE:

- In the **ROUTE** window, select the ROUTE name.
- Click the **Remove** button. Confirm action when prompted. The selected ROUTE is removed.

To set the same measurement speed for multiple FFT measurements:

- Starting from a ROUTE, expand the appropriate machine. Beneath the machine in the hierarchy, right-click on the measurement POINT you wish to use as a reference and select Set Speed (Multiple) from the resulting context menu.

OR

- Starting from a ROUTE, expand the appropriate machine. Beneath the machine in the hierarchy, click on the appropriate measurement POINT to display its measurements in the right panel. Then, right-click on the single measurement you wish to use as a reference and select Set Speed (Multiple) from the resulting context menu.

The [Set Speed \(Multiple\)](#) window appears.

Downloading ROUTEs to the On-line Device

- WMx devices automatically transfer data for WMx devices / channels with assigned POINTs when the WMx Service is running.

On-line System Transfer Overview

The On-line transfer function allows you to download measurement POINT setups to the IMx, check the IMx status, and configure, clear, or reset the IMx.

After configuring your IMx POINTs, and configuring your system's preferences, use "Download" options in the **Transfer menu's** On-line dialog to download the new POINTs to your On-line network.

- A maximum of 80 IMx POINTs can be downloaded.
- In @ptitude Analyst, select **Online** from the **Transfer** menu. The **Online Transfer** screen displays.

On-line Transfer Download Tab

- The **Online Transfer** screen's **Download** tab allows you to download an individual hierarchy item, or an entire ROUTE or workspace.

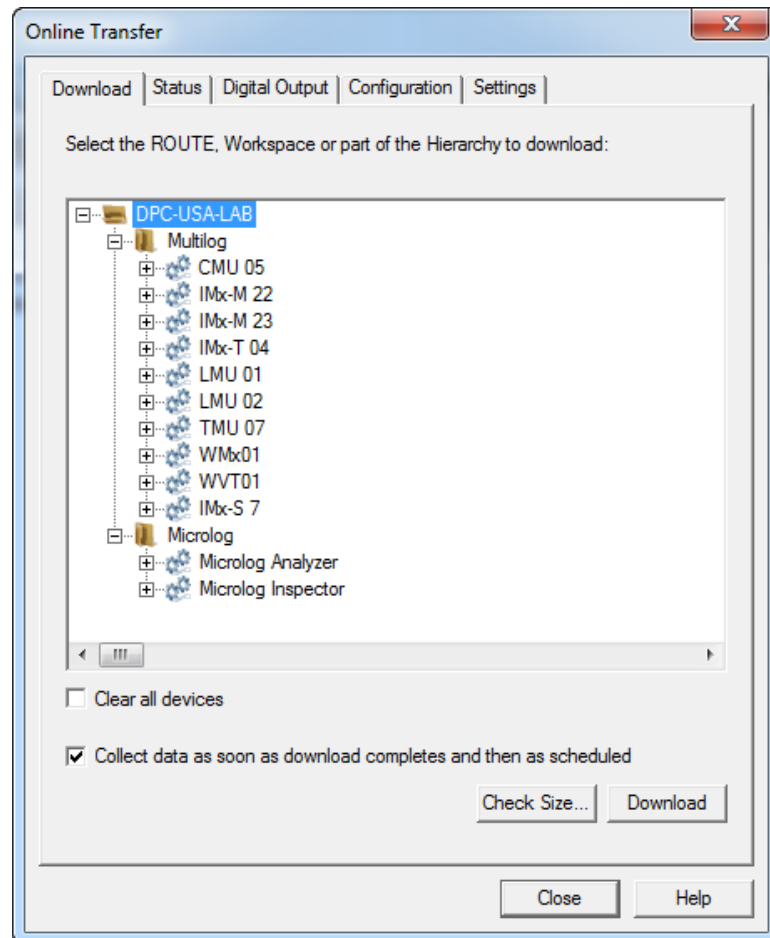


Figure 4 - 3.
The **Download** Tab.

- Click to select a single hierarchy item or a ROUTE or workspace for download from the appropriate Hierarchy, ROUTE, or Workspace list.

ROUTEs are organized into three categories; **By Name**, **By Due Date**, and **By Downloaded Date**. ROUTEs that are overdue appear in bold type.

- A ROUTE is downloaded only once, even if it is selected in more than one organizational category.
- Only complete ROUTEs and Workspaces may be downloaded. To download individual POINTs, select them from the Hierarchy list.

Clear all devices – Click to enable. When enabled, all devices will be cleared when the download is initiated.

Collect data as soon as download completes and then as scheduled – Click to enable.

Check Size – Click to check the download size of the selected item(s). The **Check Download Size** window displays. Download size details include the selected device's available memory, total memory used, and status. The POINT details area displays the memory used by each POINT in the selected ROUTE or Workspace. Click **Save As** to save the displayed information to a comma separated text file.

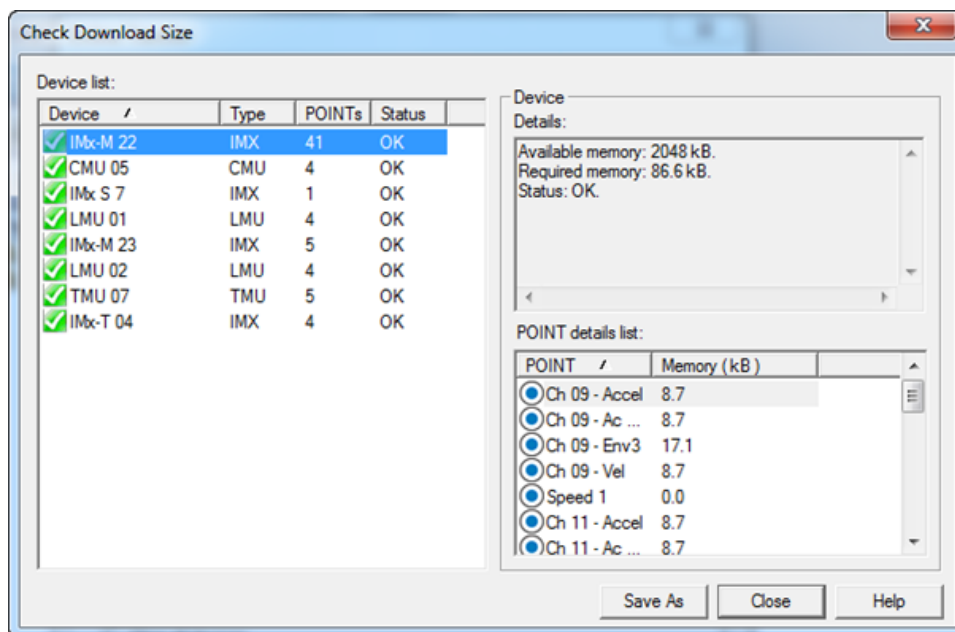


Figure 4 - 4.
The **Check Download Size** window.

Download – Click to download the selected item(s) to the selected device. A dialog appears indicating whether or not the download request was successfully sent.

- Download progress can be viewed through the **Status** progress bar.

Status

The **Online Transfer's Status** tab allows you to view a selected device's status information.

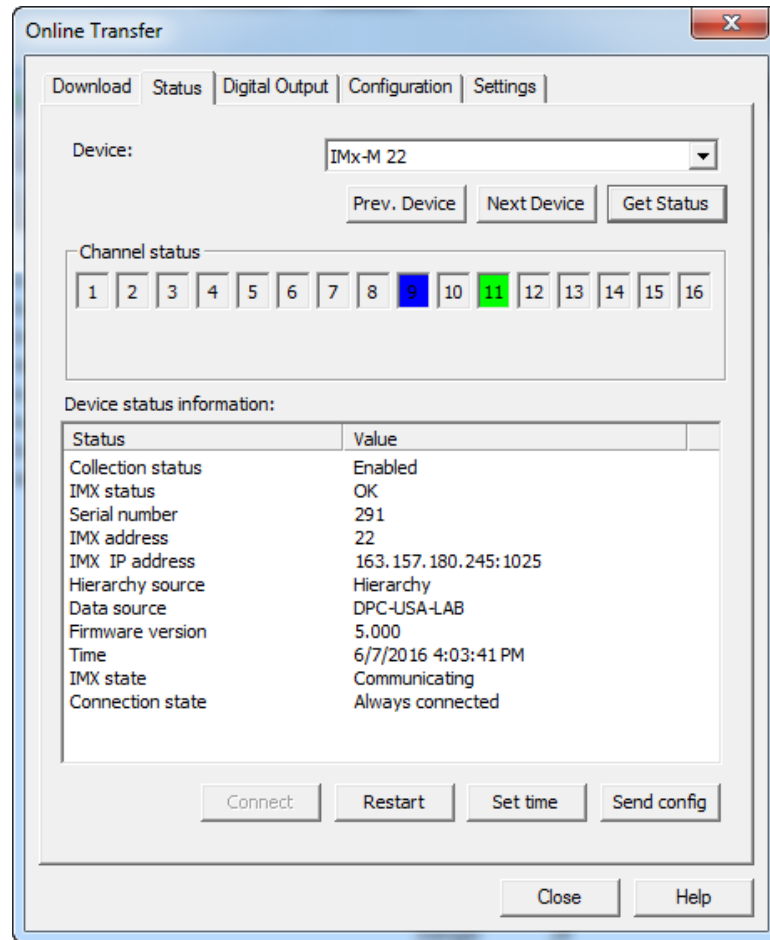


Figure 4 - 5.
The **Status** Tab.

To determine the device status:

- Select the appropriate device from the **Device** drop down list.
- Click the **Get Status** button. The selected device's status appears in the **Channel status** and **Device status information** areas.
- Click the **Prev. device** or **Next device** buttons to navigate the **Device** drop down list and to get status.

The **Channel status** area displays up to 32 numbered boxes, each representing a channel on the IMx. A blue indicator through the channel number represents a sensor problem for the indicated channel. Green indicates there are no problems.

- Channel status is applicable only for channels set up for BOV Gating.

The **Device status information** area displays the following information:

Collection status – Indicates whether collection for the IMx is enabled or disabled.

DAD status – Indicates the channel number and tachometer being used.

DAD address – The physical DAD number as per the switches on the box itself.

ROUTE/Workspace / Hierarchy source – Name of the ROUTE or Workspace that was downloaded to the DAD.

- Items deleted from the ROUTE or Workspace are not deleted from the DAD.

Data Source – Name of the current database.

IMx Version – The hardware version number. If the selected device is an IMx, this option appears as “**IMx Version**.”

Firmware Version – The on-line device’s firmware version number. Useful for servicing and product update information.

Time – The on-line device’s clock’s date and time settings.

Number of POINTs – Displays the number of POINTs downloaded to the on-line device.

Temperature – The on-line device’s temperature, recorded in both degrees Fahrenheit and centigrade.

Free RAM – The amount of free RAM in the on-line device.

Selection Mode – Either On-line or Local. “Local” displays when the DAD is being accessed with a data collection device from its front panel BNC connectors. While in the Local mode, no on-line data collection occurs.

Power Up – Displays a numeric code indicating power up status.

DAD State – Displays the on-line device’s activity status.

Digital Error – Displays the on-line device’s RAM status. “No” indicates no RAM problems. “Yes” indicates RAM problems.

Force Connection to IMx

If an IMx’s **Always Connected** option has been disabled on the **Customize** menu’s **Online Settings** screen, you can force a connection to the device if necessary.

To force a connection to an IMx:

- Select the IMx device to which you wish to connect from the **Device** drop-down list.
- Make sure the **IMx Status** value is “connected” in the **Device status information** area.
- Click the **Connect** button. The **Force Connection** dialog displays.
- Enter the amount of time to stay connected to the IMx and click **OK**.

On-line Transfer Settings

The **Transfer** menu's **Online Transfer** screen allows you to configure your processing delay settings.

- Select **Transfer / Online** and then the **Settings** tab.

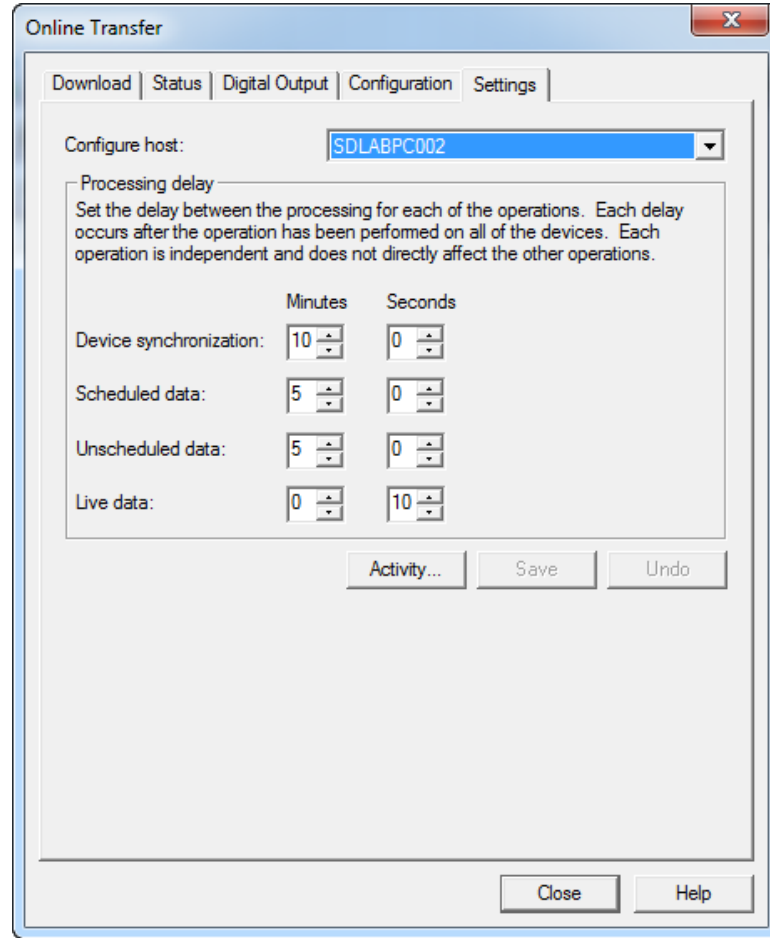


Figure 4 - 6.
The **Settings** Tab.

- Select the appropriate host or server from the **Configure Host** drop down list.
- Use the arrows to adjust the processing delay time for the following operations:

Device synchronization

Unscheduled data

Scheduled data

Live data

- Click the **Activity** button to view an activity log of the interaction between the @ptitude Analyst and the on-line device network.

The **Device Activity** dialog displays activity between the current hardware device and @ptitude Analyst.

Save As – Click to save **Device Activity** window contents to a specified location.

Clear – Click to clear the **Device Activity** window contents.

Stop – Click to stop the **Device Activity** window from displaying the interaction between the @ptitude Analyst and the WMx / IMx network.

Close – Click to close the **Device Activity** window.

Automatic Data Retrieval

Once the @ptitude Analyst hierarchy has been transferred to online devices, @ptitude IMx Services automatically begins data collection for IMx POINTs and @ptitude Analyst Monitor automatically begins data collection on all other POINTs according to the schedule specified in POINT Properties. (Refer to the **SKF @ptitude Analyst Introduction and Global Features** manual's **SKF @ptitude Analyst Monitor Application** section for more information on Monitor.) The status bar at the bottom of the @ptitude Analyst screen provides color-coded status information.

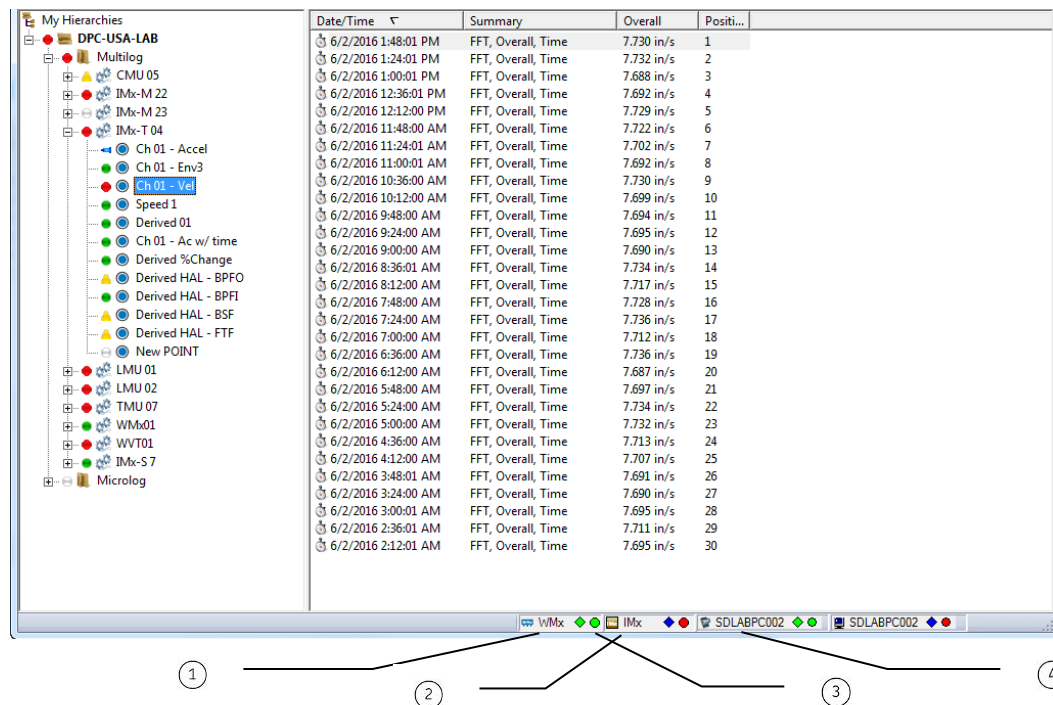


Figure 4 - 7.
Data Collection Status.

- ① WMX Service ID
- ② IMx Service ID
- ③ alarm status
- ④ name of the PC running Monitor

➤ If you are collecting data for the DMx, two Monitor status indicators appear, one for the DMx, and one for all other devices. Refer to **Chapter 7, Multilog DMx Machine Monitoring Module** for details on the DMx Monitor status indicator.

- If you are collecting data for the IMx, a Service status indicator appears. Refer to **Chapter 1, Introduction to SKF @ptitude Analyst for SKF Multilog On-line Systems** for details on IMx Service.
- Multiple WMx services running on separate servers and connecting to one Analyst client (a single database) now show separate status bar indicators for each service.

The status indicator has three informational areas:

ID – Displays the machine name of the Monitor program or IMx Service that is in use. If one of the POINTs being monitored has an alert level alarm, this flashes yellow. If a POINT has a danger level alarm, this flashes red. If there is a system error, for example, a device not communicating, this flashes blue. The alarm flashes until it is reset.

- If multiple conditions exist, a system error takes precedence, followed by a danger alarm. This only flashes yellow if there are no other issues.

System status – The diamond on the status line provides information concerning communication with the devices. If there is an issue with any device, this changes color to blue. Green indicates all devices are communicating properly.

Alarm status – The circle on the status line provides information concerning the danger and alert alarm levels of the POINTs being monitored. If any POINTs are in alert, the circle appears yellow. If any POINTs are in danger, the circle appears red. If there are no alarms on any POINTs, the circle appears green.

- If there are both danger and alert level alarms active, the circle appears red.

A right click menu on the status provides access to additional functionality.

Options may include:

Reset – opens a sub- menu that provides options to clear status alerts.

Alarm Indicator – Clears danger and alert alarm status.

Digital Outputs – When an alarm condition is met, digital output conditions trigger. This includes enabling a light on the online device, as well as triggering any additional signals (e.g., ringing a bell) that have been connected to the device's output channels. This option turns off the lights and any other output signals.

System Indicator – If an issue with any devices communicating with Monitor is detected, the status line flashes blue. This option clears the alert.

All – Clears all alerts.

Digital Output – Opens the **Digital Output** dialog. (The settings on this dialog are also available in POINT Properties and the **Online Transfer** screen, documented earlier in this manual. Refer to the appropriate sections above for details.)

Hardware Activity – Opens the **Hardware Activity** dialog, which provides an activity log of the interaction between the @ptitude Analyst and the on-line device network. (This

dialog is also available from the **Online Transfer** screen's **Settings** tab. Refer to **Online Transfer Settings** earlier in this chapter for details.)

Settings – Opens the **Settings** dialog, which allows you to configure your processing delay settings. (These settings are also available on the **Online Transfer** screen's **Settings** tab. Refer to **Online Transfer Settings** earlier in this chapter for details.)

Status – Opens the **Status** dialog, which allows you to view a selected device's status information. (These settings are also available on the **Online Transfer** screen's **Status** tab. Refer to the **Status** section earlier in this chapter for details.)

System Information – Opens the System Information dialog, which provides access to the Event Log and the Online Data log. (Refer to the **SKF @ptitude Analyst Introduction and Global Features** manual for details.)

Manual Data Entry

Use the **Insert** menu's **Manual Entry** option to manually enter overall measurement values into your @ptitude Analyst hierarchy. This feature allows you to store, trend, and analyze measurements made with the SKF Pens (VibPen Plus, *SEE* Pen, and ThermoPen). Also, other machinery operating conditions such as flow, speed, and pressure can be manually entered and trended. The **Manual Entry** window allows you to manually type in one overall value per POINT.

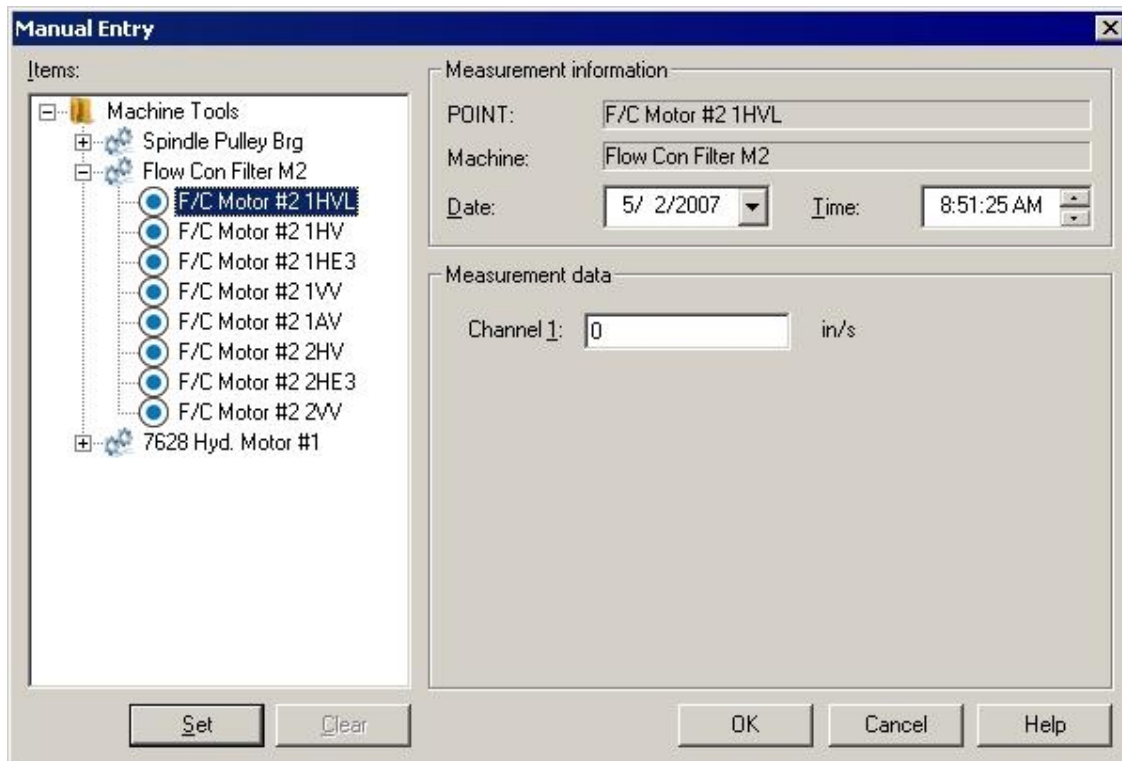


Figure 4 - 8.
The **Manual Entry** Window.

To manually enter data:

- Select a POINT from the **Items** area.
- Type in the value in the **Measurement data** field(s).
 - The **Measurement data** section varies depending on the type of POINT that is selected.
- Click the **Set** button.
 - By default, the current date / time is applied to the entered POINT value. Select desired date and time from the drop down menus to edit these fields as needed.
 - To quickly enter multiple values that all use the default Date / Time, simply click the **Measurement data** field, type the value and press **Enter**. The value is stored and the pointer moves to the next item's **Measurement data** field.

To clear entered data:

- Select a measurement with a set value and click the **Clear** button.
- Click **OK** to store the specified values and automatically re-process alarms, or **Cancel** to undo settings.

5

Displaying Graphic Plots

Overview

@ptitude Analyst allows you to display your collected measurements in various plot formats for machinery analysis purposes.

Graphic On-line Systems plot formats include:

- Trend
- Spectrum
- Trend / Spectrum
- Time
- Trend / Time
- Trend / Spectrum / Time
- Spectrum Waterfall
- Polar Vector
- Mag / Phase Trend
- Band Trend
- Extracted Trend
- Extracted Band
- Variable Speed
- Orbit
- Shaft Centerline
- Nyquist
- Bode
- Cascade
- Topology
- Contribution /Profile
- HAL Trend
 - Orbit and Shaft Centerline plots are available for the DMx, IMx, and WMx.
 - Nyquist, Bode, Cascade, and Topology plots primarily apply to transient data. They are documented **Chapter 8, Transient Data Analysis**.

How To Display Graphic Plots

@ptitude Analyst offers multiple methods for displaying measurement data in plot format. Each method has its advantages. However, regardless of the selected method, the first step in displaying plots is to open any view that contains POINTs (Hierarchy, ROUTE, Workspace, Plot, and Alarms view). The second step is to select the measurement POINT(s) whose data you wish to display in plot form.

Then use one of the following methods for displaying measurement data in graphic plot format.

- The **File** menu's **Print** option may be used at any time to print the contents of the “active” window (including graphic display windows).

Displaying Plots Using Toolbar Buttons

@ptitude Analyst has toolbar buttons for commonly used plots.

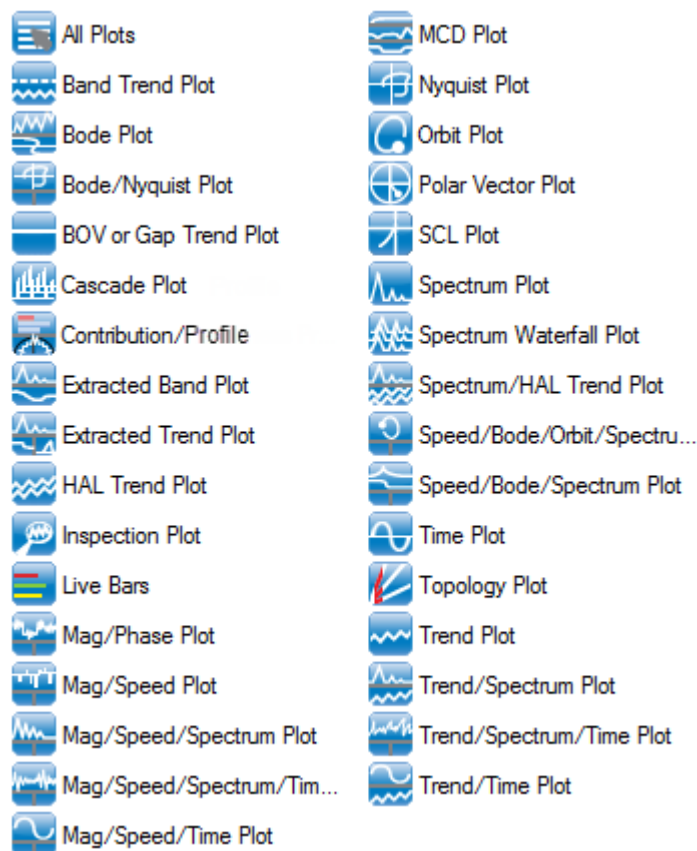


Figure 5 - 1.
Plot Toolbar Buttons (Shown Here as Two Columns).

- To select multiple POINTs for display in a single plot, you must first select the machine in which the POINTs list in the hierarchy's left panel, then select the desired multiple POINTs in the hierarchy's right panel.

- To select POINTs from multiple machines, you must first copy the desired POINTs to a Workspace window.

To display graphic plots using the toolbar:

- Select (highlight) the POINT(s) you wish to display in the Hierarchy, ROUTE, Workspace, or Alarms windows.
- Click one of the toolbar's graphic display buttons to display the selected POINTs or measurement(s) in a specific type of plot.

Click the **All Plots** toolbar button to display the **All Plots** dialog. From this dialog, you may select the plot type to display from all available plots, rather than only the commonly used plot types represented with toolbar buttons.

- Different plot display toolbar buttons may be manually added or removed using the **Customize** menu's **Toolbars** option. Custom toolbars are detailed in **Appendix A, SKF @ptitude Analyst Toolbars**.

Displaying Plots Using the View Menu

View menu graphic display operations are similar to toolbar button graphic display operations. The **View** menu allows you to display every graphic plot type that applies to the selected POINT(s).

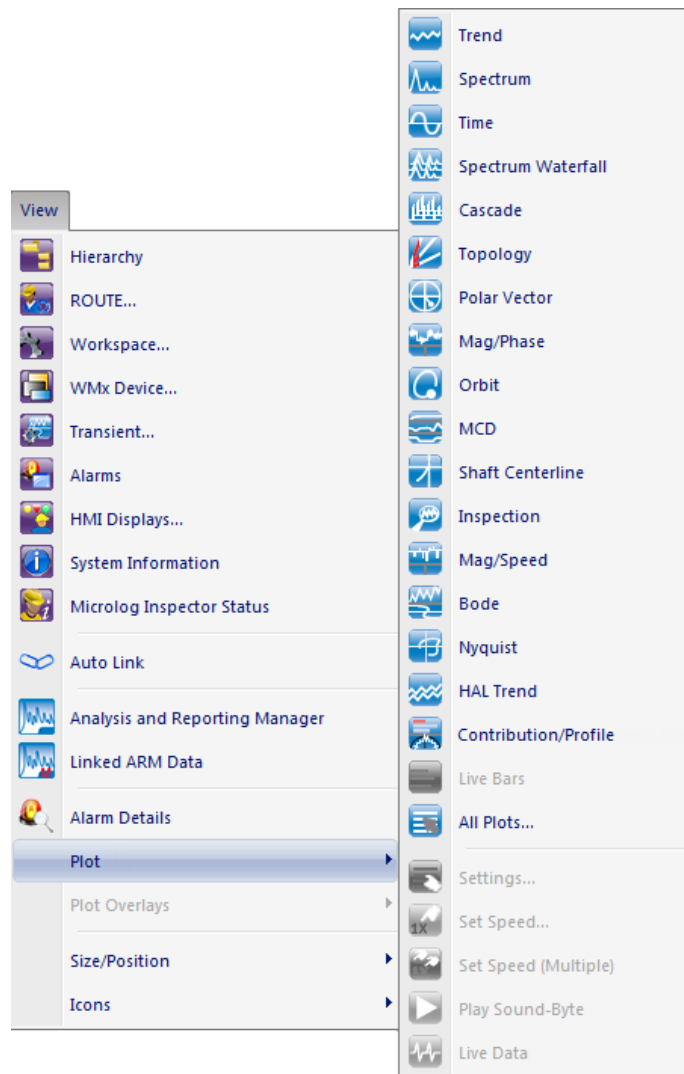


Figure 5 - 2.
The **View** Menu's **Plot** Option.

To display graphic plots using the View menu:

- Highlight the POINT(s) you wish to display in the Hierarchy, ROUTE, Workspace, or Alarms windows.
- Select the **View** menu's **Plot** option. Select one of the visible plot types, or select **All Plots** for more selections. All plot types display in the dialog.

Displaying Plots Using the POINT's Context Menu

You can also display a plot directly from selected single or multiple POINTs using the context menu.

To display a plot using the context menu:

- Select POINT(s) from a Hierarchy, ROUTE, Workspace, or Alarm window.
- Using your mouse, right click to activate the context menu.

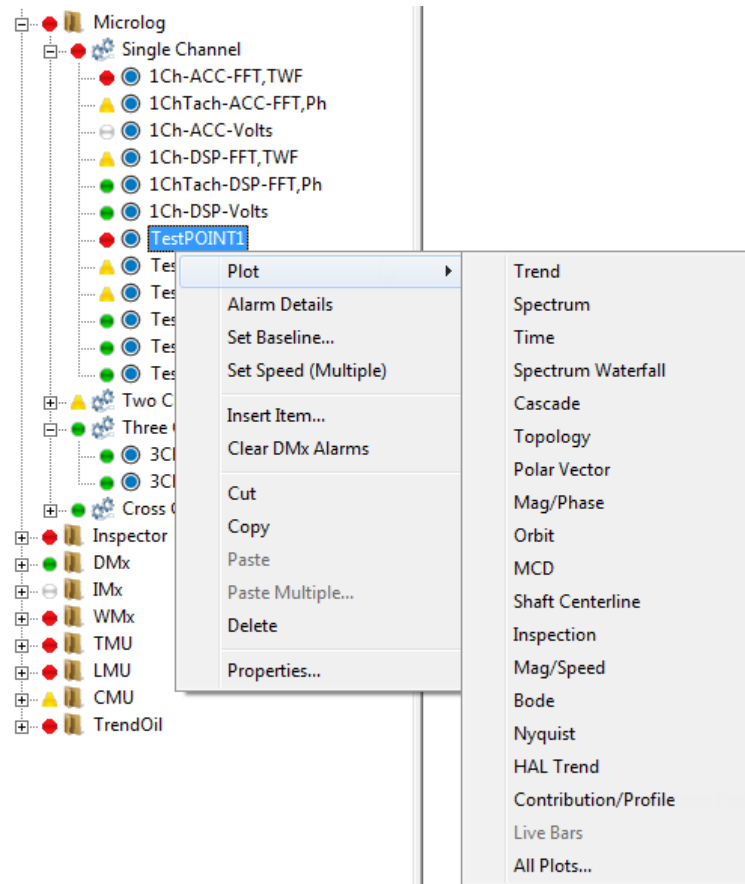


Figure 5 - 3.
Hierarchy Context Menu's **Plot** Option.

- Select the desired **Plot** type. The selected plot type displays in a plot window for the selected POINT(s).
 - You can also use the right-click context menu to display a plot directly from a selected single measurement data record or multiple measurement data records.

Plot Window

Plot window displays collected measurements in various graphic plot formats for machinery analysis purposes.

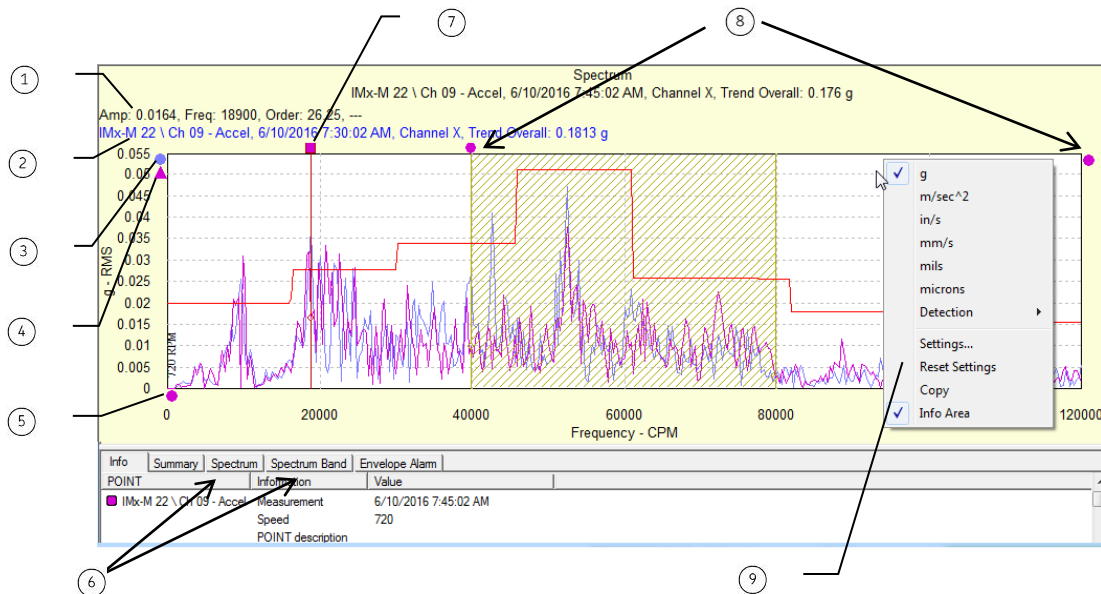


Figure 5 - 4.
Plot Window.

- | | |
|--------------------------|------------------------------|
| (1) cursor feedback | (6) various overlay tabs |
| (2) mouse feedback | (7) active overlay |
| (3) inactive plot line | (8) inactive overlays |
| (4) active plot line | (9) right-click context menu |
| (5) running speed anchor | |

Plot Window Overview

The **Plot** window's title bar displays the plot type displayed for the current POINT. The **Machine** name (from the hierarchy) corresponding to the POINT displays in front of the POINT name (for a single POINT). The Machine and POINT name display in the plot window's top center area for all plots. The date / time stamp and overall value display for spectrum and time plots. Multiple POINTs are not individually identified.

There are two areas in the Plot window. The top area is the plot area. The lower part is the information area.

- You may re-size the entire Plot window, and/or either of the window's areas, for customized viewing. You may also hide the information area automatically (using **Preferences**) or manually (using the toolbar or context menu).
- The status of the information area affects plot print-out. If a plot is printed when the **Info** tab is displayed, the **Info** tab's information prints along with the plot. If a plot is printed when

the **Info** tab is hidden, the **Info** tab's information *does not* print with the plot.

Plot Window Information Area

Info		Summary	Spectrum		
POINT		Information		Value	
■	FD Fan \ FD FAN	2V-VEL	Measurement	6/8/2011 8:05:14 AM	
			Speed	1185	
			POINT description	FD Fan ib motor brg.	
			Machine description	Force Draft Fan	
			SET name	Machine Data \ FD Fan \ FD FAN 2V-VEL	
			Location		

Figure 5 - 5.

The information area's tabs display various plot information for the active plot.

- Use the "I" key to toggle the information area on and off.

Info tab – Displays general information for the active plot.

Summary tab – Displays measurement summary information for all POINTs displayed on the plot.

Plot type tab (Trend, Spectrum, etc.) – Displays information for each *single* cursor on the active plot.

Other tabs appear in the information area depending on the type(s) of overlay(s) used on the current plot, and display information specific to each overlay type.

Plot Feedback Areas

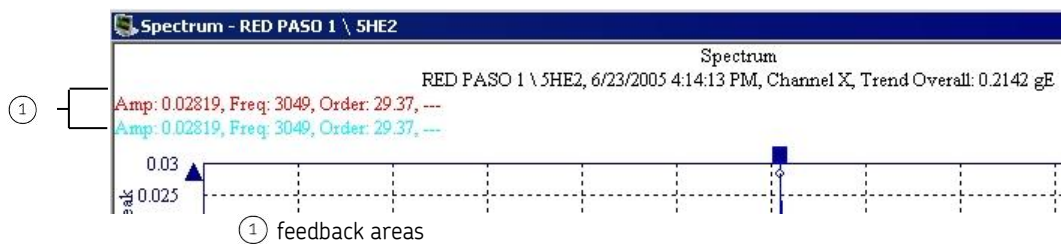


Figure 5 - 6.
Plot Feedback Areas.

The first line displays information corresponding to the active cursor overlay's current position.

The second line displays information corresponding to the mouse pointer's current position (when positioned over a plot item).

Plot Window Operations

Mouse Operations

There are several ways to work within the Plot window. The mouse can be used to display specific plot information. The mouse's pointer changes to an up arrow (↑) when

placed over a plot item. Typical plot items include overlay, plot line (trace), anchor, any object with feedback information, and context menus.

Overlays

Plot “overlays” superimpose cursors, alarms, text annotations, and frequency markers on displayed plots. Each overlay displays an “anchor” which you use to manipulate the overlay.

Anchors

Anchors indicate overlays and plot lines on the active plot. Anchors also identify the active status of an overlay and plot line (trace).

The *Active* plot line anchor is indicated using a **triangle** icon. Plot line anchors display on the plot’s left.

The *Active* overlay anchor is indicated using a **square** icon. Active overlay anchors indicate which plot’s data is displayed using the plot’s color in the overlay’s square icon.

Inactive plot line and overlay anchors are indicated using **circle** icons.

- Double-click an overlay’s anchor to switch it to another plot.

Some overlay anchors appear at the top of the plot, others appear to the plot’s right. Band cursor, harmonic cursor, sideband cursor, and single cursor anchors display across the top of the plot, directly above their respective overlays. Band alarm, envelope alarm, frequencies, curve fit, overall alarm, and peak cursor anchors display on the plot’s right. The running speed anchor displays beneath the plot.

Many anchors indicate overlay position in respect to the plot’s X and/or Y axis. Anchors provide easy access to the plot item’s right-click context menu. For example, to access the settings dialog for your frequencies overlay, right-click on the frequency overlay anchor to launch the frequencies **Settings** dialog.

If two or more traces are displaying on a plot and an overlay is added to the plot, it automatically attaches itself to the *active* plot line (trace).

Text annotations (temporary textual annotations) may be placed anywhere on the plot. Text annotations do not have anchors.

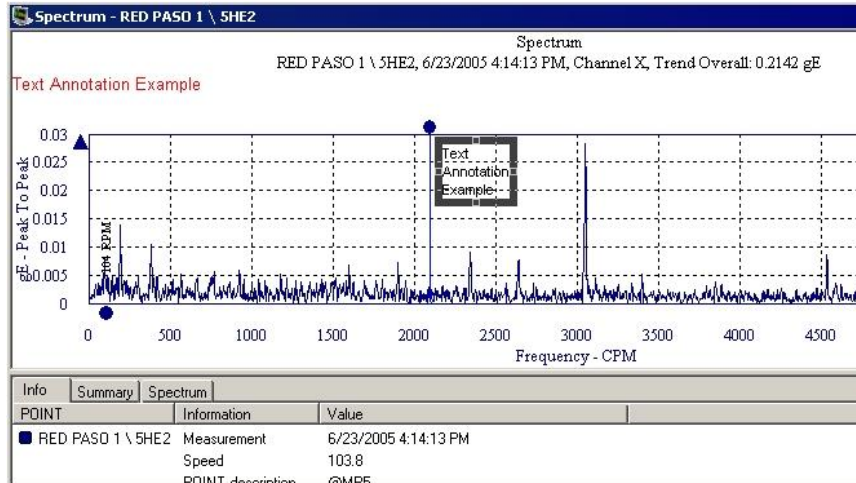


Figure 5 - 7.
Plot Window with Text Annotation.

Plot Line (Trace) Right-Click Context Menu

Position the cursor over the plot line and using your mouse, right-click to access the plot line context menu. Menu options include:

Lock Trace – Enable this option to “lock” the selected plot line data so it will remain visible when auto linking is used. This allows you to compare the “locked” plot line data to the new data that is added or removed when autolinking is used.

Remove – Removes trace from plot.

Properties – Displays **POINT Properties** screen for the plot’s active POINT.

Go to Hierarchy – Displays the Hierarchy window with the selected hierarchy item highlighted for easy identification.

Priority – Assign a priority level to the Machine the POINT is under.

Plot Right-Click Context Menu

Position the cursor over the plot background and using your mouse, right-click to access the plot context menu. Menu options include:

Plot Specific Options – Plot options display in the menu’s top area (if available), allowing you to configure the plot’s content. Which options appear (if any) depends upon the current plot type.

For example, you can convert the units in an acceleration, velocity, or displacement spectrum plot. Unit types display in the menu’s top area and are available for selection.

Settings – Launches the **Settings** dialog for the current plot type. This dialog allows you to change the way the plot displays. For example, use the **Settings** dialog to change axis ranges.

Reset Settings – Resets to default plot settings. Use **Reset Settings** to clear all settings you made and reset the plot window based on its current content.

Copy – Copies the plot image to the clipboard.

Info Area – **Show / Hide** the current plot's information area.

- Square icons on a trend plot line indicate the measurement is included in calculations for mean and standard deviation (as in the **Info** tab) and statistical alarm generation. Use the single cursor's context menu or **Measurement Properties** to change the "include" status.

Overlay Anchor Right-Click Context Menu

The Overlay anchor right-click context menu provides quick access to the overlay's options (e.g. **Remove** the overlay, or if more than one trace is displayed, move the overlay to the **Next Trace**, etc.)

Drag and Drop Operation

Drag and drop operation allows you to easily display plots for different measurements. These measurements can belong to the same POINT, or to different POINTs. By default, when the POINT is selected, the plot is displayed for the POINT's last measurement. The drag and drop feature allows you to override this default setting and display specific measurements on the plot.

You can also drag and drop to view multiple POINTs on the same plot. Simply drag the desired POINT(s) and/or measurement(s) into the open plot window.

- Some plots combine multiple plot types in one window for side-by-side comparison. In most cases, you may only drag and drop into the primary plot (i.e., the top plot area).

Multiple Measurements and Channels in Plots

You may have multiple measurements from one or more POINTs represented in a plot, either by selecting them when opening the plot, or by dragging and dropping additional measurements onto an open plot.

It is also possible to have multiple channels represented on a plot for multi-channel POINTs. When you access a plot from a multi-channel POINT, the Plot Preferences **Channel Number** setting specifies whether all channels open automatically, only channel X opens, or the **Select Channel Number** dialog displays where you may select a single channel or **All Channels**.

- If Auto Link is turned on, this setting is overridden and all channels display.



Figure 5 - 8.
The **Select Channel Number** Dialog.

If all channels open, each channel is treated as a separate measurement on the plot.

Depending on your plot type, multiple measurements may overlay each other (e.g., spectrum and time plots) or may be represented as individual data points on the plot (e.g., waterfall and trend plots).

A plot anchor is located on the left of the plot for each measurement. Depending on the plot type, the anchors are color-coded to match the data.

Inactive plot line and overlay anchors are indicated using **circle** icons.

The *Active* plot line anchor is indicated using a **triangle** icon.

In the case of plots that are designed to display multiple measurements (e.g., waterfall and trend plots), all measurements under the same POINT are included in one plot anchor. Separate plot anchors only appear if you have multiple POINTs or channels represented in the plot.

For combination plots (e.g., Trend / Spectrum), the channel anchors only toggle the channel on the top plot. To toggle the channels on additional plots, click the single cursor overlay anchor.

The active measurement determines the cursor feedback and information window's content and overlay settings. You may toggle between the measurements by clicking on the appropriate anchor.

Zoom Operation

The zoom operation allows you to easily zoom in and out on the plots for a closer look. You may zoom in and out one of two ways:

- Using the zoom buttons on the toolbar
- Using the mouse scroll wheel

To zoom in / out on a plot using the zoom buttons:



Figure 5 - 9.
Zoom Buttons.

- ① activates zoom
- ② zooms out

- Activate the zoom by clicking the left magnifying glass.
- Click and drag across the area of the plot to which you would like to zoom.

- Click the right magnifying glass to zoom out.

To zoom in / out using the mouse scroll wheel:

- Position your cursor over the area of the plot to which you would like to zoom.
- While holding the Ctrl key, roll the mouse scroll wheel up or down. Rolling up causes the plot to zoom in, while rolling down causes the plot to zoom out.

Plot Navigation

While viewing a plot, use the arrow keys on your keyboard to navigate to the next / previous measurement on the plot or to the next / previous POINT's plot.

To navigate to the next / previous measurement on the plot:

- While holding the Ctrl key, press the left arrow to display the previous measurement, or press the right arrow to display the next measurement.

To navigate to the next / previous POINT's plot:

- While holding the Ctrl key, press the up arrow to display the plot for the previous POINT, or press the down arrow to display the plot for the next POINT.

Set Speed (Multiple)

Use the Set Speed (Multiple) feature to set the same measurement speed for multiple FFT measurements.

- Starting from an FFT measurement plot, right-click on the single cursor and select Set Speed (Multiple) from the resulting context menu.

The [Set Speed \(Multiple\)](#) window appears.

Plot Types

Machinery measurements can be displayed in a variety of graphic display formats that aid machinery analysis. Each graphic display type is detailed below.

- This section does not document Orbit, Shaft Centerline, Nyquist, Bode, Cascade, or Topology plots. Orbit and Shaft Centerline plots are only available for the DMx On-line System. They are documented in **Chapter 7, Multilog DMx Machine Monitoring Module**. Nyquist, Bode, Cascade, and Topology plots primarily apply to transient data. They are documented **Chapter 8, Transient Data Analysis**.

For each type of graphic display, @ptitude Analyst provides settings to manipulate the plot display and to gain valuable analysis information. These settings dialogs are available from the @ptitude Analyst **View** menu and from the toolbar (which changes according to the active plot display type). Each plot's settings dialogs are also detailed below.

Trend Plot

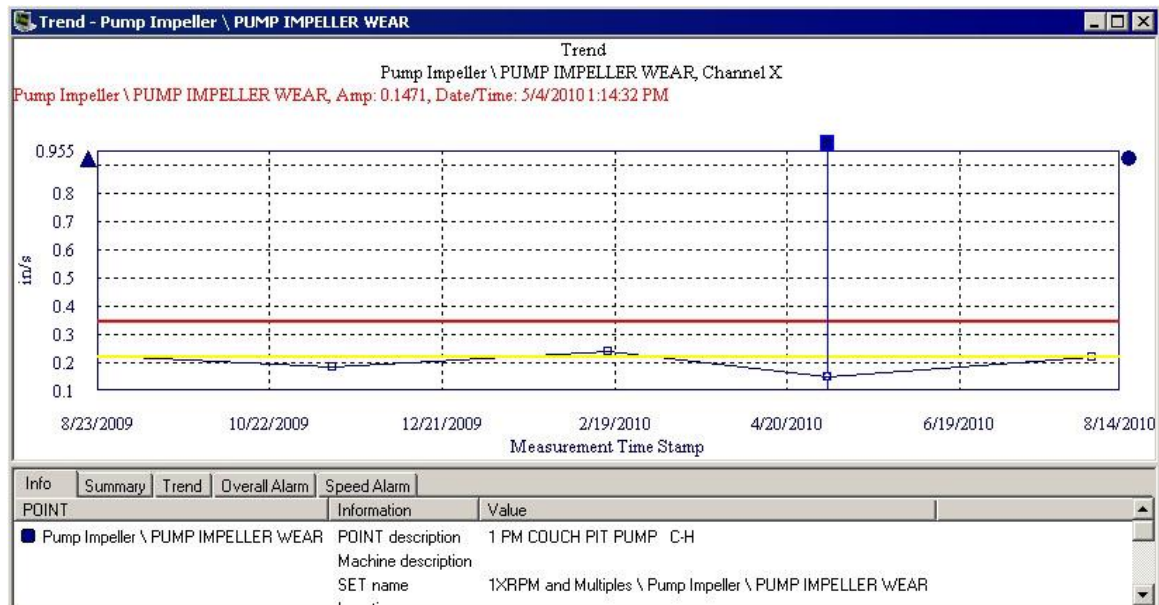


Figure 5 - 10.
Example of a Trend Plot.

Trend plots allow you to easily compare a POINT's most recent reading against its previous readings and its alarm set up, allowing you to see how the POINT is "trending" over time. Trend plots are an easy and accurate method of detecting gradual changes in process conditions and changes that might otherwise be overlooked.

In addition to displaying trend plots for individual POINTs, you can display multiple POINTs' trends (from the same machine or from different machines) in one graphic display window. This allows easy comparison between various POINTs' trends.

In a trend plot, the X axis (horizontal axis) represents time and the Y axis (vertical axis) represents magnitude.

- Square icons on a trend plot indicate the measurement is included in calculations. Use the single cursor's context menu or the **Measurement Properties** dialog to change the "include" status.

Trend Settings

To access the Trend Settings Dialog:

With a trend plot displayed, select the **View** menu's **Plot / Settings** option, use the settings toolbar button, or right-click to display the plot's context menu and select the **Settings** option.

Magnitude scale fields include:

Autoscale - Enabling **Autoscale** automatically scales the initial amplitude axis so it is approximately 120% of the largest amplitude. Disabling **Autoscale** displays the spectrum on the same full scale vertical axis used when it was recorded.

% Full Scale - When enabled, the amplitude axis displays as a % value of the POINT's full scale value. Use **% Full Scale** to compare measurements that do not have the same units or the same Full Scale value.

- If you do not select **Autoscale** or **% Full Scale**, you must enter values to determine the plot's magnitude scale (Y-axis scaling).

Magnitude Scale - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Magnitude Lin / Log - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

Date / Time scale fields include:

Date / Time Scale - Enter minimum and maximum date and time.

- With a plot displayed, to reset all settings back to their defaults, click the right-click context menu's "Reset Settings" option.

Adjust date/time range to include latest notes - When enabled, all notes created after the date / time of the last collected measurement display on the plot. Default is enabled.

