

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *GE / Commtest vb7* at our website: *Click HERE*

vb7

Instrument Reference Guide

Revision 24/07/2007

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

COPYRIGHT © 2007 Commtest Instruments Ltd.

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Commtest Instruments Ltd. For information, contact:

Commtest Instruments Ltd
28-b Moorhouse Avenue
Christchurch
New Zealand
E-mail help@commtest.com

Printed in New Zealand.

Disclaimer

Information in this document is subject to change without notice. Names and data used in examples are fictitious unless otherwise noted. This document is distributed *as is*, without warranty of any kind, either expressed or implied, respecting the contents of this document, including but not limited to implied warranties for the document's quality, performance, merchantability, or fitness for any particular purpose. Neither Commtest Instruments Ltd nor its employees, dealers, or distributors shall be liable to the user of this document or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by this document.

Trademark Notice

vb7™, PROFLASH™ and Commtest™ are trademarks of Commtest Instruments Ltd.
vbSeries® and Ascent® are registered trademarks of Commtest Instruments Ltd. Other trademarks and registered trademarks belong to their respective owners.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 1: Introduction

This Instrument Reference Guide is the companion manual to the Ascent Software Reference Guide. Please keep this book for future reference and read it before operating your instrument.

Although this book makes use of common vibration analysis concepts, it is not intended as a comprehensive guide or training manual. Please ensure you have the relevant knowledge and experience to carry out the procedures described. It is essential to follow all appropriate safety precautions when working near rotating machinery.

Product and support feedback
To help us improve what we offer you, if you any have questions not answered by this reference guide or would like to make a suggestion please contact us at www.commtest.com.

Standard Features

- DSP for fast, accurate calculations
- 24-bit A/D converter providing high-precision measurements
- Displacement, velocity, acceleration and current measurements
- Frequency and time domain measurements
- 1 GB non-volatile flash memory providing almost unlimited recording storage
- Time and date stamped recordings
- vb firmware - upgradeable using Commtest PROFLASH
- Temperature compensated graphical LCD (Liquid Crystal Display) with 480 x 320 pixels and white LED backlight
- 4500 mAh custom Lithium Ion battery pack
- Battery charger
- USB or Ethernet interface to communicate with your PC
- Ascent Windows-based vibration analysis software
- Tachometer and Keyphasor® input for speed and phase measurements
- Balancing analysis: single and dual plane (for multi-channel instruments)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Route and off-route recording modes

Standard Kit Items

Note: Additional accelerometers and associated accessories are included with multi-channel instruments.

- vb7 instrument with carry strap
- Power adaptor 12 V 3 A output, center positive
- DC car adaptor 12 V DC output
- USB Ascent security dongle (parallel dongle available on request)
- USB data transfer cable
- Accelerometer ICP®-type
- Accelerometer coiled cable
- Accelerometer magnetic mounting base
- Ascent vibration analysis software on CD-ROM
- ILearn vibration training CD-ROM
- Instrument Reference Guide
- Software Reference Guide
- Quick Start Guide
- Warranty card
- QA card
- Carry bag

Balancing kit items

- Reflective tape
- Non-contact laser tachometer sensor
- Adjustable tachometer stand with magnetic mount
- Lemo cable (5 meters)
- Accelerometer straight cable (5 meters)

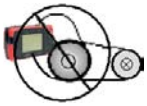
Precautions

Please read and understand this section before operating your instrument. Heed all warnings and recommendations to prevent data loss, data inaccuracy, damage to the instrument, or injury to yourself.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Do not attach sensors to any object with a high potential voltage i.e. a voltage that exceeds 50 V DC or 32 V AC or the 'safety extra low voltage' (SELV) defined by your local power authority.



Ensure the cables and bootstrap cannot become entangled with any rotating or moving machinery.



Do not bring any objects sensitive to magnetic fields near the magnetic mounting bases (e.g. cardiac pacemakers, credit cards, floppy disks, video tapes, audio cassette tapes, mechanical watches).



Do not operate the instrument in an explosive environment.



Do not detach the battery pack from the instrument for more than 10 minutes as this will cause the date/time to be lost. The instrument will retain all recordings and other information.



Neck-straps must be connected to the instrument via the 2.5 turn stainless steel rings provided. The strap must not be connected directly to the unit as this will defeat the 10 kg safety release provided by the rings. Replacement rings are available from Commtest.



Use only an approved power adaptor 12 V 3 A output, center positive. Do **not** use the plug-pack transformers supplied with previous Commtest instrument versions.

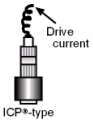


The cover over the comms and charger connectors provides an essential seal. It must be in place whenever using the instrument in an industrial environment.

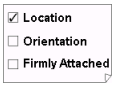
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Transfer information stored