BOV or Gap Trend Plot

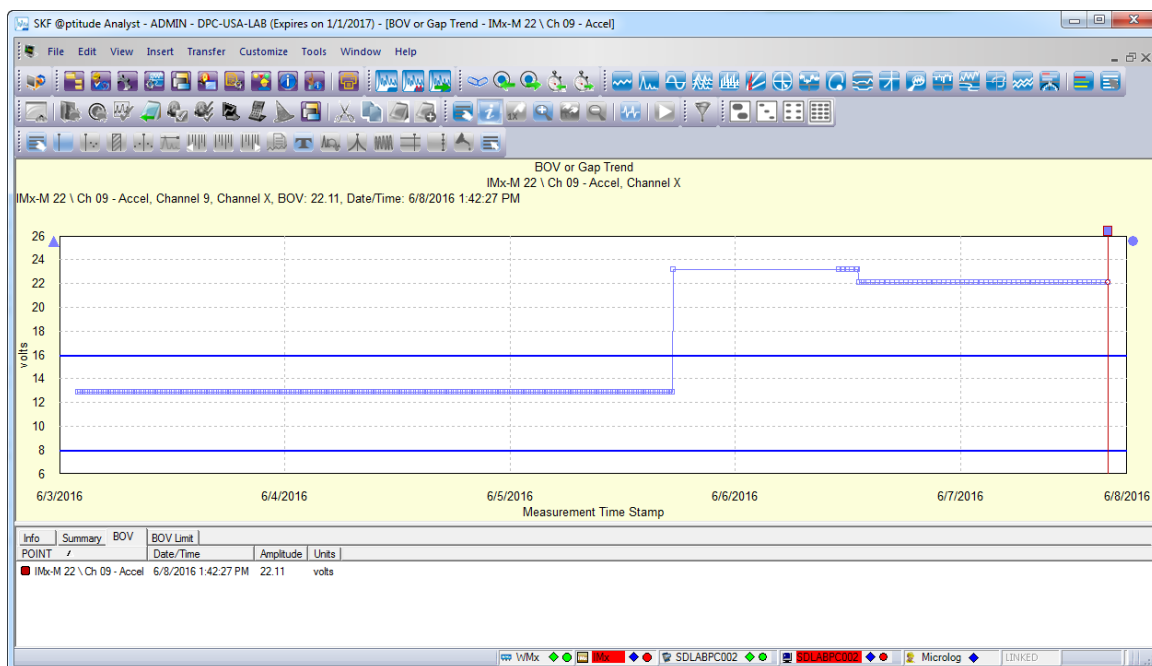


Figure 5 - 11.
Example of a **BOV** Trend Plot.

For IMx POINTs that have channels with the **Check sensor ok status** option enabled, the **BOV or Gap Trend** plot option allows you to trend a sensor's Bias Output Voltage value. The BOV limit overlay (blue horizontal lines) indicate the specified BOV limits. If a sensor's BOV value exceeds its limits, it indicates a bad sensor, and a zero overall value is stored for its vibration measurements.

BOV or Gap Trend Settings

With a trend plot displayed, select the **View** menu's **Plot / Settings** option, use the settings toolbar button, or right-click to display the plot's context menu and select the **Settings** option.

Fields include:

Autoscale - Enabling **Autoscale** automatically scales the initial amplitude axis so it is approximately 120% of the largest amplitude.

BOV min / BOV max - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Date / Time scale fields include:

Date / Time Scale - Enter minimum and maximum date and time.

Spectrum Plot

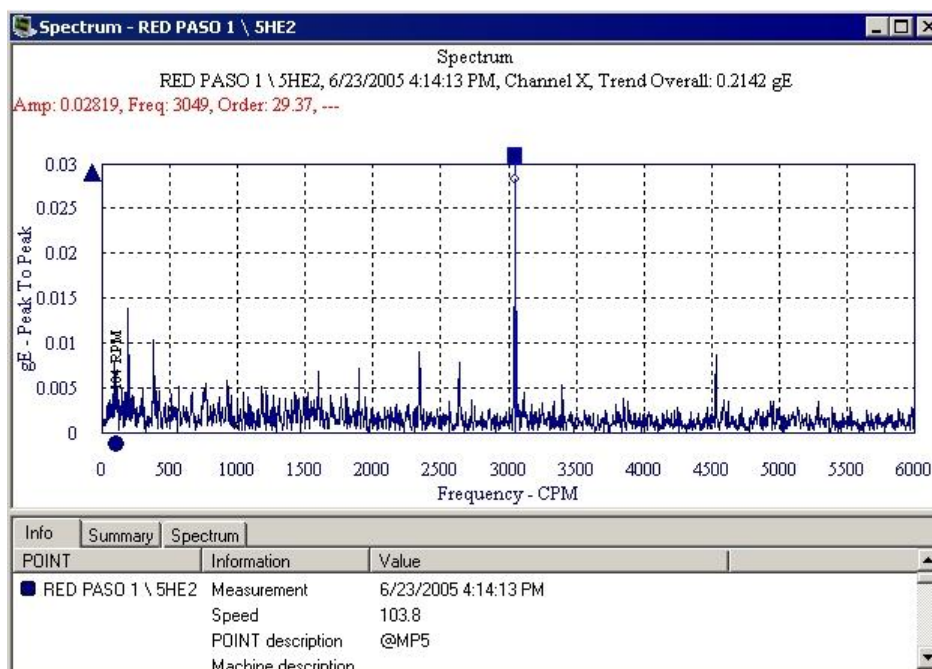


Figure 5 - 12.
Example of a Spectrum Plot.

As different types of machinery problems often occur at different frequencies, it is very useful to analyze measured vibration signals with respect to frequency.

FFT spectrum plots (pl. spectra) display vibration amplitudes at various component frequencies.

- FFT is the abbreviation for Fast Fourier Transform (the mathematical formula that transforms the vibration signal into its component frequencies).

In an FFT spectrum, the X axis (horizontal axis) represents vibration *frequency* in Hz or CPM (or orders of running speed). The Y axis (vertical axis) represents vibration *amplitude*.

FFT spectrum plots are extremely useful machinery analysis tools. FFT spectra provide information that helps determine the location of a problem, the cause of the problem, and with trending, how long until the problem becomes critical.

In addition to single display, you can display multiple POINTs' or measurements' FFT spectra (POINTs may be from the same machine or from different machines). This allows easy comparison between various POINTs' FFT spectra.

Spectrum Settings

To access the Spectrum Settings dialog:

With a spectrum plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.

- The Settings dialog is also available from the spectrum plot's context menu.

View Type fields include:

Combined / Stacked - Determine the plot orientation for multi-channel data. **Stacked** displays each channel as a separate plot. **Combined** shows a single plot overlaid with all channels.

Link - If **View Type** is set to **Stacked**, determine whether cursors and overlays are linked across all plots, or operate independently. If **Link** is enabled, cursors and overlays appear in the same position across all plots. If **Link** is disabled, you may add and move cursors and overlays in each plot independently.

Magnitude scale fields include:

Autoscale - Enable to automatically scale the initial amplitude axis so it is approximately 120% of the largest amplitude. Disable to display the spectrum on the same full scale vertical axis used when it was recorded.

% Full Scale - Enable to display the amplitude axis as a % value of the full scale. Use **% Full Scale** to compare measurements that do not have the same units or the same Full Scale value.

- If you do not select **Autoscale** or **% Full Scale**, you must enter values to determine the plot's magnitude scale (Y-axis scaling).

Magnitude Scale - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Magnitude Lin / Log - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

You must enter values to determine the plot's frequency scale (X-axis scaling).

Frequency scale fields include:

Frequency Scale - Enter the minimum and maximum frequency scale values in the designated text boxes.

Frequency Lin / Log - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

- With a plot displayed, to reset all settings back to their defaults, click the right-click context menu's **Reset Settings** option.

Spectrum Plot – Multi Channel

For two channel and Triax POINTs, you have the option to display spectrum plots in either a *Stacked* or *Combined* view, based on preferences.

- To view multi-channel spectrums in Stacked view, set the **Layout Orientation / Spectrum Plot Preference** to **Stacked**.

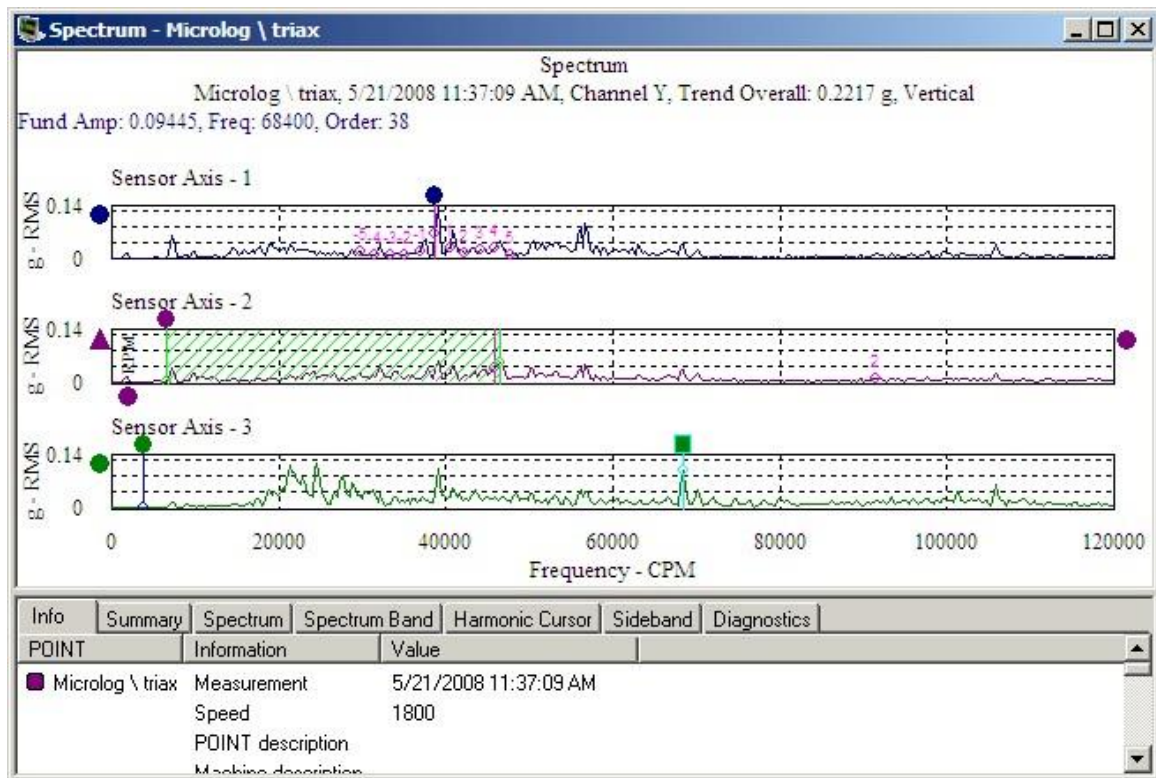


Figure 5 - 13.

Example of a Stacked Spectrum Plot with Unlinked Cursors / Overlays.

In Stacked mode, each channel displays in a separate panel. Depending on your **Stack Mode** plot preference, cursors and overlays on the plot may either be linked or unlinked.

If **Link** is selected, cursors and overlays appear in the same position across all plots. Where applicable, overlay tabs in the information area provide a separate column for each channel (for example, Amp X, Amp Y, and Amp Z).

If **Unlink** is selected, you may add and move cursors and overlays in each plot independently. Where applicable, overlay tabs in the information area list overlay details for each channel on a separate line.

- To view multi-channel spectrums in Combined view, set the **Layout Orientation / Spectrum Plot Preference** to **Combined**.

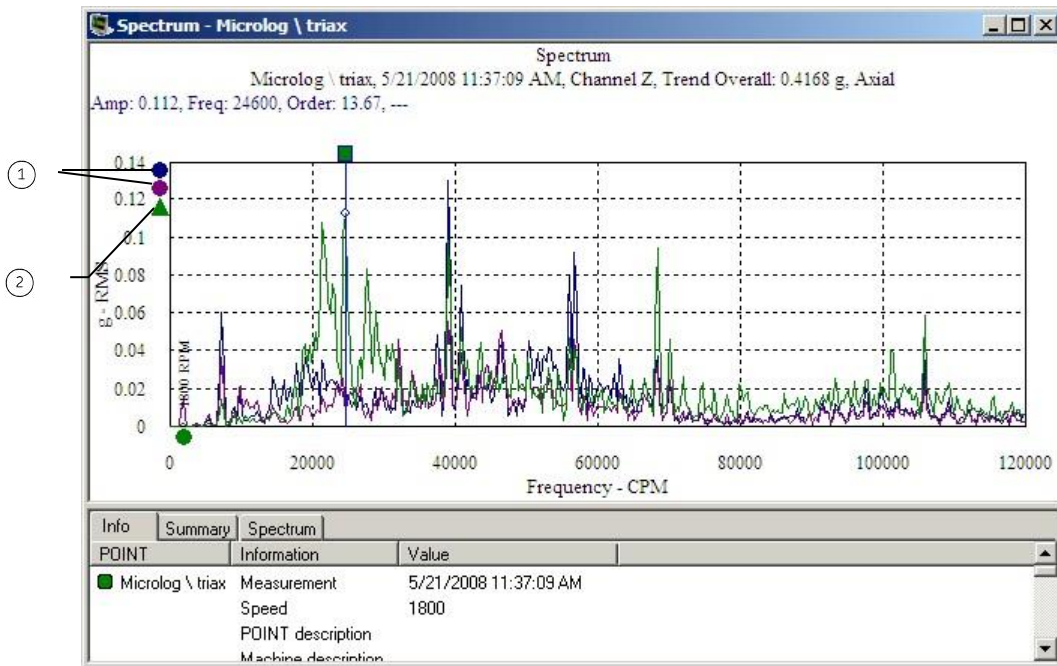


Figure 5 - 14.
Example of a Combined Spectrum Plot.

- ① Inactive channels
- ② Active channel

Combined spectrum plots overlap the data from each channel. The channel indicators on the side of the plot are color-coded to match the spectrum data. The active spectrum is shown as a triangle. Toggle between the channels by clicking on the appropriate indicator. The active channel determines the cursor feedback and information window's content and overlay settings.

Trend / Spectrum Plot

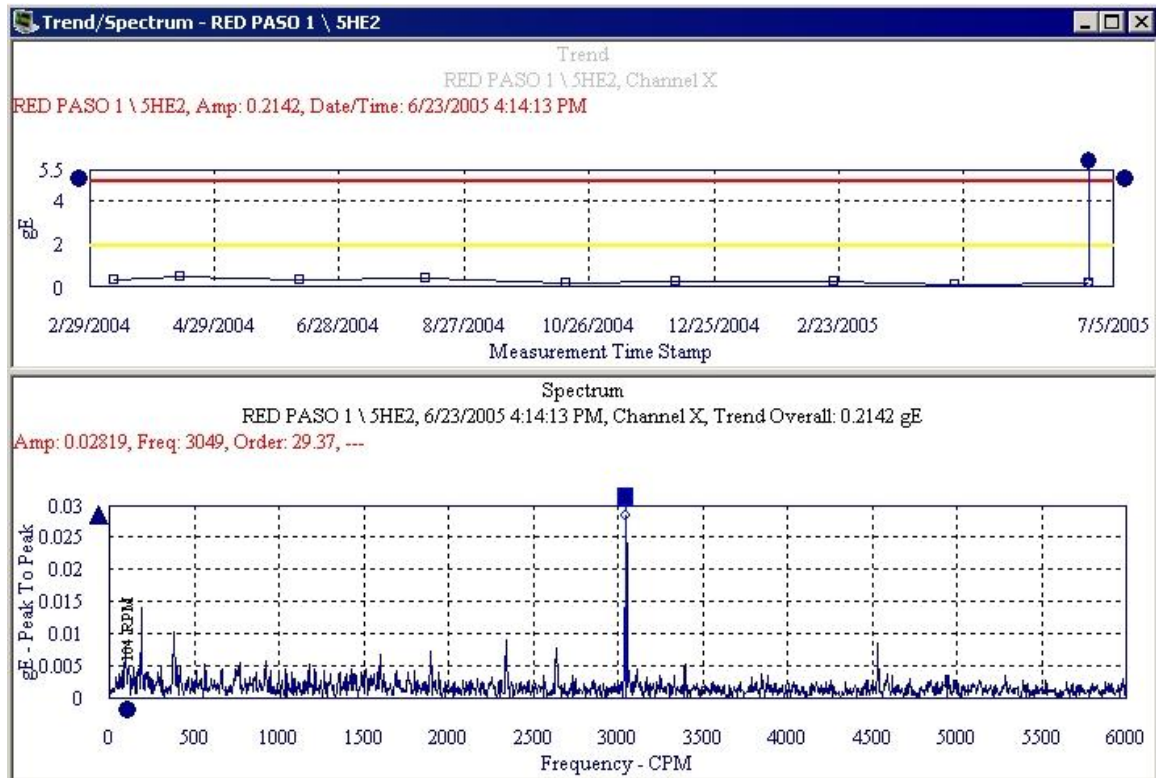


Figure 5 - 15.
Example of a Trend / Spectrum Plot.

Trend / Spectrum Plots display both a trend plot and a spectrum plot for a trend record indicated by the single cursor position.

Each single cursor on the trend plot has a corresponding spectrum data line, *if FFT data is available*. Removing the cursor from the trend also removes the associated spectrum data line.

The active plot (trend or spectrum) determines the information window's content and overlay settings.

All other trend and spectrum operations behave as described previously in the trend and spectrum plot descriptions.

- Right-click on either plot to access the appropriate context menu.
- See Trend Settings and Spectrum Settings for display parameters that can be modified to change the plot display.

Time Plot

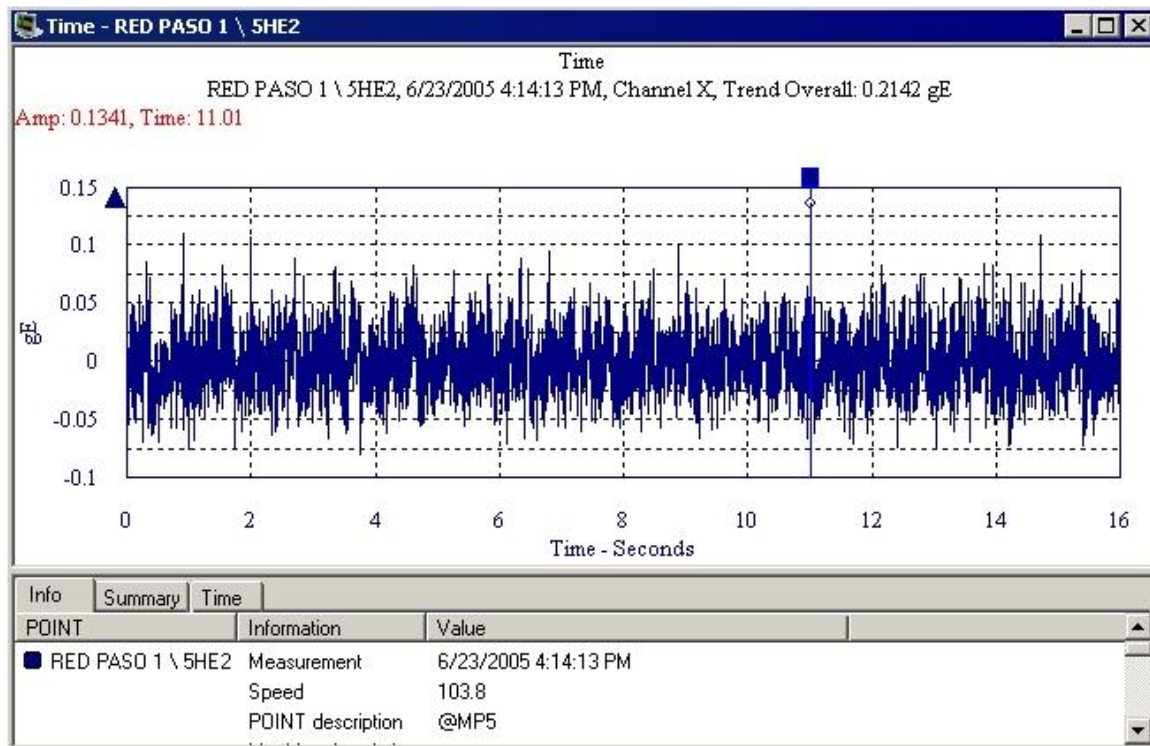


Figure 5 - 16.
Example of a Time Plot.

Time Plots display a short time sample of a raw vibration signal with vibration amplitude plotted over the time scale. Current time plots are compared to past time plots to analyze changes in vibration amplitude or frequency.

Each plot line represents a time waveform measurement for a single POINT. You may configure the X-axis to display time in seconds or milliseconds.

Time Plot Settings

To access the Time Plot Settings dialog:

- With a time plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the time plot's right-click context menu.

Magnitude Scale fields include:

Autoscale - Enabling **autoscale** automatically scales the initial amplitude axis so it is approximately 120% of the largest amplitude. Disabling **autoscale** displays the spectrum on the same full scale vertical axis used when it was recorded.

% Full Scale - When enabled, the amplitude axis displays as a % value of the full scale. Use **% Full Scale** to compare measurements that do not have the same units or the same Full Scale value.

- If you do not select **Autoscale** or **% Full Scale**, you must enter values to determine the plot's magnitude scale (Y-axis scaling).

Magnitude Scale - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Magnitude Lin / Log - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

You must enter values to determine the plot's time scale (X-axis scaling)

Time Scale - Enter the minimum and maximum time scale values in the designated text boxes. Select **Seconds** or **Milliseconds**.

Sound Byte

@ptitude Analyst's Sound Byte utility allows you to listen to sound data waveform through your computer's speakers or connected earphones.

To utilize Sound Byte:

- Select a POINT with saved time data and display its time plot.
- Click the Sound Byte toolbar button, or select the **Plot** menu's **Play Sound Byte** option. The **Sound Byte** utility launches, providing various playback options.

Sound Byte Controls

Play Time – Controls the play back period length. To change the setting, highlight the displayed play back length value and type in a new value, or use the arrows to increase or decrease play back length. The maximum play time is 10 seconds.

RPM Multiplier – Controls the play back speed. The range is 0.5 – 2, which is equivalent to playing the data back at half the running speed, or double the running speed.

Cursor Update Speed – Controls the cursor update rate so the sound and cursor position are synchronized. Use a lower cursor update speed setting if the cursor is slower than the sound. To change the setting, click the drop down list and select the new cursor update speed.

Volume – Controls the play back sound volume. Click the slider bar and move up or down to increase or decrease the volume.

- Click the **Play** button to generate sound from the vibration data, and listen to the waveform.
- Click the **Save** button to save the sound data into a Windows ".wav" file.
- Click the **Exit** button to exit the Sound Byte utility.

Trend / Time Plot

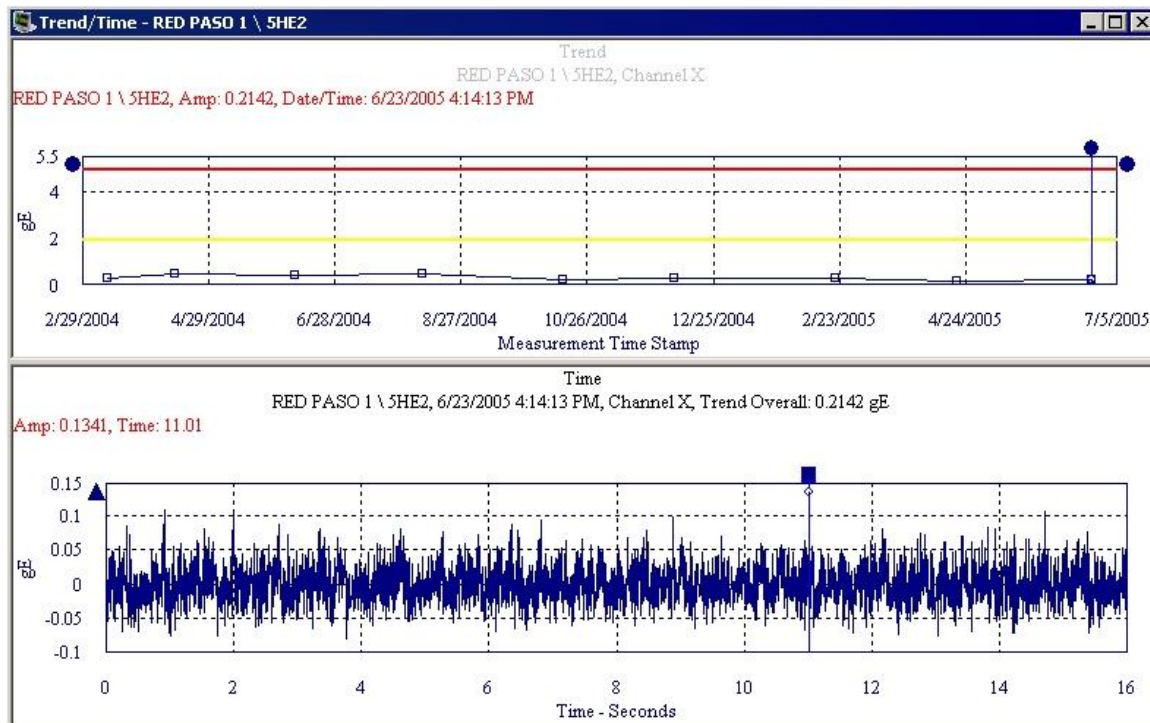


Figure 5 - 17.
Example of a Trend / Time Plot.

Trend / Time Plots display both a trend plot and a time waveform plot for a trend record indicated by the single cursor (if available).

The active plot (trend or time) determines the information window's content and overlay settings. Use a single cursor to view dynamic data for the measurement's date and time. Use multiple cursors to overlay dynamic data to visually display different data values.

All other trend and time plot operations behave as described previously in the single trend and time plot descriptions.

- Right-click on either plot to access the appropriate context menu.
- See **Trend Settings** and **Time Plot Settings** for display parameters that can be modified to change plot display.

Trend / Spectrum / Time Plot

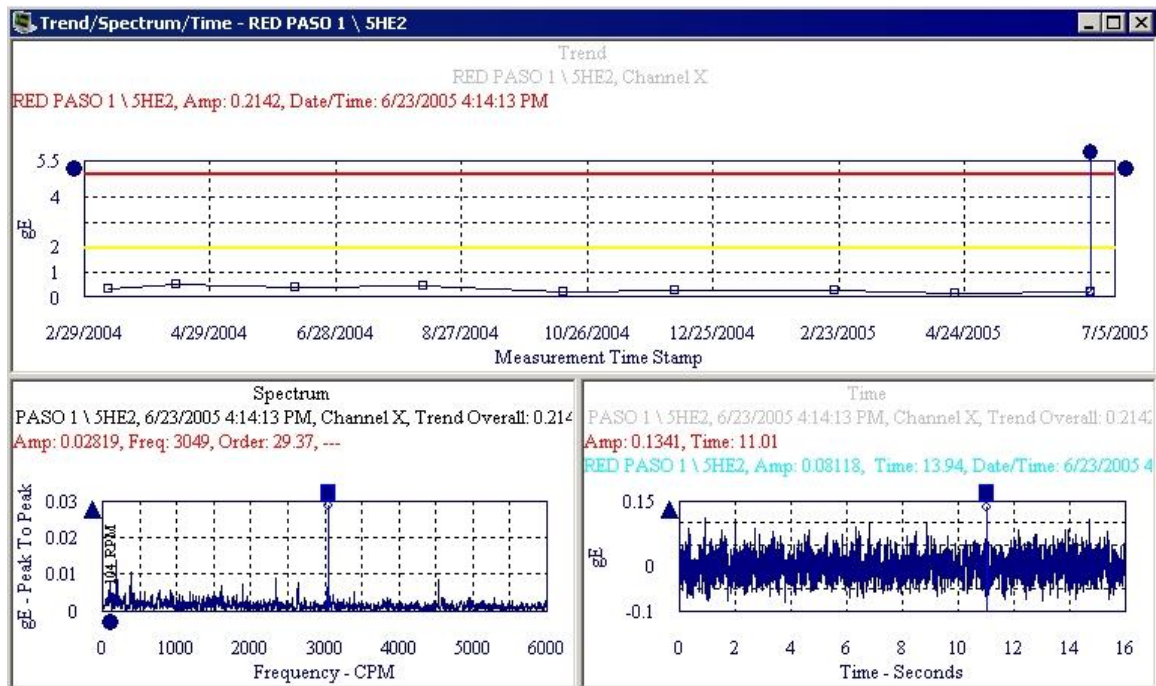


Figure 5 - 18.
Example of a Trend / Spectrum / Time Plot.

Trend / Spectrum / Time plots display a point's trend plot, spectrum plot, and time waveform plot. The three plots display in three different panels. The trend panel is the primary panel of the display.

Use a single cursor to view dynamic data for the measurement's date and time. Use multiple cursors to overlay dynamic data to visually display different data values.

All trend, spectrum, and time plot operations behave as described previously in plot descriptions.

- Right-click on each plot to access its context menu
- See **Trend Settings**, **Spectrum Settings**, and **Time Plot Settings** for display parameters that can be modified to change plot display.

Waterfall Plot

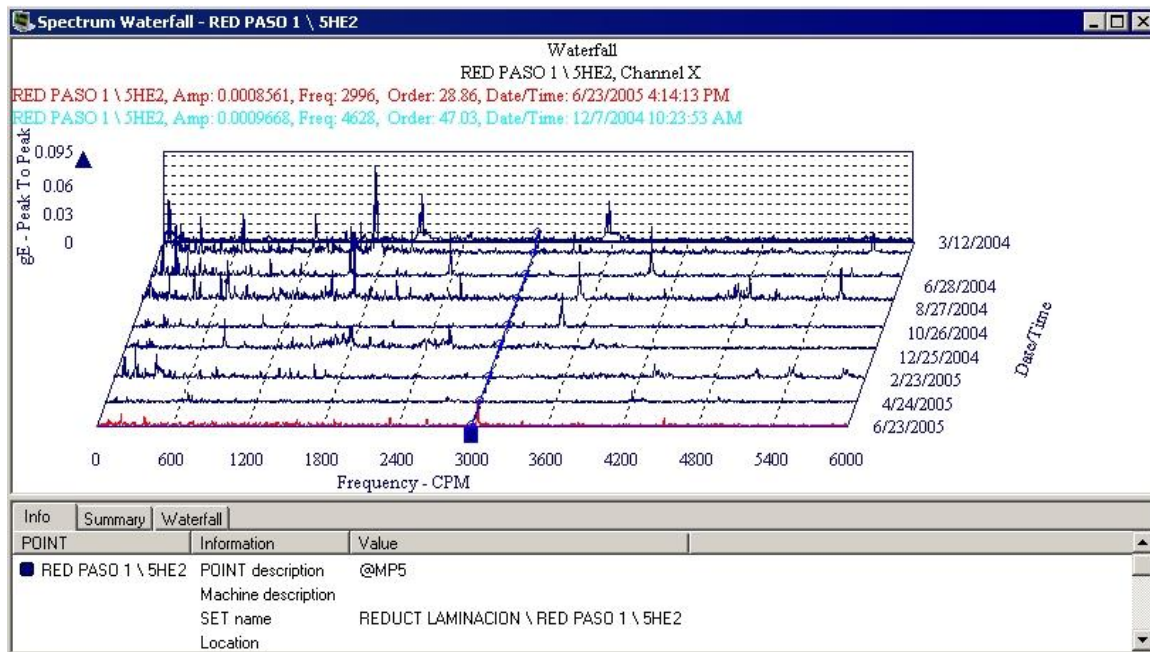


Figure 5 - 19.
Example of a Waterfall Plot.

Three-dimensional Waterfall Plots display POINT's historical spectra collected over time. Historical spectra may be displayed as either a waterfall plot or a palogram plot as configured in **Plot Settings** or **Plot Preferences**.

In a waterfall plot:

X axis = frequency (Hz / CPM, or orders of running speed)

Z axis = date

In a palogram plot:

X axis = date

Z axis = frequency (Hz / CPM, or orders of running speed)

- The slant angle for palogram and waterfall mode may be modified in **Plot Preferences**, allowing further customization of the waterfall plot, including even spacing between spectra regardless of time interval between readings.

Waterfall Settings

To access the Waterfall Plot Settings dialog:

- With a waterfall plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the waterfall plot's right-click context menu.

Waterfall Plot Settings fields include:

View type - Select display configuration, Waterfall or Palogram.

Waterfall - Three dimensional plot displaying a single POINT's historical spectral data collected over time (frequency axis along bottom).

Palogram - Shows a rotated historical spectrum displaying in a three dimensional format, allowing easy observation of trends at each frequency (date / time axis along bottom).

Even Spacing - Enable to retain the date order, but space evenly for simple viewing.

Date / Time Scale - Enter the minimum and maximum date / time scale values in the designated text boxes.

Magnitude Scale - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Magnitude Lin / Log - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

Frequency Scale - Enter the minimum and maximum frequency scale values in the designated text boxes.

Frequency Lin / Log - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

Polar Vector Plot



Figure 5 - 20.
Example of a Polar Vector Plot.

Polar Vector plots show vibration amplitude and phase. Phase is the angular difference between a known mark on a rotating shaft and the shaft's vibration signal. This relationship provides valuable information on shaft orbit and shaft position and is used for analysis, balancing, and shaft orbital analysis.

The newest measurement for the current data line is indicated by an asterisk (*).

- Access the right-click context menu anywhere on the polar vector plot to change order view, copy, reset settings, and turn amplitude labels on or off.

Polar Vector Settings

To access the Polar Vector Settings dialog:

- With a polar vector plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the polar vector plot's context menu

Polar Vector Settings fields include:

Full Scale - Enter full scale amplitude

Order - Select order from drop down menu (1-4).

Mag / Phase Trend

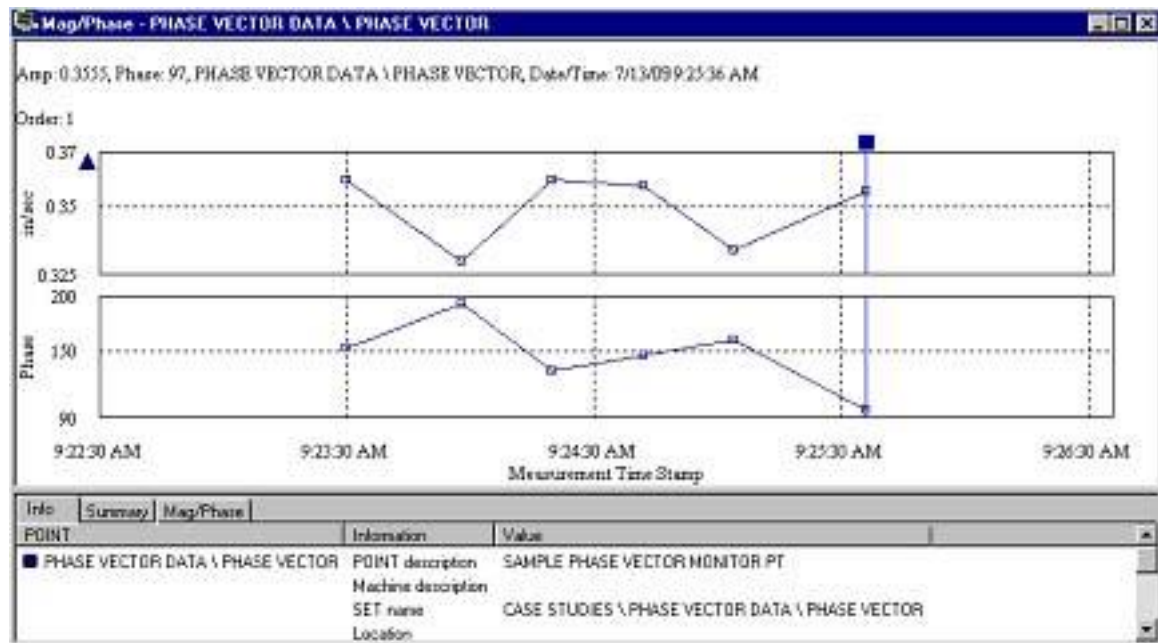


Figure 5 - 21.
Example of a Mag / Phase Trend Plot.

Mag / Phase trends plot the amplitude (top) and phase / angle (bottom) aligned by the measurement date. Mag / Phase trends may be used to determine if a machine's mechanics are changing by analyzing the shifting in phase.

Mag / Phase Settings

To access the Mag / Phase Plot Settings dialog:

- With a mag / phase plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the mag / phase plot's right-click context menu.

Mag / Phase Plot Settings fields include:

Date / Time Scale - Enter the minimum and maximum date / time scale values in the designated text boxes.

Magnitude Scale - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Magnitude Lin / Log - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

Phase Scale - Enter the minimum and maximum phase angles in the designated text boxes.

Order - Determines which frequency order of running speed to display (1X, 2X, 3X, 4X).

Mag / Speed Trend

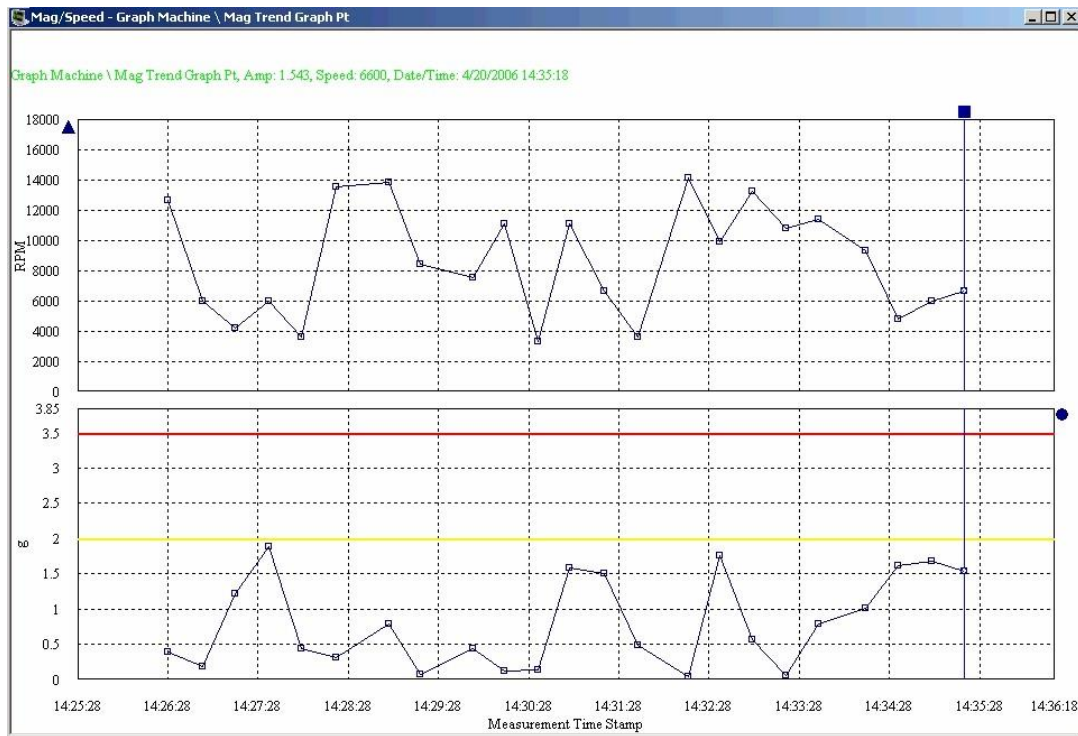


Figure 5 - 22.
Example of a Mag / Speed Trend Plot.

Mag / Speed trends plot the speed (top) and amplitude (bottom) aligned by the measurement date. Mag / Speed trends may be used to determine if a machine's mechanics are changing by analyzing the relationship between vibration amplitude and speed.

- The speed value comes from the dynamic measurement. If only the overall value is stored for a particular date / time, then there will not be a corresponding Mag / Speed trend value.

Mag / Speed Settings

To access the Mag / Speed Plot Settings dialog:

With a mag / speed plot displayed, select the **View** menu's **Plot/Settings** option, or use the settings toolbar button.

- The **Settings** dialog is also available from the mag / speed plot's right-click context menu.

Mag / Speed Plot Settings fields include:

Date / Time Scale – Enter the minimum and maximum date / time scale values in the designated text boxes.

Speed Scale – Enter the minimum and maximum speed scale values in the designated text boxes.

Magnitude Scale – Enter the minimum and maximum magnitude scale values in the designated text boxes.

Magnitude Lin / Log – Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

Mag / Speed / Spectrum Trend

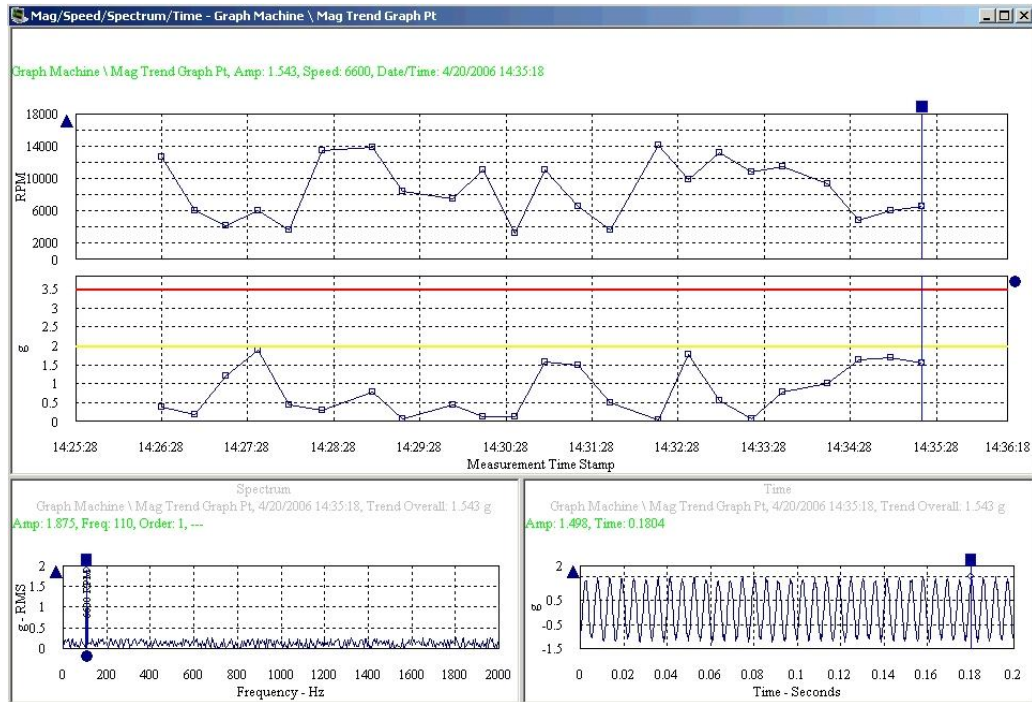


Figure 5 - 23.

Example of a Mag / Speed / Spectrum Trend Plot.

Mag / Speed / Spectrum trends display a POINT's mag / speed plot and spectrum plot. The two plots display in two different panels. The mag / speed panel is the primary panel of the display.

All mag / speed and spectrum plot operations behave as described previously in plot descriptions.

- Right-click on each plot to access its context menu

See **Mag / Speed Settings** and **Spectrum Settings** for display parameters that can be modified to change plot display.

Mag / Speed / Spectrum / Time Trend

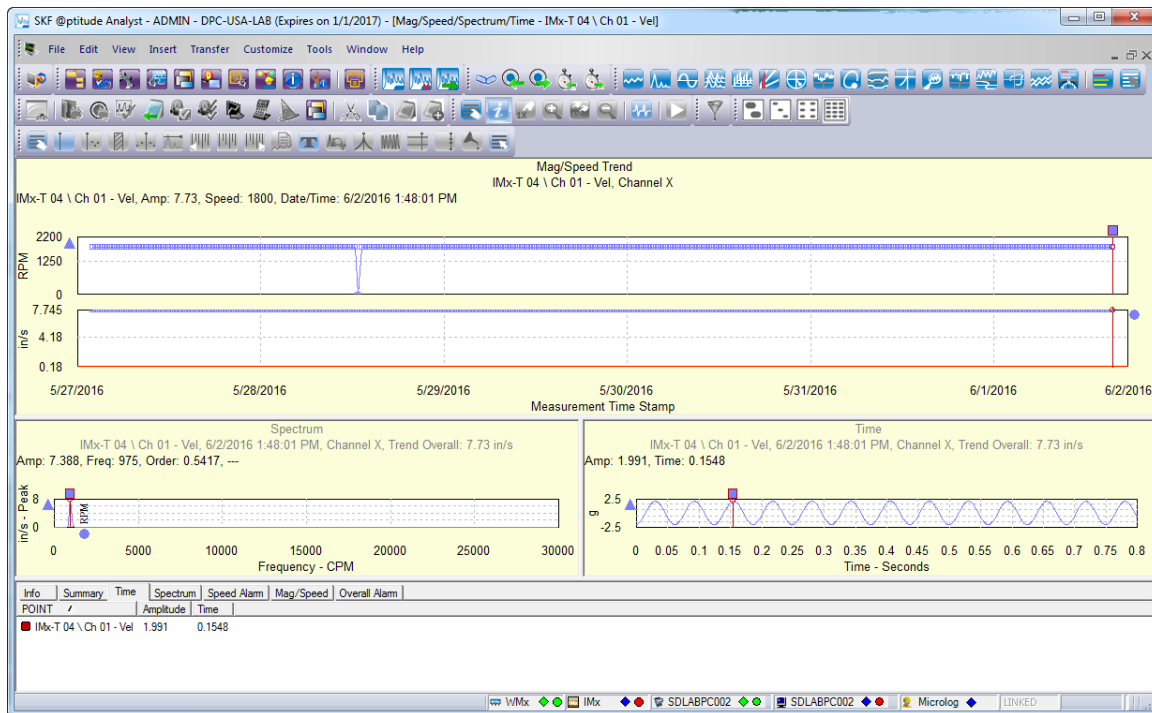


Figure 5 - 24.
Example of a Mag / Speed / Spectrum / Time Trend Plot.

Mag / Speed / Spectrum / Time trends display a POINT's mag / speed plot, spectrum plot, and time plot. The three plots display in three different panels. The mag / speed panel is the primary panel of the display.

All mag / speed, spectrum, and time plot operations behave as described previously in plot descriptions.

- Right-click on each plot to access its context menu

See **Mag / Speed Settings**, **Spectrum Settings**, and **Time Settings** for display parameters that can be modified to change plot display.

Mag / Speed / Time Trend

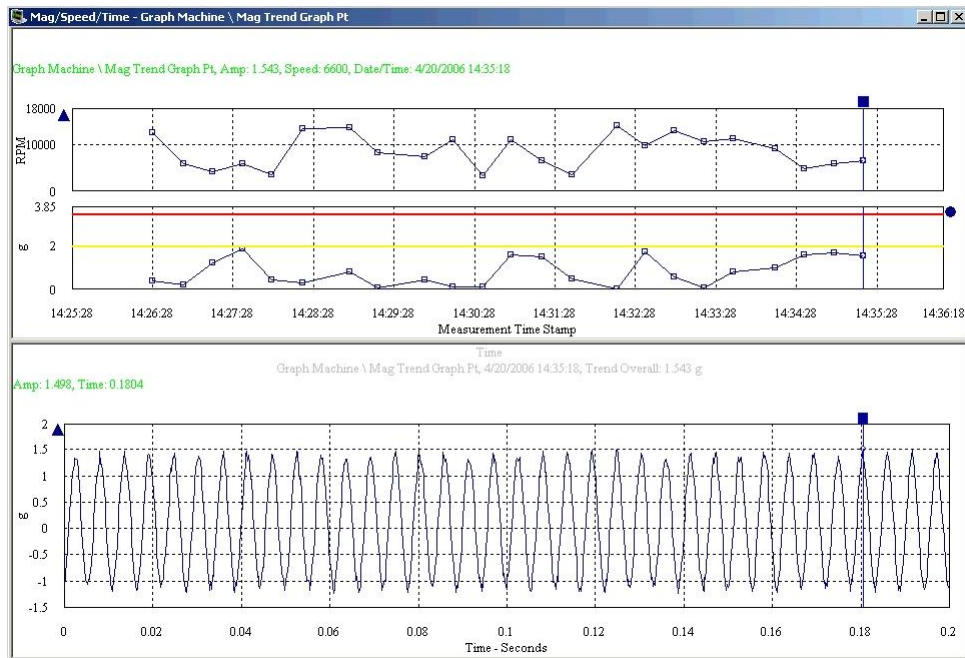


Figure 5 - 25.

Example of a Mag/Speed/Time Trend Plot.

Mag / Speed / Time trends display a POINT's mag / speed plot and time plot. The two plots display in two different panels. The mag / speed panel is the primary panel of the display.

All mag / speed and time plot operations behave as described previously in plot descriptions.

- Right-click on each plot to access its context menu

See **Mag / Speed Settings** and **Time Settings** for display parameters that can be modified to change plot display.

Band Trend

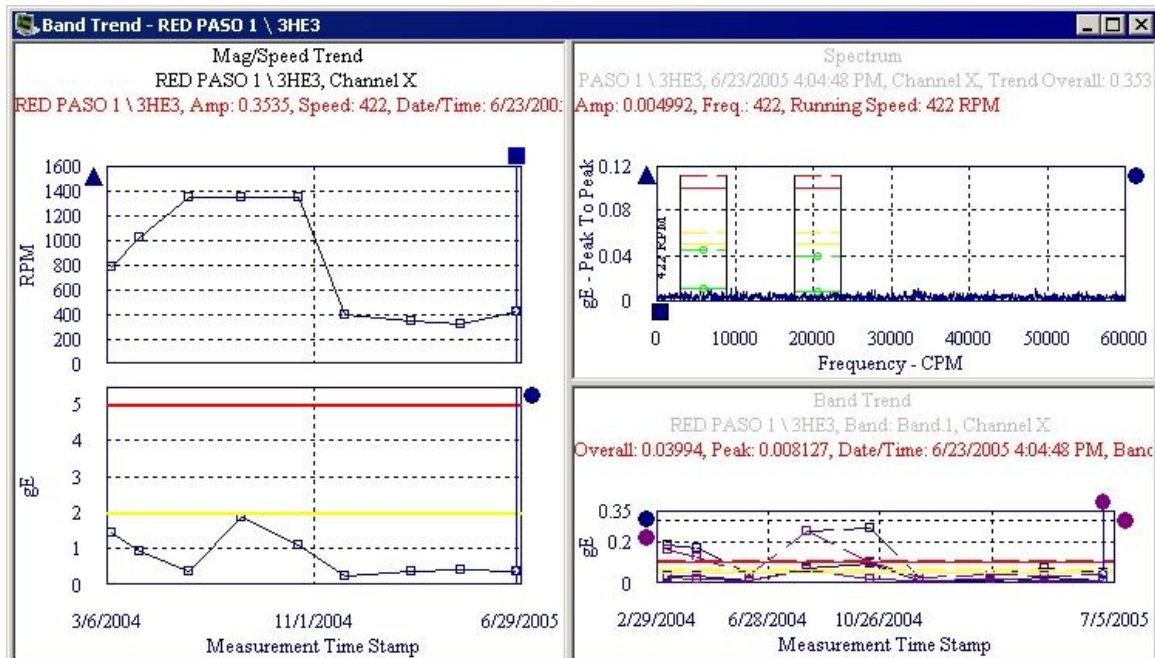


Figure 5 - 26.
Example of a Band Trend.

Band trends combine the spectrum and available band trends for the selected POINT. Band Trends are used to analyze the energy within the band to closely monitor that particular frequency range.

To view a spectral band trend plot:

- Select the POINT whose band trends you wish to display.
- Select the **View** menu's **Plot / All Plots** option. The **All Plots** dialog displays.
- Select the **Band Trend** option.

Initially, all bands for the specified POINT display in the Band Trend display's plots.

To view specific bands / band trends:

- On the display's spectrum plot, right-click on the overlay "anchor" in the plot's upper right corner and select the Settings option. The **Band Alarm Settings** dialog displays.

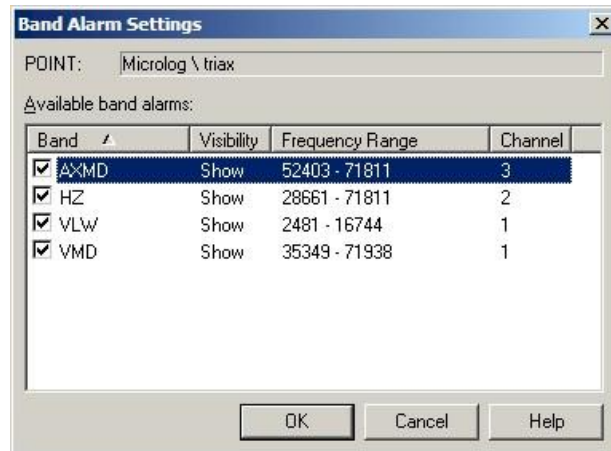


Figure 5 - 27.
Band Alarm Settings Dialog.

POINT – Displays the selected POINT name.

Available band alarms

- Use checkboxes to enable and disable bands for display.

In the plot window's lower band trend plot, specified bands display along with band alarm overlays for one of the band trends. Right-click on the trend's overlay anchor to display the Next Trace's band alarms.

- On the band trend plot, position the cursor and mouse pointer and use feedback areas to analyze the plot.
 - Right-click on either plot to access the appropriate context menu.

See **Trend Settings** and **Spectrum Settings** for display parameters that can be modified to change plot display.

Extracted Trend

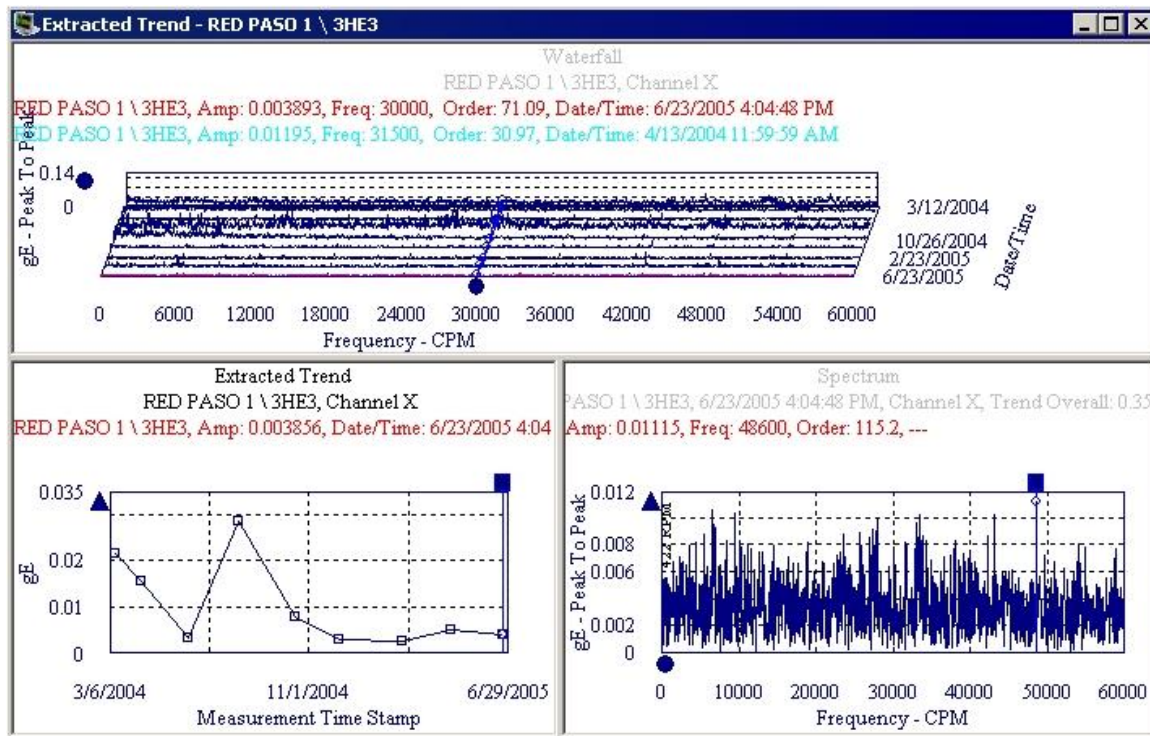


Figure 5 - 28.
Example of an Extracted Trend Plot.

Extracted trend plots display a trend plot of spectrum amplitudes at a frequency. A waterfall plot shows which spectra are to be used. The single cursor in the waterfall controls which frequency to plot in the trend. In addition, the single cursor in the waterfall plots selects which spectrum is displayed in the spectrum plot. The waterfall plot is the primary plot.

- Right-click on each plot to access its context menu.

See **Trend Settings**, **Spectrum Settings** and **Waterfall Settings** for display parameters that can be modified to change plot display.

Extracted Band

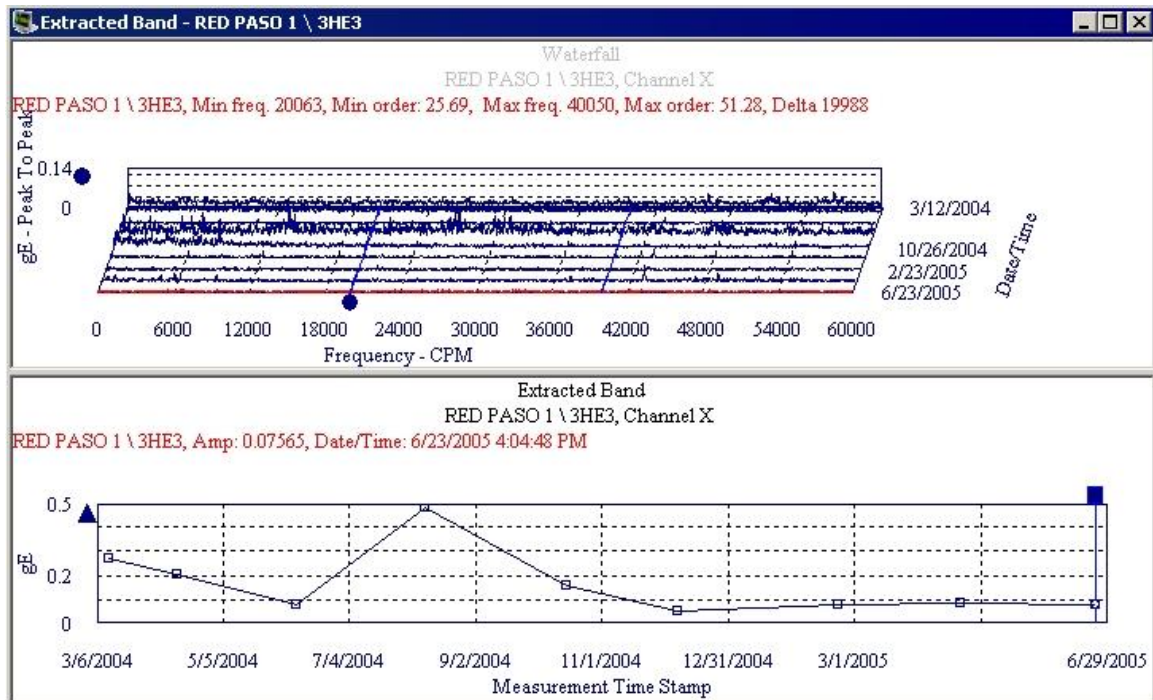


Figure 5 - 29.

Example of an Extracted Band Plot.

Extracted band plots display a waterfall and extracted band plot. The energy of the frequency within the band across the spectrum displays. You may create and move the band while viewing, allowing you to analyze a particular component's energy.

- Right-click on either plot to access the appropriate context menu.

See **Trend Settings** and **Waterfall Settings** for display parameters that can be modified to change plot display.

HAL Trend

The HAL trend plot can be viewed for any POINT that has: (a) a defined Frequency set in the POINT Properties dialog and (b) FFT data measurements. The POINT does not need to be in HAL alarm to view the trend.

The HAL trend plot has the following characteristics:

- Trend plot shows the HAI values calculated from the FFT data.
- Each plot/data line in the HAL trend represents a frequency.
- The selection of one or more frequencies can be displayed.
- The HAL trend plot view supports individual POINT and multiple POINT trends.
- You can right-click the active plot line (triangle) anchor and select **View Frequencies** from the context menu to exclude or include specific frequency plot/data lines.

- The cursor in a HAL trend plot is used to update the frequency display for that particular date and time.
- You can drag and drop POINTs from the hierarchy into the HAL trend view to display all applicable HAL trends that are assigned to the same bearing type and same frequencies (BPFO, BPFI, etc.).
- Standard trend plot functionality applies.
 - Live HAL trend plots are NOT supported due to processing time constraints and the need to recalculate the HAL values before the next live measurement.
- If the HAL value for a frequency cannot be calculated, that frequency does not display on the plot. See *About HAL Trend Plot Calculation Limitations* below for details.

About HAL Trend Plot Calculation Limitations

Under specific limiting conditions, the HAL value for a frequency cannot be calculated or the calculation result is zero. When this occurs, a HAL trend plot for that frequency is not generated. The main benefit of these limiting conditions is to eliminate the display of trace lines that do not present coherent, useful information.

- Derived point HAL calculations that return a non-calculation result will produce a non-collection measurement.

The following terms are used in the table below:

Fundamental Frequency = Multiplier x Running Speed
 Resolution = $F_{\max} / (\text{Number of Lines} - 1)$
 Harmonics = $F_{\max} / \text{Fundamental Frequency}$
 Base Energy = Sum (FFT values)
 Average Base Energy = Base Energy / Number of Lines

Reason a HAL Trend Plot Is Not Produced	One or More Limiting Conditions Applied to the Calculation
HAL Calculation Cannot Be Completed	No FFT values in the measurement Number of Lines = 0 Harmonics is greater than or equal to Number of Lines / 4
HAL Calculation Results = 0	Harmonics is less than 1.0. All individual harmonic energy levels are less than Average Base Energy.

Two additional limitations are enforced by Analyst to make the HAL calculation results meaningful for condition monitoring purposes.

- One is a global preference setting, **Maximum harmonics to use in HAL calculations**. The default range is 4 to 50, but the maximum can be increased up to 500.
- The other limitation is that the Fundamental Frequency cannot be in low frequency cut-off region. (**Low freq. cutoff** parameter displays on POINT Properties, Setup tab.)

Information Area Displays

In the **HAL Trend** tab (which shows the values for the measurement where the single cursor is active), the column is blank for any frequency that could not be calculated (the FTF column in the example below).

Info	Summary	HAL Trend	Notes	HAL Alarm						
POINT	/	Date/Time	Description	BPFO	BPFI	BSF	FTF	Other		
#78 DRYER ROLL BS \ DRY 78-D 6K 36/6		11/28/2012 12:29:59 AM	24260CA (SKF)	1.353	0.7944	1.19				


Figure 5 - 30.
HAL Trend Tab's FTF Column.

In the **Summary** tab, frequencies for which HAL values could not be calculated display in the **Not Calculated** column, as shown below.

Info	Summary	HAL Trend	Notes							
POINT	/	Information	Value							
#78 DRYER ROLL BS \ DRY 78-D 6K 36/6		POINT description	2PM/DRYER 79/TEND/TOP/7TH SECT							
		Units	HAL							
		Measurement	11/28/2012 12:29:59 AM 24260CA (SKF) BPFO = 1.353, BPFI = 0.7944, BSF = 1.19							
		Measurement	11/27/2012 12:30:39 AM 24260CA (SKF) BPFO = 1.558, BPFI = 0.896, BSF = 1.477							
		Measurement	11/26/2012 12:30:33 AM 24260CA (SKF) BPFO = 0.7649, BPFI = 0.4776, BSF = 0.9777							
		Measurement	11/25/2012 12:30:19 AM 24260CA (SKF) BPFO = 0.8897, BPFI = 0.7583, BSF = 1.047							
		Measurement	11/24/2012 12:30:33 AM 24260CA (SKF) BPFO = 0.6891, BPFI = 0.4688, BSF = 0.9889							

Figure 5 - 31.
Summary Tab's Not Calculated Column.

To view historical HAL data in a trend plot:

- From the hierarchy, select a POINT that meets the two requirements of having assigned frequencies and FFT data.
- Right-click the POINT and select **Plot > HAL Trend**, OR click the HAL trend icon .

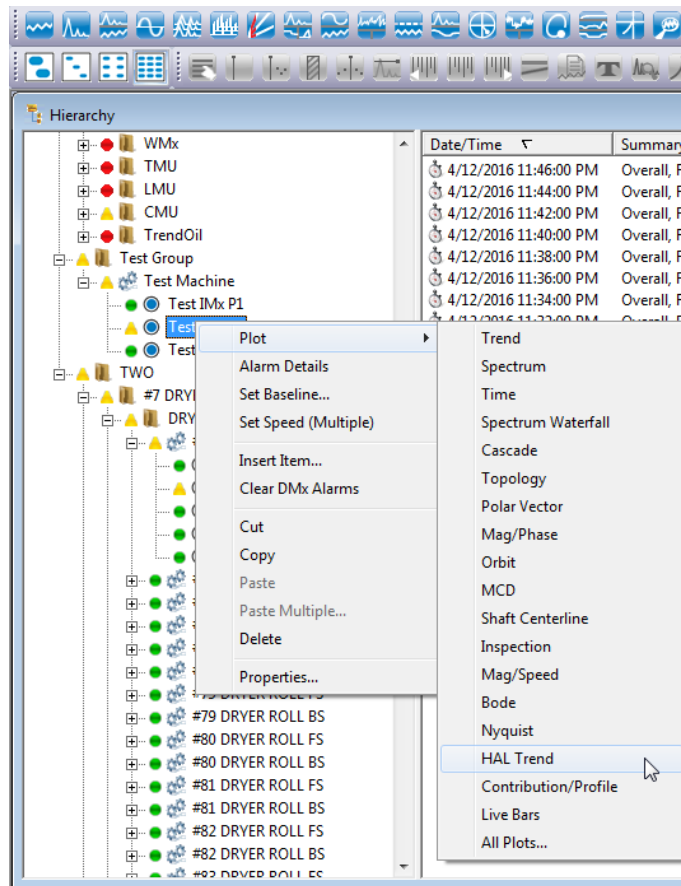


Figure 5 - 32.
Path to Open a HAL Trend Plot.

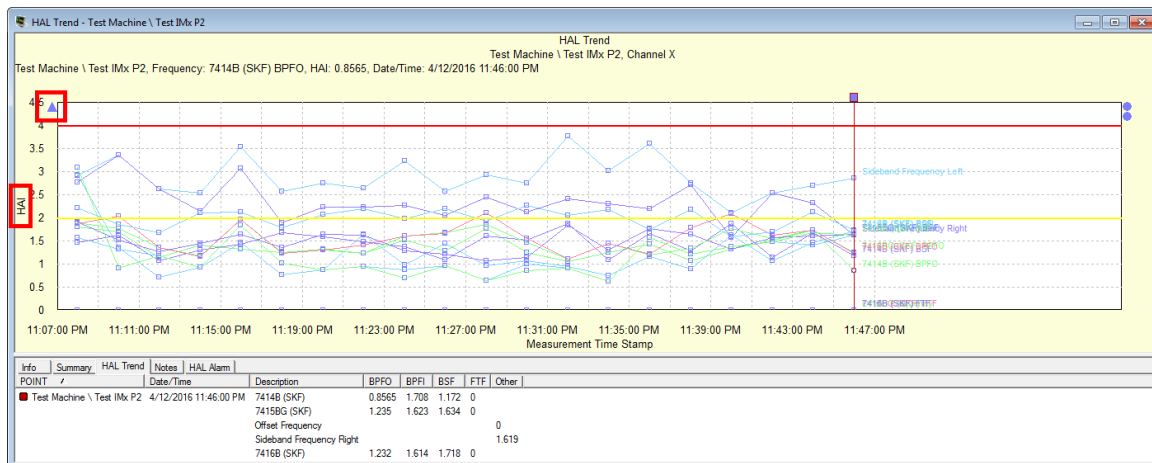




Figure 5 - 33.
Example of HAL Trend Plot.

All HAL trends display in one trend plot. Each frequency associated with the POINT displays a separate HAL trend line. When a frequency has a sideband cursor, two trends are displayed for the sidebands: one for the right side and one for the left.

- Click the **Previous Frequency/Next Frequency** buttons ( / ) or use the +/- keys on your keyboard's ten-key area to cycle through which frequencies are shown in the plot (all, each individually, etc.).

Preference settings determine how many historical spectra are computed in the HAL trend. The preferences for all measurements are set in the **Measurement** tab (go to **Customize > Preference > Measurement** tab).

- HAL Trend plot itself and the Summary tab show Units = HAI (harmonic activity index).
- A plot line anchor represents a POINT and one of its channels (indicated as X, Y, or Z). A 3-channel POINT will display three plot line anchors, as shown below.

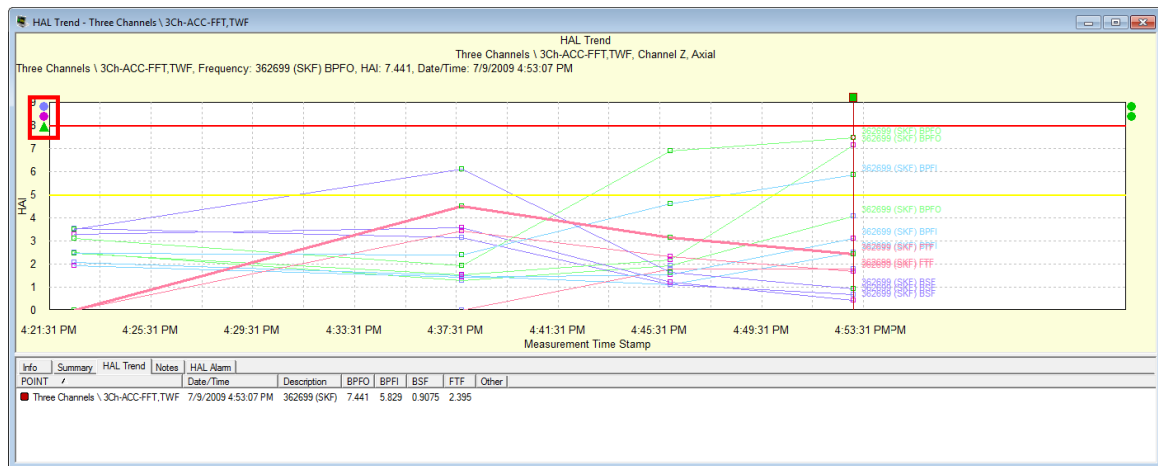


Figure 5 - 34.
Example of a 3-channel POINT Showing Three Plot Line Anchors.

You can right-click the anchor at the upper left to open the context menu. Select **View Frequencies** to specify which frequencies to display in the HAL trend view.

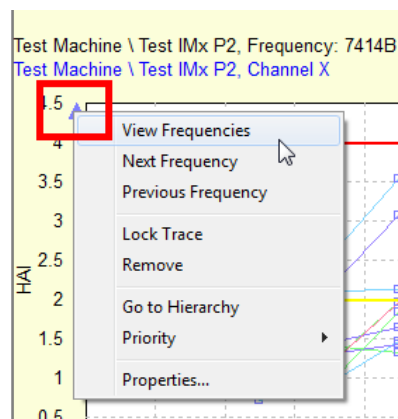


Figure 5 - 35.
Example of the Context Menu Accessible Via the Anchors.

The **View Frequency** dialog opens, showing only available frequencies.

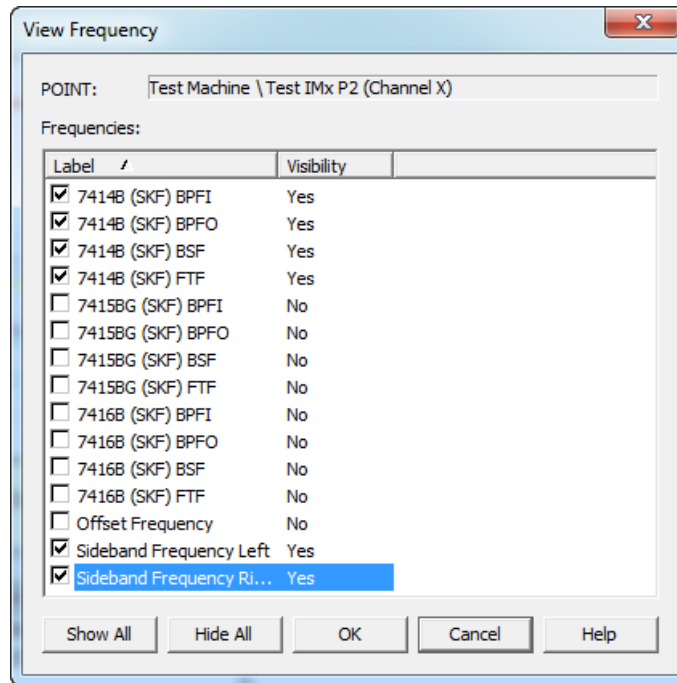


Figure 5 - 36.
View Frequency Dialog.

In the **View Frequency** dialog, all frequencies associated with the POINT are listed with the **Visibility** set to **Yes** by default. You can deselect a checkbox to change **Visibility** in the HAL trend plot to **No**. Click **OK** to accept your changes.

- The **Show All** and **Hide All** buttons enable setting all the frequencies as visible or not visible.

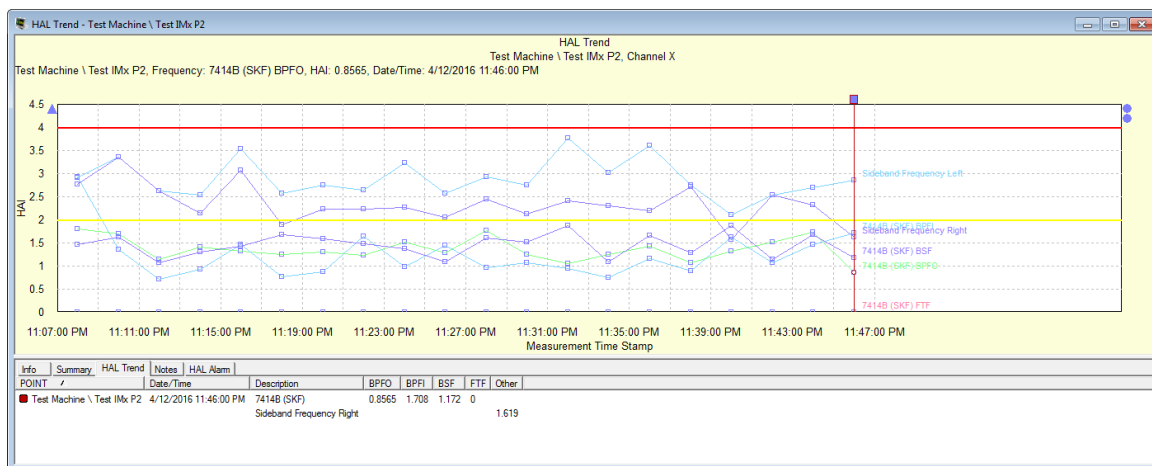


Figure 5 - 37.
Example of HAL Trend Plot with Some Frequencies Changed to Not Visible.

If you drag a single channel POINT into the HAL trend, it will add another plot line anchor. Similarly, dragging in a 2-channel POINT will add two more plot line anchors and a 3-channel POINT will add three plot line anchors.

- The drag and drop feature does NOT check if the additional POINTs are assigned to the same bearings or frequencies. The **View Frequencies** dialog can be used to remove any frequencies that do not match the frequencies associated with the original POINT.

Spectrum/HAL Trend Plot

When a POINT with associated frequencies is selected in the hierarchy, you can view the Spectrum and HAL Trend plots together. The two plots interact so that the measurement and frequency selections made on one plot alter the data displayed on the other. This behavior is described below.

When the Spectrum/HAL Trend plot opens, the spectrum is highlighted by default and the HAL trend below is disabled by default.

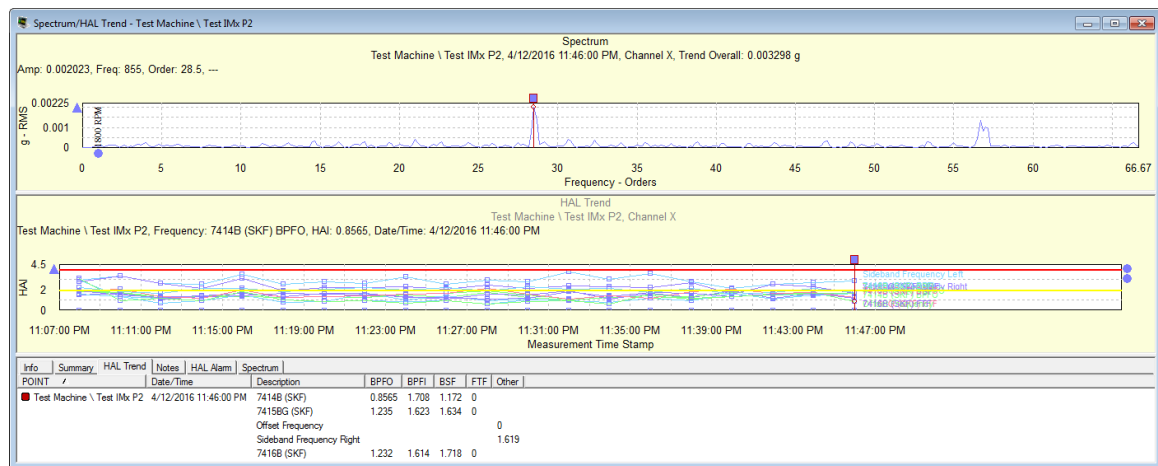



Figure 5 - 38.
Example of a Spectrum/HAL Trend Combo Plot.

The frequencies displayed in the spectrum plot control which frequencies are shown in the HAL trend plot. This includes the frequencies indicated with spectrum single cursor markers and the frequency markers shown by the frequency overlay.

The Spectrum/HAL trend combo plot does not support the frequency selection menus that are available on the standalone HAL trend plot. Instead, the frequencies displayed in the HAL trend plot are controlled by the frequencies being called out in the spectrum plot. You can show or hide frequencies by using the methods described below.

- To show all frequencies, click on the **Frequencies**  icon in the SKF @ptitude Analyst toolbar. The spectrum plot will show all the frequencies available. The info area is also updated and the **FAM** tab appears containing the details of the frequencies.

Displaying Graphic Plots Plot Types

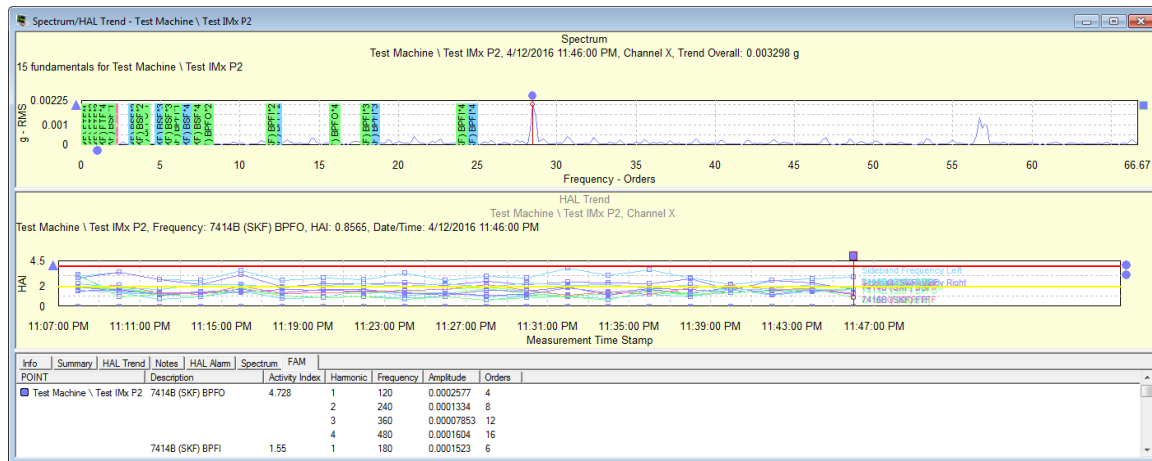




Figure 5 - 39.

Example of Spectrum Plot Showing all Available Frequencies with the Cursor on 7414B (SKF) BPFO.

- You can change from one frequency to another by clicking the **Next Frequency**  or **Previous Frequency**  icons in the toolbar. The frequency now displayed in the spectrum plot is reflected in the HAL trend also.
- To select a specific frequency (hiding the others), you can right-click on any frequency in the spectrum to open the **Frequency Settings** dialog. Enable the desired frequency (in this example, 7416B (SKF) BPFI) to show, and then click **OK**.

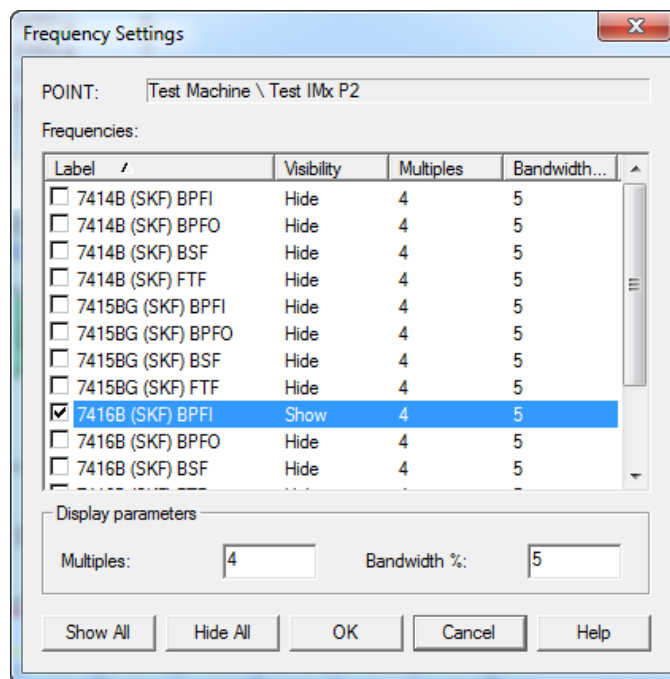


Figure 5 - 40.

The **Frequency Settings** Dialog.

- The selected frequency is now the only one shown in the in the HAL trend plot.

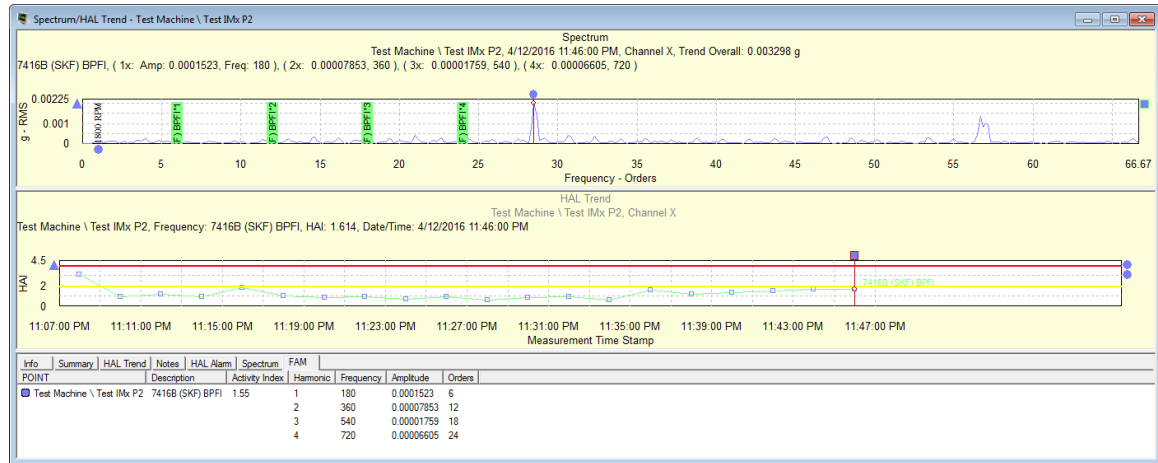


Figure 5 - 41.
Example of Frequency Changed to 7416B (SKF) BPFI in the Spectrum/HAL Trend Plot.

You can drag and drop an additional POINT on to the existing combo plot window in the same manner as other plot types. The additional POINT will display all HAL trends related to it.

Contribution/Profile

A Note about Cyclic Time Averaging (CTA)

CTA is a post process operation that operates on time waveform signals, creating an averaged waveform similar to a Synchronous Time Averaging (STA) measurement. Unlike STA, CTA does not require a trigger and can be computed on already acquired time domain signals.

One of the best cases for using Cyclic Time Averaging is when an external trigger is not possible, or practical, such as when monitoring the inner shafts of a gearbox. The goal is to find out if there are damaged gear teeth on the gear without having to stop the machine and open it up for inspection.

CTA uses only a single measurement to perform averaging. CTA can be performed on any time domain measurement as long as this measurement covers more than two revolutions of the defect source under study. Consider a measurement length of 10 seconds (not uncommon in the paper industry) and a defect frequency of 5 Hz (200 ms). One single measurement captures $10/0.2 = 50$ cycles of the defect. CTA realigns the samples in the measurement so that they can be averaged to produce an improved signal waveform with reduced noise.

In the Roundness Profile plot, the time domain is wrapped around each component frequency's periodic cycle time. It can be seen that a damaged gear tooth generates a significant amount of high frequency vibration during initial contact with the mating tooth.

The Contribution/Profile Plot

The Contribution/Profile combo plot shows the contribution bar graph. The Trend plot in the bottom panel is a standard Trend plot that displays traces for selected points and channels. The Contribution (upper left panel) and Roundness Profile (upper right panel)

plots display data for the point and channel indicated by the active Single Cursor on the trend plot.

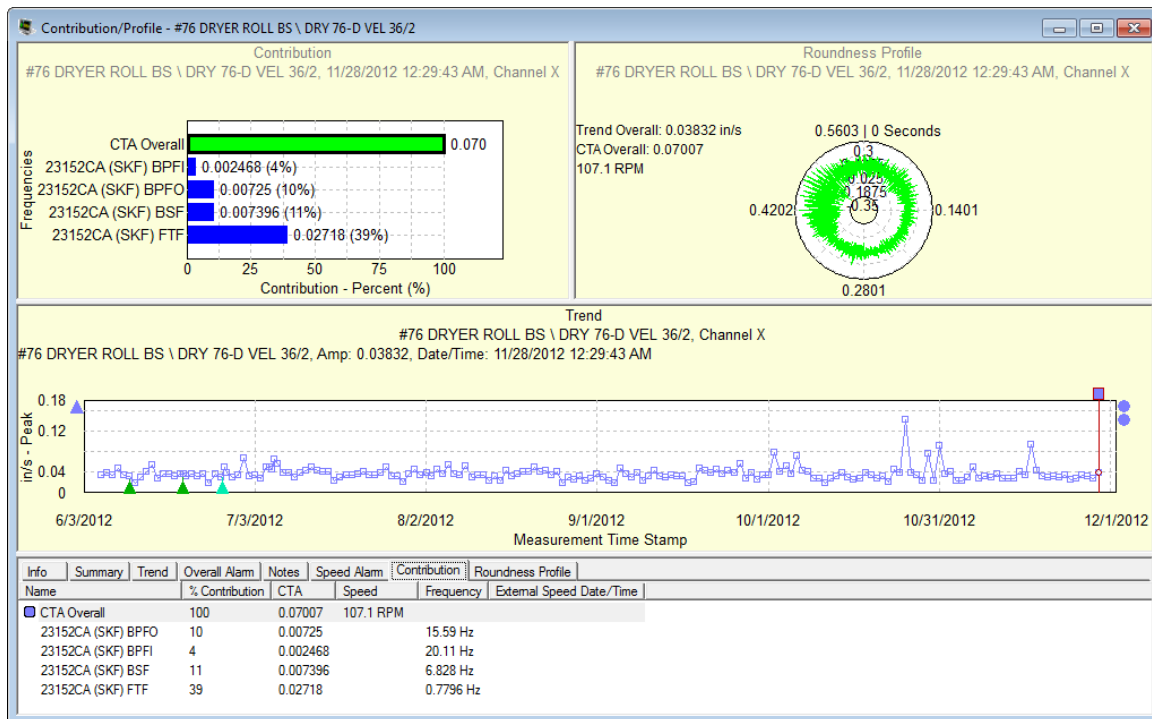


Figure 5 -42.
Example of Contribution/Profile Plot with Contribution Tab Below.

The Trend Plot and Data Selection

The Trend plot is the standard Trend plot so it supports the usual behaviors and overlays. It opens with a Single Cursor but additional Single Cursors can be added.

The data selection process through the plots is as follows:

- The Trend plot is the initial content driver. The active Single Cursor determines the data that displays in the Contribution plot. When there are multiple Single Cursors on the Trend plot, only the active Single Cursor drives the Contribution plot.
- Use the arrow keys to navigate among measurements. The Contribution plot updates to display data for the selected measurement.
- The Contribution plot drives the content of the Roundness Profile plot based on the selected bar (either the CTA Overall or a Frequency). The CTA Overall bar is initially selected. CTA stands for Cyclical Time Averaging; CTA Overall applies specifically to the Contribution plot.
 - If the Single Cursor that currently drives the Contribution plot is removed, the Contribution and Roundness Profile plots will go blank and show the message: "There is no data available to display on the plot".
 - The Contribution/Profile combo plot supports "live data" mode. Details are provided later in this document.

- Only the Trend plot supports the zoom function.

The Contribution Plot

As stated, the contribution plot displays data for the frequencies associated with the particular trace that is indicated by the active single cursor on the Trend plot. The plot title presents the following elements: plot type as Contribution, Machine/Point name, Measurement date/time, and Channel.

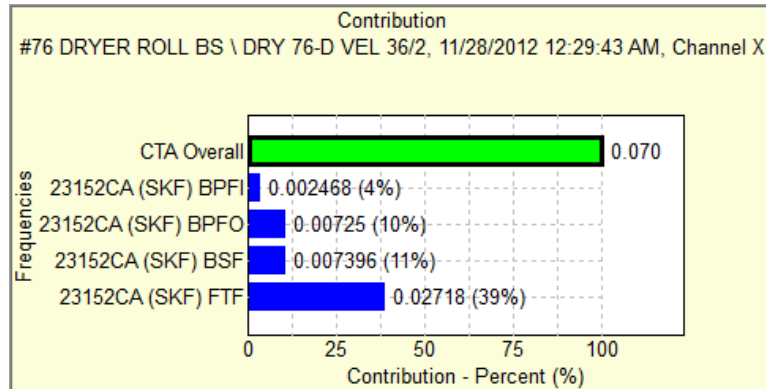


Figure 5 - 43.

Example of a Contribution Plot Only.

The data displays in bar chart format, showing the measurement value and vibration contribution by percent of the total (the x-axis) for each frequency (the y-axis). The top bar, labeled **CTA Overall**, represents the total of the selected frequencies associated with the POINT and therefore represents 100%. The overall value of the measurement is given at the right of the **CTA Overall** bar.

The other bars show the names (up to 15 characters) of the frequencies selected for inclusion by the checkboxes on the **POINT Properties > Frequencies** tab. Each bar represents the relative contribution of a frequency; the label at the right provides both the measurement value and percent of the contribution to the overall. If more than 15 frequencies are enabled on the **Frequencies** tab, only the first 15 (depending on the sort type) will display in the bar chart.

Right-click in the Contribution plot to open the context menu.

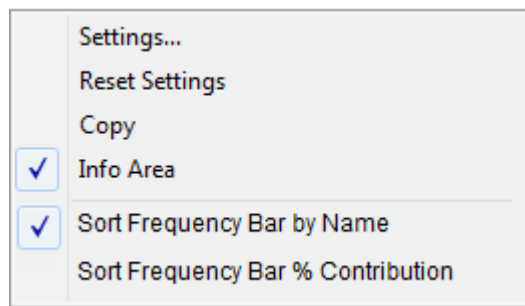


Figure 5 - 44.

Contribution Plot Context Menu

Settings... - open the **Contribution Settings** dialog.

Reset Settings - reset changes made in the **Contribution Settings** dialog to the default settings.

Copy - copy the Contribution plot to the Windows clipboard. (This menu item appears in all plots.)

Info Area - hide or show the Info Area. (This menu item appears in all plots.)

Sort Frequency Bar by Name - sort the Frequency bars by the frequency name in ascending order.

- The **CTA Overall** bar is not sortable and remains at the top.

Sort Frequency Bar by % Contribution - sort the Frequency bars by the % contribution in descending order.

To change the Speed Reference Time Window:

- Select **Settings...** to open the **Contribution Plot Settings** dialog.

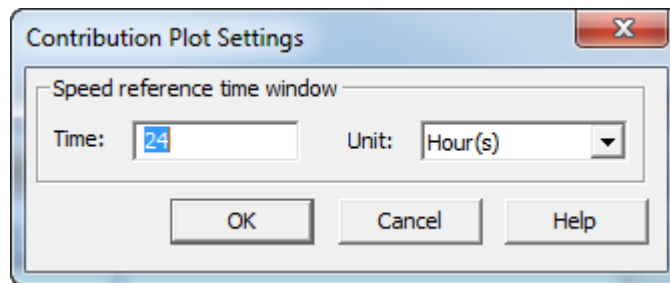


Figure 5 - 45.
Contribution Plot Settings Dialog.

- You can change the **Speed reference time window** value and units. The maximum allowable value is 48 hours; this is equivalent to 2880 minutes or 172800 seconds.
- Click **OK** to save the settings. Any change you make applies only to the plot currently open; the global plot preference setting is not changed. Bear in mind that the settings implemented in this dialog continue to be applied to this plot when the data changes (until the settings are changed manually again).

The Roundness Profile Plot

The Roundness Profile plot shows only one time waveform at a time. The Roundness Profile plot is determined by the frequency bar selected in the Contribution section. Selecting a frequency bar (the color changes upon selection) updates the profile to show CTA(Fd) in a roundness plot. The calculated statistics for the Contribution-derived time waveform are also displayed.

- The Roundness Profile plot supports only the **Linear Speed** overlay

The Roundness Profile plot is drawn as follows:

- The circle angle represents the Time.
 - 0 degree is 0 second.
 - 360 degrees is the time for one revolution, using the specified speed reference.

- Each circle represents the waveform amplitude.
 - The innermost circle is the minimum amplitude.
 - The outermost outer circle is the maximum amplitude.
 - There are five circles for the max value, min value, mid level, a circle between the mid and max circles and another between the mid and min circles.
- Traces for values outside the minimum and maximum values will be clipped.

When first opened, the **CTA Overall** bar is selected in the Contribution plot and the Roundness Profile plot draws the whole raw time waveform, with each cycle representing one revolution. The plot line color matches the color of the CTA Overall bar in the Contribution plot. (Refer to the first example, Figure 2-1.) The plot title presents the following elements: plot type as Roundness Profile, Machine/Point name, Measurement date/time, Channel, and Overall value. The Machine/Point name, Measurement date/time, Channel, and Overall value reflect the data from the trace selected by active single cursor in the Trend plot.

When a Frequency bar is selected in the Contribution plot, the roundness plot draws one revolution of the frequency time waveform. The plot line color matches the color of the selected Frequency bar in the Contribution plot. The plot title presents the following additional elements: the selected frequency name, RMS and speed.

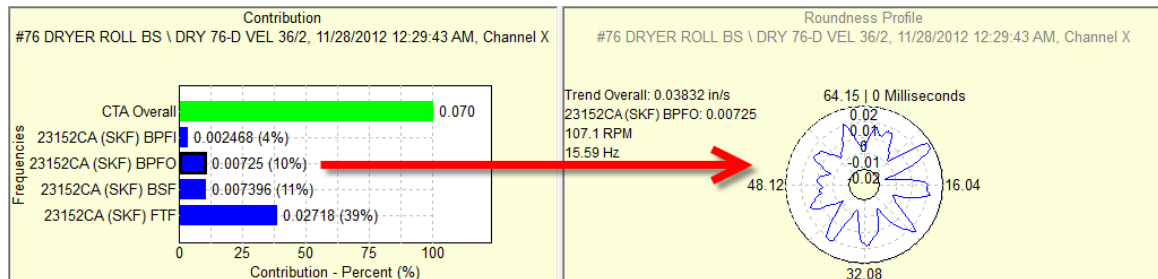


Figure 5 - 46.

The Roundness Profile Plot with a Frequency Bar Selected.

Right-click in the Roundness Profile plot to open the context menu.

- The access levels "Operator" and "View Data HMI Operator" will not see **Settings...** and **Reset Settings**. All users will see the **Copy** and **Info Area** options.

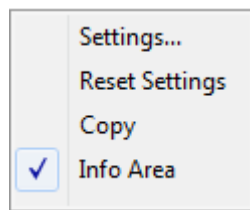


Figure 5 - 47.

Roundness Profile Plot Context Menu (Complete).

Settings... - open the **Roundness Profile Plot Settings** dialog.

Reset Settings - reset changes made in the **Roundness Profile Plot Settings** dialog to the default settings.

Copy - copy the Contribution plot to the Windows clipboard. (This menu item appears in all plots.)

Info Area - hide or show the Info Area. (This menu item appears in all plots.)

To change the Magnitude Range:

- Select **Settings...** to open the **Roundness Profile Plot Settings** dialog.

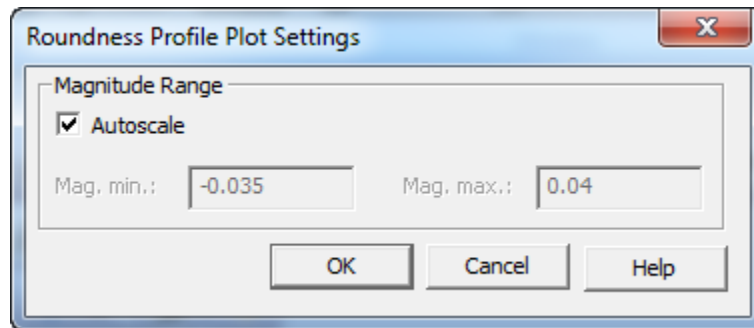



Figure 5 - 48.
Roundness Profile Plot Settings Dialog.

- When **Autoscale** is disabled, you can change the values for **Mag. min.** and **Mag. max.** Negative values and values with decimal points are allowed.
- Click **OK** to save the settings.

Linear Speed Overlay

From the Roundness Profile plot, click the **Linear Speed** tool  in the overlay toolbar. Or go to **View > Plot Overlays > All Overlays** and select **Linear Speed**.

- Only one instance of the Linear Speed overlay is supported in the Roundness Profile plot.

The overlay behavior is the same as Linear Speed in the Time plot. An anchor displays at the top left of the plot and feedback for Linear Speed displays.

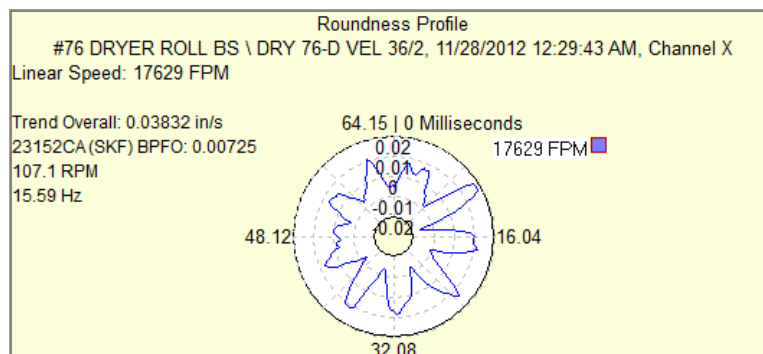


Figure 5 - 49.
Roundness Profile Plot with Linear Speed Overlay.

Speed References

As stated previously, the Contribution/Profile combo plot supports “live” display. For setups that require an external speed reference, the live display includes the external speed reference as part of the live display so that a valid value is obtained.

If the nearest speed measurement is outside the allowable speed reference window time, the frequency bar will change different color. The Contribution plot will display the message: “Speed reference out of range”. The same color change and message also appear in the Roundness Profile plot.

If the speed measurement is not available (that is, the speed reference was removed from system, or no measurement data is available), then the Frequency bar is not shown. Instead, there is the message: “No speed data”.

If any of the calculations fail (for frequencies or CTA Overall), then the bar is not shown. Instead, there is the message: “Insufficient data”.

Live Data Mode

Click the **Live Data** tool to switch the Trend plot (main content driver) into live mode. As the Trend plot is updated with live data, the Contribution plot is also updated depending on the Single Cursor position in the live Trend plot.

If the frequency uses an external speed point, the speed point is also put into live mode so that the frequency will have the live speed data.

- The external speed point live data will not be shown in the Trend plot.
- If one or more external speed points fail to go live, a message will inform you of it, but other live POINTs will continue.
- As with other plots, saving live data is supported. If an external speed point is used, the speed point’s live data is saved as well.

Working with Overlays

Plot “overlays” superimpose cursors, alarms, and frequency markers on displayed plots. Each overlay displays an “anchor” which you use to manipulate the overlay.

Displaying Overlays Using Toolbar Buttons

@ptitude Analyst has toolbar buttons for commonly used overlays.

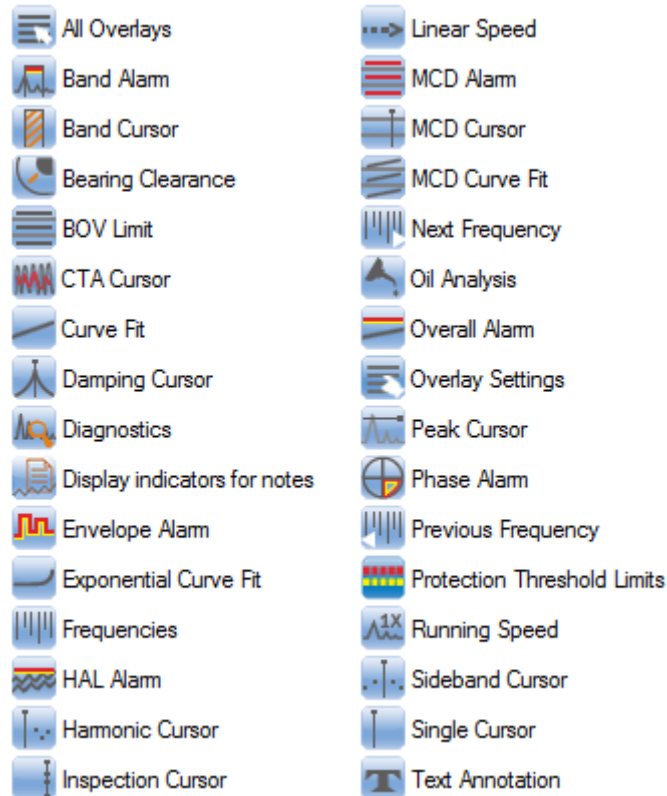


Figure 5 - 50.
Overlay Toolbar Buttons (Shown Here as Two Columns).

Toolbar buttons are available for each overlay. The buttons on the toolbar can be configured using the **Customize** menu's **Toolbar** option. For more information on customizing toolbars, refer to **Appendix A, SKF @ptitude Analyst Toolbars**.

Each button is enabled / disabled based on whether the overlay can appear on the active plot. Individual toolbar buttons are identified later in this section.

Displaying Overlays Using the View Menu

The **View** menu's **Plot Overlays** option contains a list of commonly used overlays. Individual items on this list are enabled or disabled based on whether the overlay is available for the plot window displayed when the item is selected.

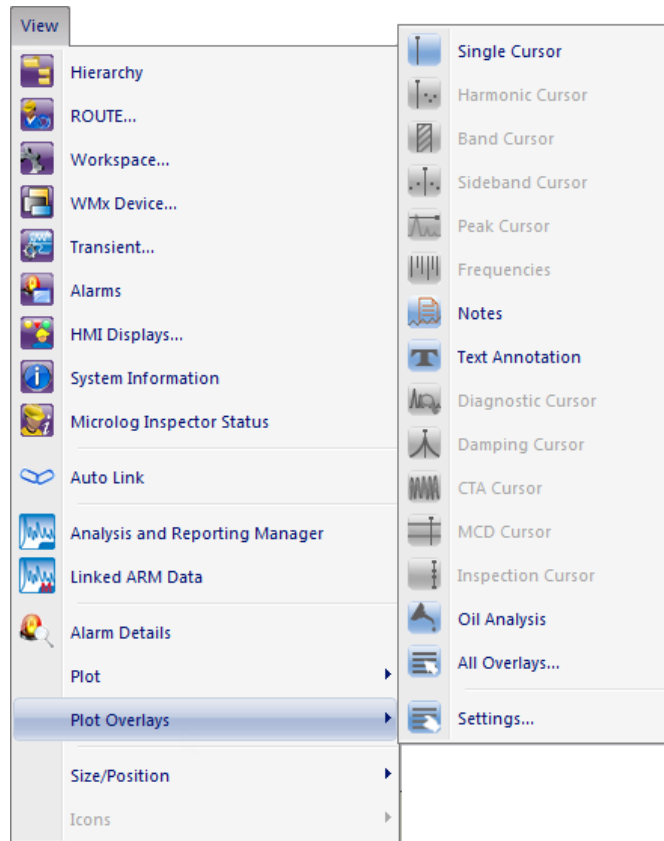


Figure 5 - 51.
The **View** Menu's **Plot Overlays** Option.

Using the **View** menu's **Overlay** option:

Select the **View** menu's **Plot Overlay** option. A group of commonly used overlay types displays on the menu.

- Select one of the visible overlay types, or select **All Overlays** for more selections.

You may also use the **All Overlays** toolbar button to display the **All Overlays** dialog.

All Overlays

- Select the **View** menu's **All Overlays** option. The **All Overlays** dialog displays.

All overlays applicable to the open plot display in the dialog.

- Select an overlay to display and click **OK**. The selected overlay displays in the plot window.
 - You may add as many instances of overlays as needed (excluding the peak cursor).
- Click **Cancel** to undo your selection.

Overlay Settings

To access the **Settings** dialog for the selected overlay, either click the toolbar's overlay settings button, or use the **View** menu's **Plot Overlays / Settings** option.

Overlay Types

Individual Overlay types and settings are listed below:

Text Annotation

Use text annotation overlays to create temporary textual notations and display on a plot.

- Text annotations are for temporary use. They are not attached to the measurement or stored in the database. They remain on a plot until the plot is closed.

To create a text annotation:

- With a plot displayed, click the toolbar's text annotation button, or select the **View** menu's **Plot Overlays / Text Annotation** option. The "Text Annotation" displays on the plot.

To edit the text annotation:

- Double-click the text annotation. The **Text Annotation Settings** dialog displays.

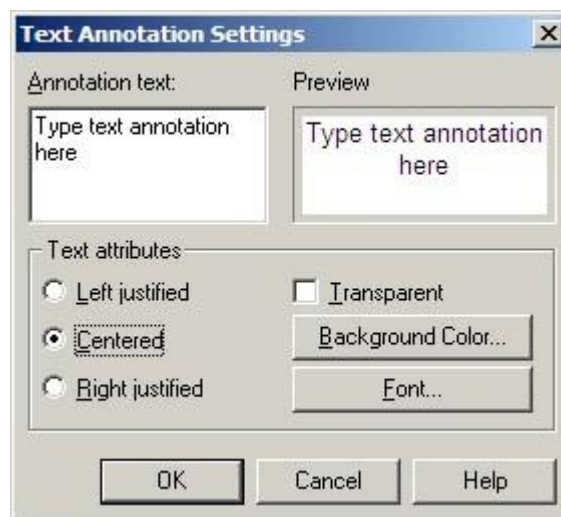


Figure 5 - 52.
The **Text Annotation Settings** Dialog.

Annotation text - Enter text to display on the plot. The entered text displays in the dialog's **Preview** area, allowing you to view the entered text before displaying it on the plot.

Text attributes options include:

Left justified, Centered, or Right justified - Determine how the text displays in its text box.

Transparent - Enable to make the annotation's background area transparent, allowing you to see the plot beneath the text.

Background Color - Click to select the annotation's background area color.

Font - Click to select the font for the annotation text.

- Click the **OK** button. The entered text annotation displays on the active plot.

Context Menu - Right-click on the displayed text annotation to reveal its context menu. Available operations are:

Remove - Removes the annotation from the plot.

Settings - Launches **Text Annotation Settings** dialog.

Keyboard Support - Press **Delete** to remove the annotation from the plot. Use up / down / left / right arrow keys to re-position. Use **Shift** and the left or right arrow key to enlarge in the direction of the selected arrow. Use **Ctrl** and the up / down / left / right arrow keys to shrink the box from the direction of the selected arrow.

Feedback Area - Displays the annotation text.

Information Area - None.

Available Preferences

None.

- Text annotation may also be moved with the mouse (drag and drop). Click on an anchor area and drag to re-size.

Linear Speed Overlay Settings

Use a **Linear Speed Settings** dialog to set the text attributes for your linear speed overlay.

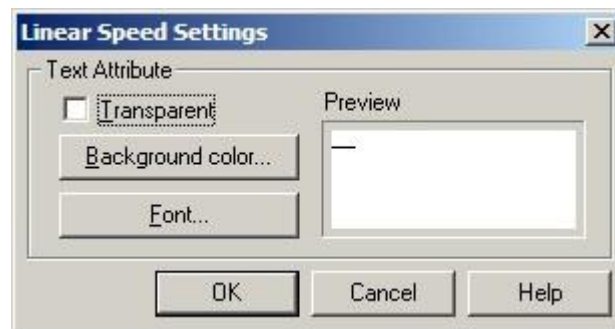


Figure 5 - 53.
The **Linear Speed Settings** Dialog.

In the **Text attribute** section:

- Click the **Transparent** checkbox to display a transparent text annotation over the active plot.
- Click the **Background Color** button to select the color of textbox background.
- Click the **Font** button to select the desired font.
 - Observe linear speed edits in the **Preview** window before applying your linear speed overlay.
- Click **OK** to close the dialog and save your edits.

Trend / Notes

Use the notes overlay to create and display notes at a specific date / time on the trend plot.

To create a note:

- With a trend plot displayed, position your cursor over the plot area and right click to display the right-click context menu.
- Select **Add Notes**. The **Add Notes** dialog displays. A new note displays in the **Notes** list with the date and time of the location you right-clicked on the plot.

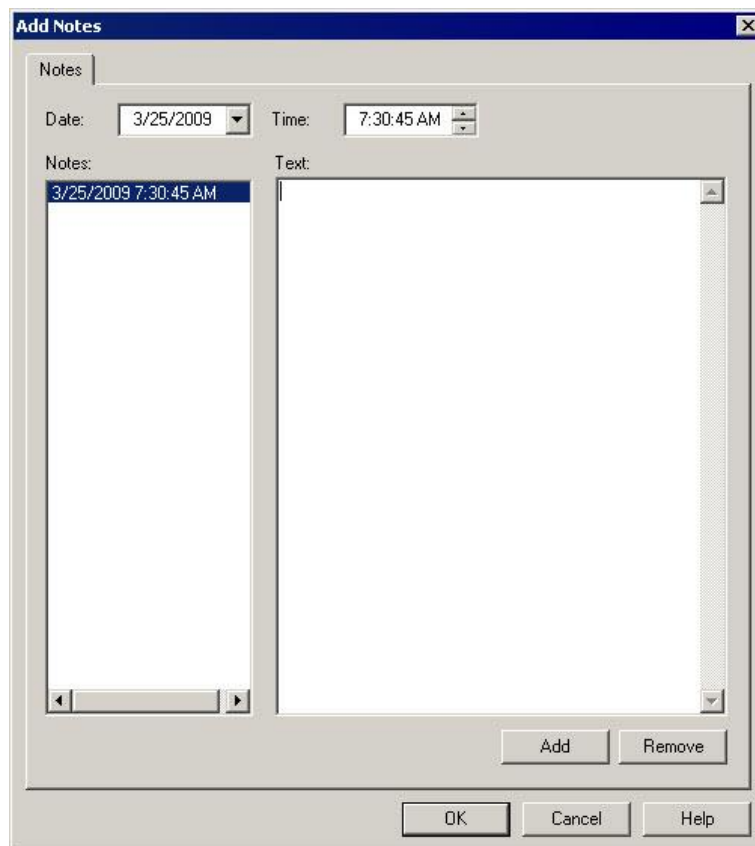


Figure 5 - 54.
The **Add Notes** Dialog.

- If you need to change the date / time of the note, use the **Date** and **Time** fields to adjust the date / time as necessary. The **Add / Remove** buttons will change to **Save / Undo** buttons. Click **Save** and the note's date / time adjusts accordingly in the **Notes** list.
- Type your note in the **Text** area and click **Save**.
- Click **OK**. The created note displays on the plot at its specified date / time location.

To create additional notes:

- Click the **Add** button. A new note is added to the **Notes** list with the current date / time stamp.
- Adjust the date / time using the **Date** and **Time** fields as necessary.
- Type your note in the **Text** area and click **Save**.
- Click **OK**. The created note displays on the plot at its specified date / time location.

To remove a note:

- Select the note you wish to remove in the **Notes** list.
- Click the **Remove** button. You will be asked to confirm that you wish to remove the note.
- Click **Yes**, or if you do not wish to remove the note, click **No**.

How Notes Overlays Display on the Plot

Feedback Area - Displays note and date / time information.

Information Area – Specific information displays on the **Notes** tab. Tab information includes the POINT on which the cursor is currently positioned, note, and date / time.

Context Menu - Right-click on the displayed note to reveal its context menu. Available operations are:

Remove – Removes overlay from the plot.

- This does not delete existing notes. To display the notes overlay again, select **View / Plot Overlays / Notes**.

Next Trace – Toggles between traces when the plot is displaying more than one trace.

Display Note – Displays the note on the plot.

Remove All Display Notes – Hides all notes displayed on the plot.

Filter Notes – Allows you to select one or more note categories to display on the plot.

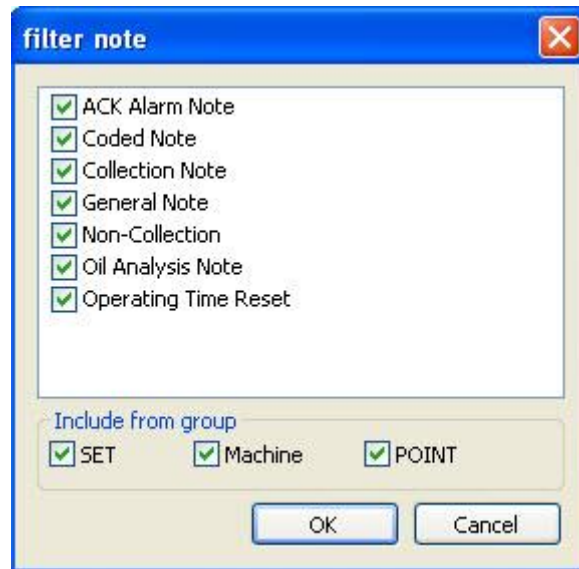


Figure 5 - 55.
The **Filter Notes** Dialog.

- From the list of note categories, enable the check box next to one or more note categories.
- In the **Include from group** area, select the check boxes to include notes from SETs, Machines, and / or POINTs.
- Click **OK**. Only notes from the selected note categories display on the plot.

Available Preferences

The following preferences are found on the **Preferences** dialog's **Plot** tab.

Notes – Configure the default display status (on or off).

Notes Indicator Location – Configure the display notes indicator (at top or bottom of plot).

Notes Indicator Tooltip – Configure whether to display the tooltip (on or off) when hovering over the notes indicator.

Notes Line Style – Configure how the notes cursor line displays (dashed, solid, etc.).

Trend / Single Cursor

Use a single cursor to view individual measurement data on the trend plot by moving the cursor to various measurement records.

To display a single cursor:

- With a trend plot displayed, select the **View** menu's **Plot / Plot Overlays / Single Cursor** option, or use the single cursor overlay toolbar button.
- Drag the cursor to position it on the plot.
- If multiple traces appear in a plot, double-click the cursor overlay's anchor to position it on another trace. The anchor's color indicates the current trace.

Feedback Area - Displays amplitude and date / time information.

Information Area – Specific information displays on the **Trend** tab. Tab information includes the POINT on which the cursor is currently positioned, cursor color, amplitude, and date / time.

Right-Click Context Menu - Right-click on the single cursor overlay anchor to reveal its context menu.

Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Exclude Reading – Toggles selected measurement's **Exclude** status on and off. When **Exclude** is selected, the measurement is excluded from all calculations. This setting is stored with the measurement and is in effect until the setting is changed.

Keyboard Support – Move the cursor with the left and right arrow keys. Press **Enter** to toggle to next trace. Press **Delete** to remove the cursor.

Available Preferences

Color - Cursor is the color of the next available cursor (as configured in **Cursor / Color Preferences** in the **Preferences** dialog).

Display Status – Display status (on or off) is configured in the **Trend Single Cursor / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Trend / Overall Alarm

Use an overall alarm overlay to display your overall alarms graphically (as configured in **POINT Properties**) on the active trend plot.

To display an overall alarm overlay:

- With a trend plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option. The **All Overlays** dialog displays.
- Select **Overall Alarm** and click **OK**.

Feedback Area - Identifies the POINT, displays private alarm or alarm name (if shared), and the alarm levels set.

Information Area - Specific information displays on the **Overall Alarm** tab. Tab information includes POINT name, type, alarm level values and alarm message summaries.

Overall Alarm tab - Information includes name, type, and alarm level values.

Right-Click Context Menu - Right-click on the overall alarm overlay anchor to reveal its context menu.

Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Color – Alert and Danger colors appear as configured in **Cursor / Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Trend Overall Alarm / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Trend / Linear Speed

Use a linear speed overlay to graphically display the value of the linear factor multiplied by the running speed.

To display linear speed overlay:

- With a trend plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option. The **All Overlays** dialog displays.
- Select **Linear Speed** and click **OK**.

Feedback Area – Displays amplitude, frequency, orders, and linear speed.

Information Area – No tabs display for this overlay.

Right-Click Context Menu – Right-click on the linear speed overlay anchor to reveal its context menu.

Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Display Status – Display status (on or off) is configured in the **Trend / Linear Speed / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Linear Speed Settings

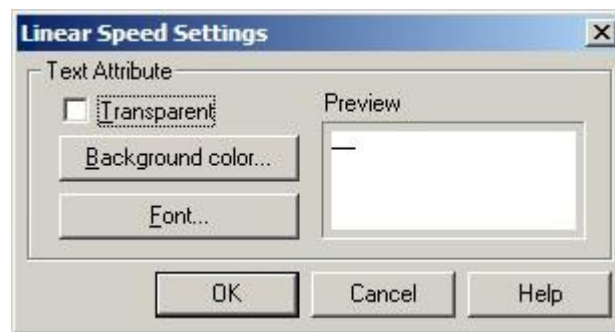


Figure 5 - 56.
The **Linear Speed Settings** Dialog.

Use the **Linear Speed Settings** dialog to set the text attributes for your linear speed overlay.

In the **Text attribute** section:

- Click the **Transparent** checkbox to display a transparent text annotation over the active plot.
- Click the **Background Color** button to select the color of the textbox background.
- Click the **Font** button to select the desired font.
 - Observe linear speed edits in the Preview window before applying your linear speed overlay.
- Click **OK** to close the dialog and save your edits.

Trend / Curve Fit

Use a curve fit overlay to graphically display the projected linear direction a trend is heading based on current data.

To display a curve fit overlay:

- With a trend plot displayed, select the **View** menu's **Plot / Plot Overlays / Curve Fit** option, or use the curve fit toolbar button.

Feedback Area - Identifies the curve fit and associated POINT.

Information Area - Specific information displays on the **Curve Fit** tab. Tab information includes:

Date, time, and amplitude for 2 years from last plotted measurement.

Date, time, and amplitude when alert exceeded (or projected to be reached).

Date, time, and amplitude when danger exceeded (or projected to be reached).

Information is sorted by the POINT name or color of the current trace.

Right-Click Context Menu - Right-click on the curve fit overlay anchor to reveal its context menu.

Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Color – Color appears as configured in **Curve Fit / Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Trend Curve Fit / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Trend / Protection Threshold Limits

Use a protection threshold limits cursor on a trend plot to graphically display the protection levels for IMx-M protection POINTs. The protection threshold limits display as red (danger) and/or yellow (alert) dashed lines for the **Alert High**, **Alert Low**, **Danger High**, and **Danger Low** settings defined on the **POINT Properties / Protection Threshold Levels** tab.

To display a protection threshold limits overlay:

- With a trend plot displayed, select the **View** menu's **Plot / Plot Overlays / Protection Threshold Limits** option, or use the **Protection Threshold Limits** toolbar button.

Feedback Area - Identifies the protection threshold limits and associated POINT.

Information Area - Specific information displays on the **Protection Threshold** tab. Tab information includes the IMx-M protection POINT's danger and alert protection threshold levels.

Information is sorted by the POINT name of the current trace.

Right-Click Context Menu - Right-click the protection threshold limit overlay anchor to reveal its context menu.

Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Display Status – Display status (on or off) is configured on the **Plot Preferences / Protection Threshold Limits** in the **Preferences** dialog.

➤ The default status is off.

Spectrum / Single Cursor

Use a single cursor on a spectrum plot to display the amplitude for the frequency of the cursor's current placement

To display a single cursor overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / Single Cursor** option, or use the single cursor toolbar button.

Feedback Area – Displays amplitude, frequency, number of orders, and phase angle (if available).

Information Area – Specific information displays on the **Spectrum** tab. Tab information includes POINT name, cursor color, frequency, amplitude of each channel, number of orders, and phase angle (if available).

Right-Click Context Menu – Right-click on the single cursor overlay anchor to reveal its context menu. Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Set Speed – Launches the **Set Running Speed** dialog.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove. Left and right arrow keys move one line at a time. **Shift** and the left or right arrow moves 15 lines at a time.

Available Preferences

Color - Cursor is the color of the next available cursor (as configured in **Cursor / Color Preferences** in the **Preferences** dialog).

Display Status – Display status (on or off) is configured in the **Spectrum Single Cursor / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Set Running Speed

The calculated or custom running speed appears on the active plot if the running speed overlay is displayed.

To specify the running speed:

- Right click on the single cursor overlay and select **Set Speed** from the pop-up menu.

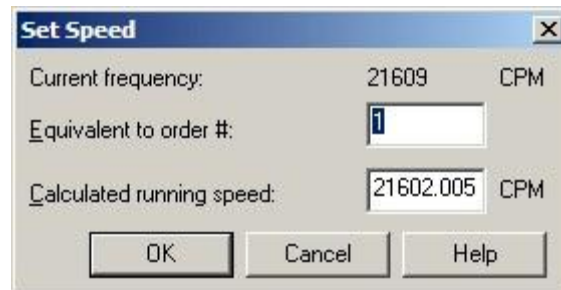


Figure 5 - 57.
The **Set Speed** Dialog.

Use the **Set Running Speed** dialog to edit the running speed for the measurement.

Current frequency – Displays the frequency of the current cursor position on the open plot.

To set a custom running speed:

- Enter the desired frequency in the **Calculated running speed** field and click **OK**.

To automatically calculate running speed by current frequency and number of orders:

- Enter the desired value in the **Equivalent to order#** field.
- Click **OK**.

Trend / HAL Alarm

The HAL alarm overlay has the following characteristics:

- If HAL alarm levels have been defined for a POINT in the POINT Properties > HAL Alarms tab, then the HAL trend plot will open with the HAL alarm overlay displaying the alert and danger level lines.
- The alert (yellow) and danger (red) lines are shown for the selected frequency.

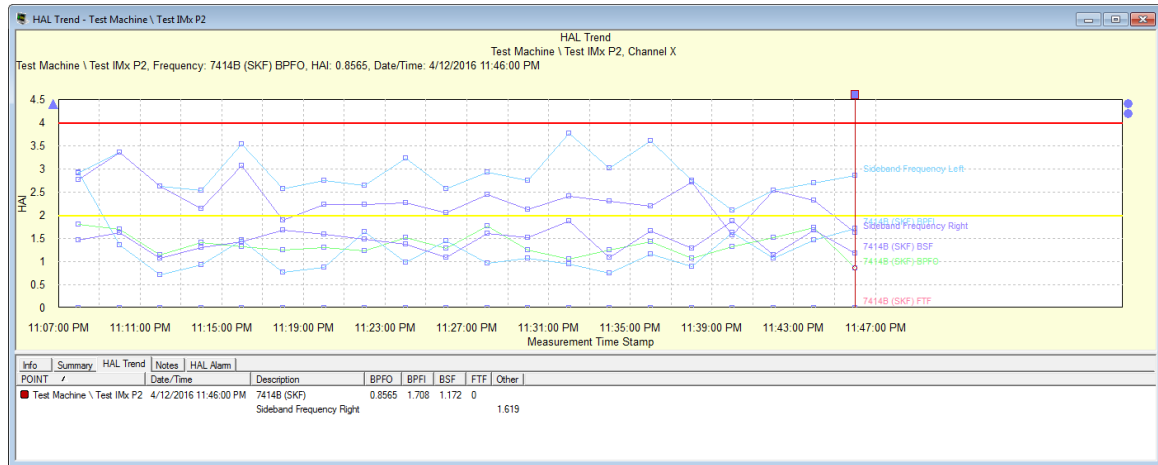


Figure 5 - 58.
Example of HAL Trend Plot with HAL Alarm Overlay.

In the example below, the active overlay is the single cursor (indicated by the square box on the cursor) and the primary feedback text is displayed in black. When you use the mouse to hover your cursor on the circle at the right, representing the HAL Alarm overlay, the blue secondary feedback text highlights and displays alarm information.

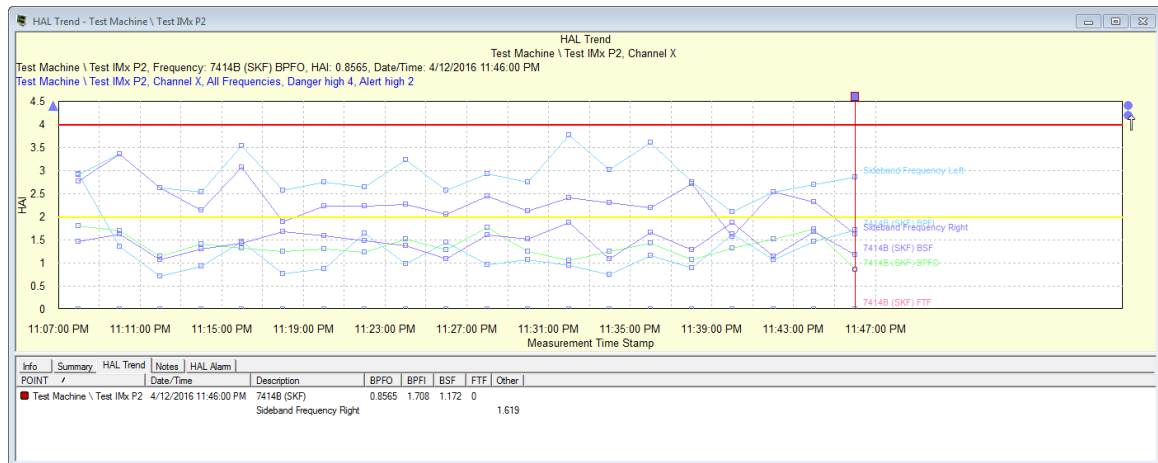


Figure 5 - 59.
Example of HAL Trend Plot with HAL Alarm Overlay Feedback Text.

To change the HAL alarm cursor to a different frequency, either:

- click the HAL alarm anchor and use the up/down arrow keys to select different frequencies on the HAL Alarm plot, OR
- right click the HAL alarm anchor to open the context menu and then select another HAL alarm frequency to highlight on the trend plot.

The line for the selected frequency is highlighted and the corresponding highlight rectangle indicates the current measurement displayed in the feedback text.

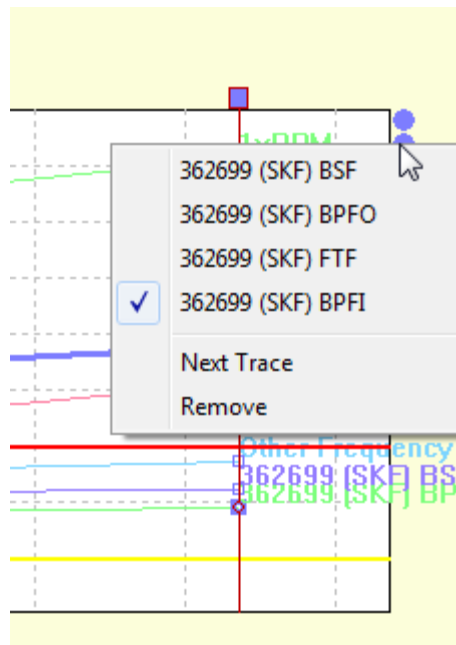


Figure 5 - 60.
Example of the HAL Trend Plot Anchor Context Menu.

A HAL Alarm tab is added to the information area at the bottom of the HAL trend plot when the cursor is visible. The tab shows the POINT name, its frequency, and the alert and danger threshold values set on the POINT Properties > HAL Alarm tab for the current selected HAL alarm. Alarm levels display in the plot and are updated appropriately for each HAL frequency.

Info	Summary	HAL Trend	Notes	HAL Alarm
POINT	Frequency	Alert High	Danger High	
<input checked="" type="checkbox"/> Test Machine \ Test IMx P2	All Frequencies	2	4	

Figure 5 - 61.
Example of the HAL Alarm Tab for the HAL Trend Plot.

Spectrum / Running Speed

Use a Running Speed overlay to visually indicate the running speed frequency (Machine's running speed at time of measurement).

To display a running speed overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option to display the **All Overlays** dialog.
- Select **Running Speed** and click **OK**.

- Use the **Customize** menu's **Toolbar** option to activate the running speed overlay toolbar button.

Feedback Area - Displays amplitude, frequency, orders, and running speed.

Information Area – None.

Right-Click Context Menu – Right-click on the running speed overlay anchor to reveal its context menu.

Available options include:

Next Trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

- An anchor symbol appears on the bottom of the plot. Click the anchor to toggle between multiple spectra.

Available Preferences

Color – Running speed color is configured in **Running Speed / Colors** in the **Preferences** dialog).

- The default color is black.

Display Status – Display status (on or off) is configured in the **Running Speed - Spectrum / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Spectrum / Band Cursor

Use a band cursor to display the frequency / time and amplitude difference (delta) between two cursor positions.

To display a band cursor overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / Band Cursor** option, or use the band cursor toolbar button.

Feedback Area - Displays left amplitude and frequency, right amplitude and frequency, orders, and delta (distance between cursor positions in frequency units).

Information Area – Specific information displays on the **Spectrum Band** tab. Tab information includes left frequency and amplitude for each channel, right frequency and amplitude for each channel, orders, delta, and overall for each channel.

Right-Click Context Menu - Right-click on the band cursor overlay anchor to reveal its context menu. Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes the overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

The band cursor is made up of three parts. The fundamental left line, fundamental right line, and the band width. The active line is indicated by the cursor line focus icon. This icon displays as a triangle on the active part of the cursor. Use left and right arrow keys to move band width or an individual line (depending on which is active) left or right. The **Page Up** and **Page Down** keys toggle between left line, right line, and band width.

- The individual fundamental lines and the band width move in small increments (one line at a time). Use the **Shift** and the left or right arrow key to move part or the entire band in larger increments (15 lines at a time).

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Color Preferences** in the **Preferences** dialog). Cursor line focus icon color appears as configured in **Cursor Line Focus** in **Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Spectrum Band Cursor / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Spectrum / Harmonic Cursor

Use a harmonic cursor to display multiples of the current frequency.

To display a harmonic cursor overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / Harmonic Cursor** option, or use the harmonic cursor toolbar button.

Feedback Area – Displays the value for fundamental and harmonic amplitude, frequency, and orders. When the mouse pointer is positioned over a harmonic marker, that marker's amplitude, frequency, and orders display on the feedback area's second line.

Information Area – Specific information displays on the **Harmonic Cursor** tab. Tab information includes POINT name, cursor color, frequency, amplitude of each channel, number of orders, and percentage of each channel's fundamental frequency for each harmonic.

Info	Summary	Harmonic Cursor					
POINT	Activity Index	Harmonic	Frequency	Order	Amplitude	% of Fund.	
RED PASO 1 \ 8H	3.786	Fund.	47.13	6.24	0.005567		
		2	94.25	12.48	0.001719	30.88	
		3	141.4	18.72	0.0005326	9.567	
		4	188.5	24.96	0.0003046	5.472	

Figure 5 - 62.
The **Harmonic Cursor** Tab.

The **Harmonic Cursor** tab provides details on potential harmonics using SKF's Harmonic Activity Index (HAI). All impact defects create spectra with a fundamental and a series of harmonics (i.e., a harmonic pattern). The amplitudes of these harmonics are

affected by the defect itself, as well as the filtering effect of the machine. HAI is a calculation that quantifies the likelihood of harmonic patterns being present in a spectrum, and therefore, the likelihood of a defect being present.

The result of the HAI calculation is displayed in the **Activity Index** column. The **Activity Index** is a quick indicator to determine if there is a meaningful pattern under the current cursor position (i.e., whether or not there is a defect associated with this frequency). It can also act as a guide to determine the best cursor position for a suspected a harmonic pattern.

An HAI value of 2.5 or greater indicates a likely defect pattern; HAI values of 3 or more show clear patterns.

- HAI values are the same across spectra from different sources (i.e., the number of lines or unit types do not matter).
- HAI values are calculated from spectral data only. In some spectra, many different sources unrelated to each other may create a seemingly harmonious pattern. The HAI value for this pattern might be high enough to suggest a true pattern is shown. To verify it is a true pattern, always check a few spectra taken over time for similar HAI values.

Right-Click Context Menu - Right-click on the harmonic cursor overlay anchor to reveal its context menu. Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes the overlay from the plot.

Set Running Speed

The calculated or custom running speed appears on the active plot if the running speed overlay is displayed.

To specify the running speed:

- Right click on the harmonic cursor overlay and select **Set Speed** from the pop-up menu.

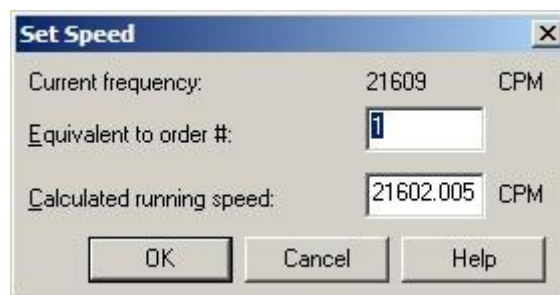


Figure 5 - 63.
The **Set Speed** Dialog.

Use the **Set Running Speed** dialog to edit the running speed for the measurement.

Current frequency – Displays the frequency of the current cursor position on the open plot.

To set a custom running speed:

- Enter the desired frequency in the **Calculated running speed** field and click **OK**.

To automatically calculate running speed by current frequency and number of orders:

- Enter the desired value in the **Equivalent to order#** field.
- Click **OK**.

Keyboard Support – Press **Enter** to toggle to the next trace. Press **Delete** to remove.

Left and right arrow keys move the fundamental line in small increments (one line at a time). Use the **Shift** and the left or right arrow key to move in larger increments (15 lines at a time).

Ctrl and the left or right arrow key moves the marker on the far right in small increments.

Available Preferences –

Color – Cursor is the color of the next available cursor (as configured in **Color Preferences** in the **Preferences** dialog).

Display Status – Display status (on or off) is configured in the **Harmonic Cursor / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Number of Harmonics – Maximum number of harmonic markers displayed (1-100).

- The default number is 50.

Spectrum / Sideband Cursor

Sideband markers consist of an array of five pairs of markers evenly spaced on both sides of a sideband cursor reference position. Sideband markers are referenced as located from left to right around the center cursor. Sideband markers to the left of the center cursor are referenced with negative numbers; their associated markers to the right of the cursor are referenced with positive numbers.

To display a sideband cursor overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / Sideband Cursor** option, or use the sideband cursor toolbar button.

Feedback Area – Displays the center position's amplitude and frequency, orders, delta, and each sideband marker's amplitude and frequency (arranged negative to positive).

When the mouse pointer is over a sideband marker, its amplitude and frequency display on the feedback area's second line.

Information Area – Specific information displays on the **Sideband** tab. Tab information includes sideband position, frequency, orders, amplitude, and delta (arranged negative to positive by sideband marker number).

Right-Click Context Menu – Right click on the sideband cursor overlay anchor to reveal its context menu. Available options include:

Next Trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Use the left and right arrow keys to move the center cursor in small increments (one line at a time). Use **Shift** and the left and right arrow keys to move the center cursor in larger increments (15 lines at a time). Use **Ctrl** and the left and right arrow keys to move the markers in and out in small increments (left arrow to expand / right arrow to contract). Use **Ctrl** and **Shift** and the left and right arrow keys to move markers in larger increments (15 lines at a time).

You may drag every individual marker, effectively changing the delta value, and thus the location of all other markers.

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Color Preferences** in the **Preferences** dialog).

Display Status – Display status (on or off) is configured in the **Sideband Cursor Spectrum / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Spectrum / Peak Cursor

Peak cursors label all peaks above a user determined amplitude.

- The default amplitude is based on the **Threshold %** preference.

To display a peak cursor overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / Peak Cursor** option, or use the peak cursor toolbar button.

Feedback Area - Displays the amplitude line value and the total number of peaks. Displays each peak's position, amplitude, frequency, and orders.

Information Area – Specific information displays on the **Peak** tab. Tab information includes peak position (index), amplitude, frequency, and orders.

Right-Click Context Menu - Right-click on the peak cursor overlay anchor to reveal its context menu. Available options include:

Next Trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Use the up and down arrow keys to increase or decrease the amplitude line 1% of the current amplitude value. Use the **Shift** and up and down arrow keys to increase / decrease the amplitude range in larger increments (10% at a time).

Available Preferences

Color - Cursor is the color of the next available cursor (as configured in **Color Preferences** in the **Preferences** dialog).

Display Status – Display status (on or off) is configured in the **Peak Cursor - Spectrum / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Threshold % - This value is used to determine the initial position of the cursor as a percentage of the full scale value.

- The default amplitude is based on the **Threshold%** preference

Spectrum / Band Alarm

Use a band alarm overlay to display all band alarms assigned to the active POINT.

- If the band alarms display was previously modified for the active POINT, then only those marked visible will display.

To display a band alarm overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option. The **All Overlays** dialog displays.
- Select **Band Alarm** and click **OK**.
 - Use the **Customize** menu's **Toolbar** option to activate the band alarm overlay toolbar button.

In displayed band alarm overlays, solid lines represent peak values and dashed lines represent overall values. Green lines represent the band's peak and overall value for the measurement, yellow lines show *alert* alarm values, red lines show *danger* alarm values.

Feedback Area– When anchor is active, displays band alarm for specific POINT. When band alarm is active, displays band name, alarm level, and value (Overall Danger and Alert / Peak Danger and Alert).

Information Area – Specific information displays on the **Band Alarm** tab. Tab information includes low and high frequency values, orders, peak, overall alert and danger alarm values, data values, for example: peak value and status / overall value, and status.

Right-Click Context Menu - Right-click on the band alarm overlay anchor to reveal its context menu. Available options include:

Next Trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes the overlay from the plot.

Settings – Launches **Band Alarm Settings** dialog.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Color – Color preferences set in following areas of the **Preferences** dialog:

Band Alarm / Colors – Configures frequency lines (left and right) colors.

Clear / Colors – Configures data value line colors.

Alert / Colors – Configures alert color.

Danger / Colors – Configures danger color.

Display Status – Display status (on or off) is configured in the **Band Alarm - Spectrum / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Band Alarm Settings Dialog

Use the **Band Alarm Settings** dialog to show / hide available band alarms on the active POINT's plot. Available Band Alarm names, visibility status, and frequency range display on the tab.

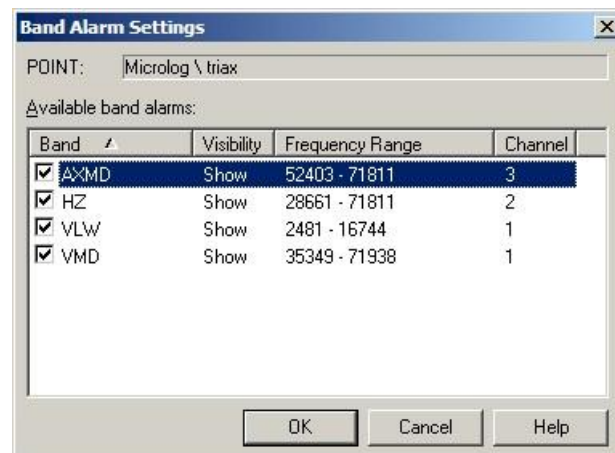


Figure 5 - 64.
The **Band Alarm Settings** Dialog.

Band Alarm Settings fields include:

POINT – Displays POINT name.

Available band alarms – Displays individual band alarms and their visibility status, frequency ranges, and channels.

To show / hide band alarms:

- Click the band alarm's checkbox to toggle the band alarm's status from **Show** to **Hide**.
- Click **OK** to save changes, click **Cancel** to close the dialog without saving changes.
 - These display settings are stored with the POINT. Whenever the POINT displays, the current settings are used.

Spectrum / Envelope Alarm

Use an envelope alarm overlay to display the envelope alarm assigned to the active POINT(s).

To display an envelope alarm overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option. The **All Overlays** dialog displays.
- Select **Envelope Alarm** and click **OK**.

The generated envelope alarm remains in * **EDIT** * mode until you **Save** or **Undo** your settings using the plot's context menu.

Editing the Envelope Alarm

After you have generated an envelope alarm, you can edit it graphically using your mouse, or enter numeric envelope parameters using the **Set Frequency** dialog.

To graphically edit the envelope alarm:

- While in edit mode, the plot window displays * **EDIT** * in each upper corner. Move the mouse over the envelope alarm. The cursor changes to an up arrow.
- Click the mouse on the portion of the envelope alarm line to be edited. A square icon identifies where the line will be drawn.
- Drag the mouse to draw the line to create the new envelope alarm.

Tip - You can use your keyboard's **Insert** key to begin drawing the envelope alarm line. Then, use the arrow keys to move the line, and the **Insert** key again to stop drawing the line.

- Right-click within the plot to display its context menu.
- Select **Save** to save your envelope alarm settings and end * **EDIT** * mode, or select **Undo** to undo your settings.

To edit the envelope alarm using numeric frequency ranges:

- Click the **Set Range** button. The **Set Frequency** dialog displays.
- Enter the desired low frequency, high frequency, and level value.
- Click **OK**. The displayed envelope alarm automatically conforms to your entries.

Feedback Area – Identifies the envelope alarm and POINT.

Information Area – Specific information displays on the **Envelope** tab. Tab information includes each frequency that pierced the envelope, FFT amplitude, and alarm amplitude.

Additional overlay information displays on the **Envelope** tab.

Right-Click Context Menu – Right-click on the envelope alarm overlay anchor to reveal its context menu. Available options include:

Next Trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Color – Alarm line color is configured in **Danger / Colors** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Envelope Alarm - Spectrum / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Spectrum / Linear Speed

Use a linear speed overlay to graphically display the value of the linear factor multiplied by the running speed.

To display linear speed overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option. The **All Overlays** dialog displays.
- Select **Linear Speed** and click **OK**.

Feedback Area – Displays amplitude, frequency, orders, and linear speed.

Information Area - No tabs display for this overlay.

Right-Click Context Menu - Right-click on the linear speed overlay anchor to reveal its context menu.

Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Settings – Launches the **Linear Speed Settings** dialog.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Display Status – Display status (on or off) is configured in the **Spectrum / Linear Speed / Plot Preferences** in the **Preferences** dialog.

- The default status is **off**.

Spectrum / Frequency

Use a frequency overlay to label POINTs' assigned frequency set(s) for identification and analysis of bearing defects, etc.

- The current POINT must have an assigned frequency set.

To display a frequency overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot / Plot Overlays / Frequency** option, or use the frequency toolbar button.

Feedback Area – Displays the number of fundamental frequencies available for the POINT. Displays individual frequency label, orders, each multiple's amplitude and frequency.

When the mouse pointer is over a frequency label, that label's amplitude and frequency values display feedback area's second line.

- The number of fundamental frequencies is not limited to the number of displayed frequencies.

Information Area – Specific information displays on the **FAM** tab. Tab information includes all displayed frequencies for active overlay, harmonic, frequency, orders, and amplitude values.

Also included on the **FAM** tab is an **Activity Index** column. The Activity Index displays the result of an HAI (Harmonic Activity Index) calculation, which quantifies the likelihood of defects at the FAM frequencies for the BPFO, BPFI, BSF, and FTF harmonics in the spectrum.

A HAI value in the **Activity Index** column of 2.5 or greater indicates a likely defect pattern; HAI values of 3 or more show clear patterns.

Right-Click Context Menu - Right-click on the frequency overlay anchor to reveal its context menu. Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Next Frequency – Advance to next frequency set.

Previous Frequency - Return to previous frequency set.

Remove – Removes the overlay from the plot.

Settings – Launches **Frequency Settings** dialog.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove the overlay. Use the plus (+) and minus (-) keys to cycle through the frequency sets for an individual POINT and return to original selection.

Available Preferences

Color – Frequency color is configured in **Frequency / Color Preferences** in the **Preferences** dialog).

Display Status – Display status (on or off) is configured in **Frequency – Spectrum / Plot Preferences** in the **Preferences** dialog.

- The default status is **off**.

Frequency Settings Dialog

Use the **Frequency Settings** dialog to enable / disable any or all frequencies for display on the current POINT's plot.

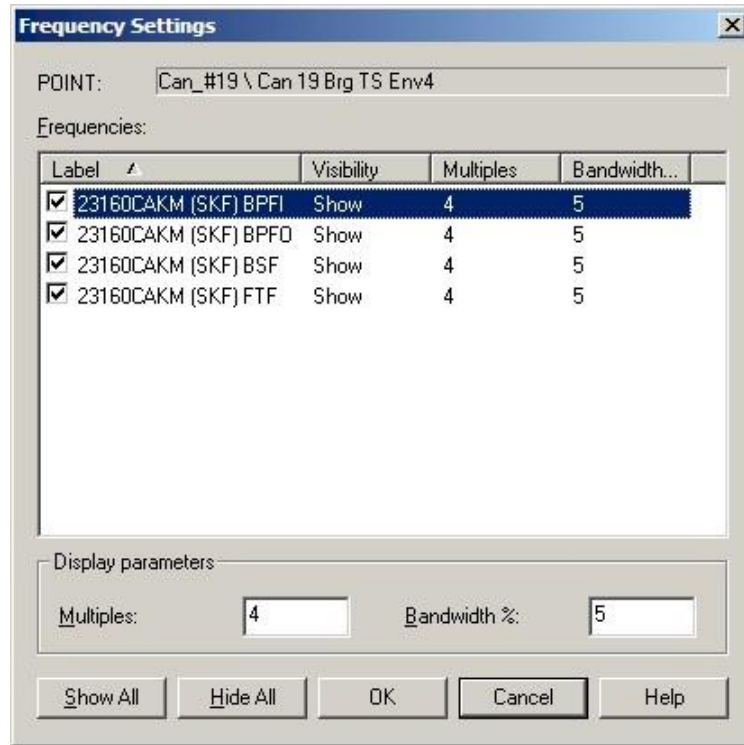


Figure 5 - 65.
The **Frequency Settings** Dialog.

To enable / disable frequencies:

- Click the checkbox next to the frequency set to enable it for display. Clear the checkbox to disable the frequency set.

Display parameters fields include:

Multiples - Enter number of multiples for each label.

Bandwidth % - Enter bandwidth % for each label.

➤ Settings are permanently saved with the POINT.

- Click **Show All** to **enable** all frequencies for display, click **Hide All** to disable all frequencies for display.
- Click **OK** to save changes, click **Cancel** to close dialog without saving changes.

Spectrum / Diagnostic Cursor

Use a diagnostic cursor to let @ptitude Analyst compute and display all relevant harmonic series of the current spectrum, and rank all series found according to probability.

- This option is only available with @ptitude Analyst CMSW 7400.

To display a diagnostic cursor overlay:

- With a spectrum plot displayed, select the **View** menu's **Plot Overlays / Diagnostic Cursor** option, use the diagnostic cursor toolbar button, or press X on your keyboard.

@ptitude Analyst uses a patented algorithm to distinguish between very probable and less probable harmonic series, and ranks all series found according to probability.

The result is shown on the **Diagnostics** tab in the info area below the spectrum plot. The probability is expressed as an activity index, whereby values of 1.5 and higher indicate an increasing probability of a significant harmonic pattern.

In addition, the algorithm compares the fundamental frequency of each series to any frequency associated with the POINT (e.g., bearing defect frequencies). If a match is found, it displays the name of this frequency next to the related harmonic pattern.

POINT	Index	Activity Index	Frequency	Order	Information
Bottom Wire TS \ Bottom Wire Vel	1	3.779	47.13	6.24	22319C (SKF) BPFO
	2	3.757	31.42	4.16	
	3	3.695	9.988	1.322	
	4	3.647	16.97	2.248	
	5	3.323	12.23	1.62	

Figure 5 - 66.
The **Diagnostics** Tab.

- ① list of patterns ranked by probability
- ② Activity Index (2.5 or greater indicates a likely defect pattern; 3 or more show clear patterns)
- ③ pattern matches BPFO

Feedback Area – Displays the values for the currently shown harmonic series by activity index, fundamental frequency, and orders.

Information Area – Specific information displays on the **Diagnostics** tab. Tab information includes harmonic frequency, orders, and activity index for all relevant harmonic series, sorted by activity index. Use the mouse or cursor keys to scroll through the list and display the highlighted series on the spectrum plot.

Right-Click Context Menu - Right-click on the diagnostic cursor overlay anchor to reveal its context menu. Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes the overlay from the plot.

Keyboard Support – Press Enter to toggle to the next trace. Press Delete to remove.

Available Preferences

Color - Cursor is the color of the next available cursor (as configured in **Color Preferences** in the **Preferences** dialog).

Diagnostics Percentage – Configured in **Diagnostic Percentage – Spectrum/Plot Preferences** in the **Preferences** dialog. Filters the list of harmonic patterns displayed, based on a percentage of the highest Activity Index detected in the spectrum. (For example, if the highest Activity Index is 3.5, a Diagnostics Percentage of 50% would filter out any harmonic patterns with an Activity Index below 1.75.)

- The default percentage is 30%.

Diagnostic Cursor – Configured in **Diagnostic Cursor – Spectrum / Plot Preferences** in the **Preferences** dialog. Determines whether the diagnostic cursor is on by default when a spectrum plot is displayed.

- The default status is off.

Waterfall / Single Cursor

Use a single cursor to select a particular frequency across one or more spectra and toggle between open spectra.

To display a single cursor overlay:

- With a waterfall plot displayed, select the **View** menu's **Plot / Plot Overlays / Single Cursor** option, or use the single cursor toolbar button.

Feedback Area – Displays the amplitude and frequency for the selected spectrum line with a marker. Displays the spectrum's name and date / time.

Information Area – Specific information displays on the **Waterfall** tab. Tab information includes selected spectrum line's amplitude and frequency, measurement date / time, and selected measurement details.

Right-Click Context Menu - Right-click on the single cursor overlay anchor to reveal its context menu. Available options include:

Next POINT - Toggles between open POINTs (with two or more POINTs active).

Next / Previous Spectrum – Moves to next or previous spectrum for active POINT.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to the next POINT. Press **Delete** to remove. Use the left and right arrow keys to move to next / previous frequency in small increments (one line at a time). Use the up and down arrow keys to move to next / previous spectrum for the POINT.

- Use **Shift** and left and right arrow keys to move to next or previous frequency in larger increments (10 lines at a time).
- In Palogram mode, the keys are reversed. Use left and right arrow keys to move to next / previous spectrum, and up and down arrow keys to move to next / previous frequency.

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursor / Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Single Cursor - Waterfall / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Waterfall / Band Cursor

Use a band cursor to calculate and display the delta between two frequencies.

To display a band cursor overlay:

- With a waterfall plot displayed, select the **View** menu's **Plot / Plot Overlays / Band Cursor** option, or use the band cursor toolbar button.

Feedback Area – Displays the minimum and maximum frequency and delta for the active POINT.

Information Area – Specific information displays on the **Waterfall Band** tab. Tab information includes minimum and maximum frequency and delta for the active POINT.

Right-Click Context Menu - Right-click on the band cursor overlay anchor to reveal its context menu. Available options include:

Next POINT - Toggles between open POINTs (with two or more POINTs active).

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to the next POINT. Press **Delete** to remove. The band cursor is made up of three parts, the fundamental left line, fundamental right line, and the entire band. The active line is indicated by the cursor line focus icon. This icon displays as a triangle on the active part of the cursor. Use left and right arrow keys to move the entire band or an individual line (depending on which is active) left or right. The **Page Up** and **Page Down** keys toggle between left line, right line, and entire band.

- The individual fundamental lines and the entire band move in small increments (one line at a time). Use the **Shift** and the left or right arrow key to move part or all of the band in larger increments (15 lines at a time).

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursor / Color Preferences** in the **Preferences** dialog. Cursor line focus icon color appears as configured in **Cursor Line Focus** in **Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Band Cursor - Waterfall / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Polar Vector / Single Cursor

Use a single cursor to display the magnitude and phase for FFT / phase data and to navigate between individual readings for a selected order.

To display a single cursor overlay:

- With a polar vector plot displayed, select the **View** menu's **Plot / Plot Overlays / Single Cursor** option, or use the single cursor toolbar button.

Feedback Area – Displays amplitude, phase angle, POINT name, and measurement date / time for cursor location.

Information Area – Specific information displays on the **Polar Vector** tab. Tab information includes POINT name, date / time stamp, amplitude, and phase angle.

Right-Click Context Menu - Right-click on the single cursor overlay anchor to reveal its context menu. Available options include:

Next Trace - Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to next POINT. Press **Delete** to remove. Use the left and right arrow keys to move to next or previous reading (by date / time).

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursor / Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Single Cursor – Polar Vector / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Polar Vector / Phase Alarm Cursor

Use a phase alarm overlay to graphically display alarm levels for phase data. Normal levels display inside small enclosed areas. Alert levels are contained within a larger enclosed area. Danger levels appear outside the enclosed area.

To display a phase alarm overlay:

- With a polar vector plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option. The **All Overlays** dialog displays.
- Select **Phase Alarm** and click **OK**.
 - Use the **Customize** menu's **Toolbar** option to activate the phase alarm overlay toolbar button.

Feedback Area– Displays POINT name and phase alarm.

Information Area – Specific information displays on the **Phase Alarm** tab. Tab information includes order number, start and end angle, and low and high amplitudes for enabled alarms (alert, danger, or both).

Right-Click Context Menu - Right-click on the phase alarm overlay anchor to reveal its context menu. Available options include:

Next Trace - Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next POINT. Press **Delete** to remove.

Available Preferences

Color – Alarm colors configured in **Danger** and **Alert / Colors** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Phase Alarm – Polar Vector / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Mag / Phase / Single Cursor

Use a single cursor to display amplitude and phase data in linear form for trending purposes. Navigate by date / time and simultaneously analyze magnitude and phase data.

To display a single cursor overlay:

- With a mag / phase plot displayed, select the **View** menu's **Plot / Plot Overlays / Single Cursor** option, or use the single cursor toolbar button.

Feedback Area – Displays POINT name, date / time, amplitude, and phase.

Information Area – Specific information displays on the **Mag/Phase** tab. Tab information includes POINT name, date / time, amplitude, and phase.

Right-Click Context Menu - Right-click on the single cursor overlay anchor to reveal its context menu. Available options include:

Next Trace - Toggles between traces when the plot is displaying more than one trace.

Remove - Removes overlay from the plot.

Keyboard Support - Press **Enter** to toggle to next POINT. Press **Delete** to remove.

Available Preferences

Color - Cursor is the color of the next available cursor (as configured in **Cursors / Color Preferences** in the **Preferences** dialog.

Display Status - Display status (on or off) is configured in the **Single Cursor - Mag-Phase Trend / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Time / Single Cursor

Use a single cursor to analyze a time waveform's amplitude and time data.

To display a single cursor overlay:

- With a time plot displayed, select the **View** menu's **Plot / Plot Overlays / Single Cursor** option, or use the single cursor toolbar button.

Feedback Area - Displays amplitude and time data for cursor's location on the plot.

Information Area - Specific information displays on the **Time** tab. Tab information includes POINT name, amplitude, and time.

Right-Click Context Menu - Right-click on the single cursor overlay anchor to reveal its context menu. Available options include:

Next Trace - Toggles between traces when the plot is displaying more than one trace.

Remove - Removes overlay from the plot.

Keyboard Support - Press **Enter** to toggle to next POINT. Press **Delete** to remove.

Available Preferences

Color - Cursor is the color of the next available cursor (as configured in **Cursors / Color Preferences** in the **Preferences** dialog.

Display Status - Display status (on or off) is configured in the **Single Cursor - Time / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Time / Harmonic Cursor

Use a harmonic cursor to create and view a time interval's harmonics.

To display a harmonic cursor overlay:

- With a time plot displayed, select the **View** menu's **Plot / Plot Overlays / Harmonic Cursor** option, or use the harmonic cursor toolbar button.

Feedback Area – Displays amplitude and time of fundamental left line and right line of cursor. Displays interval in time and interval as a frequency.

Information Area – Specific information displays on the **Harmonic Cursor** tab. Tab information includes POINT name, left and right fundamental lines' amplitude and time, interval, frequency, and all visible harmonic labels.

Right-Click Context Menu - Right- click on the harmonic cursor overlay anchor to reveal its context menu. Available options include:

Next Trace - Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next POINT. Press **Delete** to remove.

The cursor is made up of three parts. The fundamental left line, fundamental right line, and the entire cursor. The active line is indicated by the cursor line focus icon. This icon displays as a triangle on the active part of the cursor. Use the left and right arrow keys to move the entire cursor or either individual line (depending on which is active) left or right. The **Page Up** and **Page Down** keys toggle between selections of left line, right line, and entire cursor.

- The individual fundamental lines and the entire cursor move in small increments (one line at a time). Use the **Shift** and left and right arrow keys to move all or part of the cursor in larger increments (15 lines at a time).

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursors / Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Harmonic Cursor – Time / Plot Preferences** in the **Preferences** dialog.

- The default status is off.
- The **Time – Harmonic** cursor's fill pattern lines slope *downward* from left to right to distinguish it from a **Band** cursor. A **Band** cursor's fill pattern lines slope *upward* left to right.
- The default number of harmonics is 50.

Time / Band Cursor

Use a band cursor to identify the time interval and amplitude delta.

To display a band cursor overlay:

- With a time plot displayed, select the **View** menu's **Plot / Plot Overlays / Band Cursor** option, or use the band cursor toolbar button.

Feedback Area – Displays amplitude and time of left and right fundamental lines and the delta (in time).

Information Area – Specific information displays on the **Time Band** tab. Tab information includes current position, amplitude, time, delta (frequency and time), positive and negative peak, RMS and time domain statistics for the time data shown within the band, including:

Standard Deviation – A basic measure of the spread of values within a set around their average value.

Skew – A measure of the asymmetry of the time domain values when plotted around their average. Whereas the Standard Deviation suggests that values are homogeneously distributed left and right of their average, the Skew indicates whether this assumption is true.

Kurtosis – A measure of the general extent of peaks. A high value means that more of the variance is due to infrequent, extreme deviations as opposed to frequent, modest deviations.

Crest Factor – A calculation of the highest absolute Peak / RMS value of the signal. The Crest Factor is a measure of the general extent of peaks as compared to a pure sinusoid. The crest factor for pure sinusoid is 1.41 (square root of 2).

Right-Click Context Menu - Right-click on the band cursor overlay anchor to reveal its context menu. Available options include:

Next Trace - Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next POINT. Press **Delete** to remove.

The band cursor is made up of three parts. The fundamental left line, fundamental right line, and the entire band. The active line is indicated by the cursor line focus icon. This icon displays as a triangle on the active part of the cursor. Use left and right arrow keys to move the entire band or an individual line (depending on which is active) left or right. The **Page Up** and **Page Down** keys toggle between the left line, right line, and entire band.

- The individual fundamental lines and the entire band move in small increments (one line at a time). Use the **Shift** and the left or right arrow key to move part or all of the band in larger increments (15 lines at a time).

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursors / Color Preferences** in the **Preferences** dialog. Cursor line focus icon color appears as configured in **Cursor Line Focus** in **Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Band Cursor – Time / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Cursor Cross Hashing – Cross-hashing (on or off) is configured in the **Cursor Cross-Hashing – Time / Plot Preferences** in the **Preferences** dialog. Determines whether the band is shaded with a single diagonal line or a cross-hash.

- The Time – Band cursor's fill pattern lines slope *upward* from left to right to distinguish it from a harmonic cursor. A harmonic cursor's fill pattern lines slope *downward* from left to right. Cross hashing can be useful to help further distinguish a time band cursor from a harmonic band cursor.

Time / Peak Cursor

Use a peak cursor overlay to label all peaks above a set amplitude value.

To display a peak cursor overlay:

- With a time plot displayed, select the **View** menu's **Plot / Plot Overlays / Peak Cursor** option, or use the peak cursor toolbar button.

Feedback Area – Displays the line's current amplitude, total number of peaks displayed, and the peak number, amplitude, and time for as many displayed peaks as space allows.

Information Area – Specific information displays on the **Peak** tab. Tab information includes POINT name, line amplitude, and each peak number's time and amplitude.

Right-Click Context Menu – Right-click on the peak cursor overlay anchor to reveal its context menu. Available options include:

Next Trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next POINT. Press **Delete** to remove.

Use the up and down arrow keys to increase / decrease the amplitude range in small increments (1% at a time). Use the **Shift** and up and down arrow keys to increase / decrease the amplitude range in larger increments (10% at a time).

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursors / Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Peak Cursor – Time / Plot Preferences** in the **Preferences** dialog.

- The default status is off.

Time / Linear Speed

Use a linear speed overlay to graphically display the value of the linear factor multiplied by the running speed.

To display linear speed overlay:

- With a time plot displayed, select the **View** menu's **Plot / Plot Overlays / All Overlays** option. The **All Overlays** dialog displays.
- Select **Linear Speed** and click **OK**.

Feedback Area – Displays amplitude, frequency, orders, and linear speed.

Information Area - No tabs display for this overlay.

Right-Click Context Menu - Right-click on the linear speed overlay anchor to reveal its context menu.

Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove.

Available Preferences

Display Status – Display status (on or off) is configured in the **Time / Linear Speed / Plot Preferences** in the **Preferences** dialog.

The default status is **off**.

Time / CTA

Use a CTA cursor to create and view a time interval's average waveform.

To display a CTA cursor overlay:

- With a time plot displayed, select the **View** menu's **Plot / Plot Overlays / CTA Cursor** option, or use the CTA cursor toolbar button.

Feedback Area – Displays amplitude and time of fundamental left line and right line of cursor. Displays interval in time and interval as a frequency.

Information Area – Specific information displays on the **CTA Cursor** tab. Tab information includes POINT name, left and right fundamental lines' amplitude and time, interval, frequency, and all visible harmonic labels.

Right-Click Context Menu - Right- click on the CTA cursor overlay anchor to reveal its context menu. Available options include:

Next Trace - Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next POINT. Press **Delete** to remove. Use the plus (+) and minus (-) keys to select the next or previous frequency.

The cursor is made up of three parts. The fundamental left line, fundamental right line, and the entire cursor. The active line is indicated by the cursor line focus icon. This icon displays as a triangle on the active part of the cursor. Use the left and right arrow keys to move the entire cursor or either individual line (depending on which is active) left or right. The **Page Up** and **Page Down** keys toggle between selections of left line, right line, and entire cursor.

- The individual fundamental lines and the entire cursor move in small increments (one line at a time). Use the **Shift** and left and right arrow keys to move all or part of the cursor in larger increments (15 lines at a time).

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursors / Color Preferences** in the **Preferences** dialog.

Display Status – Display status (on or off) is configured in the **Harmonic Cursor – Time / Plot Preferences** in the **Preferences** dialog.

- The default status is off.
- The **Time – CTA** cursor displays differently from the **Time – Harmonic** cursor. Instead of a cross hatch between two markers, the CTA cursor displays the averaged waveform (per CTA calculation), allowing you to isolate the various sources contributing to the signal.
- The default number of harmonics is 50.

Live Data Displays

@ptitude Analyst's Live Data Displays allow you to view a POINT's live data in various graphical formats. When **Live Data** mode is enabled, the active display updates as new data is collected by its on-line device.

- Live data display is only available when a single POINT is selected.

When live data mode is enabled, displayed measurements automatically update on a continuous basis. Previous spectra and time waveform plots are overwritten by updated spectra / time waveforms.

To display live data:

- Select a POINT from the hierarchy list.
- Display the desired plot type using the **View** menu's **Plot** options, or the plot type toolbar buttons. The selected plot displays in its plot window.
- Click the **Live Data** toolbar button to initiate live data mode, or select the **View** menu's **Plot / Live Data** option.

The plot window initially displays * **WAITING LIVE** * in the upper corners and displays "Waiting for live data for the plot" in the center.

Once live data is available, the plot window displays

* **LIVE** * in its upper corners and the live data appears in the selected graphical format.

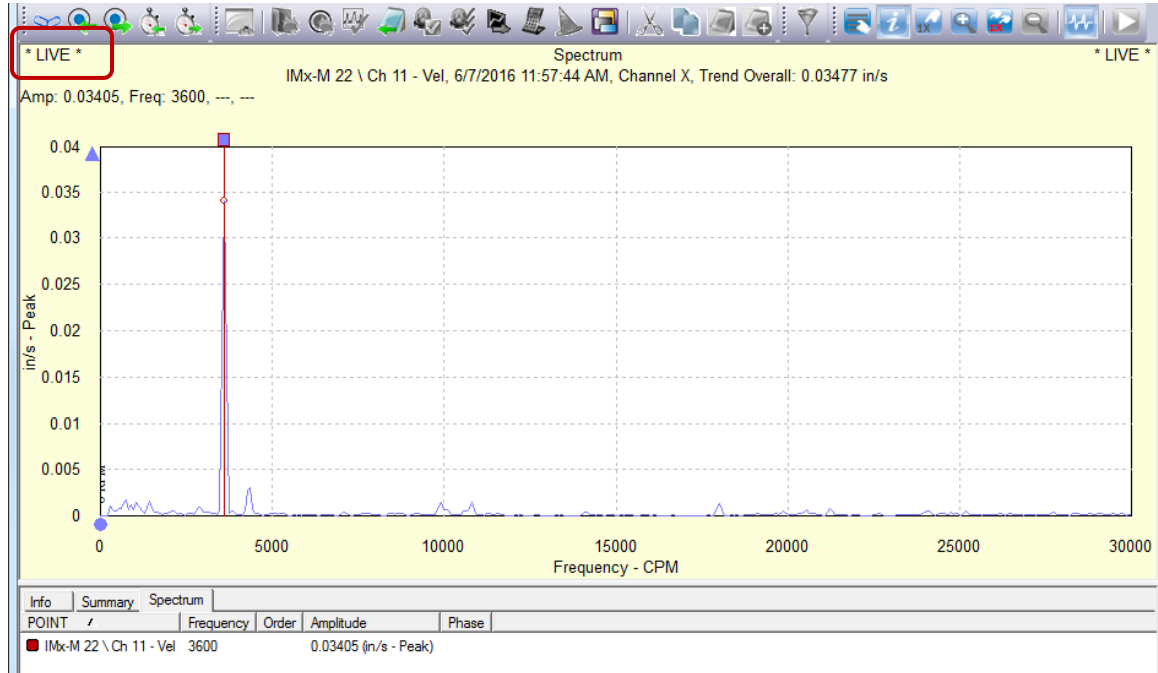


Figure 5 - 67.

A Spectrum Plot Window Displaying Live Data.

Spectrum and Time Waveform Plots

As the POINT's DAD collects new data, the new data overwrites the existing data on the spectrum and time plots.

Trend Plot

The trend plot in live data mode "grows" from the bottom of the overall trend plot with each new DAD data collection. When the overall Trend plot fills the overall trend plot, a First In First Out process begins, in which the oldest data moves off the display to make room for the most recent data.

Spectrum Waterfall Plot

Instead of overwriting previous FFT spectra with each update, live data waterfall plots' previous spectra scroll up the spectrum display window with each update, creating a waterfall spectra display.

Polar Vector Plots

An on-line polar vector display can also go "live". However, unlike non-live polar vector displays, with live displays, only the POINT's current value is displayed and updated every few seconds, no historical data appears.

Alarm criteria remains assigned to the displayed POINT. The line segment (vector) that includes the hollow circle as its endpoint shows the selected harmonic's current magnitude and phase. This vector's magnitude and direction (phase) update every few seconds.

Saving Live Data

Live data may be saved either to the POINT or to a live data set in your hierarchy.

To save live data:

- Right-click in the live data plot window to display the plot's context menu.
- Select **Save Live Data**. The **Save Live Data** dialog displays.

The **Save Live Data** dialog allows you to specify which measurements to save and where you'd like to save their live data.

Measurements

- Click to select **Save last measurement** or **Save all measurements**.

Location

- **Save data to POINT** – Select this option to save the live data to the POINT. Live data is saved to the POINT itself and may be viewed when the POINT is selected in the hierarchy.
- **Save data to live data location** – Select this option to save the live data to a LIVE DATA SET in the hierarchy. The first time this option is selected, a new SET named **LIVE DATA** is created in the hierarchy. When this option is selected, the live data, along with the machine name, date / time stamp, and a copy of the POINT are stored in the **LIVE DATA** SET. The live data is **not** saved directly to the original source POINT.

Live Bar Display

@ptitude Analyst's Live Bar Display allows you to display live overall values in bar graph format for DMx POINTs.

Live bar data is useful when checking or replacing a sensor. If a sensor is faulty, it produces an out of range voltage value. By observing the live bar data, you can quickly tell if a sensor is functioning properly.

To display live bars:

- Select the Hierarchy, ROUTE, or Workspace containing POINTs that have been downloaded to the online device.
- Click the Live Bars toolbar button, or select the **View** menu's **Plot / Live Bars** option.

A **Live Bars** window displays with two panels. The left panel displays the current Hierarchy, ROUTE, or Workspace, containing only POINTs that have been downloaded to the online device(s).

- Click a POINT's checkbox to display its live bar data in the window's right panel.

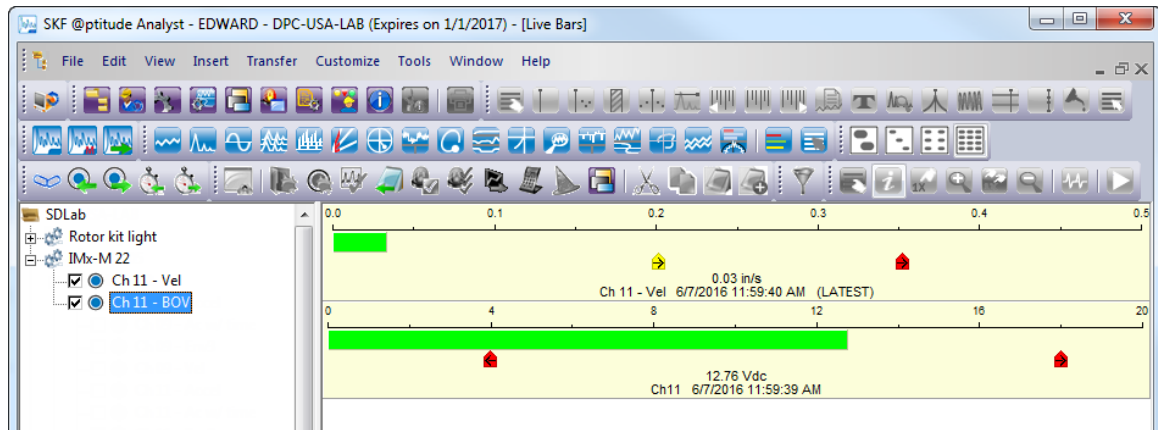


Figure 5 - 68.
The **Live Bars** Display.

Each selected POINT's overall data displays in bar graph format. The **Customize / Preferences** dialog's **Plot** tab allows you to select the scaling for the graph using the **Live Bar Axis** value. Available options include:

POINT Full Scale (default value)

Alarm Limit – Alert

Alarm Limit – Danger

Autoscale

For positive values, the graph is scaled from zero to the live bar axis value. For negative values, the scaling varies, depending on the selected Live Bar Axis value:

If **Autoscale** is selected with a negative value, the scale will change to negative with the zero setting on right-hand side.

If **POINT Full Scale** or an **Alarm Limit** is selected with a negative value, the scale changes to bipolar with zero in the middle of the graph, and +/- the full scale value on either side.

- The graph remains bipolar, even if the value returns to positive.

The bar graphs display the POINT's overall alarm levels. By default, red icons graphically indicate the POINT's danger alarm value, and yellow indicates the alert alarm value. Arrows within these icons indicate if the alert or danger area is to the right or left. The arrow positions depend on the POINT's overall alarm properties. If the POINT's overall alarm is a **Level** alarm, the live bar graph's arrows point to the right because the value is considered "clear" if it is to the left of the alert and danger alarm values, as indicated by the yellow and red icons. If the POINT's overall alarm is **In Window**, the arrows point from the outside toward the inside. If the POINT's alarm is **Out of Window**, the live bar graph's arrows point from the inside to the outside. The actual bars on the graph also display according to alarm values. By default, the POINT's alarm value displays green when "clear", yellow for "alert," and red for "danger."

- The **Preferences** dialog's **Colors** tab allows you to change colors of items appearing in graphic display plots and in the colors of alarm indicators (on hierarchy lists and in graphic displays).

Live Bar Messages

If no new data has been collected for a POINT for more than a specified number of minutes, the displayed data is considered “aged data,” and the POINT’s name and overall value display in light blue text within the POINT’s bar graph. By default, this value is thirty minutes, and the text displays in light blue. You can customize the **Data Aged Time (Minutes)** in the **Preferences / Plot** tab, and change the text color in the **Preferences / Colors** tab.

An error message displays if no live data is available for the selected POINT(s).

An “(OV)” displays in a POINT’s bar graph if the device has an overloaded signal.

The word “(LATEST)” displays in the bar graph with the most recent data. In most cases, data is collected in sequence, but if you have POINTs from multiple IMx / DMx selected, data may be collected out of order.

Generating and Printing SKF @ptitude Analyst Reports

Overview

- The **File** menu's **Print** option or the toolbar's **Print** button may be used at any time to print the contents of the "active" @ptitude Analyst window (including graphic display windows).
- Microsoft Internet Explorer version 4.X or newer is required to view reports.

@ptitude Analyst's **Reports** feature provides options for controlling the generation and printing of hard copy reports showing database and measurement information.

Exception - Produces a report of POINTs in violation of specified exception criteria.

History - Produces a report of machine notes.

Last Measurement - Reports POINTs' last measurement values.

Overdue - Produces a report of all POINTs that are overdue for measurement.

ROUTE Statistics - Produces a report of statistics for one or more ROUTEs. Statistics include when due, last downloaded, total number of POINTs in the ROUTE.

ROUTE History Report - Produces a report of ROUTE history for the selected ROUTEs. ROUTE History reports include ROUTE collection time duration, and start and stop times. The amount of reported ROUTE historical information is determined using the **ROUTE Properties / General** tab.

SET Statistics - Produces a report of statistics for the selected data source. The statistics include total number of POINTs, POINTs in alarm, POINTs disabled, and POINTs overdue.

Transient - Produces a report of start-up or coast down data for the selected transient events.

Upload Statistics - Produces a report of the statistics for information last uploaded from the DAD.

- Each of @ptitude Analyst's report types may be customized. Report setup is discussed later in this chapter.

Reports Window

- Select the **File** menu's **Reports** option. The **Reports** window displays.

The **Reports** window allows you to select, configure, manage, and generate reports. Each report type is available for use and may also be used as a starting point to customize reports to fit your particular application.

- Reports may also be generated automatically using the **Scheduler** feature. Refer to **Chapter 3, Working With Your SKF @ptitude Analyst Hierarchy** for more information on scheduling automatic reports.

Use the **Reports** window to work with existing reports and to create new report templates. The top area provides options for new and current reports. The bottom area provides options for preserved (archived) reports.

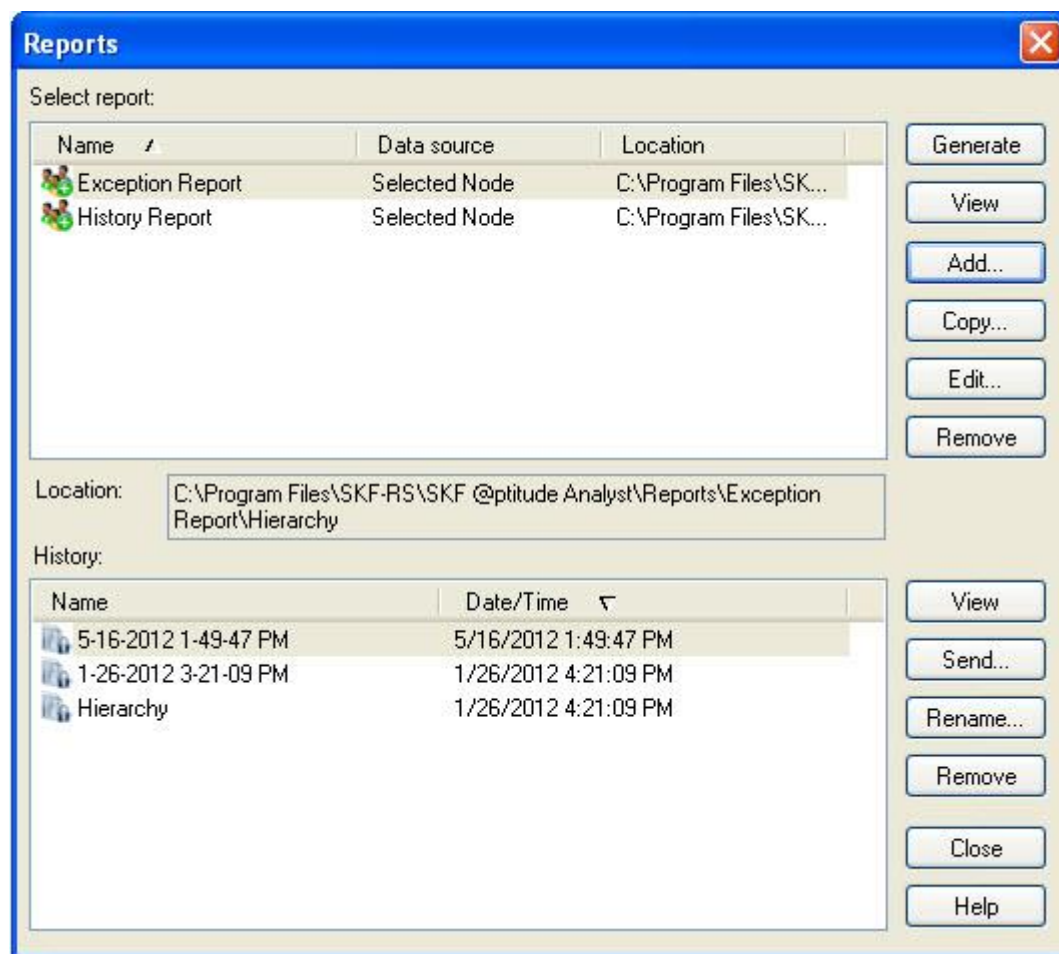


Figure 6 - 1.
The **Reports** Window.

Select report area - Displays all existing report definitions.

- Click a report's name to select it.

Reports options include:

Generate – Generates a report to the computer display based on the selected report definition.

View – Displays the latest generated version of the selected report.

Add – Defines a new report based on a pre-defined @ptitude Analyst template.

Copy – Defines a new report using the selected custom report as a template.

Edit – Launches the **Report Editor** window to edit the selected report.

Remove – Deletes the selected report definition. When you delete a report from the window's top area, you are asked if you also want to delete all preserved historical reports for the selected report definition.

- When a report is removed, its corresponding subdirectory and all included files are also removed from your computer's hard drive. If you wish to delete a report, but save previous copies, copy the report's files from its subdirectory to a new location on your hard drive before removing the report.

History area – Displays all existing preserved reports for the selected report definition.

- Refer to the **Report Editor / General** section later in this chapter for more information on preserving historical reports.
- Click a preserved report's name to select it.

View – Displays the preserved version of the selected report, identified by its date and time.

Send – Launches the **Recipient Selection** dialog and allows you to send the report in an email message to one or more selected contacts or groups of contacts. The report is sent in HTML and PDF format to the selected email recipients.

- Refer to the SKF @ptitude Analyst Introduction and Global Features User Manual, Chapter 2, Getting Around in @ptitude Analyst / Contact Information section for details on how to set up contacts and groups.

Rename – Allows you to rename the selected preserved report. The **Enter Name** dialog displays, prompting you to enter the new report name. Click **OK** to rename the selected report.

Remove – Removes the selected preserved report.

Close – Closes the window.

To generate a @ptitude Analyst Report:

- Open the Hierarchy window whose data you wish to report. If necessary, open or select hierarchy items within the window to limit the report's content.
- Select the **File** menu's **Reports** option. The **Reports** window displays.
- Select a report from the **Reports** window's **Select report** area.
- Click the **Generate** button. The report is rendered and when complete, displays in a report window for viewing or printing.

- Report generation progress displays in the progress bar in the screen's lower right corner.
 - When setting up a report, there is an option to select the data source at the time the report is generated. If this has been selected, the **Select Data Source** dialog displays. Refer to the **Selecting the Data Source** section, later in this chapter, for details.
 - If your report is based on transient data and there is more than one transient data set available, the **Select Transient Data Source** dialog displays. Select the desired transient event from the list.
 - The Plot Preferences **Channel Number** option determines how you specify which channel(s) to include when viewing plots with multi-channel data. This option also applies to plots in reports. Be aware that if this preference is set to **Ask** and there are multiple plots in your report, you will receive a channel prompt for each plot, but the prompts do not indicate to which plots they correspond. If you have a large number of plots in your reports, consider selecting the **All** channels option for this preference to avoid multiple prompts. If you do have this set to **Ask**, it is recommended you make the same selection for all plots in the report to avoid confusion.
- Press your keyboard's **End** key to go to the end of the report.
 - Press your keyboard's **Home** key to go to the top of the report.

To print a generated report:

- With the generated report on the computer's display, use the **Print** toolbar button or select the **File** menu's **Print** option.

To view an existing report:

- In the **Reports** window, select the desired report.
- Click the **View** button. The report displays in a **Report** window and is available for viewing and/or printing.

Use the **Reports** window to "add" a customized report type. Customized reports are based on pre-defined report types, then modified to suit your particular application. Once your new report type is defined, it is available for selection from the **Reports** window, and may be generated as needed.

To add a new report:

- Click the **Report** window's **Add** button. The **Select Report Template** dialog displays.

The **Select Report Template** dialog displays all pre-defined @ptitude Analyst report templates. These templates may be used to generate reports without further modification, or as a starting point for creating custom reports.

- Select the template to use as a basis for your new report.

- If you wish to use the selected report “as is,” (no modifications are required) assign the report a unique name, verify the path settings, and click the **OK** button to accept all default settings.
- Click **OK**. The **Report Editor** window displays.

Report Editor

The **Report Editor** window contains three tabs:

General – Defines the new report’s identity and processing parameters.

Definition – Defines the new report’s criteria, criteria settings, and content.

Assign – Allows you to configure default report configurations for both public and hierarchy-specific reports.

Report Editor / General

Report Editor / General tab fields include:

Name – Using standard file naming conventions, assign the new report a unique name. Do not use the pound sign (#) in your report name as it can cause errors when printing. The assigned name identifies the most recently generated report and is used to name the disk directory (folder) where the report and all its supporting files are stored. If you maintain historical reports, a separate directory is created beneath the report’s directory identified by the historical report’s name.

The assigned name identifies the report and is used to name the disk directory where the report and all its supporting files are stored.

If you change a report’s name, all data for the previously generated report remains in the subdirectory with the original report’s name. The original report subdirectory cannot be deleted using @ptitude Analyst.

Title – Enter a descriptive title for the report. This text appears at the top of the generated report.

Description – Enter descriptive text for the report. This text appears as the title at the top of the generated report.

Header – Enter text to display in the printed report’s header area.

Footer – Enter text to display in the printed report’s footer area.

Preserve Reports – Click to enable report preservation. When enabled, newly generated reports are archived, organized by report definition and date / time.

Report is Available for all users – Click to enable and define the report as a public report, available to all @ptitude Analyst users. If you do not check this option, the report is defined as a private report, available only to the report creator.

Report is Available for all hierarchies – Click to enable and make the report available for use with all @ptitude Analyst hierarchies. If you do not check this option, the report will only be available to the current hierarchy.

Report can specify data sources from multiple hierarchies – Click to enable and make the report available for use with all @ptitude Analyst hierarchies, as well, as

enable the ability to select multiple data sources from multiple hierarchies. If you do not check this option, the report will only be available using a single hierarchy source.

Report Editor / Definition

The **Report Editor / Definition** tab is divided into two main areas, the **Select report criteria** area in the tab's left panel and the criteria setup panel on the right. Click an item to expand and view any sub-items available for configuration.

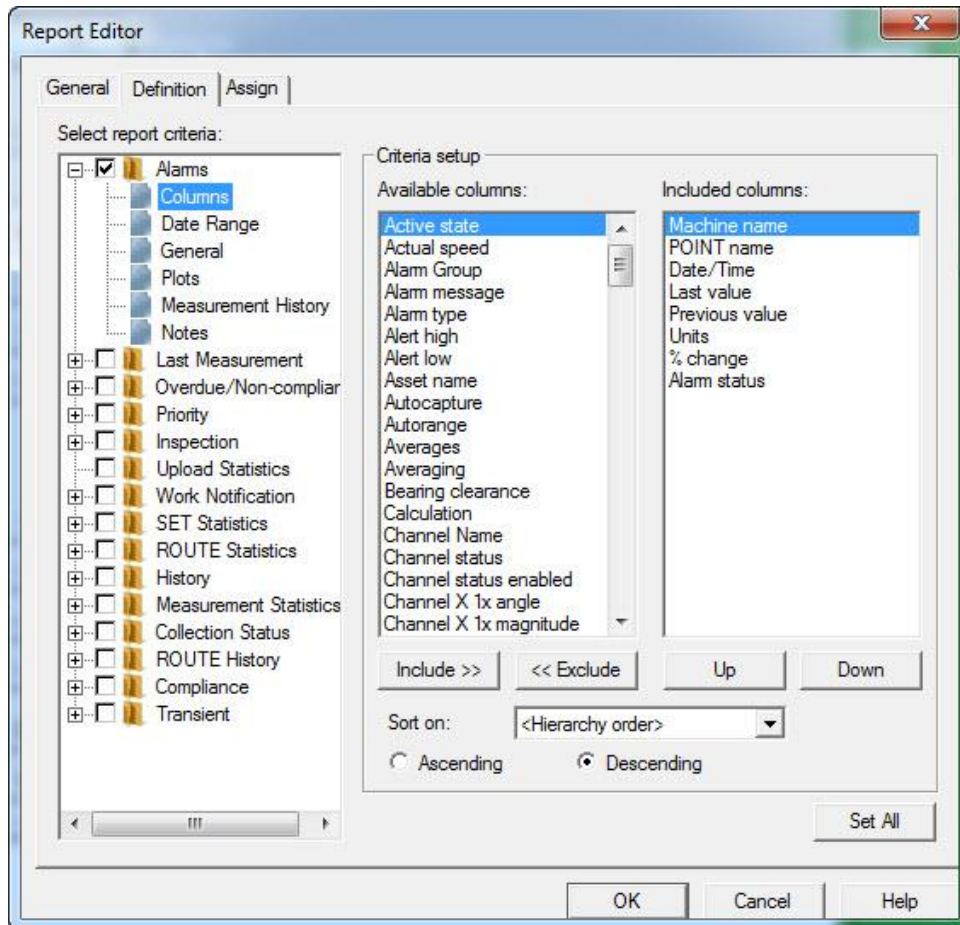


Figure 6 - 2.
The **Report Editor / Definition** Tab.

Select report criteria – Select attributes to appear in the report.

Criteria setup (contents change depending upon item selected in left panel) – Allows you to configure the selected report criteria to determine report content.

To select an element to include in the report:

- Highlight the item and click the item's checkbox to include it in your report. Once selected, the item's input fields (if any) display in the tab's right panel. Available report elements are detailed in the **Report Criteria** section later in this chapter.
- Click the item's + icon to expand the item in the hierarchy list and view its additional configuration options.

- Click an additional configuration item to select it. When selected, the additional item's set up fields display in the **Criteria Setup** area, allowing you to further customize the report. Available setup fields are detailed in the **Criteria Setup Fields** section later in this chapter.

Report Criteria

The following items display in the **Select report criteria** area as top-level items.

Alarms - Select individual alarm conditions and types to include in the report.

Last Measurement - Select to include all POINTs in the report with a last measurement.

Overdue/Noncompliant - Specify the amount of overdue POINTs to include in the report.

Priority - Includes any Machine with a set priority matching your selection(s).

Inspection / Upload Statistics - Select one or more alarm conditions (Clear, In alert, In danger); select the columns, date range and type of notes to include. Check Upload Statistics to include a summary of the last data upload from the DAD.

Work Notification - Select to include all work notifications, a fixed number of them, or select a date or date range. Specific ROUTEs and work request statuses can be selected for the report.

SET Statistics - Select to include a summary of the hierarchy item and all its children.

ROUTE Statistics - Select to include a summary of ROUTE data collection status for each ROUTE included in the report.

History - Select to include all machine notes and images for any machine in the selected data source.

Measurement Statistics - Select to include a summary of statistical information for a selected measurement type (selected by the **Full Scale Units** setting) and alarm threshold (selected by the **Threshold Level** setting). This setting includes the average amplitude for last measurement data of the specified measurement type, and indicates all POINTs with an amplitude above the specified alarm threshold in the report.

Collection Status - Select to include a summary of the ROUTE activities and its POINTs' status. Include all collection activities, a fixed number of them, or select a date or date range. You can choose to show only missed or uncollected POINTs.

Route History - Specify the amount of historical ROUTE information to include in the report.

- The **Include records by comparing** options under **Route History** are only applicable to the date range settings. They further filter the range based on start time, end time, or both.

Compliance - Select ROUTEs on which you wish to report a summary of compliance status, and specify to report status for either the previous collection

interval (previous compliance) or the current collection interval (current compliance). You may also specify to list all missed or out of compliance POINTs for the specified ROUTEs and to exclude interval-based POINTs.

Transient – Select to include transient data and specify the phase order (1 – 4).

Criteria setup (right panel setup fields, dependent upon item select in left panel)

Columns – Use the **Columns** input area to specify which columns appear in report tables, to specify column order, and select column sort criteria.

Available columns – Displays all available columns for the selected report element.

Included columns – Displays all included columns for the selected report element.

To include / exclude columns:

- Click the column type to select it.
- Use the Include / Exclude buttons to move the selected column to the **Included columns** area to include in the report, or move the selected column to the **Available columns** area to exclude it from the report.

To specify column order:

- Click the column type in the **Included columns** area.
- Use the **Up** and **Down** buttons to place the column into the desired position.

To specify sort criteria:

- Select a column type from the **Sort on** drop down list box.
- Click the desired sort method button, **Ascending** or **Descending**.
- Click the **Set All** button to use the current column settings for all matching column types in other report element setup fields. For example, the same column settings are available for various report elements. The **Set All** feature allows you to configure this information once and then use the same settings for all applicable report elements.
- Click **OK** to save changes, or **Cancel** to undo settings.

Date Range – Use the date range fields to specify a date interval. This date interval is used to retrieve only POINTs with a last measurement that falls within the indicated date interval.

Only include enabled POINTs – Select (check) to have the applicable report criterion retrieve data from enabled POINTs only. This checkbox can be selected or not selected (checked or not checked) by default and may or may not be editable depending on the selected report criterion.

- For **Alarms** and **Overdue/Non-compliant** criteria – This checkbox is selected (checked) by default and is read-only. Thus, these criteria will always retrieve data from enabled POINTs only for reporting.

- For **Last Measurement, Inspection, and Measurement Statistics** criteria – This checkbox is not selected (not checked) by default and is editable. Thus, by default these criteria will retrieve data from all POINTs for reporting, but you can select (check) this checkbox to have them retrieve data from enabled POINTs only.

No date range restriction – Select to remove date range restrictions.

Absolute date – Enter “absolute” (calendar) dates for date range restriction.

Relative date – Enter number of days (from / to) for date range restriction.

- Click the **Set All** button to use the current date range settings for all date range settings in other report element setup fields. The **Set All** feature allows you to configure this information once and then use the same settings for all applicable report elements.

General – Use the **General** fields to configure general report element information.

Include image – Click to enable and include any images associated with the selected report element.

Grouped by machine – Click to enable and display included report items grouped by machine.

Plots – Use the **Plots** fields to specify which plot types are to be included with the report table for the selected report item.

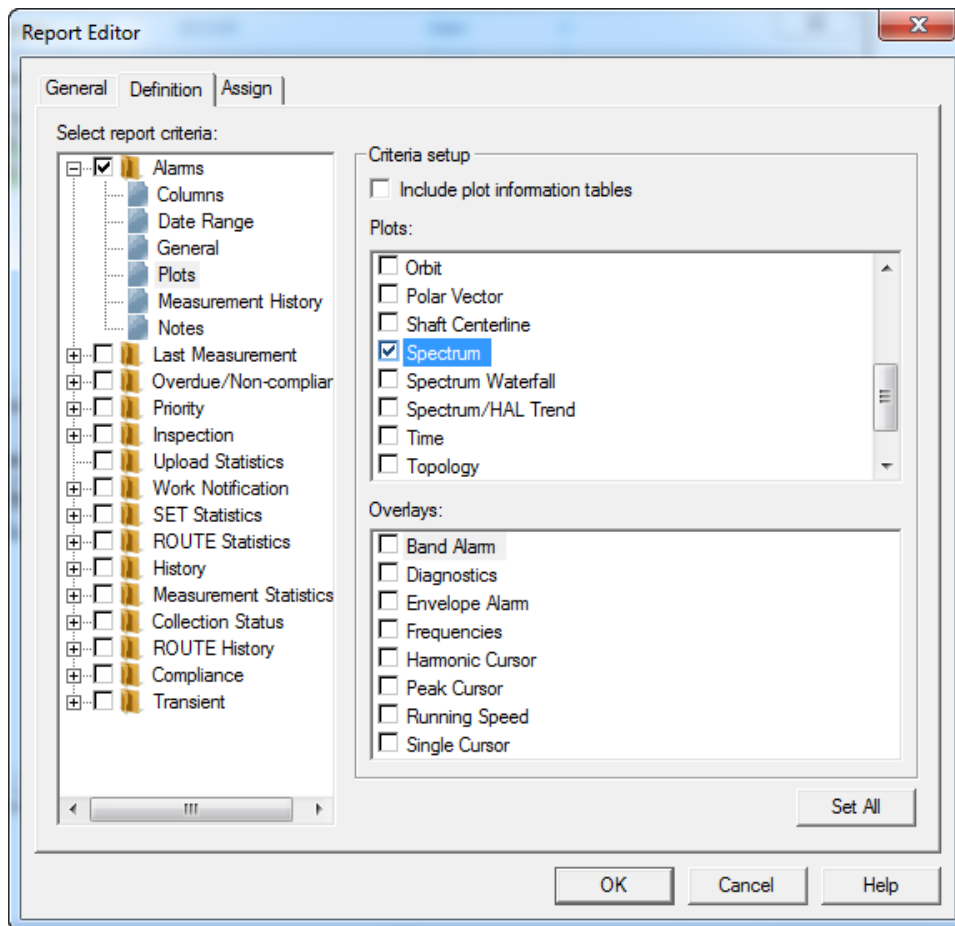


Figure 6 - 3.
The **Report Editor** Screen.

Include plot information tables – Click to enable and include plot content details and overlay information in table format on the report.

Plots area – Displays all available plots. Click a plot type to include it in the report.

- Selected plots are created only if there is associated data.

Overlays area – Displays overlays associated with the selected plot type (if applicable).

- Click the **Set All** button to use the current plot and overlay settings for all matching plot and overlay types in other report element setup fields. For example, the same plot settings are available for various report elements. The **Set All** feature allows you to configure this information once and then use the same settings for all applicable report elements.

Measurement History – Use the **Measurement History** fields to specify which measurements to include in the report.

Last fixed number of measurements – Select this option and type in or use the arrow buttons to specify the fixed number of measurements to include in the report.

Measurements in this date range – Select this option to include all measurements occurring between your entered date interval in the report. Type in a start date in the **From** field and an end date in the **To** field, or use the arrow buttons to display a pop-up calendar to select start and end dates.

Measurements from the last fixed number of days – Select this option to include measurements occurring within a specific number of days in the report. Type in or use the arrow buttons to specify the fixed number of days.

All measurements – Select this option to include all measurements in the report.

Notes – Use the **Notes** fields to specify which notes to include in the report.

Note Categories – Click to enable and include one or more note categories for the selected report item in the report. Note categories include **ACK Alarm Note, Coded Note, General Note, Non-Collection, Oil Analysis Note, and Operating Time Reset.**

Settings area – Use the settings area to define which notes to include in the report.

Last fixed number of notes – Select this option and type in or use the arrow buttons to specify the fixed number of notes to include in the report.

Notes in this date range – Select this option to include all notes occurring between your entered date interval in the report. Type in a start date in the **From** field and an end date in the **To** field, or use the arrow buttons to display a pop-up calendar to select start and end dates.

Notes from the last fixed number of days – Select this option to include notes occurring within a specific number of days in the report. Type in or use the arrow buttons to specify the fixed number of days.

All notes – Select this option to include all notes in the report.

Routes – Use the **ROUTES** fields to specify which ROUTEs to include in the report.

Routes – All available ROUTEs display in the **ROUTES** area. Click to select one or more ROUTE.

- Click **Check All** to select all available ROUTEs. Click **Clear All** to clear your selections.
- Click the **Set All** button to use the current ROUTE selections in other report element setup fields. The **Set All** feature allows you to configure this information once and then use the same settings for all applicable report elements.

Overdue Forecast – Use the **Overdue Forecast** option to forecast which POINTs will be overdue for collection if data for the POINTs does not come in by a specified date.

Absolute date in the future – Select this option to forecast based on a fixed date. This is useful if the report will be run over the course of several days leading up to a fixed deadline. Select the date from the pop-up calendar.

Number of days from today – Select this option to forecast based on a specified number of days from the date the report is run. Enter a number in the text field or use the up and down arrows to indicate the number of days from now for use with the forecast.

Report Editor / Assign

Use the **Report Editor** window's **Assign** tab to configure default report settings, and to override defaults when the report is generated from the current Hierarchy.

The **Assign** tab varies, depending on whether **Report is available for all hierarchies** or **Report can specify data sources from multiple hierarchies** is enabled on this window's **General** tab.

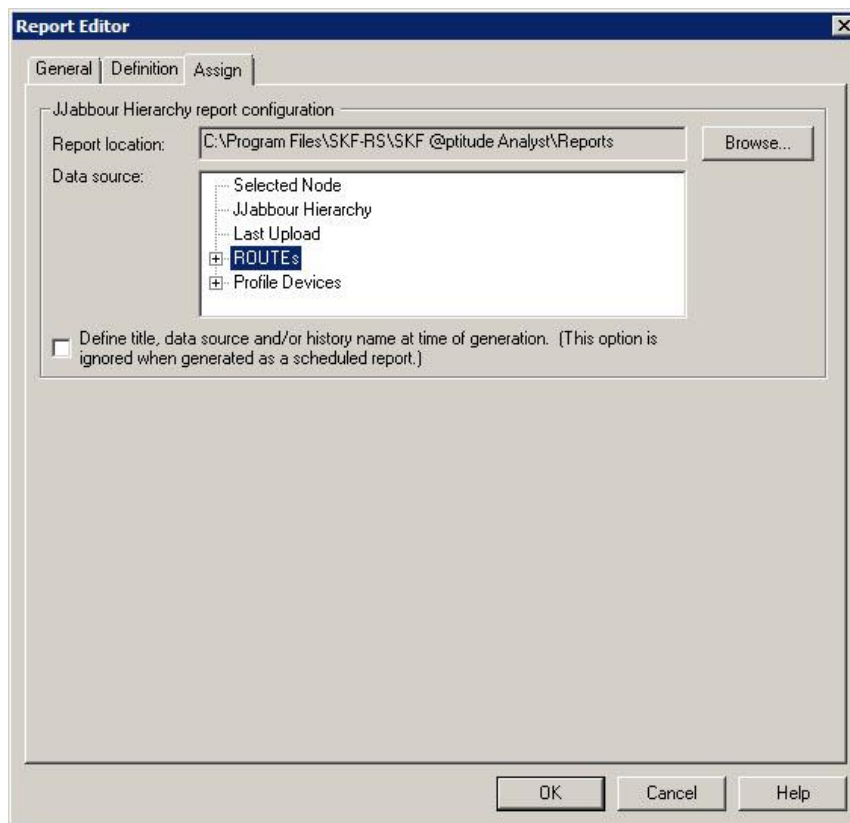


Figure 6 - 4.

The **Report Editor / Assign** Tab with **Report is available for all hierarchies** Disabled.

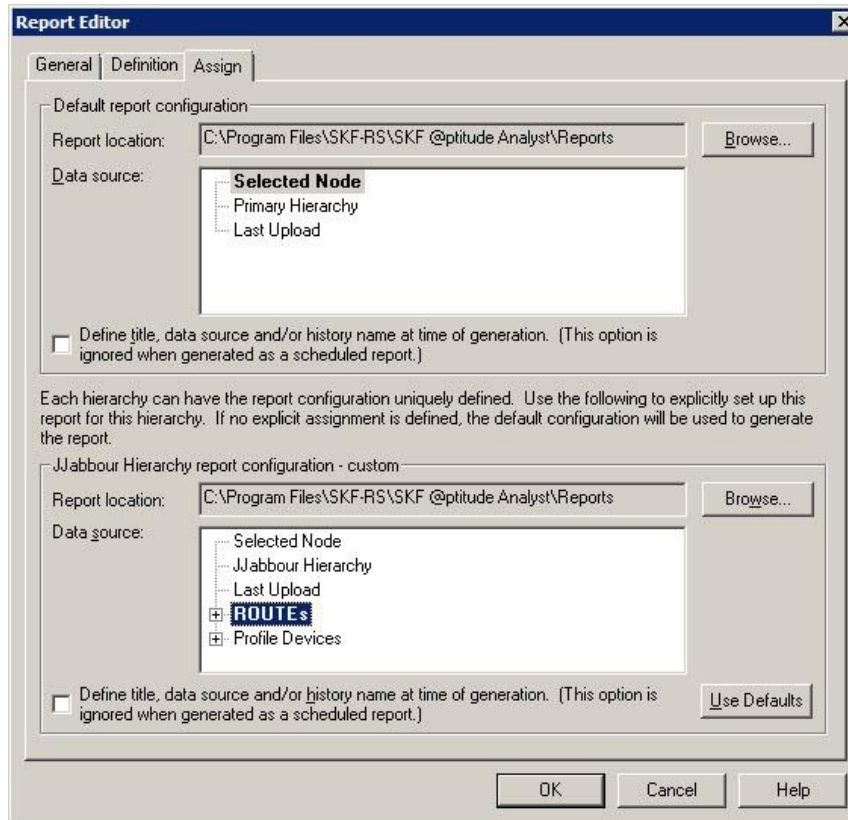


Figure 6 - 5.

The **Report Editor / Assign** Tab with **Report is available for all hierarchies** Enabled.

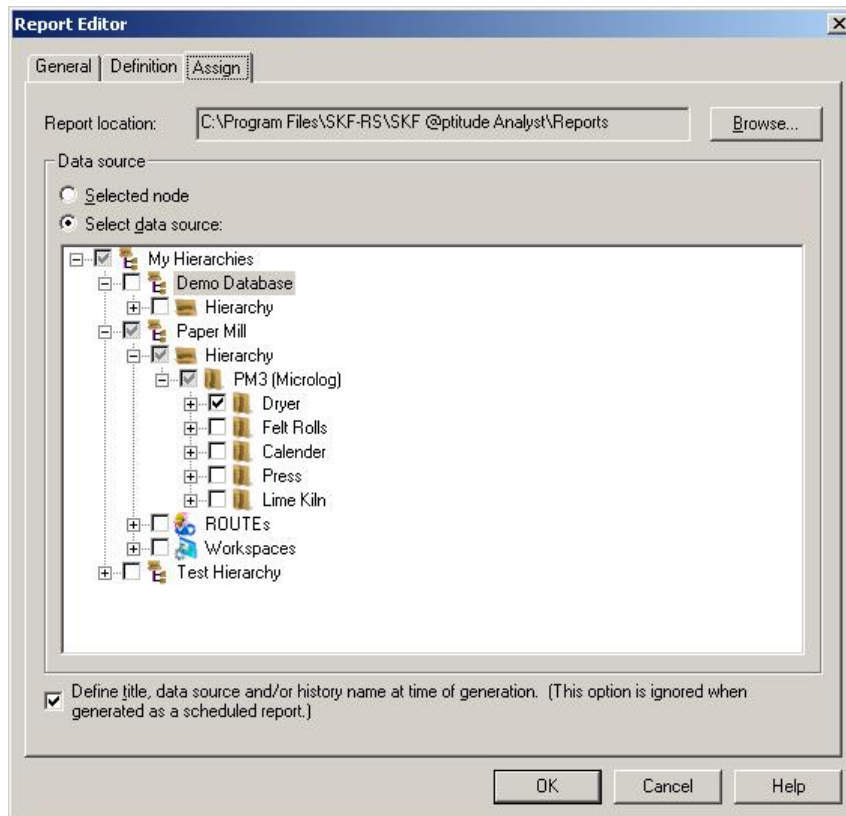


Figure 6 - 6.

The **Report Editor / Assign** Tab with **Report can specify data sources from multiple hierarchies** Enabled.

The tab provides fields to configure default report settings. Options include:

Report Location – Specify the path for the disk directory for report storage. The report is stored in a subdirectory (using the report's name) beneath this indicated directory. For example, specify **E:\SKF @ptitude Analyst\Reports** to place all reports in their unique directories branching from a "reports" directory.

- Click the **Browse** button to specify a new path.
 - Reports are stored in HTML format and are available for copying, moving, and sharing over intranet, world wide web, etc.

Data Source – Select the source of the data to include in the report. Use the plus and minus icons to expand the hierarchy as needed to display sub-items. If **Report can specify data sources from multiple hierarchies** is disabled, options include:

Selected Node – Select to include data from the node that is selected in the hierarchy at the time the report is generated, including all sub items. For example, if a SET is selected in the hierarchy when the report is generated, all POINTs from all Machines under that SET are included.

- Use this option when including Transient data in your report.

Current Hierarchy – Select to include all data from the hierarchy that is open when the report is generated.

Primary Hierarchy - Select to use the currently selected primary hierarchy as the report's data source.

Last Uploaded - Select to include the most recently uploaded data.

ROUTEs / Workspace - These options appear in the upper section's **Data source** list if the report is only available for this hierarchy (i.e., **Report is available for all hierarchies** is disabled). Select a previously defined ROUTE or Workspace to use with the report.

- ROUTE based reports, such as ROUTE Statistics, ROUTE History, Compliance, and Collection Status, use data from the ROUTEs specified on the **Definition** tab, rather than the source data specified on the **Assign** tab.

If **Report can specify data sources from multiple hierarchies** is enabled, options include:

Selected Node - Select to include data from the node that is selected in the hierarchy at the time the report is generated, including all sub items.

- Use this option when including Transient data in your report.

Select Data Source - Select multiple hierarchies, groups, and POINTs to include in your report.

Define title, data source, and/or history name at time of generation - Enable to receive an option to override the **Data source** selection at the time the report is run. If this is enabled, you must manually specify this report information each time the report is generated. Before report generation occurs, the **Select Data Source** dialog displays, prompting you to enter report information and select the report's data source. (See **Selecting the Data Source** below for details.)

If the **Report is available for all hierarchies** check box is enabled on the **Report Editor's General** tab, the tab's bottom area allows you to configure reports specifically for use with the current Hierarchy only. If you do not use the bottom area's configuration options, the default configuration from the tab's top section is used.

- You must edit the report in each hierarchy where you wish to override the default options.

The top line of this section displays the current hierarchy name and indicates whether the **default** settings are used, or if **custom** overrides have been established in the fields below.

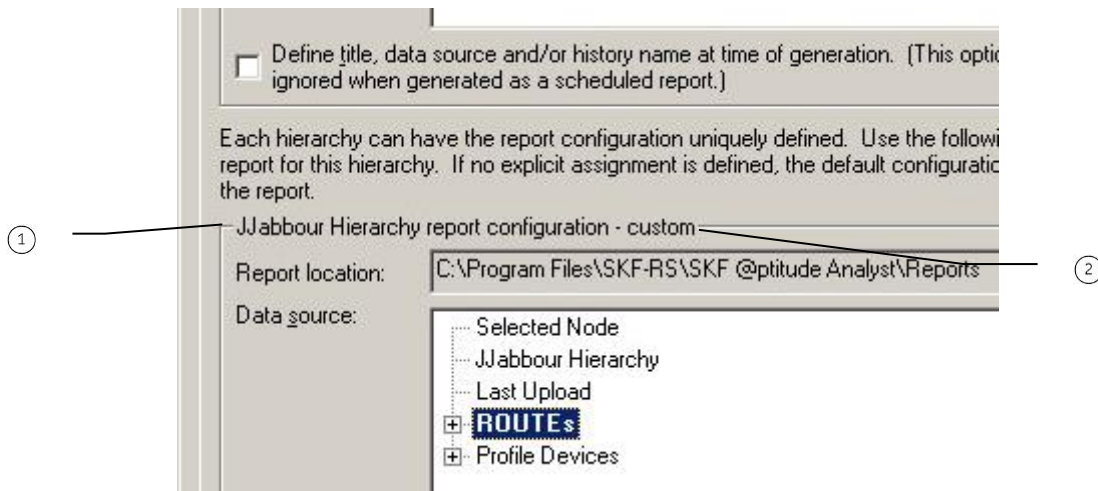


Figure 6 - 7.
The **Report Editor / Assign** Tab's **Default / Custom** Line.

- ① hierarchy name
- ② default / custom

The remaining fields function as previously described. These settings will be used to generate the selected report type for the current Hierarchy only.

- Click the **Use Defaults** button to clear your custom configuration and return to all default settings.

Selecting the Data Source

If **Define title, data source, and/or history name at time of generation** is enabled on the **Report Editor's Assign** tab, the **Select Data Source** dialog appears when the report is generated.

The **Select Data Source** dialog varies, depending on whether **Report can specify data sources from multiple hierarchies** is enabled on the **Report Editor's General** tab.

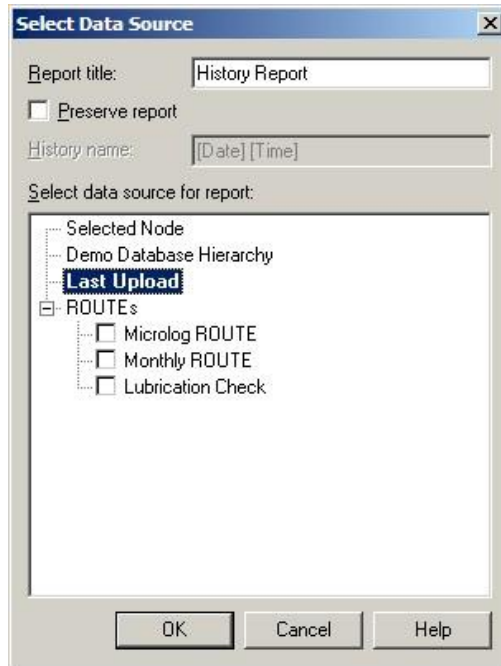


Figure 6 - 8.
The **Select Data Source** Dialog.

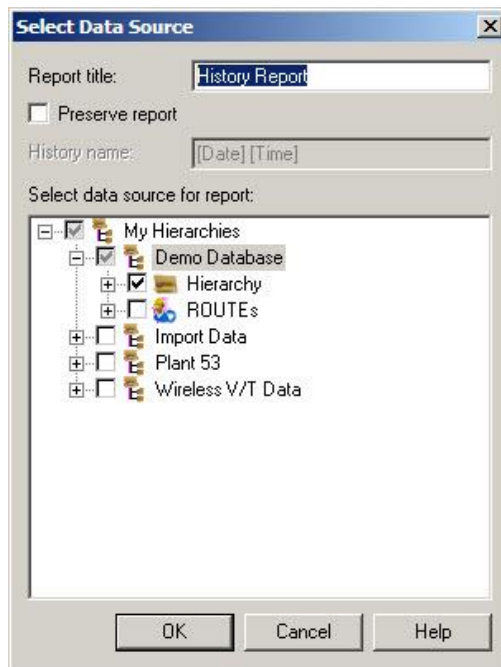


Figure 6 - 9.
The **Select Data Source** Dialog when **Report can specify data sources from multiple hierarchies** is Enabled on the **Report Editor's General Tab**.

This dialog lets you configure the report title, specify whether to preserve a copy of the generated report, and specify the data source for this instance of the report.

- The data source defaults to the **Data source** setting on the **Report Editor's Assign** tab.

- In the **Report title** field, enter the report title.
- Click the **Preserve report** checkbox to enable report preservation. When enabled, newly generated reports are archived, organized (by default) by report definition and date / time.

If **Preserve report** is enabled, you can also manually enter a **History name** to use when organizing your preserved reports, instead of the default date / time naming method. The **History name** determines how the reports are organized, and how they display in both the **Report Editor / General's History** window, and in the separate preserved reports directory created in the disk directory (folder) designated as the report storage location. The **History name** field displays “[Date] [Time]” until you type in the field. If you do not type within the **History name** field, the preserved report is named and organized by its date / time.

To assign a manual history name:

- In the **History name** field, enter text to identify and organize your preserved reports, overriding the default date / time history name.

To select the report's data source:

- From the **Select data source for report** window, click to select the appropriate data source from the displayed hierarchy list.
 - Use the plus and minus icons to expand the hierarchy as needed to display sub-items.

Multilog DMx Machine Monitoring Module

Overview

The Intrinsically Safe SKF Multilog DMx Machine Monitoring module is designed to provide machine monitoring and protection in safe and hazardous areas. Data that is collected by DMx modules deployed in the plant can be brought into @ptitude Analyst for analysis and alarming purposes.

Most standard @ptitude Analyst features and functionality also apply to the DMx. (Refer to the appropriate sections, earlier in this manual, for details.) This chapter describes setup and functionality that is specific to the DMx.

- Where possible, DMx information is included in the related manual sections. For help locating specific information, refer to the index.
- DMx transient data setup and collection is documented in **Chapter 8, Transient Data Analysis**. Because transient data collection impacts standard DMx data collection, it is recommended that you read both chapters.

Hardware Configuration

One important difference when using the SKF Multilog DMx Machine Monitoring system as opposed to conventional Machine Protection systems is that an RS485 field bus, rather than individual signal wires, is used to transmit data. From the module, a single or dual field bus cable is used to transfer data to the safe area. Up to 31 DMx modules can be connected together to share a single field bus cable.

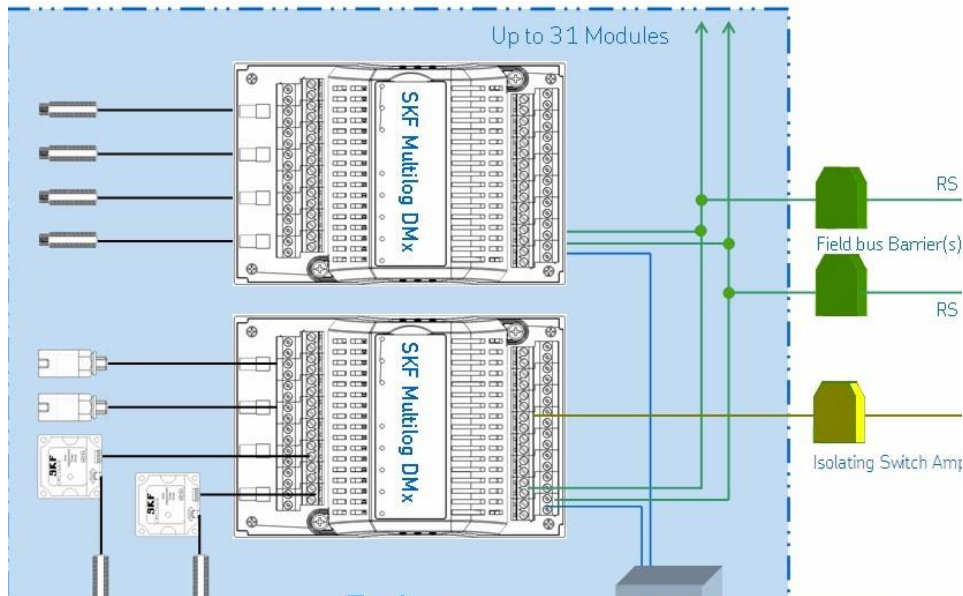


Figure 7 - 1.
Sample DMx System Configuration.

The SKF Multilog DMx module has two independent RS485 communication channels. Each of the channels can be used for the connection to @ptitude Analyst or to the DMx Manager software.

@ptitude Analyst Monitor is used to acquire data from the DMx devices and bring that data into @ptitude Analyst. Using the field bus cable, multiple DMx modules can share a connection to the computer running Monitor.

- If the connection to the computer running Monitor is via a serial port using an RS485 -PC interface module (which converts the RS485 signal to USB), and both @ptitude Analyst Monitor and DMx Manager are installed on the same computer, the following two configuration options are available:
 1. If both RS485 communication channels are available for monitoring, one link can be used for configuration using DMx Manager and the other for monitoring using @ptitude Analyst Monitor.
 2. If only one link is available, then only one application may be active and occupy the available communication port at a time. In this case, you must ensure DMx Manager is shut down when using @ptitude Analyst Monitor, and vice versa.
- If the connection is via Ethernet access to a gateway, the two applications may reside on different systems.
 - Refer to your SKF Multilog DMx hardware manual for more information on installing your hardware.

Configuring DMx Settings

DMx settings allow you to configure communication between @ptitude Analyst Monitor and the DMx devices.

To access DMx Settings:

- Select **DMx Settings** from the **Transfer** menu's **DMx** sub-menu.

The **DMx Settings** dialog displays.

- Select the **Hosts** tab to specify the Monitor hosts used to acquire data from DMx devices. The **Host** settings display.

DMx Settings Host Tab

It is possible to have @ptitude Analyst Monitor running on more than one computer. This tab allows users to ensure that all Monitor host installation(s) being used for monitoring DMx devices are included and appropriately configured.

Options on this tab include:

Hosts – This list automatically populates with the machine names of any Monitor installations that have communicated with the @ptitude Analyst database. Select the host whose settings you would like to configure from the list.

Host name – This field displays the machine name for the selected host. Typically, you do not need to modify this setting. If the machine name for a computer running @ptitude Analyst Monitor has changed, enter the new name in this field.

Live data mode – You are able to view a live trace of data collected from DMx devices in @ptitude Analyst. In addition to scheduled data collection, Monitor keeps a buffer of overall measurements that is used in the event of an alarm. (Refer to **Buffer update rate**, below, for details.) Typically, Monitor buffers data as it comes in, however, this process can result in a speed impact on the live data display. This field allows you to specify whether you would like to continue buffering overall measurements from the DMx modules, or temporarily suspend the buffer while viewing live data. Options are:

Dedicated – This option instructs the Monitor program to suspend buffer data collection and dedicate resources to updating the live trace.

Interleaved – This option instructs the Monitor program to continue buffering data while in the live display.

Live Data Resolution – Specify the percentage of the total waveform data captured by DMx modules that should be transferred to @ptitude Analyst for live data display. A lower percentage improves the update rate, but offers a lower resolution on the display.

Buffer update rate – When setting up your @ptitude Analyst hierarchy, you are able to set a data collection schedule for your DMx POINTs. In addition to this scheduled data collection, Monitor keeps a buffer of overall readings that may be written to the database as “unscheduled” data in the event of an alarm condition. In the event of an alarm, the full buffer is written to the @ptitude Analyst hierarchy for the POINT in alarm, and a single overall value from the buffer is stored for all additional POINTs on the same DMx device. Specify how often Monitor should buffer data collected from the DMx modules. Enter an update rate between 2 and 999 seconds.

Buffer samples – Specify how many measurements should be buffered from each DMx device. Once the buffer sample limit is met, new data overwrites older data in the buffer.

Trend mode – The DMx supports two types of measurements: Trend and Transient (i.e., variable speed) data. (Refer to **Chapter 8, Transient Data Analysis** for more information on Transient data POINTs.) This option defines which measurement type(s) are available for live data display and included in the buffer. Options are:

Interleaved – Both transient and trend data are used.

Transient – Only transient data is used. You will not be able to include normal trend POINTs (i.e., DMx Processed measurements) in live data display. In the event of an alarm condition, overall measurements will only be available for transient POINTs.

Normal – Only trend data is used. You will not be able to include transient POINTs in live data display. In the event of an alarm condition, overall measurements will not be available for transient POINTs.

- The **Trend Mode** setting only impacts live data display and the buffer used for unscheduled data in the event of an alarm. The non-selected option will continue to be collected according to the normal data acquisition schedule.
- If the **Trend Mode** is set to **Interleaved**, a buffer update rate of 2 seconds might be too short to collect both Transient and Trend data, depending on the number of DMx modules per connection. In this case, consider increasing the update interval.

Normal data resolution – This setting is similar to **Live Data Resolution**, but it defines the waveform/FFT resolution used for scheduled data acquisition.

- To speed data collection, if time waveform data is available, FFT is post-processed from the waveform rather than collected directly from the DMx. This setting specifies the resolution of the waveform, and by extension, the FFT. If FFT Data Collection mode is enabled on the DMx and @ptitude Analyst's POINT Properties **Save Data** field is set to **FFT** only, FFT is collected directly from the DMx. In this case, 1000 lines of resolution is used, regardless of this setting.

Synchronize date/time – Enable to automatically set the time on the DMx devices to the time on the @ptitude Analyst Monitor computer.

Interval – If **Synchronize date/time** is enabled, this setting controls how often the time from the Monitor computer is synchronized to the DMx devices.

Add – If the @ptitude Analyst Monitor host you wish to configure is not in the **Hosts** list, click this button to add a new host and enter the machine name where Monitor is installed in the **Host name** field.

Save – When changes are made to any of the **Properties** fields, the **Add** button toggles to a **Save** button. Click to save your changes.

Remove – Click to remove the Monitor host currently selected in the **Hosts** list.

- If the selected host has been assigned to a connection on the **Connections** tab, you must clear the assignment (as well as any related devices and POINTs) before deleting the host.

Undo – When changes are made to any of the **Properties** fields, the **Remove** button toggles to an **Undo** button. Click to cancel your changes.

- When you have set up your host, click the **Connections** tab. The **Connections** settings display.

DMx Settings Connections Tab

A connection group is a group of DMx devices that are connected together and share the same field bus cable. This tab is used to define the communication protocols for each connection group communicating with the Monitor hosts.

- It is possible to have more than one connection group of DMx devices communicating with the same Monitor host.
- Click the **Add** button to add a new connection group and enter the appropriate settings in the **Properties** section.

Options include:

Connections – This list displays all connection groups that have been added.

Connection name – Enter a unique name for the new connection group.

Host – This list displays all Monitor hosts that have been configured on the **Hosts** tab. Select the host to use for this connection.

Communication type – Select the communication protocol used for this connection group. Options include:

Serial port – Select this option if you are connecting through a serial cable.

- This can be direct serial ports or emulated serial ports (i.e., USB-Serial converters).

TCP/IP – Select this option if you are connecting through a network cable.

- TCP/IP operation with the DMx Protection System is only possible when using TCP/IP to RS485 terminal servers to establish the required physical serial connection between network and DMx connection.

Config – Click to access configuration settings for either the serial port or TCP/IP protocol, depending on your **Communication type** selection. Refer to the appropriate **Configuration** section below for details.

Save – When changes are made to any of the **Properties** fields, the **Add** button toggles to a **Save** button. Click to save your changes.

Remove – Click to remove the connection group currently selected in the **Connections** list.

- If the selected connection group has been assigned to a device on the **Devices** tab, you must clear the assignment (as well as any related POINTs) before deleting the connection group.

Undo – When changes are made to any of the **Properties** fields, the **Remove** button toggles to an **Undo** button. Click this button to cancel your changes.

DMx Settings - Serial Port Configuration

If the **Communication type** on the **DMx Settings** dialog's **Connections** tab is set to **Serial port**, click the **Config** button to display the **Configure Serial Port** dialog.

This dialog lets you specify settings for serial communication from DMx modules to the @ptitude Analyst Monitor installation.

Options include:

RS485 settings – These settings should reflect how the converter between the serial port of the host computer and the DMx modules has been configured to handle communication.

Tx/Rx switching (Auto / RTS) – This setting is used to control how the RS485 connection switches between listen mode and send mode. If you are using a latest generation USB to RS485 converter, set this **Auto**. If you are using an old style converter, you may need to set this to **RTS**.

Tx message echo (Off / On) – Echo is used as a communication check to verify that data from the converter is received. With the two-wire, bidirectional communication system recommended by SKF, echo is not necessary. If you are using a latest generation USB to RS485 converter, set this to **Off**. For older models, Echo may need to be set **On**.

Serial Port settings

COM port – Enter the COM port on the host machine to which the serial cable is attached.

Baud rate – Enter the baud rate for the DMx modules, as configured in the DMx Manager's **Serial Communications** settings.

- The default baud rate for DMx modules is 38.4 K.

The **Stop bits**, **Data bits**, and **Flow control** settings are fixed within the DMx modules and provided for reference purposes only.

- Click **OK** to return to the **DMx Settings** dialog.

DMx Settings TCP/IP Configuration

If the **Communication type** on the **DMx Settings** dialog's **Connections** tab is set to **TCP/IP**, click the **Config** button to display the **Configure TCP/IP** dialog.

This dialog lets you specify the TCP/IP parameters of the Ethernet to serial converter used to connect the DMx system to the Ethernet connection.

Options include:

IP Address – Enter the IP address of the Ethernet to serial converter.

Port no. – Enter the port number used by the converter.

- Click **OK** to return to the **DMx Settings** dialog.

DMx Settings Devices Tab

- When you have set up your communications groups, click the **Devices** tab. The **Devices** settings display.

This tab defines the individual DMx devices. Each definition provides information to uniquely identify a device within a connection group. Typically, devices are added automatically when new DMx POINTs are created from the **New DMx POINTs** option on the **Transfer** menu's **DMx** sub menu. (See the **Creating DMx POINTs** section below for details.) In this case, this screen is informational and no configuration is required.

- You must select the **New DMx POINTs** dialog's **Create from Monitor Host** option to automatically create a device.

In the event a DMx module is added after initial POINT setup, it can be manually configured here.

- Click the **Add** button to add a new device and enter the appropriate settings in the **Properties** section.

Options include:

Devices – Lists any devices that have already been configured.

Device name – Enter a unique name to help identify this device.

Connection – This list contains the connection groups that were created on the **Connections** tab. Select the appropriate group from the list. The communication settings for the selected connection group are used for this device.

DAD # – This corresponds to the module address that has been configured on the DMx. Within each connection, all devices must have a unique address. If you are adding a new device, obtain the Module Address from DMx Manager software and enter it here.

Add – Click this button to add a new device.

Save – When changes are made to any of the **Properties** fields, the **Add** button toggles to a **Save** button. Click this button to save your changes.

Remove – Click this button to remove the device.

- If any POINTs have been added for this device, they must be deleted before you can remove the device.

Undo – When changes are made to any of the **Properties** fields, the **Remove** button toggles to an **Undo** button. Click this button to cancel your changes.

Creating DMx POINTs

Once connections settings have been configured, @ptitude Analyst POINTs can be created based on the configuration of the DMx devices. Within DMx Manager, you are able to set up measurements under **Process Channels** in the hierarchy and on the **Transient Data** tab in Module Properties. (Refer to your DMx Manager documentation for more information.) A POINT is created in the @ptitude Analyst hierarchy for each of these measurements that has been configured.

- Only Processed Channel and Transient Data measurements are included. Any other measurement types are not imported into @ptitude Analyst.

To create DMx POINTs:

- Select **New DMx POINTs** from the **Transfer** menu's **DMx** sub-menu.

The **New DMx POINTs** wizard displays.

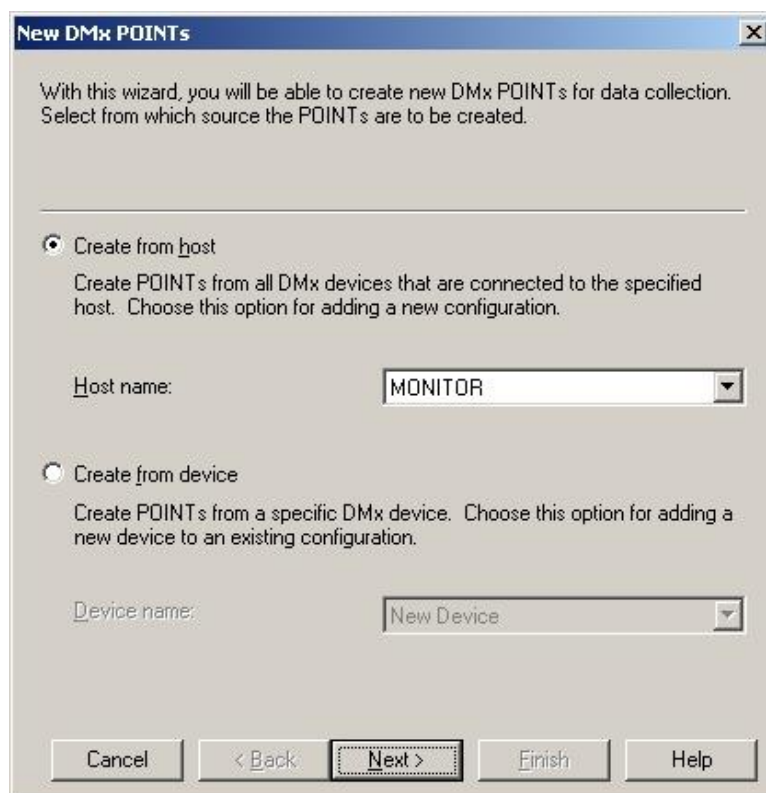


Figure 7 - 2.
The **New DMx POINTs** Wizard.

This dialog offers two options for creating @ptitude Analyst POINTs:

Create from host – This option is used for first time setup of devices on a Monitor host. Configured connections on the specified Monitor host are scanned for connected devices. A machine is created in the hierarchy for each device, along with the applicable measurement POINTs.

Host name – This list displays all of the hosts configured on the **Hosts** tab of the **DMx Settings** dialog. Select the Monitor host that should be scanned.

Create from device – This option is used to add additional devices to an existing DMx hierarchy. This is useful if a DMx device has been added to an existing connection. Rather than re-creating POINTs for all devices associated with a Monitor host, it enables you to append a machine and the related POINTs to the existing configuration.

Device name – This list displays all of the devices configured on the **Devices** tab of the **DMx Settings** dialog.

Subsequent New DMx POINTs wizard screens vary, depending on which option is selected. Refer to the appropriate section, below.

Creating New DMx POINTs from a Monitor Host

To create New DMx POINTs from a host:

- Select the **Create from host** option button and select the appropriate Monitor host from the **Host name** list.
- Click **Next** to access the next screen, where you can specify the DMx module address range to scan.

➤ Monitor must be running to proceed.

This screen lets you limit the DMx device addresses that are scanned. This can be used to speed up the setup by instructing the system to only scan addresses that are in use. POINTs are only created for devices that fall within the specified range of addresses.

Scan from address – If desired, enter the starting and ending addresses of the DMx modules that should be scanned. Modules with addresses falling outside of this range are ignored.

➤ Refer to the DMx Manager user manual for more information on module addresses on the DMx.

- Click **Next** to proceed to a communication status screen.
- Click **Next** to begin adding DMx POINTs.

A SET level item is added to the Primary hierarchy with the name of the selected Monitor host. Beneath the SET, a machine is added for each DMx device, with related POINTs branching from the machine. The first measurement value for each POINT is collected and stored to the database.

The status window updates to list the names of the hierarchy items that are created, and the total number of POINTs added.

- When the POINT creation is complete, the **Next** button toggles with a **Finish** button. Click **Finish** to exit this wizard.

Creating New DMx POINTs from a DMx Device

To create New DMx POINTs from a DMx device:

- Select **New DMx POINTs** from the **Transfer** menu's **DMx** sub-menu to access the **New DMx POINTs Wizard**.
- Select the **Create from device** option button and select the appropriate DMx device from the **Device name** list.
- Click **Next** to access the next screen, where you can specify the location in the hierarchy to add the new DMx machine and related POINTs.
 - Monitor must be running and the hierarchy selected in Monitor must match the Primary hierarchy in @ptitude Analyst to proceed.

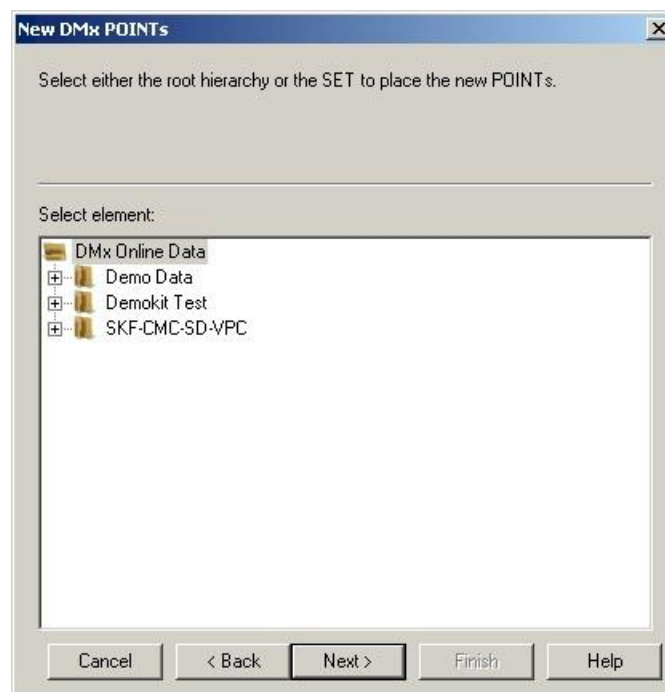


Figure 7 - 3.

The **New DMx POINTs** Wizard's **Select Element** Screen.

The **Select element** hierarchy displays all SET level hierarchy items in the currently selected Primary hierarchy. The new DMx machine can be placed in the root of the hierarchy, or beneath an existing SET.

- If DMx POINTs have already been created from the Monitor host, it is recommended that you add the additional device under the host SET.
- Select the desired hierarchy item and click **Next** to proceed to a communication status screen.
- Click **Next** to begin adding DMx POINTs. A new machine and related POINTs are created under the specified hierarchy location. The first measurement value for each POINT is collected and stored to the database. The status window updates to

list the names of the hierarchy items that are created, and the total number of POINTs added.

- When the POINT creation is complete, the **Next** button toggles with a **Finish** button. Click **Finish** to exit this wizard.

Viewing DMx Hierarchy Items

DMx POINTs appear in the @ptitude Analyst hierarchy.

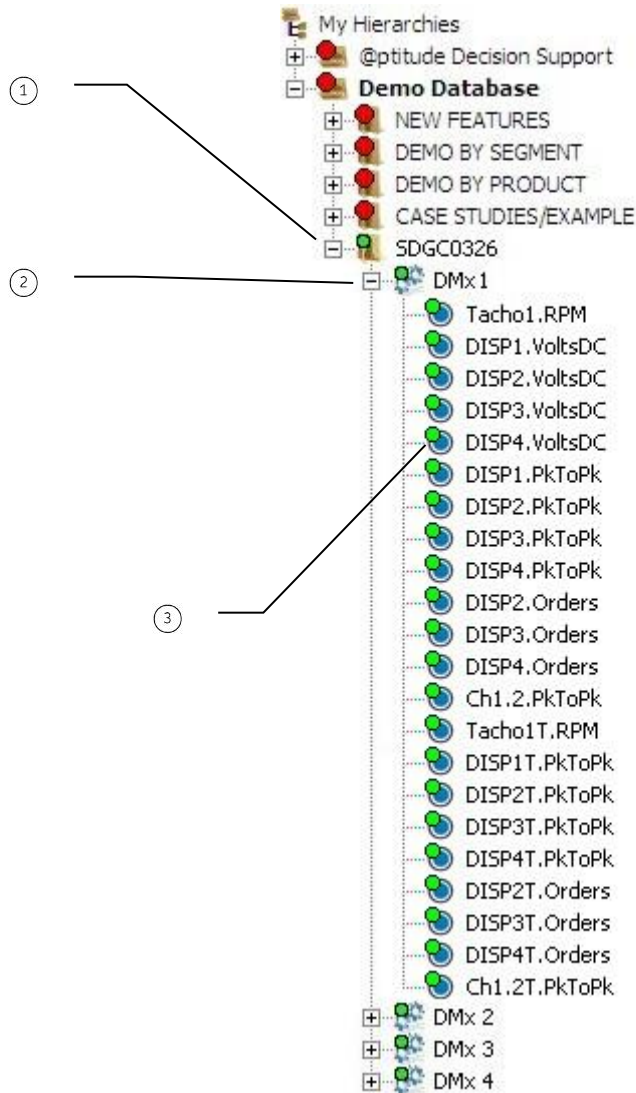


Figure 7 - 4.
@ptitude Analyst Hierarchy with DMx POINTs.

- ① Monitor host
- ② machine for each DMx device
- ③ DMx POINTs

In the hierarchy, the Monitor host appears as the SET. Beneath the set, a machine appears for each DMx device. Branching from the machines are the measurement POINTs that were created based on the device settings. The POINT types that may be created from the DMx include:

- Single channel measurements. The POINT name includes the channel name and the type of measurement (e.g., Channel 1.PktoPk).
- Dual channel Orbit measurements. DMx device setup allows for pairing channels 1 and 2 or channels 3 and 4. This POINT type is created from two single measurements on the DMx if both channels in a pair have the transducer type set to Displacement, there is a probe mounting angle difference between 85 and 95 degrees, and they share the same measurement type. An Orbit POINT is also created if DMx Manager's **TSI Application** field for both channels in a pair is set to **Smax**. Orbit POINT names include the channel numbers of the channel pairing and the type of measurement (e.g., Ch1.2.PktoPk).
- Order measurements. This POINT type groups all available order measurements (magnitude and/or phase) defined for a single channel. The POINT names include the channel name and **Orders** (e.g., Channel 1.Orders).
 - Order measurements are only created if no dual channel Orbit measurement POINT exists for the channel pair. If Orbit POINTs are present for the processed channels, the order measurements will be integrated into the Orbit POINTs.
- Transient measurement POINTs. This measurement type is configured specifically for use with @ptitude Analyst's transient data analysis feature. (Refer to **Chapter 8** for details.) The POINT names display the channel name, followed by the letter **T** (to signify transient data), and the type of measurement (e.g., Channel1T.RPM).
 - Transient measurement POINTs may include any of the types described above.

DMx Machine Properties

Group Properties for machines created from a DMx device provide the ability to check the device's alarm status and setup parameters from within @ptitude Analyst.

- For a full discussion of Group Properties, refer to this manual's **Working With Your SKF @ptitude Analyst Hierarchy** chapter.

To Check DMx Device Status:

- From the @ptitude Analyst Hierarchy, right click on a DMx machine and select **Properties**. The **Group Properties** screen displays.
- Select the **DMx Status** tab. The **DMx Status** tab displays.

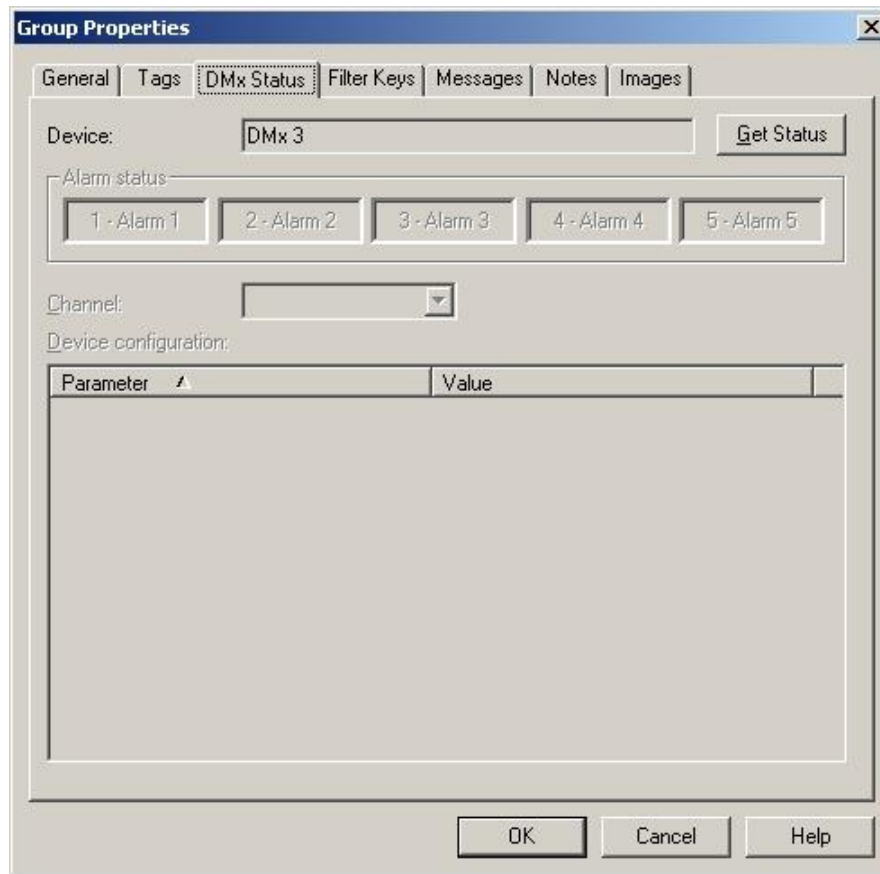


Figure 7 - 5.
The **Group Properties** Screen's **DMx Status** Tab.

- Click **Get Status** to collect status for the DMx device. The tab updates with information from the device.

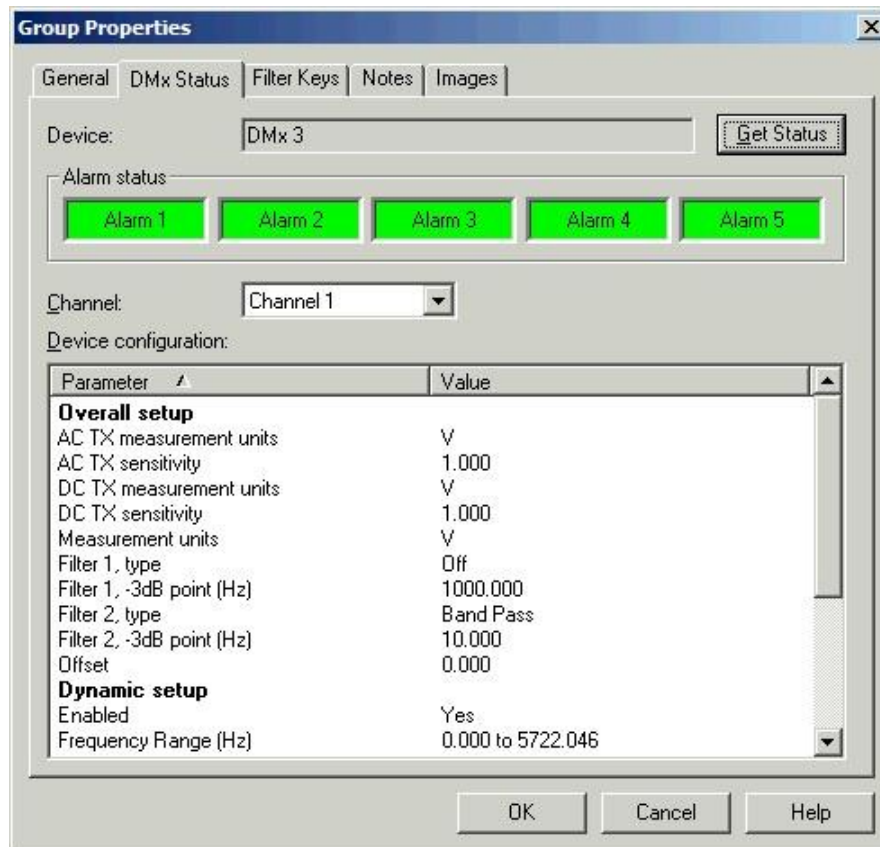


Figure 7 - 6.
The **Group Properties** Screen's DMx Status Results.

Alarm status – The DMx offers up to five alarm configuration containers that are used to create alarms. The alarm status displays green for each container that is not in alarm, and red for containers that are in alarm.

Channel – Select which channel's configuration to display in the **Device configuration** area.

Device configuration – This box displays detailed information on the configuration of the selected channel.

DMx POINT Properties

Properties for POINTs created from DMx devices provide information about the POINT configuration on the DMx and allow configuration of some settings for use with @ptitude Analyst.

- Changes to POINT Properties are internal to @ptitude Analyst. They are not transferred to the DMx device.
- This section only discusses POINT properties that specifically relate to the DMx. It does not cover properties that operate the same for DMx POINTs as other POINT types. For a full discussion of POINT Properties, refer to this manual's **Working With Your SKF @ptitude Analyst Hierarchy** chapter.

To Access POINT Properties:

- From the @ptitude Analyst Hierarchy, right click on a DMx POINT and select **Properties**. The **POINT Properties** screen displays.

The screenshot shows the 'POINT Properties' dialog box with the 'General' tab selected. The dialog has a title bar with a close button. Below the title bar are two rows of tabs: 'Frequencies', 'Images', 'Waveform', 'Band', 'Envelope', 'Vector' in the first row, and 'General', 'Setup', 'Orbit/SCL', 'Schedule', 'Filter Keys', 'Notes' in the second row. The 'General' tab is active. Inside the tab, there is an 'Identity' section with a 'Name' field containing 'Ch3.4T.PkToPk', a 'Description' field, and a checked 'Enable data collection' checkbox. Below these are fields for 'DAD type' (DMx), 'Application' (Vibration), 'Sensor type' (Displacement Probe), and 'Units' (mils). At the bottom of the tab are 'Location' and 'Orientation' fields. The 'Location' field has a text input and a right-pointing arrow button. The 'Orientation' field is a dropdown menu currently set to 'None'. At the very bottom of the dialog are 'OK', 'Cancel', and 'Help' buttons.

Figure 7 - 7.
The **POINT Properties** Screen's **General** Tab.

The **Application**, **Sensor type**, and **Units** display information about this measurement POINT.

DMx POINT Properties – Setup Tab

- Click on the **Setup** tab to view further information related to the POINT settings.

The screenshot shows the 'POINT Properties' dialog box with the 'Setup' tab selected. The dialog is organized into three main sections: Baseline, Band, and Envelope. The 'Setup' tab contains various configuration fields. Under 'Baseline', there are fields for 'Device' (DMx 4), 'Channel #' (4), 'Full scale' (32767 mV), 'Input mV/EU' (200), 'Freq. type' (Fixed span), 'Lines' (1000), 'Save data' (FFT), 'Window' (Flatop), 'Start freq.' (0 Hz), 'End freq.' (520,185 Hz), 'Low freq. cutoff' (2 Hz), 'Speed' (1800 RPM), and 'Averages' (1). The 'OK', 'Cancel', and 'Help' buttons are located at the bottom right of the dialog.

Figure 7 - 8.

The **POINT Properties** Screen's **Setup** Tab.

- The options on this tab vary, depending on the type of POINT selected.
- The DMx Hamming window function is not supported in @ptitude Analyst. The Hanning window function is used instead.
- The DMx Average detection type is not supported in @ptitude Analyst. RMS detection is used instead.

This tab provides read-only information concerning the measurement settings. In addition, some POINT types offer the following editable options:

Speed – Enter the nominal shaft speed in CPM or Hz.

Save data – Specify whether data is stored as **FFT** data, **Time** data, **FFT and Time**, **FFT and Phase**, or **FFT, Time and Phase**. (Options vary depending on the **Freq. type**.)

- Changes made to POINT Properties do not impact the configuration on the DMx device.

Low freq. cutoff – Enter a low frequency cutoff filter value for FFT enabled measurement POINTs. Although values are allowed from 0.0 CPM to 1200 kCPM, the range for normal measurements is from approximately 200 CPM to 600 CPM, or the equivalent in Hz. The default value for DMx measurement POINTs is 120 CPM (or 2 Hz).

DMx POINT Properties – Schedule Tab

- Click the **Schedule** tab to configure the collection schedule for this POINT. The **Schedule** tab displays.

The screenshot shows the 'POINT Properties' dialog box with the 'Schedule' tab selected. The dialog has a title bar with a close button. Below the title bar are several tabs: 'General', 'Setup', 'Schedule' (selected), 'Filter Keys', 'Notes', 'Envelope', 'Frequencies', and 'Images'. The 'Schedule' tab contains four sections: 'Data collection', 'Short term archive', 'Long term archive', and 'Unscheduled data'. Each section has two rows of input fields: 'Take data every:' or 'Archive data every:' and 'Keep current data for:' or 'Keep archive for:'. The 'Data collection' section has '24' in the first field and 'Hour(s)' in the second. The 'Short term archive' section has '1' in the first field and 'Week(s)' in the second. The 'Long term archive' section has '12' in the first field and 'Month(s)' in the second. The 'Unscheduled data' section has '2' in the first field and 'Year(s)' in the second. At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Figure 7 - 9.
The **POINT Properties** Screen's **Schedule** Tab.

@ptitude Analyst Monitor reads and buffers overall measurement readings using the schedule established on the **Hosts** tab of the **DMx Settings** dialog. These readings are used for alarming, but the measurements are not stored in @ptitude Analyst unless an alarm is detected.

In addition, more complete measurements, including FFT spectrum, if applicable, are taken and stored to the @ptitude Analyst database using the schedule specified in the **Take Data Every** field on this tab.

- The default schedule is every 24 hours.

Take data every – Enter a numerical value to indicate how often data should be collected and select the appropriate units from list box options (**Second(s)**, **Minute(s)**, **Hour(s)**, **Day(s)**).

DMx POINT Properties – Band and Envelop Alarms

If the DMx POINT is a Displacement, Velocity, or Acceleration type POINT, the **Band Alarm** and **Envelope Alarm** tabs are available. Band alarm configuration is imported from the DMx module and can use up to four bands per POINT. They can be modified in POINT Properties without affecting the configuration on the DMx. Refer to this manual's **Working With Your SKF @ptitude Analyst Hierarchy** chapter for more information.

DMx POINT Properties - Orbit/SCL Tab

DMx device setup allows for pairing channels 1 and 2 or channels 3 and 4. If both channels in a pair have the transducer type set to Displacement, there is a probe mounting angle difference between 85 and 95 degrees, and they share the same measurement type, a dual channel Orbit POINT is created and the **Orbit/SCL** tab is available in POINT Properties.

The screenshot shows the 'POINT Properties' dialog box with the 'Orbit/SCL' tab selected. The dialog has a title bar with a close button. Below the title bar are two rows of tabs: 'Images', 'Baseline', 'Phase', 'Band', 'Envelope', 'Vector' in the first row, and 'General', 'Setup', 'Orbit/SCL', 'Schedule', 'Filter Keys', 'Notes', 'Frequencies' in the second row. The 'Orbit/SCL' tab is active. The main area contains four sections: 'Channel X settings' with 'X - Input mv/EU' (200) and 'X - Sensor angle' (-45 degrees); 'Channel Y settings' with 'Y - Input mv/EU' (200) and 'Y - Sensor angle' (45 degrees); 'Orbit settings' with 'Top dead center' (TDC), 'Display tacho angle' (unchecked), 'Shaft rotation' (Counter clockwis), and 'Tacho angle' (90 degrees); and 'Shaft centerline settings' with 'X - Cold gap' (-9 volts), 'Y - Cold gap' (-9 volts), 'Cold gap position' (Bottom), and 'Bearing clearance' (10 mils). At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Figure 7 - 10.
The **POINT Properties** Screen's **Orbit/SCL** Tab.

POINT Properties / Orbit/SCL fields may include:

Channel X and Y Settings

- For DMx orbit POINTs that pair channels 1 and 2, channel X on this screen corresponds to channel 1 and channel Y corresponds to channel 2. For DMx orbit POINTs that pair channels 3 and 4, channel X corresponds to channel 3 and channel Y corresponds to channel 4.

X-Input mv/EU – Enter a number to define the sensitivity of the pickup to be used in taking measurements for channel X.

X-Sensor angle – Specify the angle that defines the X sensors' physical location.

Y-Input mv/EU – Enter a number to define the sensitivity of the pickup to be used in taking measurements for channel Y.

Y-Sensor angle – Specify the angle that defines the Y sensors' physical location.

- The orbit axis may use Scientific or Standard mode for the 0 degree reference point, depending on your **Angular axis view** preference setting. This setting should be taken into account when entering your sensor angles.

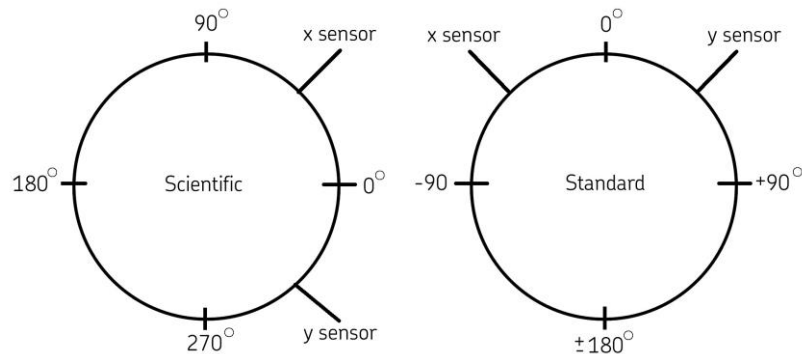


Figure 7 - 11.
Diagram Showing Scientific vs. Standard.

Orbit Settings

Top dead center – Specify the label to display at the top of the **Orbit/SCL** plot.

Display tachometer angle – Enable to allow the tachometer angle to display on the **Orbit/SCL** plot.

Shaft rotation – Specify the shaft rotation direction as either **Bidirectional**, **Clockwise**, or **Counter clockwise** for reference on the **Orbit/SCL** plot.

Tachometer angle – Specify the angle that defines the tachometer's physical location (0 to 359 degrees).

Shaft Centerline Settings

X-Cold gap – Specify the X probe's cold gap value. Together the X and Y probe cold gap values define the distance between the displacement probe and the shaft's position in the bearing when the machine is at rest.

Y-Cold gap – Specify the Y probe's cold gap value.

Cold gap position – Define the cold gap position in the bearing clearance circle when viewing the shaft centerline plot. Choices are **Bottom**, **Center**, **Left**, **Right**, and **Top**.

Bearing clearance – Specify the bearing's clearance value (typically supplied by the manufacturer). The expected clearance value is the diametric clearance between the shaft and bearing.

Waveform Tab

When analyzing orbit data, it is desirable to exclude runout of the shaft. This can be accomplished by capturing a waveform measurement when the shaft is rotating very slowly (1 – 400 RPM). This “slow roll” waveform highlights the normal variances in the rotation of the shaft, which can then be factored out when viewing orbit plots.

The **Waveform** tab in **POINT Properties** lets you select the desired waveform measurement.

- The **POINT Properties / Waveform** tab is available only when the current POINT has stored data. If there is no collected data, or the POINT type is not Orbit / SCL, the **Waveform** tab does not appear.

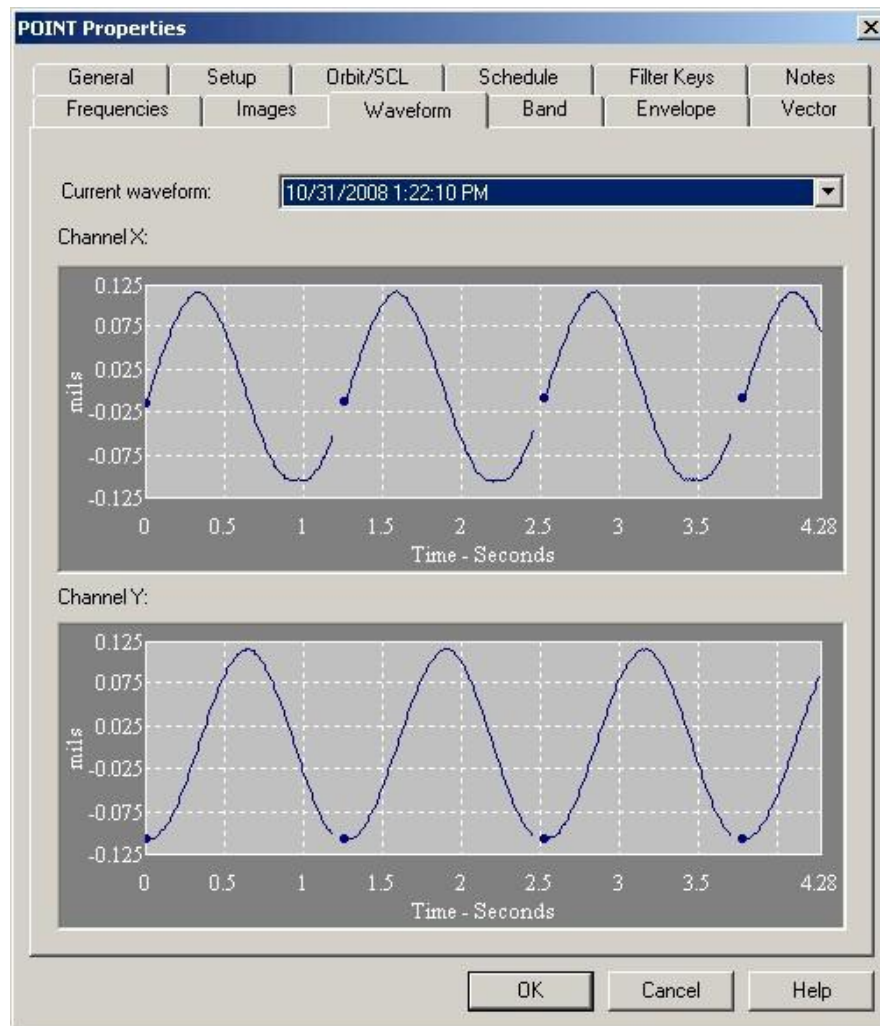


Figure 7 - 12.
The **POINT Properties** Screen's **Waveform** Tab.

To specify a POINT's waveform measurement:

- Select the POINT in the hierarchy list.
- Right-click to display the POINT's context menu and select the **Properties** option. The **POINT Properties** screen displays.
- Select the **Waveform** tab.

Current Waveform

The **Current Waveform** field lists measurement record timestamps for the POINT's stored measurements. Click to specify the measurement to use as the slow roll waveform. The specified measurement's time waveforms display graphically in the tab's lower area.

- A **<No waveform>** option appears in the drop down list as the default, and to clear the current waveform selection.

DMx POINT Properties - Vector Tab

Vector compensation allows you to specify known magnitude and phase angle values that represent shaft runout. This may be used to correct data for Orbit, Bode, and Nyquist plots.

The **Vector** tab in **POINT Properties** lets you enter the magnitude and angle that should be used to compensate Orbit, Bode, and Nyquist plots for Channel X and Channel Y at 1X, 2X, and 3X machine running speed.

- In DMx Manager's Measurement Channel Properties, you are able to **Allow free orders**. If this is selected, rather than assuming the first three orders of running speed for a measurement, you may specify any order (from 1 to 31). In this case, the 1X, 2X, and 3X settings in Vector Compensation correspond to the first three defined orders in DMx Manager. The **Allow free orders** setting also provides the option to specify a non-integer order (for example, you may wish to track speed related vibration at 1.5X running speed). Non-integer orders do not have an associated phase measurement. If a non-integer order is entered in one of the first three order fields in DMx Manager, vector compensation in @ptitude Analyst will not be accurate. It is strongly recommended that you use the forth order field in DMx Manager for any non-integer order you wish to track.
- The **Vector** tab only appears if the POINT type is Orbit / SCL or Order (i.e., **Freq. type** set to **Order Track**).

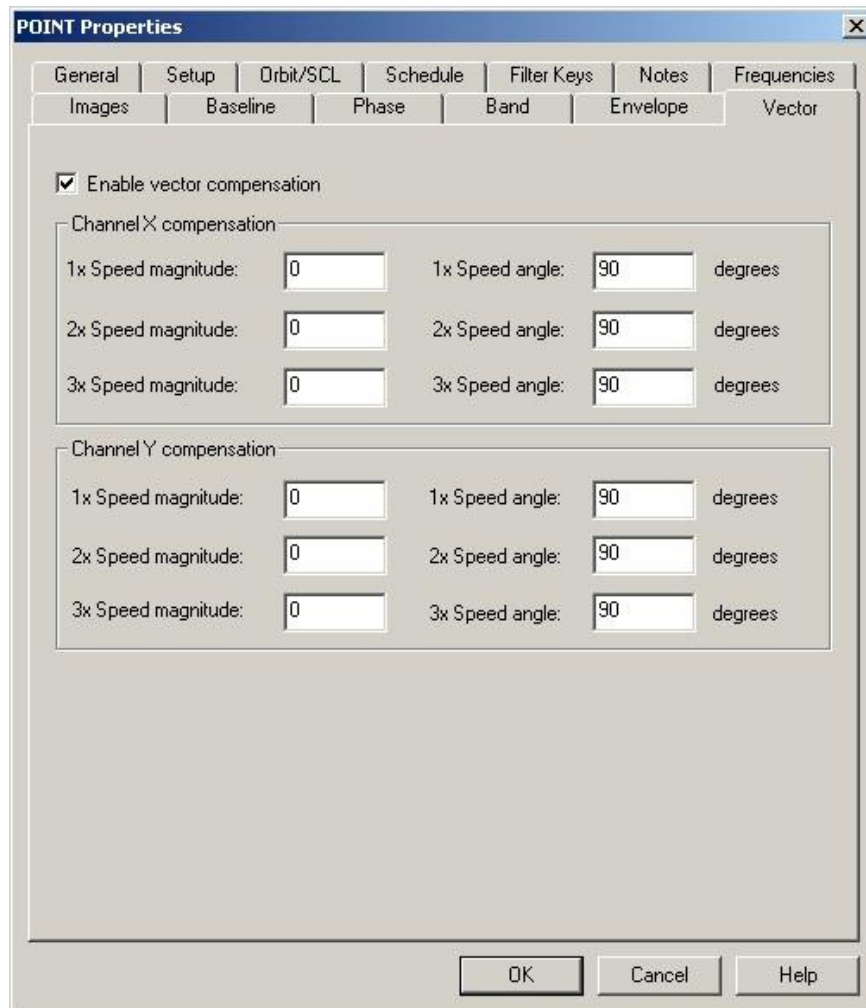


Figure 7 - 13.
The **POINT Properties** Screen's **Vector** Tab.

Enable vector compensation – Mark this check box to enable the fields on this tab. If this is unmarked, no vector compensation is performed for the POINT.

- Vector compensation is applied to the measurement as it is stored to the database. Marking this check box only affects new measurements. Vector compensation will not be available for any measurements that were taken with this check box unmarked.

Channel X and Y compensation – The vector compensation settings that should be used in plots for Channel X and Channel Y data, respectively.

Magnitude (1X, 2X, and 3X Speed) – The magnitude of the vector that should be factored out of plots at 1X, 2X, and 3X orders. (The magnitude corresponds to the peak value, using the units defined for the POINT.)

Angle (1X, 2x, and 3X Speed) – The phase angle, in degrees, of the vector that should be factored out of plots at 1X, 2X, and 3X the machine running speed.

- The General Preferences **Angular Axis View** setting specifies whether to use Scientific or Standard mode when determining the

0° reference point to define probe placement. This setting should be taken into account when entering your compensation angles.

- The **magnitude** and **angle** settings together define the vector.

DMx POINT Properties – Gating Setup

Gating is a method of controlling data collection for one POINT, called a **dependent** POINT, based on the current state of a second POINT, called the **control** POINT.

If the control POINT's conditions are met, the dependent POINT's measurement is performed. If the control POINT's conditions are not met, the dependent POINT's measurement is not performed.

- Reference **Appendix C, Data Collection Gating** for more information about gating.

The **Gating Setup** tab in **Point Properties** lets you assign speed and process reference POINTs to the selected POINT for gating purposes.

The screenshot shows the 'POINT Properties' dialog box with the 'Gating Setup' tab selected. The dialog has a blue title bar and a standard Windows-style border. Inside, there are two main sections: 'Speed Collection' and 'Process Collection'. Each section has a 'Speed Reference' or 'Process Reference' field with a 'Select' button, a 'Speed Ratio' or 'Process Ratio' field, and a checkbox to 'Enable' the respective gating. The 'Speed Collection' section has a 'Min' field set to 0, a 'Max' field set to 9999.9, and a 'Unit' field set to RPM. The 'Process Collection' section has a 'Min' field set to 0, a 'Max' field set to 24, and a 'Unit' field set to Vdc. At the bottom of the dialog are 'OK', 'Cancel', and 'Help' buttons.

Section	Reference	Ratio	Enable	Min	Max	Unit
Speed Collection	atabase \ IDSS-YEZEN-VXP \ DMx 1 \ Tacho1.RPM	1	<input checked="" type="checkbox"/>	0	9999.9	RPM
Process Collection	e \ IDSS-YEZEN-VXP \ DMx 1 \ Channel 4.VoltsDC		<input checked="" type="checkbox"/>	0	24	Vdc

Figure 7 - 14.
The **POINT Properties** Screen's **Gating Setup** Tab.

Fields include:

Speed Collection – Enter speed collection information in the fields below:

- If the selected POINT is a speed POINT, you can enable speed gating on itself.

Speed reference – To assign a POINT for speed tag reference, click the **Select...** button to browse POINTs.

- For troubleshooting purposes, it is recommended that you do not gate the reference POINT.
- It is recommended that the reference POINT collects at a faster schedule than its gated POINTs.

Speed Ratio – Enter a numerical value for the desired multiple in the **Ratio** field.

Enable Speed Gating – Click to discard data outside of the specified range.

- When you disable speed gating, also clear the reference point selection to ensure the reference point does not continue to be flagged as in use.

Min / Max – Enter the **Min / Max** range at which data collection occurs. **Max** range must be less than or equal to the reference POINT's full scale value. The max range is automatically adjusted if the **Speed Ratio** field is modified (for example, if the max range is 100 RPM, and the speed ratio is changed from 1 to 2, the max range automatically updates to 200 RPM.)

Units – The reference POINT's units of measurement automatically display. If the selected POINT is a speed POINT and no reference POINT is specified (self-gating), the selected POINT's units display.

Process Collection – Enter process collection information in the fields below:

- If the selected POINT is a process POINT, you can enable process gating on itself.

Process reference – To assign a POINT for process reference, click the **Select...** button to browse POINTs.

- For troubleshooting purposes, it is recommended that you do not gate the reference POINT.
- It is recommended that the reference POINT collects at a faster schedule than its gated POINTs.

Enable Process Gating – Click to discard data outside of the specified range.

- When you disable process gating, also clear the reference point selection to ensure the reference point does not continue to be flagged as in use.

Min / Max – Enter the **Min / Max** range at which data collection occurs. **Max** range must be less than or equal to the reference POINT's full scale value.

Units – The reference POINT's units of measurement automatically display. If the selected POINT is a process POINT and no reference POINT is specified, the selected POINT's units display.

Working with DMx Data

As soon as DMx POINTs are created, a measurement is captured and stored to the @ptitude Analyst database. @ptitude Analyst Monitor continues to take overall readings on the schedule specified on the **DMx Settings** dialog's **Hosts** tab. Monitor stores these readings in a buffer. Readings in the buffer are retained until they are overwritten with new readings when the buffer sample limit is met. Buffered readings are only used in the event of an alarm condition. (Refer to the **DMx Alarms** section, below, for details.)

On the schedule specified in POINT Properties, @ptitude Analyst Monitor takes a more complete reading, including spectral data if applicable, and writes it to the @ptitude Analyst database.

The status bar at the bottom of the @ptitude Analyst screen provides color-coded status information. If you are collecting data for the DMx, two Monitor status indicators appear, one for the DMx, and one for all other online devices. They can be identified by the icon to the left of the Monitor ID.

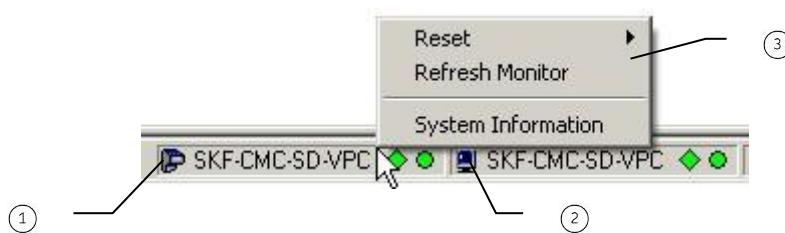


Figure 7 - 15.
DMx Monitor Status.

- ① Monitor for DMx
- ② Monitor for other online systems
- ③ DMx Monitor right-click menu

The operation of the two status indicators is similar, with the exception of the options available on the right-click menu.

- For more on general operation of the status indicators, refer to **Automatic Data Retrieval** in **Chapter 4**.

The DMx Monitor status indicator's right-click menu includes a **Refresh Monitor** option. This option refreshes Monitor with changes to DMx configuration, without requiring a restart.

DMx Alarms

Most alarms for DMx POINTs are configured in DMx Manager. The Monitor program automatically matches the POINT in @ptitude Analyst to the measurement on the DMx and captures the alarm status during data collection.

Unlike @ptitude Analyst, alarms in DMx Manager are not configured for each measurement POINT. Instead, DMx Manager allows up to five Alarm Channels that provide a logical alarming scheme based on combining multiple measurements, potentially from different measurement channels.

Because of this, the same measurement POINT may be represented in more than one Alarm Channel with different alert and danger values. Consequently, the same POINT may be in alarm in one channel, and not in another. Additionally, a single measurement within an Alarm Channel may go into alarm without triggering the Alarm Channel. (For example, the logic may specify that at least two measurements must be in alarm for the channel to trigger.)

Monitor keeps track of the alarm status for both the five alarm channels, and the individual measurements used in the alarm logic.

- This only applies to General Alarms on the DMx. If you are using Advanced alarms in DMx Manager, the alarm channel status is reported but individual measurement alarm status is not supported in @ptitude Analyst.

If an alarm channel goes into alarm, it is noted in the Event Log and in the DMx machine's Group Properties status indicators.

If an individual measurement goes into alarm on any Alarm Channel, the corresponding POINT in the @ptitude Analyst hierarchy is also placed in alarm, *whether or not* the related Alarm Channel is triggered.

- Because a POINT in @ptitude Analyst may be in alarm without triggering the Alarm Channel, @ptitude Analyst POINT status is not a reliable indicator of DMx Protection System status.

When a POINT goes into alarm, the following occurs:

- The hierarchy's status indicators update to reflect the alarm level (alert or danger) and details of the alarm are made available in the Alarm Details view.
- A time and/or spectrum measurement is taken for the POINT in alarm, when applicable.
- All data in the buffer for the POINT in alarm is immediately written to the @ptitude Analyst hierarchy.
- A single overall measurement from the buffer is stored for all other POINTs on the same DMx machine.

These unscheduled measurements from the buffer provide a "snapshot" reference of the overall machine condition.

- If a DMx POINT is a Displacement, Velocity, or Acceleration type POINT, it is also possible to configure Band and Envelope alarms in @ptitude Analyst. These alarms are treated as standard @ptitude Analyst alarms and do not result in additional buffer measurements being written to the hierarchy. They are also internal to @ptitude Analyst and do not impact the DMx device (i.e., they are not used by the Protection System) or display in DMx Manager.

DMx Hierarchy Maintenance

DMx module configuration is performed in DMx Manager. If a change is made to a measurement in DMx Manager, @ptitude Analyst automatically updates the corresponding POINT in its hierarchy using the following rules:

- If the source channel (channel 1-4) and measurement output (detection type: Pk, RMS, DC, ect.) have not changed, the existing POINT is updated with the changes.
- If the source channel and measurement output combination exists in @ptitude Analyst, but the POINT is disabled, it will be enabled again and changes will be applied.
- If the source channel and measurement output combination on the DMx does not exist in @ptitude Analyst, a new POINT is created.
- If the source channel and measurement output specified in @ptitude Analyst does not exist anymore in the new setup on the DMx, the measurement POINT is disabled in @ptitude Analyst.
- Updates use the same rules followed for creating single @ptitude Analyst POINTs from multiple DMx channel measurements (i.e., order measurement and dual channel measurement POINT merging).

Automatic changes to @ptitude Analyst POINTs are noted in the Event Log.

- Rather than using the automatic update, you may also delete your @ptitude Analyst hierarchy and use the **New DMx POINTs** wizard to recreate it from the DMx. If you would like to retain past measurement data for the machine, first export the data using the **File** menu's **Export** option. Once the machine is recreated, the data can be imported back into @ptitude Analyst by using the **File** menu's **Import** option and selecting to **Merge Measurements** on the Introduction screen.

Viewing DMx Data in Plots

Data from DMx POINTs can be viewed in graphical plots in @ptitude Analyst in the same manner as other POINTs. In addition, live data can be viewed from the following plots:

- Trend plot
 - Spectrum plot
 - Time plot
 - Trend/Spectrum plot
 - Trend/Time plot
 - Trend/Spectrum/Time plot
 - Orbit plot
 - Shaft Centerline plot
 - Bode
 - Nyquist
 - Cascade
 - Topology
- Depending on the **Live data mode** selected on the **Hosts** tab of the **DMx Settings** dialog, data collection may be temporarily suspended while the live data screen is open.

Refer to the **Displaying Graphic Plots** chapter for general information on working with plots and viewing live data.

- Bode, Nyquist, Cascade, and Topology plots primarily apply to transient data. They are documented **Chapter 8, Transient Data Analysis**.

In addition, DMx device setup allows for pairing channels 1 and 2 or channels 3 and 4. If both channels in a pair have the transducer type set to Displacement, there is a probe mounting angle difference between 85 and 95 degrees, and they share the same measurement type, a dual channel Orbit POINT is created. Data from Orbit POINTs can be displayed in Orbit and Shaft Centerline plots.

Orbit Plot

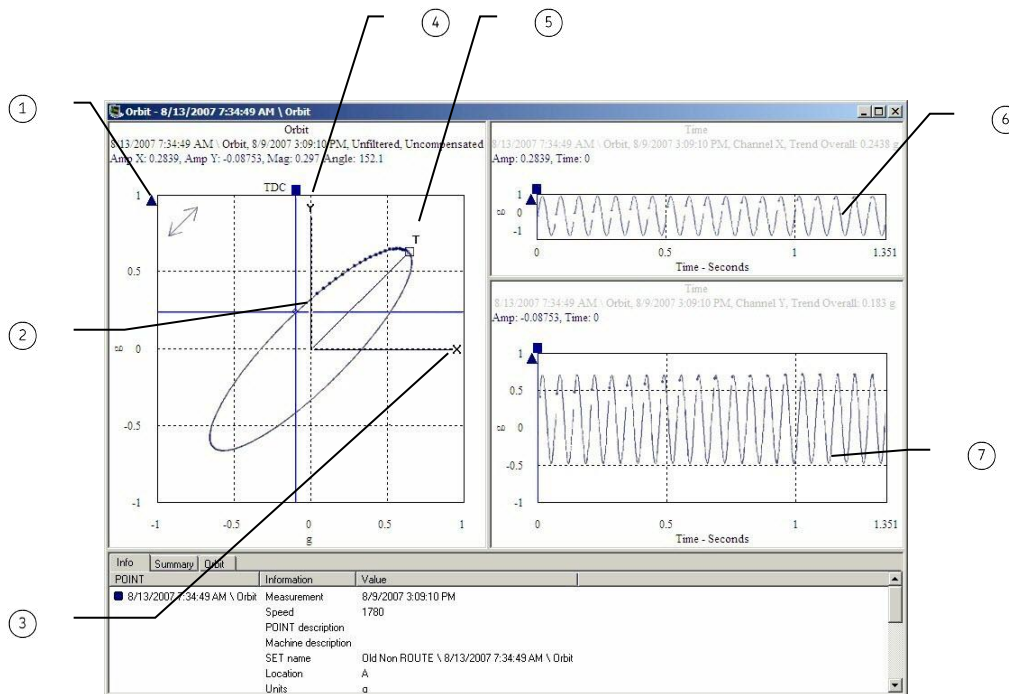


Figure 7 - 16.
Orbit Plot.

- ① directional arrows
- ② flash blank
- ③ X channel sensor location
- ④ Y channel sensor location
- ⑤ tachometer's physical location
- ⑥ X Channel Time Plot
- ⑦ Y Channel Time Plot

The Orbit plot displays the shaft's most recent orbit data for the two input channels (X and Y). Orbit plots can be used to show the movement of the shaft within the bearing.

- The sensor and tachometer angles are adjusted based on your **Angular Axis View** preference setting.

Orbit plot labels include:

↔ - Indicates the direction the shaft is rotating. ← indicates the shaft is rotating counterclockwise, → indicates the shaft is rotating clockwise, and ↔ indicates the shaft is rotating bi-directional.

T - Indicates the physical location of the tachometer sensor.

X - Indicates the physical location of the channel X sensor.

Y - Indicates the physical location of the channel Y sensor.

Flash blank - Indicates the starting point of the rotation of the shaft. A blank on the orbit plot precedes the dot for easier identification of the starting point.

Orbit Plot Settings

To access the Orbit Plot Settings dialog:

- With an orbit plot displayed, select the **View** menu's **Plot/Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the orbit plot's right-click context menu.

Orbit Plot Settings fields include:

Autoscale - Enabling **autoscale** automatically scales the initial orbit axis so it is approximately 120% of the largest orbit. Disabling **autoscale** displays the orbit on the same full scale axis used when it was recorded.

Mag. Min. / Mag. Max. - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Orbit settings

Slow roll compensation - Slow roll compensation uses a measurement taken at low speed when there should be negligible shaft vibration to quantify shaft runout. Enable the **Slow roll compensation** checkbox to allow the plot to compensate based on either the vector compensation or waveform compensation settings in POINT Properties (depending on the **Filtering** settings, below).

- Press F2 on your keyboard when viewing the plot to toggle vector compensation on or off.
- Vector compensation must be enabled in POINT Properties prior to data collection to be used in a plot.

Filtering - Allows you to display the orbit data for a specific frequency. Choices are **Raw**, **1x**, **2x**, **3x**. If **1x**, **2x**, or **3x** is selected with **Slow roll compensation**, the corresponding **1X**, **2X**, or **3X** vector compensation settings on the **Vector** tab in POINT Properties are applied. If **Raw** is selected along with **Slow roll compensation**, it uses the waveform measurement selected in POINT Properties.

- Press F3 on your keyboard when viewing the plot to scroll through the filtering options.

Revolutions - Specify the number of revolutions to display on the orbit plot. Choices are **1 revolution**, **2 revolutions**, **3 revolutions**, **4 revolutions**, **5 revolutions**, or **All revolutions**.

- Press F4 on your keyboard when viewing the plot to scroll through the revolution options.

Shaft Centerline Plot

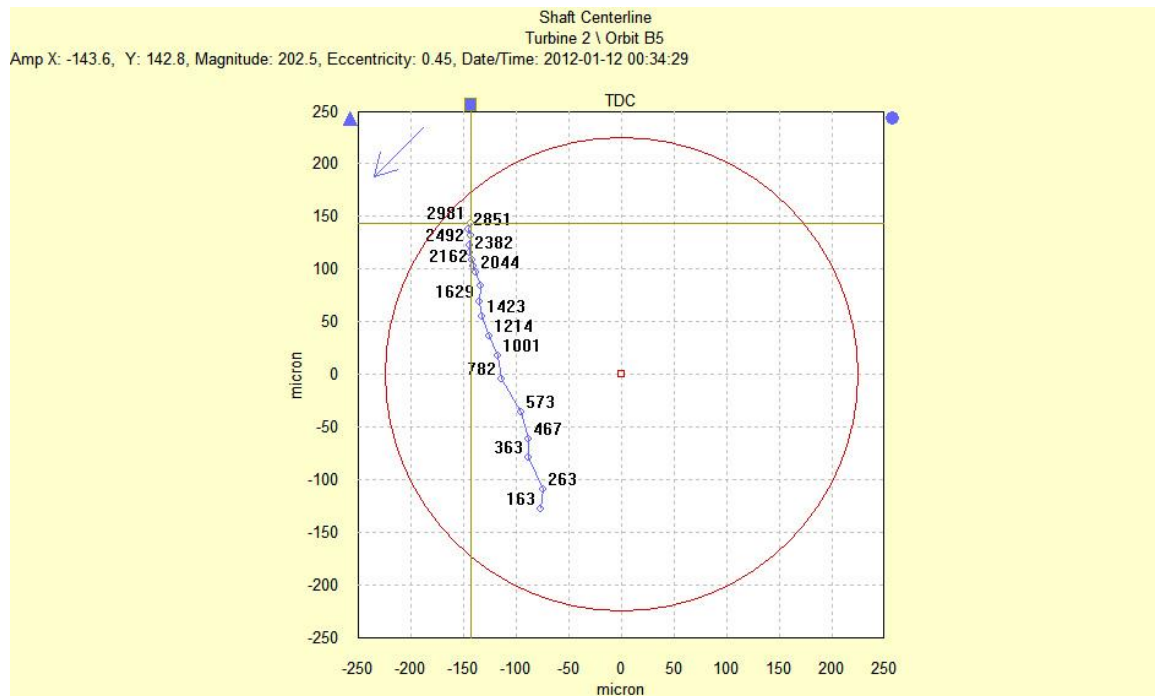


Figure 7 - 17.
Example of a Shaft Centerline Plot.

The Shaft Centerline plot displays a trend of the shaft's average centerline for Orbit POINTs. Shaft centerline plots can be used to show the movement of the shaft within the bearing.

Shaft Centerline Plot Settings

To access the SCL Plot Settings dialog:

- With a **Shaft Centerline** plot displayed, select the **View** menu's **Plot/Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the shaft centerline plot's right-click context menu.

SCL Plot Settings fields include:

Autoscale - Enabling **autoscale** automatically scales the initial amplitude axis so it is approximately 120% of the largest amplitude. Disabling **autoscale** displays the spectrum on the same full scale vertical axis used when it was recorded.

Mag. Min. / Mag. Max. - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Date / Time Scale - Enter the minimum and maximum date / time scale values in the designated text boxes.

Tag - Allows you to display RPM tags on the plot. Select either **No Tag** or **RPM**.

8

Transient Data Analysis

Overview

The Transient Data feature is used to collect and analyze run up / coast down data, intermittent events, and transient vibration signals from non steady state machinery.

- At the time of this writing, only the IMx and DMx DADs support transient data collection.
- IMx setup is documented in **Chapter 3, Working With Your SKF @ptitude Analyst Hierarchy**. DMx setup is documented in **Chapter 7, Multilog DMx Machine Monitoring Module**. Because transient data collection impacts standard data collection, it is recommended that you read each section.

For the IMx, configuring @ptitude Analyst to collect transient data is a two step process:

- First, create transient POINTs for the device via @ptitude Analyst. These POINTs can be the same as those used for normal condition monitoring.
- Next, set up your transient data hierarchy in @ptitude Analyst and add the transient POINTs.

Once setup is complete, the IMx will monitor for transient events and send transient data to the IMx Service. For this to happen, the transient data must be transferred along with the normal condition monitoring POINT data.

For the DMx, configuring @ptitude Analyst to collect transient data is a different two step process.

- First, set up transient POINTs for the device via @ptitude Analyst's Transfer > DMx > DMx Transient or in the DMx Manager's Module Properties.
- Next, set up your transient data hierarchy in @ptitude Analyst and add the transient POINTs created by @ptitude Analyst Monitor.

Once setup is complete, the DMx will monitor for transient events and send transient data to @ptitude Analyst Monitor. Transient data may be analyzed using specialized plots and/or included in reports.

Setting up DMx Transient POINTs

Transient data collection provides multiple “snapshots” of your machinery as the speed changes. Transient data generally uses Order type POINTs (i.e., magnitude and phase pairings on the same channel, potentially integrated in dual channel Orbit POINTs) configured for fast data collection to allow the DMx to rapidly take multiple measurements during the transient event. A separate setup is provided specifically for transient data so you can configure transient POINTs without impacting normal data collection.

Transient POINTs may be configured from within DMx Manager using the Module Properties **Transient Data** tab. These POINTs are added to your @ptitude Analyst hierarchy during normal DMx POINT creation. (Refer to **Chapter 7’s Creating DMx POINTs** section for details.) You may also create transient POINTs from within @ptitude Analyst and transfer them to the DMx device.

To add transient measurements in @ptitude Analyst:

- Select **DMx Transient** from the **Transfer** menu’s **DMx** sub-menu. The **DMx Transient** screen displays.
- Select the **Device Setup** tab.

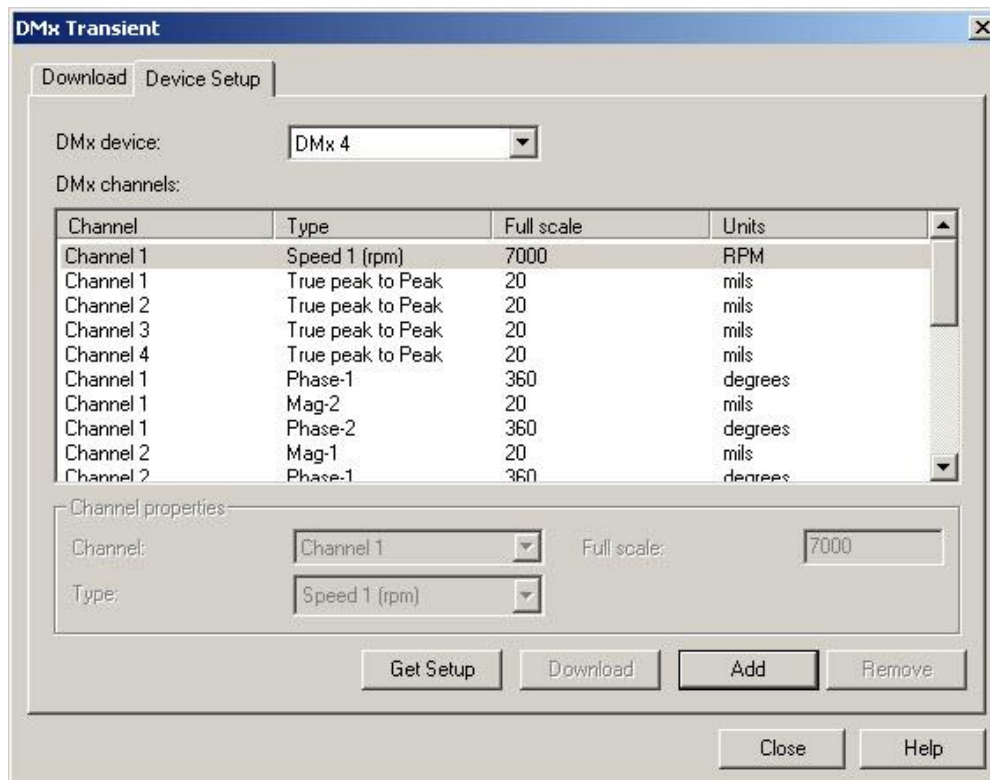


Figure 8 - 1.
The **DMx Transient** Screen’s **Device Setup** Tab.

This tab allows you to display transient POINTs that already exist on the DMx device, as well as configure new transient POINTs.

DMx Manager allows up to 48 transient measurements, of which 11 are reserved for alarming, speed, and status information. This leaves 37 measurements available for user defined configuration. This allows configuration of up to all four orders (requiring eight measurements to describe both amplitude and phase) on all four measurement channels, with an additional five spaces available for other measurement types.

Before you can add new transient measurements, you must retrieve the existing setup from the DMx device.

To retrieve transient data configuration:

- Select the DMx device you would like to use from the **DMx device** list.
- Select **Get Setup**. A progress bar displays as the data is retrieved, then the **DMx channels** section updates with information from the selected DMx device.

Options on this tab include:

DMx device – Displays all DMx devices configured on the **DMx Settings** dialog's **Devices** tab.

DMx Channels – Displays a list of the existing transient measurements on the selected DMx device. Available information includes the measurement **Channel**, measurement **Type**, the **Full Scale** limit (i.e., the measurement's maximum value), and the measurement **Units**.

Channel Properties section – Allows you to modify the highlighted transient measurement. Options include:

Channel – Select the measurement channel (**Channel 1** through **4**) corresponding to one of the four sensor inputs on the DMx.

Type – Select the measurement type from the list. Options that are not configured in DMx Manager for use with the selected channel appear dimmed.

- FFT processing is disabled during transient data collection, therefore, FFT band options are not available for transient POINTs.
- The **Units** are automatically derived from the Type.

Full Scale – Enter the measurement's maximum value.

Get Setup – Retrieves transient measurement setup from the selected DMx device.

Add – Click to add a new transient measurement with default settings. The new measurement is added to the bottom of the list.

Remove – Deletes the highlighted transient measurement.

Download – Saves and transfers the configuration to the DMx device.

To add a new transient measurement:

- Select a **DMx device** and click **Get Setup**. The **Add** button enables.
- Click **Add**. A new measurement is added at the bottom of the list. The measurement settings default to:

Channel = Channel 1
Type = True peak
Full scale = 32767

- Scroll to the bottom of the list and highlight the new measurement.
- Modify the settings in the **Channel properties** section.

To remove a transient measurement:

- Highlight the transient measurement you would like to delete and click **Remove**. The measurement is removed from the list.
 - This option removes the measurement from the DMx. If the corresponding POINT already exists in @ptitude Analyst, it is disabled.

To save and transfer configuration to the DMx:

- When you are satisfied with your configuration, click **Download**. The measurements are saved and a progress bar appears as the configuration is transferred to the DMx device.

WARNING!

The DMx device may be unresponsive for several seconds while configuration is downloaded. This results in a temporary interruption in the protection system.

Changes are reflected on the **Transient Data** tab in DMx Manager's Module Properties. If you have added new transient measurements or modified existing measurements, the next time @ptitude Analyst is updated with changes from the DMx, the new POINTs are added to the hierarchy and existing POINTs are updated.

- If a POINT already exists in the @ptitude Analyst hierarchy, only changes to the Full Scale setting are updated. Changes to the channel number or measurement type result in a new POINT being created and the existing POINT being disabled.
- If you exit this tab without downloading, you are prompted to save your configuration. Saving also downloads the changes to the DMx.

Transient Hierarchy Configuration

The transient hierarchy and captured transient data records are organized in a separate transient hierarchy window (similar to a ROUTE or workspace window).

The transient window lets you create special groups that define transient data collection. All of the data collected during a transient event is stored in one measurement record in the transient window so data is grouped and readily available for analysis.

- Scheduled data collection of POINTs is separate from transient data collection. Scheduled data continues to be collected and displayed in the standard Hierarchy window.

How to Create a New Transient Window

Transient windows are added and maintained from the **Transient** dialog.

To open the Transient dialog:

- Select **View / Transient**. The **Transient** dialog displays a list of any previously created transient windows.

Options include:

Open – Opens the highlighted transient window.

Add – Opens the **Transient Properties** dialog and adds a new transient window.

Remove – Removes the highlighted transient window.

Properties – Opens the **Transient Properties** dialog where you may edit the name and description of the highlighted transient window.

To create a new Transient window:

- Click **Add**. The **Transient Properties** dialog displays.
- Enter a **Name** for the new transient view and provide a **Description** if desired.
- Click **OK**. A new, empty transient window displays.



Figure 8 - 2.
A New Transient Window.

- ① Transient Hierarchy root level – displays the name of the Transient window.

Unlike other hierarchies in @ptitude Analyst, the transient window adds an additional hierarchy level for the transient group. All SETs, machines, and POINTs are added beneath this transient group. This window can contain one or more transient groups that define transient data collection.

Important

Although @ptitude Analyst is capable of handling multiple transient groups, keep in mind that the communication speed of the DMx is restricted for IS compliance. If you are configuring more than one transient group for the DMx, use the guidelines below to carefully evaluate your group settings to minimize the data capture requirements. (For example, consider only capturing overall data rather than waveform data, or capturing data at greater intervals.) If transient data collection is initiated for more than one group simultaneously, Monitor may be busy processing another group and some data may be missed.

How to Create a New Transient Group

To add a transient group:

- Highlight the root level of the **Transient** window hierarchy.
- Select **Insert / New Group**. The **Group Properties** screen displays.

Options include:

Name – Enter a unique name to identify the new group.

Description – (optional) Enter a description to further identify the new group.

Type – Select **IMx Transient** or **DMx Transient**.

Enable Data Collection – Enable or disable transient data collection for this group.

- Select the **Transient** tab.

The Group Properties DMx Transient Tab

The screenshot shows the 'Group Properties' dialog box with the 'Transient' tab selected. The 'General' tab is also visible. The 'Transient' tab contains the following settings:

- Low speed: 100 RPM
- High speed: 3000 RPM
- Overall data sample:
 - ☒ Delta speed: 100 RPM
 - ☒ Delta time: 5 Minute(s)
- Dynamic data sample:
 - ☐ Delta speed: 100 RPM
 - ☐ Delta time: 5 Minute(s)
 - Data resolution: 35%
- Maximum duration: 60 Minute(s)
- Extra startup sample time: 0 Minute(s)

At the bottom are buttons for 'OK', 'Cancel', and 'Help'.

Figure 8 - 3.
The **Group Properties** Screen's **DMx Transient** Tab.

Options include:

Low / High Speed – Defines the transient event window. Transient data is only collected if the running speed of the machine falls within the specified range.

Start-up events are initiated when the machine speed increases above the low speed threshold and stopped when the speed exceeds the high speed threshold.

Coast down events are initiated when the machine speed drops below the high speed threshold and stopped when the speed reaches the low speed threshold.

Important

If data collection times out on the DMx before the speed limit is reached, a new transient event will not be triggered until the running speed falls below the low speed limit or above the high speed limit. If the high speed limit is set higher than the maximum machine speed, it effectively turns off transient data collection for the DMx. If this happens, either select the Refresh Monitor option on the DMx Monitor status indicator, or stop and restart @ptitude Analyst Monitor to reset the system.

Overall data sample – Allows definition of data acquisition triggers for overall data, based on changes in speed and/or time.

Delta speed – Enable to trigger data acquisition at the speed interval specified in the adjacent **RPM** field.

Delta time – Enable to trigger data acquisition at the specified time interval. Enter the time interval in **Second(s)**, **Minute(s)**, or **Hour(s)**.

- When data collection is triggered by either one of the options, both triggers reset and are initialized to current speed and timestamp values.

Dynamic data sample – Allows definition of data acquisition triggers for dynamic data (waveform), based on changes in speed and/or time.

Delta speed – Enable to trigger data acquisition at the speed interval specified in the adjacent **RPM** field.

Delta time – Enable to trigger data acquisition at the specified time interval. Enter the time interval in **Second(s)**, **Minute(s)**, or **Hour(s)**.

- When data collection is triggered by either one of the options, both triggers reset and are initialized to current speed and timestamp values.
- Dynamic data acquisition takes considerably more time than overall data collection. Be aware that during this time, no overall measurement data is collected.

Data resolution – Allows definition of the approximate resolution for dynamic data collection by specifying the percentage of the total captured data that should be transferred to @ptitude Analyst. This allows you to minimize data acquisition and transfer time.

Maximum duration – Specifies a transient data collection timeout. Transient data collection will terminate when either the machine speed reaches the defined **Low** or

High speed limit, or the timeout is reached. Enter a timeout between 1 and 60 **Second(s)**, **Minute(s)**, or **Hour(s)**.

Extra startup sample time (optional) – Allows additional time to be added onto data collection for a startup event. Once the **High speed** limit has been met, data collection will continue for the specified amount of time. Enter a time between 0 and 60 **Second(s)**, **Minute(s)**, or **Hour(s)**. If 0 is entered, data collection terminates as soon as the high speed limit is reached.

- The **Maximum duration** timer is disabled as soon as the **Extra startup sample time** is started, allowing the full additional sample to be collected.

The Group Properties IMx Transient Tab (IMx)

The screenshot shows the 'Group Properties' dialog box with the 'IMx Transient' tab selected. The 'Transient ranges' section includes five rows: 'Overspeed' (3700 RPM), 'Normal operation (N.O.):' (3580 - 3700 RPM), 'Transient' (300 - 3580 RPM), 'Slow roll' (100 - 300 RPM), and 'Stopped' (0 - 100 RPM). To the right of these ranges is a vertical bar with five colored segments: red for 'Overspeed', green for 'Normal operation', orange for 'Transient', light blue for 'Slow roll', and dark blue for 'Stopped'. Below this, the 'Static measurement' section has 'Delta RPM' (50 RPM) and 'Delta time' (60 Second(s)). The 'Dynamic measurement' section also has 'Delta RPM' (200 RPM) and 'Delta time' (60 Second(s)). At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Figure 8 - 4.
The **Group Properties** Screen's **IMx Transient** Tab.

Options include:

Transient ranges area - Defines the transient event window. Transient data is only collected if the running speed of the machine falls within the specified range. The fields on the right are read-only, and automatically update when the fields on the left are modified. A graphical display of the speed ranges displays with different colors representing each of the transient ranges currently enabled:

Red – overspeed
Green - normal operation
Orange – transient
Pale blue - slow roll event
Blue - machine stopped

Overspeed – Specify the speed at which *Overspeed* events are initiated. These occur when the machine speed exceeds the Overspeed threshold. The machine is then shut down normally by a control system. When this occurs, a transient event collects the coast down to stopped data.

Normal operation (N.O.) – Specify the speed at which the machine is no longer in a transient state and normal operation (steady state) data collection begins.

Transient – Click to enable transient data collection. Enter the starting speed at which transient data collection begins in a run up event, or finishes in a coast down or overspeed trip event.

Slow roll – Specify the starting speed at which *Slow roll* measurements are captured. Transient events are initiated when the machine speed increases into the Transient speed range. Slow roll measurements are captured using the Normal Operation data collection schedule.

Stopped – (read-only) Specifies the speed at which the machine is considered to be stopped. Dynamic measurements in this range are discarded, but static measurements are saved.

N.O. transient capture timeout – Specifies a transient capture timeout after the machine has reached a steady state. Transient data collection will terminate when the specified time after the steady state is reached.

Maximum transient event time – Specifies a transient data collection timeout. Transient data collection will terminate when either the machine speed reaches the defined **Low** or **High speed** limit, or the timeout is reached. Enter a timeout between 1 and 60 **Second(s)**, **Minute(s)**, or **Hour(s)**.

Important

If data collection times out on the IMx before the speed limit is reached, a new transient event will not be triggered until the running speed falls below the low speed limit (into slow roll or stopped) or above the high speed limit (into Normal Operation State). Further transient readings are discarded until machine speed returns to either transient or overspeed, and a new transient event is captured.

Static measurement area - Allows definition of data acquisition triggers for overall data, gap and amplitude + phase data, based on changes in speed and/or time.

Delta RPM - Enable to trigger data acquisition at the speed interval specified in the adjacent **RPM** field.

Delta Time – Enable to trigger data acquisition at the specified time interval. Enter the time interval in **Second(s)**, **Minute(s)**, or **Hour(s)**.

Dynamic measurement area – Allows definition of data acquisition triggers for dynamic data (waveform or FFT), based on changes in speed and/or time.

Delta RPM – Enable to trigger data acquisition at the speed interval specified in the adjacent **RPM** field.

Delta time – Enable to trigger data acquisition at the specified time interval. Enter the time interval in **Second(s)**, **Minute(s)**, or **Hour(s)**.

- Dynamic data acquisition takes considerably more time than overall data collection. Be aware that during this time, no overall measurement data is collected.

Building the Transient Hierarchy

Once the transient group has been created, you can use drag and drop or copy and paste operations to copy Groups and POINTs from a Hierarchy or Workspace window into the new transient window to create the new hierarchy list.

DMX Transient Hierarchy Considerations

The following should be kept in mind when building a transient hierarchy:

- Transient POINTs are identified in the hierarchy with a **T** following the channel name (e.g., Channel1T.RMS or Channel1T.Order).
- Transient data POINTs are processed separately from trend POINTs (i.e., Processed Channel POINTs). Using both trend and transient data in your hierarchy requires *both* processing loops to be considered during data collection, impacting data acquisition speed. It is highly recommended for fast transient events to only use transient measurement POINTs. If you require a particular trend measurement in your transient analysis, consider duplicating the configuration in Transient POINT setup. This provides the same data, without slowing down data collection.
- FFT processing on the DMx is suspended during a transient event. If you do include trend data in your transient hierarchy, it is not recommended that you include POINTs set to save data as FFT. (If you select POINTs set to save FFT and Time, the FFT will be processed using the time waveform data.)
- You may not assign POINTs from a single IMx / DMx machine to multiple transient groups.
- DMx hardware setup allows the speed channel of one DMx module to be physically connected to another DMx module using an assigned opto-output (speed out) and Logic input (speed input) on the other module. (i.e., You may “daisy chain” multiple DMx modules on one physical machine.) Since separate “DMx machines” in @ptitude Analyst are not necessarily on separate physical machines, you may assign POINTs from multiple DMx machines to the same transient group. ***This should only be done if the DMx devices share the same speed reference.***

IMx Transient Hierarchy Considerations

The following should be kept in mind when building a transient hierarchy:

- It is possible to define multiple transient groups on a single IMx. Each transient must have its own tachometer, and each channel must only be used in a single transient group.
- It is not possible to define a transient group that spans multiple IMx units. If this is required, create multiple transients, each containing channels from a single IMx.
- It is possible to mix dynamic channels and IMx-M protection channels in a single IMx transient group.

Transferring DMx Transient Groups to @ptitude Analyst Monitor

Once transient groups have been completely configured (including building the hierarchy), you must transfer them to SKF @ptitude Analyst Monitor. You must also retransfer a group if changes have been made to an existing transient hierarchy, such as modifying the group settings or adding or removing POINTs.

- If you disable a group, it is automatically communicated to Monitor. You do not need to transfer the change.

Transferring DMx Transient Groups

- Select **DMx Transient** from the **Transfer** menu's **DMx** sub-menu. The **DMx Transient** screen displays.

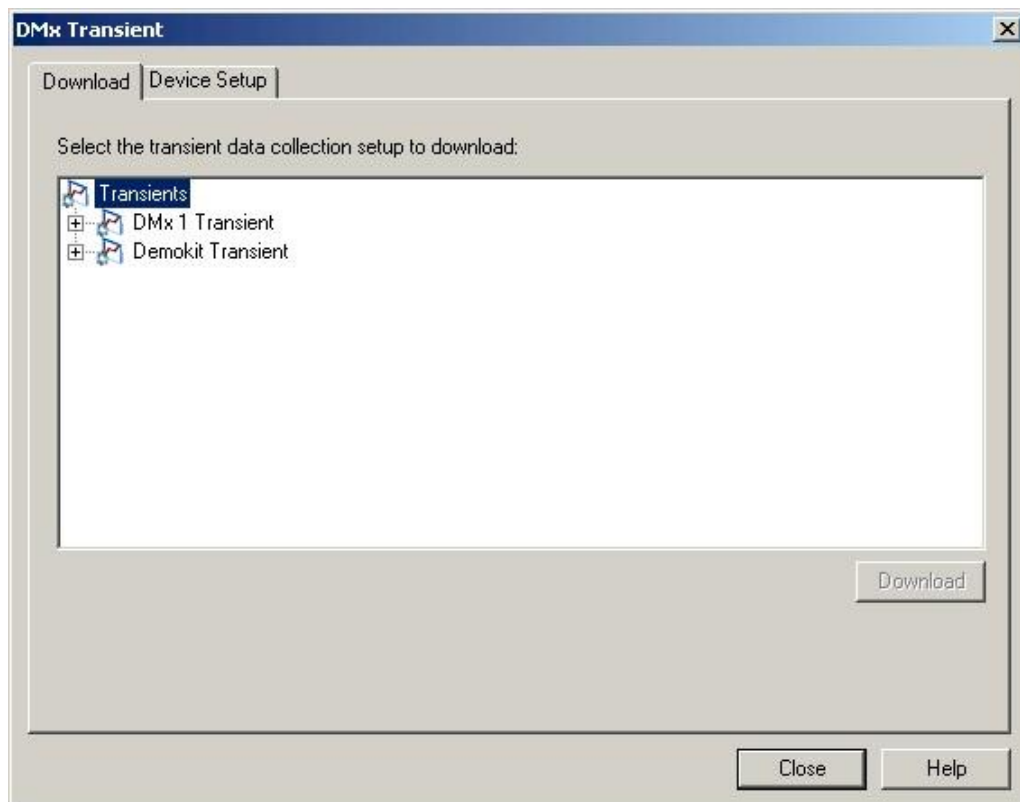


Figure 8 - 5.
The **DMx Transient** Screen.

- Highlight the group you would like to download to Monitor and click **Download**.
- Click **OK** at the download confirmation message.
- If you have multiple transient groups, repeat these steps for each group.
 - Only enabled Transient Groups are displayed in the **DMx Transient** Screen.

Transient Data Collection

Once the hierarchy setup is complete and transient groups have been downloaded, Monitor starts monitoring your machine for transient events, based on the machine speed range established for the group.

- For DMx transient data, the machine running speed is checked using the schedule specified in the **Buffer Update Rate** setting on the **DMx Settings** screen's **Host** tab.

When a change in machine speed triggers a transient event, normal data collection for all POINTs under any machine included in the affected transient hierarchy is temporarily suspended. (This does not impact data collection for POINTs on other machines.) In its place, data collection commences using the transient group parameters.

- During this time, measurements are written to the transient hierarchy, rather than the main @ptitude Analyst hierarchy.

Monitor creates a measurement record in the transient window hierarchy for each POINT under the transient group that triggered the event. As the transient event proceeds, measurements are captured at the specified delta speed and/or delta time, based on your transient group settings.

The entire data set for the transient event is included in the single transient data record under each POINT. While the transient event is still active (i.e., transient data collection is still occurring), the start and end times of the transient data set record are equal.

During the transient event, you are able to view a Live Data display of the transient data as it is collected. Data is updated in the display using the transient data collection schedule. Live Data display is temporarily suspended for any POINTs that are not in the affected transient hierarchy.

When the transient event is complete, the end time of the transient data set record updates to reflect the actual stop date and time of the event. The transient data set record is also updated to indicate whether the event was a start-up or a coast-down.

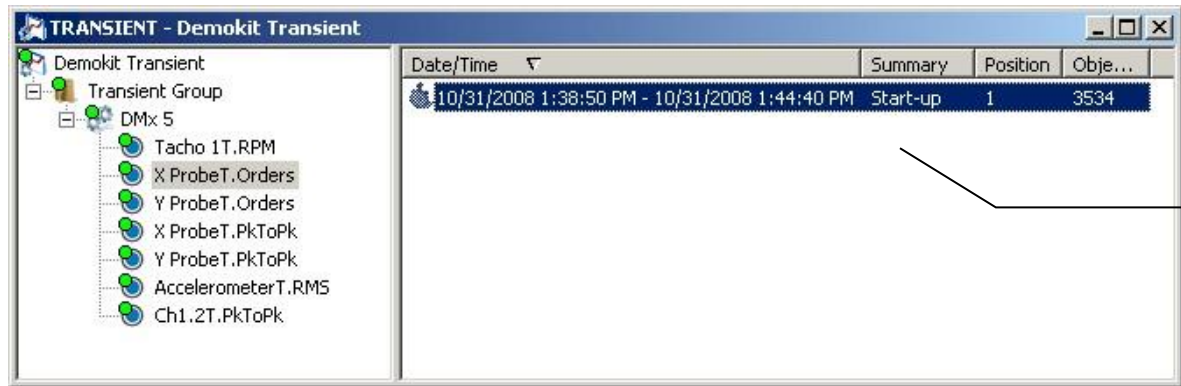


Figure 8 - 6.
Sample Transient Start-up Record.

- ① Transient data set for a start-up event.

Additional information about the transient data set is available on the **Transient Measurement Properties** dialog.

To view transient measurement properties:

- In the transient window, navigate to the desired transient data POINT.
- Highlight the transient data set in the right-hand pane.
- Select **Edit / Properties**, or click the Properties icon on the toolbar. The **Transient Measurement Properties** dialog displays.

Transient Measurement Properties

Transient

Type: Start-up

measurements: 119

Start date/time: 10/31/2008 2:34:08 PM

End date/time: 10/31/2008 2:48:50 PM

Data range

Speed range: 100 - 4950 RPM

Max duration: 30 Minute(s)

Extra sample time: 3 Minute(s)

Overall data sample

Delta speed: 60 RPM

Delta time: 30 Second(s)

Dynamic data sample

Delta speed: 120 RPM

Delta time: 30 Second(s)

☐ Current baseline

OK Cancel Help

Figure 8 - 7.
The **Transient Measurement Properties** Dialog.

This dialog displays details concerning the transient data record, an overview of the settings that were used in data collection, and provides an option to use this event as a baseline measurement.

Options include:

Type – Whether it was a start up or coast down event.

measurements – The number of individual measurements captured during the event.

Start and End date/time – The time range when the transient event occurred.

Data Range, Overall data sample, Dynamic data sample – These sections display the transient group properties that were set at the time the data was captured.

Current baseline – Sets the current data set as the baseline for the corresponding type of event (start-up or coast down).

- The baseline applies to this POINT only. If the same transient event is recorded under multiple POINTs in the transient hierarchy, you will need to set the baseline for each POINT.
- The baseline is used in reports to provide the percentage of change between the selected transient data set and the baseline.

Viewing Transient Data Plots

Depending on the type of POINT selected in the transient hierarchy, one or more of the following standard plot types are available when viewing a transient data set:

Trend
Spectrum
Time
Spectrum Waterfall
Polar Vector
Mag/Phase
Orbit
Shaft Centerline
Mag/Speed

- Plots that display a single measurement (e.g., spectrum, time, orbit) use the measurement with the highest amplitude peak in the transient data set.

In addition, there is a selection of plots that specifically apply to transient data.

- Although these plots are also available for non-transient data, they are primarily designed to reflect impact on vibration signal caused by changes in speed during a transient event.

Bode – Plots signal magnitude and phase as a function of running speed.

Nyquist – Plots the movement of the machine shaft within the (sleeve) bearing housing during the start-up or coast-down of the machine.

Cascade – Plots collected spectra against running speed.

Topology – A top-down view of a cascade or waterfall plot, where color intensity is used to visualize the spectral peaks.

Bode/Nyquist – A combined Bode and Nyquist plot.

Speed/Bode/Spectrum – Combines a speed trend, Bode, and spectrum plot.

Speed/Bode/Orbit/Spectrum – Combines a speed trend, Bode, orbit, and spectrum plot.

Bode Plot

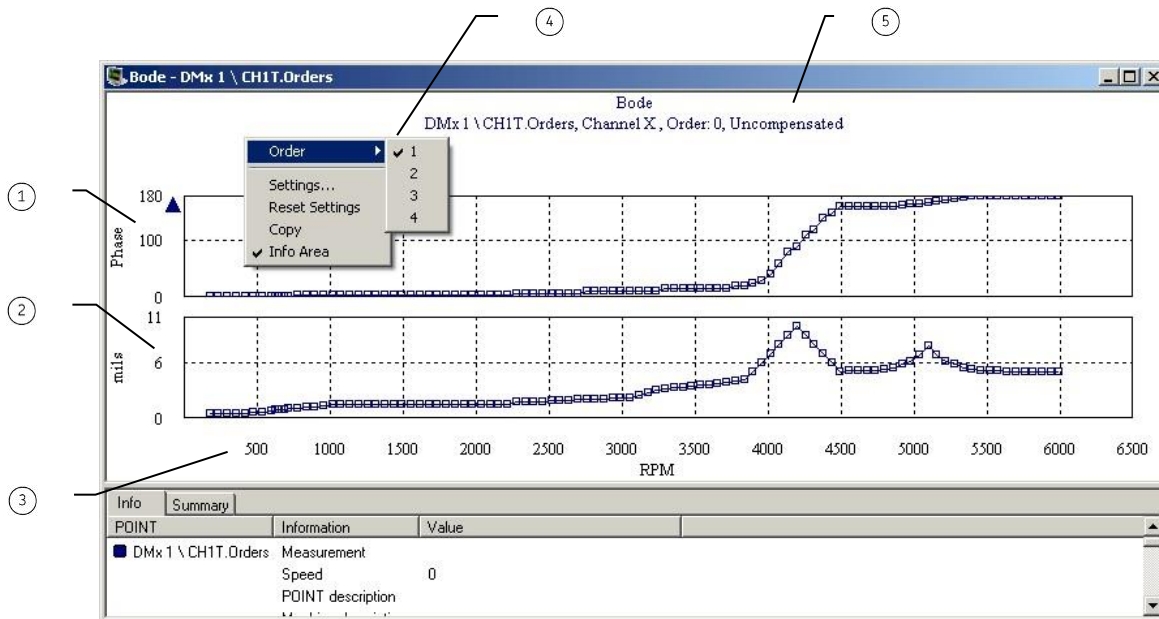


Figure 8 - 8.
Bode Plot.

- ① phase angle
- ② signal magnitude
- ③ X-axis = machine running speed
- ④ right click menu toggles the order being viewed
- ⑤ vector compensation status

The Bode graph plots signal magnitude and phase as a function of running speed. Bode plots are available for order channel (i.e., **Freq. type** = **Order Track** in POINT Properties) and dual channel POINTs with phase enabled.

You may toggle the order being displayed using the right click menu.

- The phase angle scale is adjusted based on your **Angular Axis View** preference setting.

Bode Plot Settings

To access the Bode Plot Settings dialog:

- With a Bode plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.
- The **Settings** dialog is also available from the Bode plot's right-click context menu.

Bode Plot Settings fields include:

Speed Scale – Specify the speed range that should be represented on the X-axis of the plot.

Magnitude scale – Specify the scaling for the Y-axis of the magnitude plot (bottom section).

Autoscale - Enabling **Autoscale** automatically scales the initial amplitude axis so it is approximately 120% of the largest amplitude. Disabling **Autoscale** displays the same full scale vertical axis used when data was recorded.

% Full scale - When enabled, the amplitude axis displays as a % value of the POINT's full scale value. Use % Full Scale to compare measurements that do not have the same units or the same Full Scale value.

- If you do not select **Autoscale** or **% Full Scale**, you must enter values to determine the plot's magnitude scale (Y-axis scaling).

Mag min / max - Enter the minimum and maximum magnitude scale values in the designated text boxes.

Linear / Logarithmic - Select **Linear** scaling to space out data equally. Select **Logarithmic** scaling to emphasize lower values.

Phase scale - Specify the scaling for the Y-axis of the phase plot (top section).

View (Wrapping or Rolling) - If the phase angle exceeds 360, determines whether the data should wrap (return to 0) or roll (continue past 360). Choose **Wrapping** to have the data line beyond the phase axis range wrap around. Choose **Rolling** to have the phase axis scale extend to keep the data line continuous.

Phase min / max - Specify the phase angle range that should be represented on the plot. Enter a value between -180 and 360.

Vector compensation - Allows you to filter out known magnitude and phase angle values that represent inherent impurities in the shaft. Enable to allow the plot to compensate based on the vector compensation settings in POINT Properties.

- Press **F2** on your keyboard when viewing the plot to toggle vector compensation on or off.

Order - Specify the order that is displayed on the plot (1 - 4).

Damping Cursor

Use a damping cursor on a Bode plot to display side bands of three decibels to the left and right of the cursor position, and the calculated Q-factor (i.e., the rate of energy dissipation relative to the oscillation frequency; a higher Q factor indicates a lower rate of dissipation).

To display a damping cursor overlay:

- With a Bode plot displayed, select the **View** menu's **Plot / Plot Overlays / Damping Cursor** option, or use the damping cursor toolbar button.

Feedback Area - Displays amplitude, speed, Q-factor, and date/time.

Information Area - Specific information displays on the **Bode Damping** tab. Tab information includes POINT name, cursor color, date/time, amplitude, speed, and Q-factor.

Right-Click Context Menu - Right-click on the damping cursor overlay anchor to reveal its context menu. Available options include:

Next trace – Toggles between traces when the plot is displaying more than one trace.

Remove – Removes overlay from the plot.

Keyboard Support – Press **Enter** to toggle to next trace. Press **Delete** to remove. Left and right arrow keys move one measurement in the transient data set at a time.

Available Preferences

Color – Cursor is the color of the next available cursor (as configured in **Cursor / Color Preferences** in the **Preferences** dialog).

Display Status – Display status (on or off) is configured in the **Damping Cursor / Plot Preferences** in the **Preferences** dialog.

- The default status is on.

Nyquist Plot

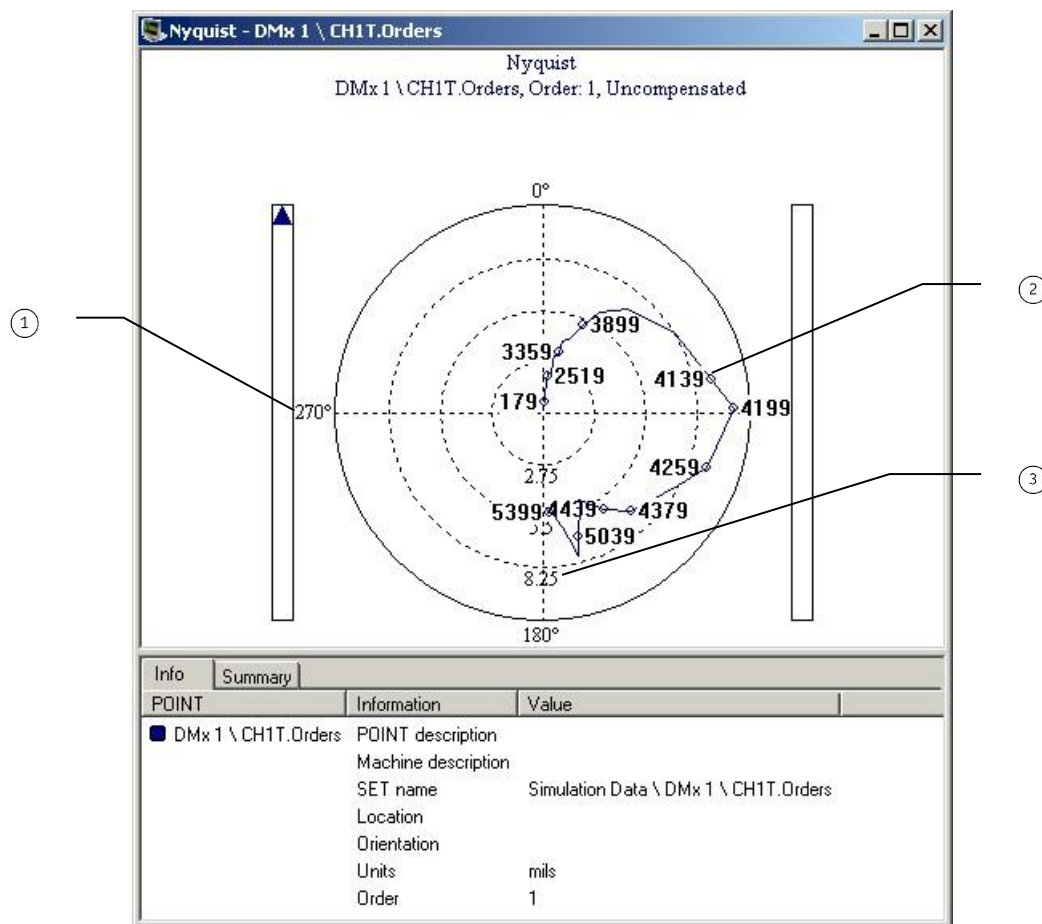


Figure 8 - 9.
Nyquist Plot.

- ① phase angle
- ② speed labels
- ③ amplitude

A Nyquist plot is a Polar plot showing the “path” of the vector against speed. This plot is a good way of observing the change in amplitude and phase angle during a transient event. When a critical speed is traversed, there is a 180° shift in phase angle. A major change in the Nyquist “profile” from a normal baseline may indicate a change in the resonant frequency (critical speed), which is an indicator of a potential structural problem. Nyquist plots are available for order channel POINTs (i.e., **Freq. type = Order Track** in POINT Properties) and dual channel POINTs with phase enabled.

The plot’s right click menu allows you to toggle the order being displayed and turn speed labels on or off using the **Show Amp Labels** option.

- The phase angle is adjusted based on your **Angular Axis View** preference setting.

Nyquist Plot Settings

To access the Nyquist Plot Settings dialog:

- With a Nyquist plot displayed, select the **View** menu’s **Plot / Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the Nyquist plot’s right-click context menu.

Nyquist Plot Settings fields include:

Magnitude scale

Autoscale – Enabling **Autoscale** automatically scales the initial amplitude so it is approximately 120% of the largest amplitude. Disabling **Autoscale** allows you to specify the plot’s maximum magnitude scale.

Mag. Max – If **Autoscale** is disabled, enter the maximum amplitude that should be displayed in the plot.

Vector compensation – Allows you to filter out known magnitude and phase angle values that represent inherent impurities in the shaft. Enable to allow the plot to compensate based on the vector compensation settings in POINT Properties.

- Press **F2** on your keyboard when viewing the plot to toggle vector compensation on or off.

Order – Specify the order that is displayed on the plot (1 – 4).

Tag – Turn speed labels on (**Speed**) or off (**<None>**).

Cascade Plot

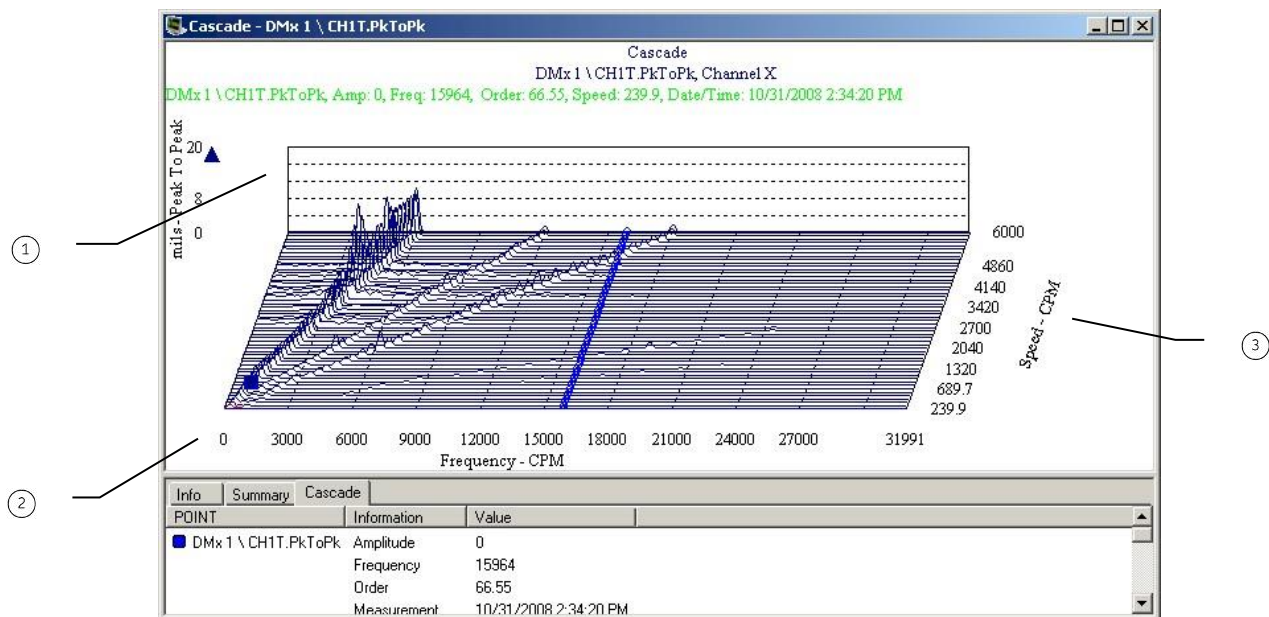


Figure 8 - 10.
Cascade Plot.

- ① amplitude
- ② frequency
- ③ machine running speed

The Cascade plot is similar to the Waterfall plot, but instead of plotting collected spectra against time, the data is plotted against running speed on the Z-axis.

Cascade Plot Settings

To access the Cascade Plot Settings dialog:

- With a Cascade plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the Cascade plot's right-click context menu.

Cascade Plot Settings fields include:

Speed scale - Specify the scaling for the plot's Z-axis (speed).

Min / Max – Enter the minimum and maximum machine speed that should be represented on the plot.

Limit measurement of the same speed – Specify how many measurements should be represented at each speed interval. This is useful if data was captured using Delta Time, potentially resulting in multiple measurements at the same speed.

Amplitude scale - Specify the scaling for the plot's Y-axis (amplitude).

Min / Max - Enter the minimum and maximum amplitude scale values in the designated text boxes.

Linear / Logarithmic - Select **Linear** scaling to space out data equally on the Y-axis. Select **Logarithmic** scaling to emphasize lower values.

Frequency scale - Specify the scaling for the plot's X-axis (frequency).

- The X-axis may display frequencies or orders, depends on your Plot Preferences **X-Axis units** setting.

Min / Max - Enter the minimum and maximum frequency scale values in the designated text boxes.

Linear / Logarithmic - Select **Linear** scaling to space out data equally on the X-axis. Select **Logarithmic** scaling to emphasize lower values.

Topology Plot

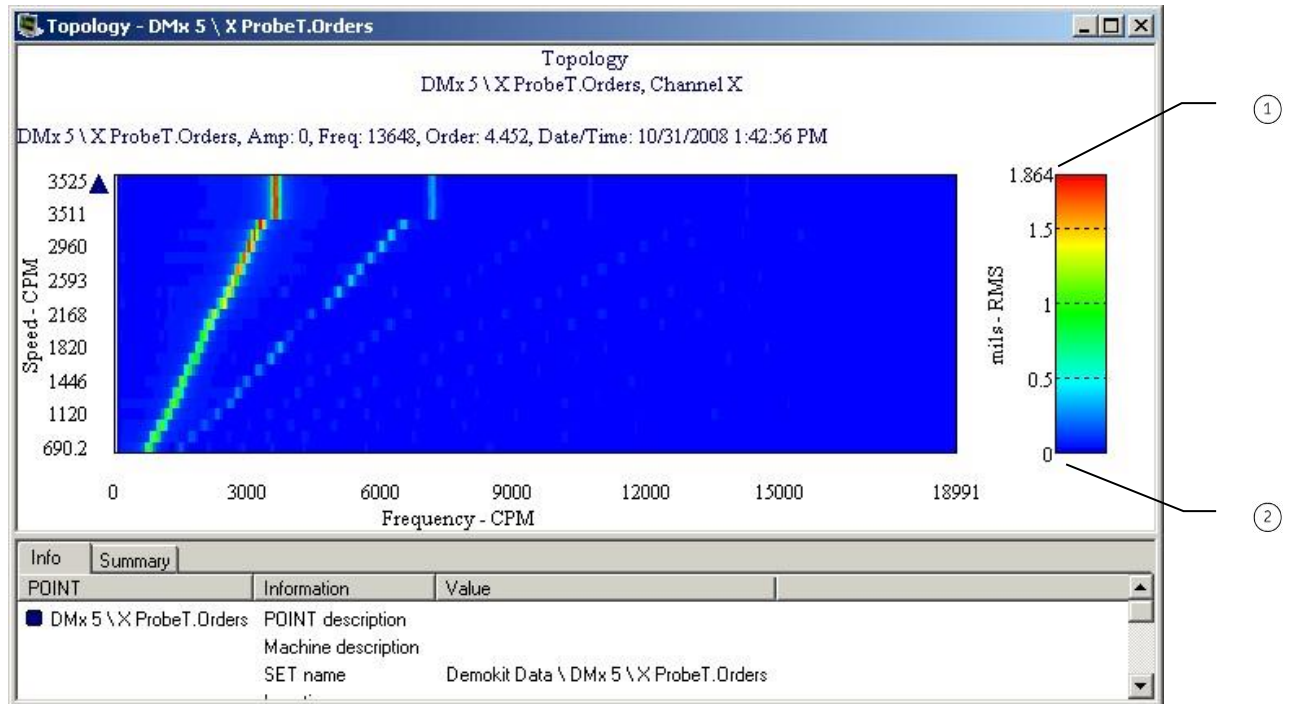


Figure 8 - 11.
Topology Plot.

- ① highest amplitude and associated color indication
- ② lowest amplitude and associated color indication

The Topology plot is similar to a Cascade or Waterfall plot, but provides a top-down view of the data using color intensity to visualize the spectral peaks.

Topology Plot Settings

To access the Topology Plot Settings dialog:

- With a Topology plot displayed, select the **View** menu's **Plot / Settings** option, or use the settings toolbar button.
 - The **Settings** dialog is also available from the Topology plot's right-click context menu.

Topology Plot Settings fields include:

X-scale – Specify the scaling for the plot's X-axis.

- The X-axis may display frequencies or orders, depends on your Plot Preferences **X-Axis units** setting.

Scale min / max – Enter the minimum and maximum frequency or order scale values in the designated text boxes.

Linear / Logarithmic – Select **Linear** scaling to space out data equally on the X-axis. Select **Logarithmic** scaling to emphasize lower values.

Y-Scale – Specify the scaling for the plot's Y-axis.

Axis – Specify whether to show the plot over **Speed** (Cascade plot) or **Time** (Waterfall plot).

Date min / max – If Time is selected for the axis, enter the minimum and maximum date range that should be reflected on the plot.

- This setting primarily applies to non-transient data.

Scale min / max – If the axis is set to **Speed**, enter the minimum and maximum machine speed that should be represented on the plot.

If the axis is set to **Time**, enter the time range that should be included.

Limit measurement of the same speed – If the axis is set to **Speed**, specify how many measurements should be represented at each speed interval. This is useful if data was captured using Delta Time, potentially resulting in multiple measurements at the same speed.

Magnitude scale – Specify the scaling and display settings for the spectral peaks.

Mag min / max – Specify the colors that should represent the minimum and maximum amplitudes for spectral peaks on the plot.

Linear / Logarithmic – Select **Linear** scaling to space out data equally on the Y-axis. Select **Logarithmic** scaling to emphasize lower values.

Bode/Nyquist Plot

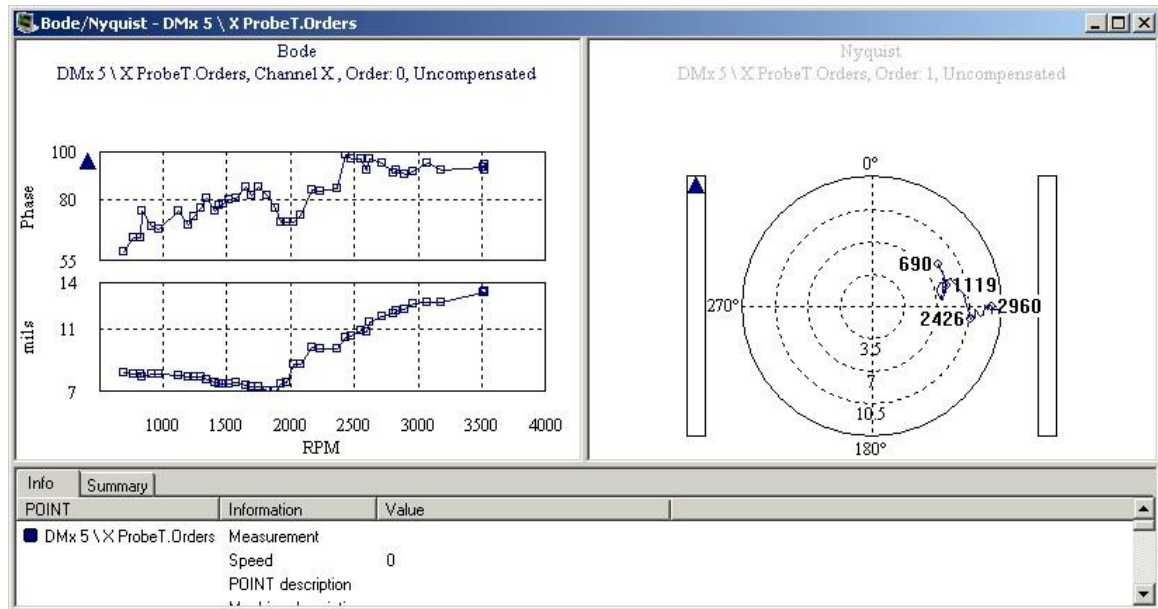


Figure 8 - 12.
Bode/Nyquist Combined Plot.

This plot combines a Bode plot and a Nyquist plot in one view. You may toggle between the plots by clicking on them or using the Tab key on your keyboard. The non-selected plot's title information area appears dimmed. When you move your cursor on the Bode plot, the cursor on the Nyquist plot automatically moves to the corresponding measurement.

Settings for each plot type may be configured individually and are identical to the single plot options.

- This plot is not available for live data display.

Speed/Bode/Spectrum Plot

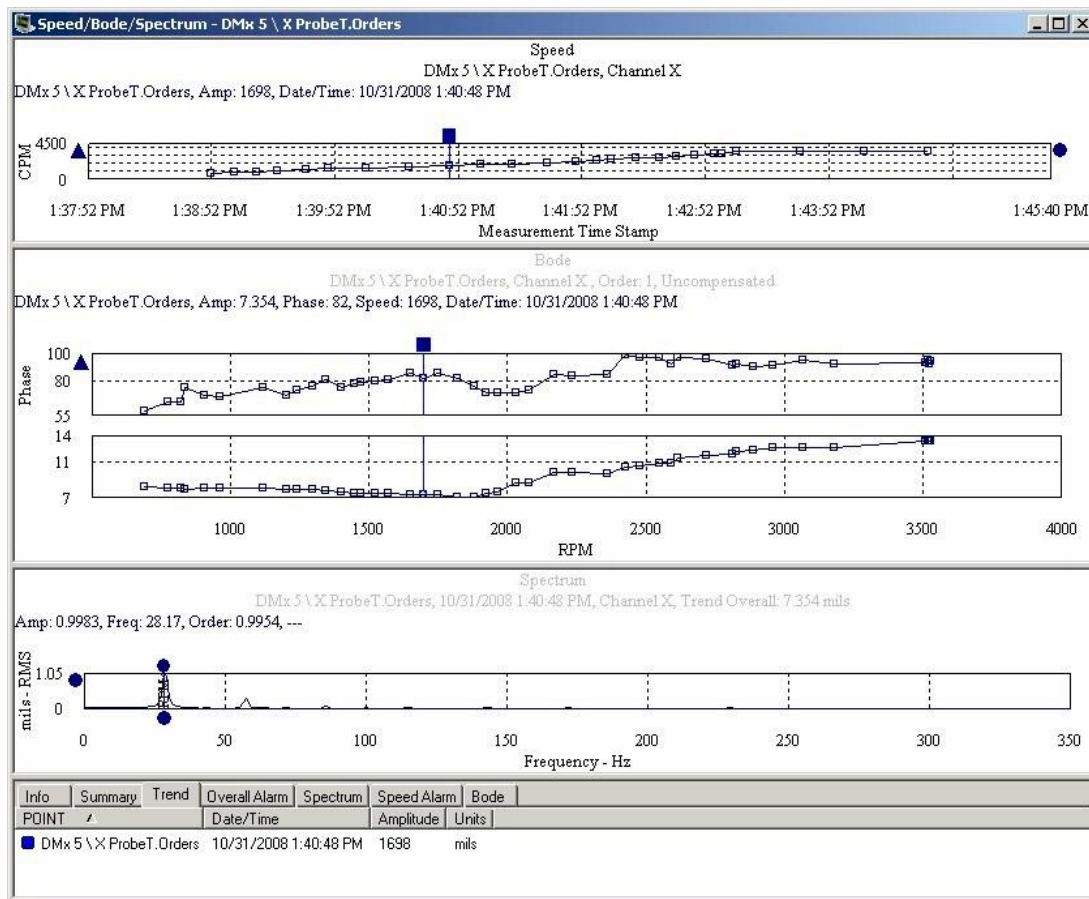


Figure 8 - 13.
Speed/Bode/Spectrum Combined Plot.

This plot combines a Speed Trend, Bode, and Spectrum plot. It is available for order channel POINTs (i.e., **Freq. type = Order Track** in POINT Properties) and dual channel POINTs with phase enabled. When you move your single cursor overlay on the Speed Trend plot, the cursor on the Bode plot automatically moves to the corresponding measurement and the Spectrum plot updates to display the corresponding spectrum.

If you are viewing multiple channels on the plot, the plots default to Channel X. For help with viewing data from other channels, refer to **Multiple Measurements and Channels in Plots** in Chapter 5, **Displaying Graphic Plots**.

You may toggle between the plots by clicking on them. The non-selected plots' title information areas appear dimmed. Cursor movement impacts the active plot.

Settings for each plot type may be configured individually and are identical to the single plot options.

- This plot is not available for live data display.

Speed/Bode/Orbit/Spectrum Plot

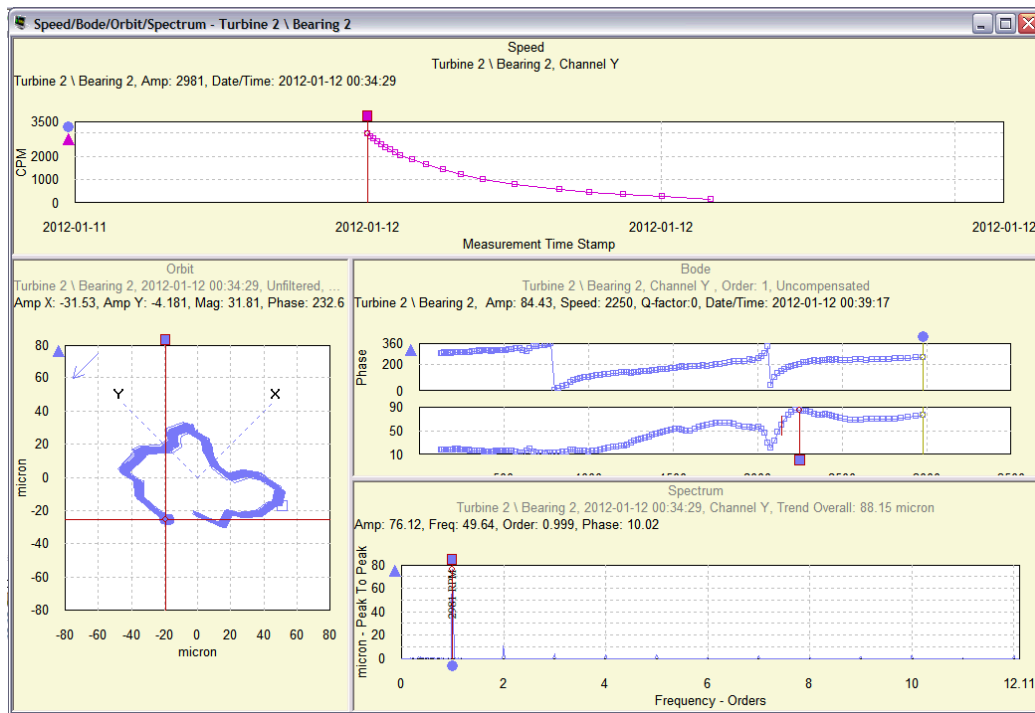


Figure 8 - 14.
Speed/Bode/Orbit/Spectrum Combined Plot.

This plot combines a Speed Trend, Bode, Orbit, and Spectrum plot. It is available for dual-channel POINTs with FFT, Time, and Phase enabled. When you move your single cursor overlay on the Speed Trend plot, the Bode, Orbit, and Spectrum plots update to display the corresponding data.

If you are viewing multiple channels on the plot, the plots default to Channel X. For help with viewing data from other channels, refer to **Multiple Measurements and Channels in Plots** in **Chapter 5, Displaying Graphic Plots**.

You may toggle between the plots by clicking on them. The non-selected plots' title information areas appear dimmed. Cursor movement impacts the active plot.

Settings for each plot type may be configured individually and are identical to the single plot options.

- This plot is not available for live data display.

Appendix A

SKF @ptitude Analyst Toolbars

Toolbar Tools

@ptitude Analyst's toolbars and toolbar button assignments are described below. You can enable any or all of the available buttons by using the **Custom Toolbar** dialog discussed later in this chapter.

Primary Toolbar



Hierarchy Window – open Hierarchy window. Organizes your monitored machinery measurements into a hierarchy structure consisting of Groups (which may be organizational SETs, machines, or custom groups) and measurement POINTs.



ROUTE Manager – open ROUTE dialog. A ROUTE is a measurement POINT collection sequence that is downloaded to a data acquisition device (DAD).



Workspace Manager – open Workspace dialog. A workspace organizes specific Groups into one location for easy comparison and analysis.



WMx Device – open WMx Device dialog.



Transient Manager – open Transient dialog to manage transient windows and data. The Transient Data feature is used to collect and analyze run up / coast down data, intermittent events, and transient vibration signals from non steady state (variable speed) machinery. *Note: Only the IMx and DMx DADs support transient data collection.*



Alarm Window – open Alarms window which displays all POINTs in alarm in the selected view.



Report Setup – open Reports dialog.



System Information – open System Information view to see the Event Log and Online Data



Microlog Inspector Status – open Microlog Inspector Device Status window.



Properties – open Properties dialog for the active hierarchy item (could be Group Properties or POINT Properties)



Print – print window contents (also print to file).



Exit – exit the application. A confirmation message displays before exiting.

Hierarchy View Toolbar



Alarm Details – open the Alarm Details view.



Apply Filter – open Apply Filter dialog. When a filter is applied, the resulting items display in a new Workspace window.



Apply Template – open the Apply Template dialog to select a template to apply to the hierarchy.

Navigation Toolbar



Auto Link – link any open Hierarchy, Workspace, ROUTE, Transient, Template, or Alarms window (source windows) to any open Alarm Details or Plot window (target windows). With Auto Link enabled, selections in one of the source type windows automatically affect all open target type windows.

For example, suppose you have a Hierarchy window open (source type window), select a POINT, and display its spectrum (target type window). With Auto Link enabled, when you select a different POINT in the Hierarchy window, the plot window automatically updates to display the newly selected POINT's spectrum.



Previous POINT – move focus to the previous POINT in the hierarchy.



Next POINT – move focus to the next POINT in the hierarchy.



Previous Measurement – move focus to the previous measurement.



Next Measurement – move focus to the next measurement.

View Icons Toolbar



Large Icons – display measurements as large icons.



Small Icons – display measurements as small icons.



Simple List Icons – display measurements as a simple list.



Detailed List Icons – display measurements as a detailed list.

Plots Toolbar



Trend Plot – view a POINT's most recent reading in comparison with its previous readings and its alarm set up. See how the POINT is “trending” over time to detect gradual changes in process conditions.



Spectrum Plot – view measured vibration signals with respect to frequency. An FFT spectrum plot displays vibration amplitudes at various component frequencies. [stacked or combined]



Time Plot – view a short time sample of a raw vibration signal with vibration amplitude plotted over the time scale. Current time plots are compared to past time plots to analyze changes in vibration amplitude or frequency.



Spectrum Waterfall Plot – view three-dimensional waterfall plots of POINT's historical spectra collected over time.



Cascade Plot – view plots of collected spectra against running speed on the Z-axis. The Cascade plot is similar to the Waterfall plot, but instead of plotting collected spectra against time, the data is plotted against running speed on the Z-axis.



Topology Plot – view a top-down view of a cascade or waterfall plot using color intensity to visualize the spectral peaks.



Polar Vector Plot – shows vibration amplitude and phase. The phase angle is the angle the shaft travels from the start of a triggering event to when the point at which the sensor experiences maximum positive force. This relationship provides valuable

information on shaft orbit and shaft position and is used for analysis, balancing, and shaft orbital analysis.



Mag/Phase Plot – view trends plotting the amplitude (top) and phase / angle (bottom) aligned by the measurement date. Mag / Phase trends may be used to determine if a machine's mechanics are changing by analyzing the shifting in phase.



Orbit Plot – view the dynamic motion of the center of a rotating shaft with signals from two perpendicularly mounted transducers.



MCD Plot – view stacked trend plots for the three values of an MCD measurement: velocity, enveloped acceleration, and temperature.



SCL Plot – view a trend of the shaft's average centerline for Orbit POINTs. Shaft centerline plots can be used to show the movement of the shaft within the bearing.



Inspection Plot – view inspection measurement results for up to six points simultaneously. Enables viewing inspection history over time.



BOV or Gap Trend – view the trend of a sensor's bias output voltage value for IMx POINTs that have channels with the Check sensor ok status option enabled. The BOV limit overlay (blue horizontal lines) indicate the specified BOV limits.



Mag/Speed Plot – view trends plotting the amplitude (top) and speed (bottom) aligned by the measurement date.



Bode Plot – plots signal magnitude and phase as a function of running speed.



Nyquist Plot – plots the movement of the machine shaft within the (sleeve) bearing housing during the start-up or coast-down of the machine.



Live Bars – displays live overall values in bar graph format for IMx and DMx POINTs. Live bar data is useful when checking or replacing a sensor.



All Plots – open the All Plots dialog to select the plot type to display from all available plots, including combination plots, in addition to the plot types commonly represented with toolbar buttons.



HAL Trend Plot – view the trend for a POINT that has a defined Frequency set plus FFT data measurements.

Combination Plots



Spectrum/HAL Trend –view the Spectrum and HAL Trend plots together for a POINT with associated frequencies.



Contribution/Profile – displays an overview of different frequencies' contributions to overall vibration within a POINT.












Band Trend - combine the spectrum and available band trends for the selected POINT. Analyze the energy within the band to closely monitor that particular frequency range.











Bode/Nyquist – view a Bode and Nyquist plot together. (For transient data analysis.)



Extracted Band – display a waterfall and extracted band plot. The energy of the frequency within the band across the spectrum displays.

-  **Extracted Trend** – display a trend plot of spectrum amplitudes at a frequency. A waterfall plot shows which spectra are to be used. The single cursor in the waterfall controls which frequency to plot in the trend. The waterfall plot is the primary plot.
-  **Mag/Speed/Spectrum** – view a POINT's mag / speed trend plot and a spectrum plot. The two plots display in two different panels with the mag / speed panel as the primary panel.
-  **Mag/Speed/Spectrum/Time** – view a POINT's mag / speed plot, spectrum plot and time plot. The three plots display in three different panels.
-  **Mag/Speed/Time** – view a POINT's mag / speed trend plot and a time plot. The two plots display in two different panels with the mag / speed panel as the primary panel.
-  **Speed/Bode/Orbit/Spectrum** – combines a speed trend, Bode, orbit and spectrum plot. It is available for dual-channel POINTs with FFT, Time, and Phase enabled. (For transient data analysis.)
-  **Speed/Bode/Spectrum** – combines a speed trend, Bode and spectrum plot. It is available for order channel POINTs (that is, Freq. type = Order Track in POINT Properties) and dual channel POINTs with phase enabled. (For transient data analysis.)
-  **Trend/Spectrum** – view both a trend plot and a spectrum plot for a trend record indicated by the single cursor position.
-  **Trend/Spectrum/Time** – display a POINT's trend plot, spectrum plot, and time waveform plot. The three plots display in three different panels with the trend plot as the primary panel.
-  **Trend/Time** – view both a trend plot and a time waveform plot for a trend record indicated by the single cursor (if available).

Plot Tools Toolbar

-  **Plot Settings** – open Plot Settings dialog for the active plot.
-  **Information Area** – open information area beneath the active plot.
-  **Set Speed** – set the cursor position to correspond with the spectrum's running speed.
-  **Set Speed (Multiple)** – set the same measurement speed for multiple FFT measurements
-  **Activate Zoom** – Click to activate the zoom feature, then click and drag across the area of the plot which you would like to zoom. The plot will redraw to display the selected area. When using a mouse scroll wheel, position your cursor over the area of the plot which you would like to zoom. While holding the Ctrl key, roll the mouse scroll wheel up or down. Rolling up causes the plot to zoom in, while rolling down causes the plot to zoom out.
-  **Zoom Out** – zoom out one level.
-  **Live Data** – initiates live data mode when a single POINT is selected. The active display updates as new data is collected by its on-line device. Previous spectra and time waveform plots are overwritten by updated spectra / time waveforms.
-  **Play Sound Byte** – launches the utility providing various playback options to listen to sound data waveform through your computer's speakers or connected earphones.

Overlays Toolbar



Overlay Settings – open the Overlay Settings dialog for the selected overlay.



Single Cursor – display single cursor. Use a single cursor to view individual measurement data on the trend plot by moving the cursor to various measurement records. Use a single cursor on a spectrum plot to display the amplitude for the frequency of the cursor's current placement.



Harmonic Cursor – display harmonic cursor to view multiples of the current frequency. Opens Harmonic Cursor tab in the plot information area to show details on potential harmonics using SKF's Harmonic Activity Index (HAI).



Band Cursor – display band cursor to view the frequency / time and amplitude difference (delta) between two cursor positions. Opens Spectrum Band tab in the plot information area to show details of the left and right cursor positions.



Sideband Cursor – display sideband cursor reference position with an array of five pairs of sideband markers evenly spaced on both sides. Sideband markers to the left of the center cursor are referenced with negative numbers; their associated markers to the right of the cursor are referenced with positive numbers. Opens Sideband tab in the plot information area to show details of the marker positions.



Peak Cursor – display peak cursor and label all peaks above a user-determined amplitude. Opens Peak tab in the plot information area to show details of peak position (index), amplitude, frequency, and orders.



Previous Frequency – display the previous frequency.



Frequencies – display all frequencies associated with the active plot.



Next Frequency – display the next frequency.



Display indicators for notes – active if notes are related to the plot.



Text Annotation – open Text Annotation Settings dialog.



Diagnostics – compute and display all relevant harmonic series of the current spectrum, and rank all series found according to probability. The results are shown on the Diagnostics tab in the info area below the spectrum plot. The probability is expressed as an activity index, whereby values of 1.5 and higher indicate an increasing probability of a significant harmonic pattern. [This option is only available with @ptitude Analyst CMSW 7400.]


















In addition, the fundamental frequency of each series is compared to any frequency associated with the POINT (for example, bearing defect frequencies). If a match is found, the name of this frequency is displayed next to the related harmonic pattern.




Damping Cursor – display damping cursor on a Bode plot to display side bands of three decibels to the left and right of the cursor position, and the calculated Q-factor (that is, the rate of energy dissipation relative to the oscillation frequency; a higher Q factor indicates a lower rate of dissipation).



CTA Cursor – display CTA cursor on a time plot and view a time interval's average waveform. Opens CTA Cursor tab in the plot information area to show details of label, interval, frequency, magnitude, and contribution (%).

-  MCD Cursor – display MCD cursor to view individual measurement values on the MCD plot. Opens the MCD Cursor tab in the information area to show: the POINT the cursor is currently positioned on, cursor color, acceleration / velocity / temperature values, and date / time.
-  MCD Alarm – display MCD alarm levels on the plot.
-  MCD Curve Fit – project the linear direction a trend is heading based on current data.
-  Inspection Cursor – display inspection cursor to view individual measurement data on the inspection plot by moving the cursor to various measurement values. Specific information displays on the Inspection tab: the POINT on which the cursor is currently positioned, cursor color, date / time, operator name, and inspection result.
-  Band Alarm – display band alarm levels on the plot. Band Alarms provide alert and danger alarms on both peak and spectral values within a defined frequency band.
-  Envelope Alarm – display a "total spectrum" envelope alarm for the POINT. You can select from a list of previously created envelope alarms or edit a private (unique) alarm for the current POINT.
-  HAL Alarm – display HAL (harmonic activity locator) alarm levels on the plot for a dynamic measurement POINT.
-  Overall Alarm – display the alert and danger levels designated for detection of machinery faults. The overall alarm levels are based on the measurement's "baseline" vibration level.
-  Phase Alarm – display alarm levels for phase data on a polar vector plot. Normal levels display inside small enclosed areas. Alert levels are contained within a larger enclosed area. Danger levels appear outside the enclosed area.
-  Bearing Clearance – display the bearing's clearance value (typically supplied by the manufacturer). The clearance value assumes the shaft is centered in the bearing and defines the physical distance between the shaft and the bearing, multiplied by 2.
-  BOV Limit – display the BOV limit overlay (blue horizontal lines). If a sensor's BOV value exceeds its limits, it indicates a bad sensor, and a zero overall value is stored for its vibration measurements.
-  Curve Fit – display a curve fit overlay to graphically display the projected linear direction a trend is heading based on current data.
-  Exponential Curve Fit – display a curve fit overlay to graphically represent the projected nonlinear trend based on current data.
-  Linear Speed – display the value of the linear factor multiplied by the running speed.
-  Oil Analysis – display the Oil Analysis overlay on a trend plot.
-  All Overlays – open the All Overlays dialog and select the overlays to display.
-  Protection Threshold Limits – display the threshold limits on a trend plot to graphically display the protection levels for IMx-M protection POINTs. The protection threshold limits display as red (danger) and/or yellow (alert) dashed lines.

Online Tools

-  Reset Indicators – resets the status indicators in the status bar.

Custom Toolbars

Toolbar buttons are available for each menu item and available function. By default, only toolbar buttons for commonly utilized features are active. Buttons are arranged by related functionality in separate sections of the toolbar area. You can enable any or all of the available buttons using the **Custom Toolbar** dialog.

To open the Custom Toolbar dialog:

- Select the **Customize** menu's **Toolbars** option. The **Custom Toolbar** dialog displays.

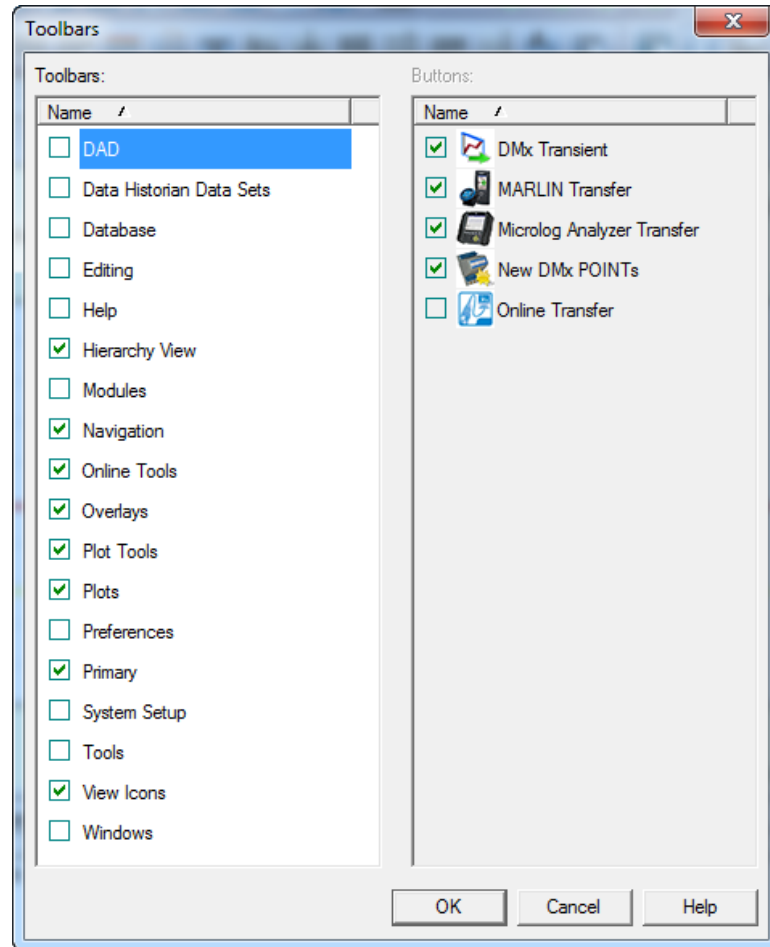


Figure A - 1.
The **Toolbars** Dialog.

The Custom **Toolbars** dialog has two main areas. The **Toolbars** area displays all available toolbars, sorted by name. All available buttons (active and non-active) for the selected toolbar display in the dialog's second area, **Buttons**.

You can configure each toolbar to display the buttons you frequently use. You may *activate* buttons that are *inactive* by default, or *inactivate* buttons that are *active* by default.

By default, the **Hierarchy View, Navigation, Overlays, Plot Views, Plots, Primary,** and **View Icons** toolbars are activated.

- Click the checkbox next to the toolbar to activate the toolbar.
- Click the checkbox next to the individual available buttons to activate the buttons for the selected toolbar.
- Click **Display toolbar titles** to display the toolbar's descriptive name on the toolbar itself for easy identification.
- Click **OK** to rebuild all toolbars incorporating your selections.
 - Custom toolbar selections are stored with your user name and automatically display for you after initial log in.

Appendix B

Event Log Redirection

Overview

Event Log redirection allows you to automatically capture or print alarm or system event information by directing the information to either a serial communications port or to a parallel printer port. Communication parameters (port, baud rate, etc.) are user selected.

When an alarm(s) is uploaded from an on-line device, or when a system event occurs (e.g., bad sensor, on-line device LAN communication failure, etc.), @ptitude Analyst formats each event as it occurs and immediately redirects the formatted output through the selected port to the connected device or printer. Printed events are formatted differently than the COM port redirected events.

Example

Following is an example of an Event Log redirected to a printer. Each line was printed as the alarm or system event occurred.

```
DTS:          10:57:00
Type:         online Alarm
Msg:          Overall (Alert) Band Peak (Danger) alarm(s) detected
Machine:      LMU POINTS
Point:        ERW (Vel)
Device:        New Device/Ch#01
Host name:     SWG-MWEBER
User name:     LMUSER
```

Figure B - 1.
Example Event Log Redirection to a Printer.

The following are the categories in each redirected event. The same data is included, regardless of whether it is redirected to a printer or a COM port.

Date / Time Setup (DTS) - 19 characters - MM / DD / YYYY HH:MM:SS

Event type - 20 characters maximum

Alarm Message (MSG) - 240 characters maximum

Machine name - 20 characters maximum

POINT name - 20 characters maximum

Device name - 250 characters maximum (contains / ch#nn at end if there is channel for the event)

Host name - 15 characters maximum

User name - 30 characters maximum

Printed events have labels for each item of data. The labels are defined in the language file. The channel abbreviation that may be included with the device name also comes from the language file. Printed lines are wrapped if they exceed 80 characters.

The format for events redirected to COM (serial) ports is as follows:

	Character Location	Character Width
DTS	1-19	19
Machine Name	21-40	20
POINT Name	42-61	20
Event Message	63-302	240
Event Type	304-323	20
Device	325-574	250
Host Name	576-590	15
User Name	592-621	30
\r	622	
\n	623	

Appendix C

Data Collection Gating

Overview

Gating is a method of controlling data collection for one POINT, called a **dependent** POINT, based on the current state of a second POINT, called the **control** POINT.

If the control POINT's conditions are met, the dependent POINT's measurement is performed. If the control POINT's conditions are not met, the dependent POINT's measurement is not performed.

- All data collection gating is performed within an on-line device. Therefore a control POINT and its dependent POINT do not need to be in the same on-line device, but must be in the same Hierarchy.

There are five types of gating:

Parametric Gating

Gating

Sensor Bias-Output-Voltage Gating

Tachometer Gating

Parametric Gating

Parametric gating is based on a measured value. Parametric gating was developed to monitor vibration under consistent running conditions. If a machine being monitored changes speed or load, its vibration level could change dramatically. This change in vibration has little correlation to machinery health. Data collected with the machine running at a consistent speed and load, however, is useful for determining the machine condition.

Parametric gating allows you to configure the data collection process so that data is collected on vibration POINTs only when the machine is in a predetermined speed and load range.

- Parametric gating works best with processes that change less frequently than once in 10 minutes. Do not use it where levels are actively varying.

Example - A winder in a steel mill operates at varying speeds. Starting from a standstill, the winder accelerates to 900 RPM, then decelerates as the rolled up product grows in diameter, and finally decelerates to a standstill. The user wants to collect vibration data at both 900 and 500 RPM. Vibration data at other speeds is not desired.

To accomplish this, the user creates two RPM POINTs. These RPM POINTs act as control POINTs. They monitor the machine speed via one of the tachometer inputs.

One RPM POINT, 900 LINE SPEED, is set to alarm if the speed is in a window between 850 and 950 RPM. The other, 500 LINE SPEED, is set to alarm between 450 and 550 RPM. The alarm window parameters define the control POINTs' criteria. Only if the control POINTs' values are within these alarm windows are the conditions met (and the dependent POINTs' measurements performed).

The user then creates the vibration POINTs (dependent POINTs). These POINTs are linked to the control POINT by selecting the appropriate RPM POINT in the parametric gating setup. This guarantees that vibration data can be trended over consistent speed conditions.

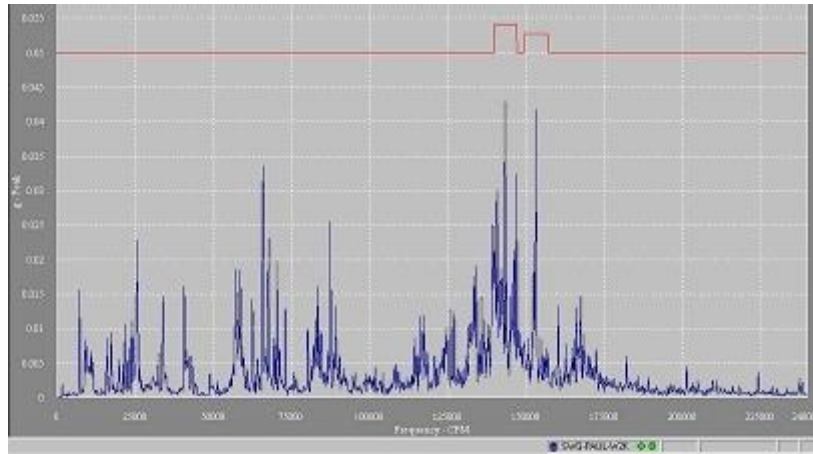


Figure C - 1.
Spectrum Envelope for a Control POINT.

The figure above shows another way to perform parametric speed gating. This method uses a spectrum envelope for a control POINT. This spectrum envelope creates an alarm as long as the running speed does not change significantly and the peak value does not become too low. While the control (RPM) POINT remains in its alarm window, conditions are considered “true” and the dependent POINT is measured and collected. If the machine is not running or not running at the correct frequency, the control POINT does not produce a spectrum alarm and the dependent POINT’s measurement is not performed.

Logic Gating

Logic gating is a type of parametric gating, therefore it can be used in the same applications. In logic gating, the control POINT is a logic POINT. A logic POINT allows signals from external control circuitry, such as programmable logic controller outputs, to make the gating decisions.

When a logic POINT takes data, it checks the state of a TTL logic input (0 to 5 volts). A value of one (HIGH) or zero (LOW) is saved. If the logic POINT is used to control another POINT, the logic POINT’s input value (HIGH or LOW) determines if data is collected on the dependent POINT. You can specify which state, high or low, will be the triggering or **Active State**.

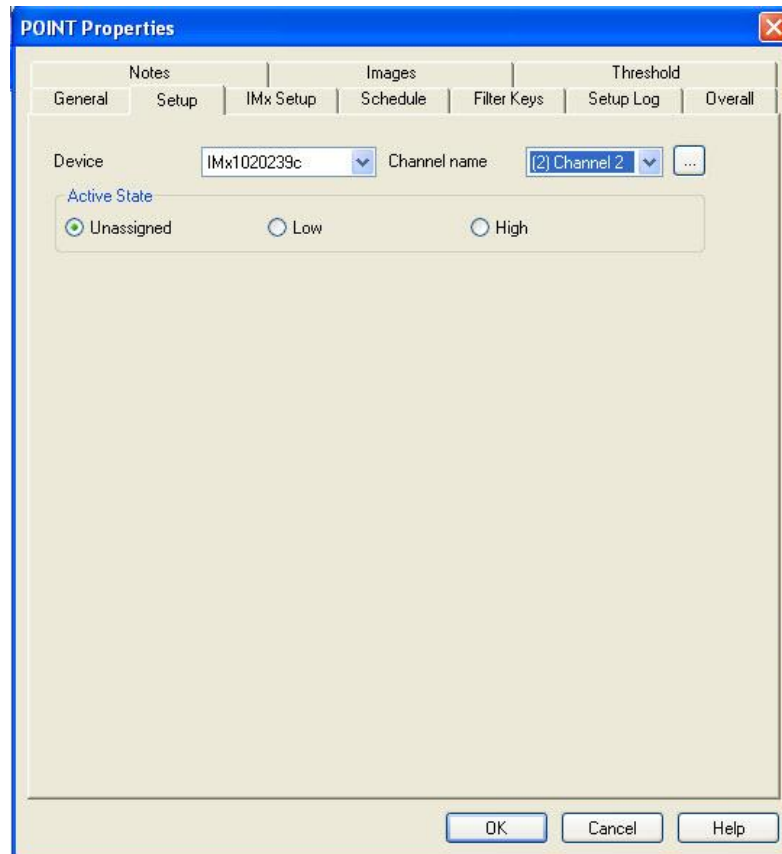


Figure C - 2.
POINT Setup Fields for Logic Control POINT Setup.

Example - A grinder in an automotive manufacturing plant operates in three modes, grinding, idle, and stop. In the grinding mode there is so much vibration from the grinding wheel that vibration data, indicative of the condition of the spindle and its bearings, is drowned out. During idle mode, the useful machinery condition vibration signals can easily be detected.

The process is controlled via a programmable logic controller (PLC) in the manufacturing cell. The PLC has programmable logic outputs. One of these outputs can be used as a logic input to the on-line device (the control POINT). The control computer's logic output can be programmed to be high during idle mode and low in grinding mode.

The user creates a logic control POINT that monitors the appropriate logic input. Since the signal from the controller is high during idle mode, the logic POINT's **Active State** should be set to **high**. The user then creates vibration monitoring POINTs (dependent POINTs) and links them to the logic (control) POINT. This allows the collection of consistent vibration data during the idle mode of operation.

Sensor Bias-Output-Voltage Gating

This gating method verifies proper sensor operation and may be used for any channel using a sensor with a dynamic signal riding on a DC bias voltage. Examples are an accelerometer with internal electronics or an eddy current displacement probe. The sensor's bias output voltage value is indicative of its operating condition.

Sensor Bias Output Voltage (BOV) is a DC voltage on which the AC signal rides. The on-line device can monitor the bias output voltage as well as the AC signal. If the bias output voltage is outside the sensor manufacturer's specified operating range, the signal coming from the sensor should probably be disregarded.

Example - Two accelerometers are installed at key points on a motor drive. The accelerometers are cabled to the first two IMx / WMx sensor inputs. The user has created one dynamic POINT for each of these channels and has enabled sensor BOV gating for both POINTs. The lower BOV for each is set to +2 VDC and the upper BOV to +22 VDC; BOVs outside this window are indicative of failures in the sensor or in its cabling. The figure below shows the BOV Gating Setup of the **Sensor Setup** Tab for one of these dynamic POINTs.)

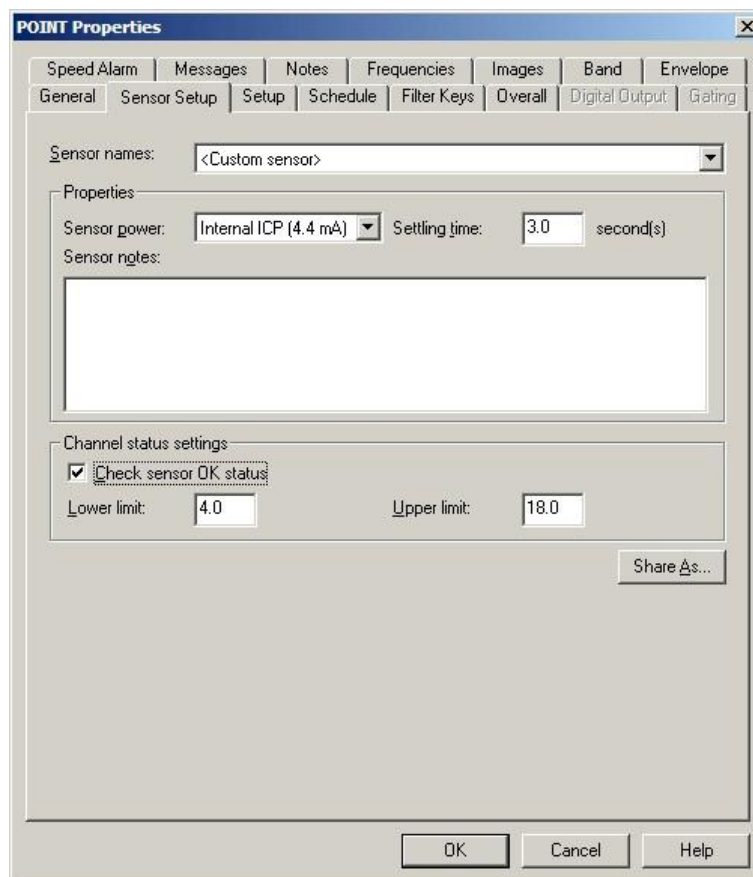


Figure C - 3.
Sensor Setup Tab.

Three months later during routine maintenance of the turbine, one of the sensor cables is accidentally cut. The sensor BOV rises up to +24V DC (the open circuit voltage). The IMx / WMx will not collect data for the POINT that uses the channel with the cut cable, but will continue to collect data on the other dynamic POINT. A non-collection event is logged for the bad BOV event.

Tachometer Gating

Tachometer gating is used to disable data collection for a POINT *when its machine stops*.

Example - In the sensor BOV motor drive example, a tachometer is permanently mounted on the motor. The output of the tachometer is cabled to the TACH 1 input on the IMx motherboard. The tachometer outputs a pulse for each revolution of the motor.

The user has enabled TACH 1 for all POINTs downloaded to the IMx. The IMx waits for a pulse from the tachometer prior to collecting data on each of the points. If no pulse is registered after ten seconds (6 RPM), the motor is assumed to have stopped.

This provides consistently trendable vibration data by turning off data logging when the machine is stopped.

Glossary of Terms

Acceleration - The time rate of change of velocity. Acceleration measurements are usually made with accelerometers.

Accelerometer - A sensor whose output is directly proportional to acceleration.

Alignment - A condition whereby the axes of machine components are either coincident, parallel, or perpendicular, according to design requirements.

Amplitude - The magnitude of dynamic motion or vibration. Expressed in terms of peak-to-peak, zero-to-peak, or RMS.

Asynchronous - Vibration components that are not related to rotating speed.

Averaging - In a dynamic signal analyzer, digitally averaging several measurements to improve statistical accuracy or to reduce the level of random asynchronous components.

Axial - In the same direction as the shaft centerline.

Axial Vibration - Vibration which is in line with a shaft centerline.

Axis - The reference plane used in plotting routines. The X-axis is the frequency plane. The Y-axis is the amplitude plane.

Balancing - A procedure for adjusting the radial mass distribution of a rotor so that the centerline of the mass approaches the geometric centerline of the rotor.

Band-Pass Filter - A filter with a single transmission band extending from lower to upper cutoff frequencies. The width of the band is determined by the separation of frequencies at which amplitude is attenuated by 3 dB (0.707).

Bandwidth - The spacing between frequencies at which a band-pass filter attenuates the signal by 3 dB.

Baseline Spectrum - A vibration spectrum taken when a machine is in good operating condition; used as a reference for monitoring and analysis.

Baud Rate - Adjustable serial communication transfer rate. Measured in bits per second.

Bit - Smallest unit of computer information storage. Equivalent to a choice of a one or a zero.

Byte - A unit of computer information storage usually equal to eight bits or one character.

Center Frequency - For a bandpass filter, the center of the transmission band.

Centerline Position - The average location, relative to the radial bearing centerline, of the shaft dynamic motion.

Channel - A sensor and the instrumentation hardware and related software required to display its output signal.

Condition Monitoring - Determining the condition of a machine by interpretation of measurements taken either periodically or continuously while the machine is running.

CPM - Cycles per minute.

CPS - Cycles per second. Also referred to as Hertz (Hz).

Critical Speeds - In general, any rotating speed which is associated with high vibration amplitude. Often the rotor speeds which correspond to natural frequencies of the system.

Cycle - One complete sequence of values of a periodic quantity.

Displacement - The change in distance or position of an object relative to a reference.

Download - Transferring information to the measurement device from the host computer.

Enable - To activate.

Engineering Units - Physical units in which a measurement is expressed, such as in/sec, micrometers, or mils. Selected by the user.

EU - See ENGINEERING UNITS.

External Sampling - In a DSA refers to control of data sampling by a multiplied tachometer signal. Provides a stationary display of vibration with changing speed.

Fast Fourier Transform - A calculation method of converting a time waveform to a frequency display that shows the relationship of discrete frequencies and their amplitudes.

Field - One data item. Examples of fields are POINT Type, Description, etc.

Filter - An electronic device designed to pass or reject a specific frequency band.

FFT - See Fast Fourier Transform.

Flat Top Window - DSA window function which provides the best amplitude accuracy for measuring discrete frequency components.

Frequency - The repetition rate of a periodic event, usually expressed in cycles per second (Hz), cycles per minute (CPM), revolutions per minute (RPM), or multiples of running speed (orders). Orders are commonly referred to as 1X for running speed, 2X for twice running speed, and so on.

Frequency Domain - An FFT graph (amplitude vs. frequency).

Free Running - A term used to describe the operation of an analyzer or processor which operates continuously at a fixed rate, not in synchronism with some external reference event.

Frequency Range - The frequency range (bandwidth) over which a measurement is considered valid. Usually refers to upper frequency limit of analysis, considering zero as the lower analysis limit.

Gap - (See Probe Gap.)

Global Bearing Defect - Relatively large damage on a bearing element.

Hanning Window - DSA window function that provides better frequency resolution than the flat top window, but with reduced amplitude accuracy.

Hertz (Hz) - Cycles per second. CPM/60.

Hierarchy - A method of organizing equipment into logical groups or physical areas for ease of access in the PRISM⁴ database. This format consists of Main SETs, Sub-SETs, machines, and POINTs.

High Pass Filter - A filter with a transmission band starting at a lower cutoff frequency and extending to (theoretically) infinite frequency.

Imbalance - A condition such that the mass of a shaft and its geometric centerlines do not coincide.

Keyphasor Phase Reference Sensor - A signal used in rotating machinery measurements, generated by a sensor observing a once-per-revolution event. (Keyphasor is a Bently-Nevada trade name.)

Linear Averaging - In a DSA, averaging of time records that results in reduction of asynchronous components.

Lines - Common term used to describe the filters of a DSA (e.g. 400 line analyzer).

Low Pass Filter - A filter whose transmission band extends from an upper cutoff frequency down to DC.

Multi-Parameter Monitoring - A condition monitoring method that uses various monitoring technologies to best monitor machine condition.

Natural Frequency - The frequency of free vibration of a system. The frequency at which an undamped system with a single degree of freedom will oscillate upon momentary displacement from its rest position.

Orbit - The path of shaft centerline motion during rotation.

Overlap Processing - The concept of performing a new analysis on a segment of data in which only a portion of the signal has been updated (some old data, some new data).

Peak Spectra - A frequency domain measurement where, in a series of spectral measurements, the one spectrum with the highest magnitude at a specified frequency is retained.

Phase - A measurement of the timing relationship between two signals, or between a specific vibration event and a keyphasor pulse.

Phase Reference - A signal used in rotating machinery measurements, generated by a sensor observing a once-per-revolution event.

Phase Response - The phase difference (in degrees) between the filter input and output signals as frequency varies; usually expressed as lead and lag referenced to the input.

Phase Spectrum - Phase frequency diagram obtained as part of the results of a Fourier transform.

POINT - Defines a machinery location at which measurement data is collected and the measurement type.

Probe - An eddy-current sensor, although sometimes used to describe any vibration sensor.

Probe Gap - The physical distance between the face of an eddy probe tip and the observed surface. The distance can be expressed in terms of displacement (mils, micrometers) or in terms of voltage (millivolts), which is the value of the (negative) dc output signal and is an electronic representation of the physical gap distance. Standard polarity convention dictates

that a decreasing gap results in an increasing (less negative) output signal; increasing gap produces a decreasing (more negative) output signal.

Radial - Direction perpendicular to the shaft centerline.

Radial Position - The average location, relative to the radial bearing centerline, of the shaft dynamic motion.

Radial Vibration - Vibration which is perpendicular to a shaft's centerline.

Resonance - The condition of vibration amplitude and phase change response caused by a corresponding system sensitivity to a particular forcing frequency. A resonance is typically identified by a substantial amplitude increase, and related phase shift.

RMS - The square root of the sum of a set of squared instantaneous values.

ROUTE - A measurement POINT collection sequence.

Run Up/Run Down - The monitoring of machinery conditions during a start up or shut down process.

Sensitivity - The ratio of magnitude of an output to the magnitude of a quantity measured. Also the smallest input signal to which an instrument can respond.

Sensor - A transducer which senses and converts a physical phenomenon to an analog electrical signal.

Signal Analysis - Process of extracting information about a signal's behavior in the time domain and/or frequency domain. Describes the entire process of filtering, sampling, digitizing, computation, and display of results in a meaningful format.

Spectrum - A display of discrete frequencies and their amplitudes.

Spectrum Analyzer - An instrument which displays the frequency spectrum of an input signal.

Thermocouple - A temperature sensing device comprised of two dissimilar metal wires which, when thermally affected (heated or cooled), produce a change in electrical potential.

Time Domain - A dynamic amplitude vs. time graph.

Time Waveform - (See Waveform.)

Transducer - A device which translates a physical quantity into an electrical output.

Trend - The measurement of a variable vs. time.

Trigger - Any event which can be used as a timing reference.

Upload - Transferring data from the measuring device to the host computer.

Vibration - The behavior of a machine's mechanical components as they react to internal or external forces. Magnitude of cyclic motion; may be expressed as acceleration, velocity, or displacement. Defined by frequency and timebased components.

Waveform - A presentation or display of the instantaneous amplitude of a signal as a function of time.

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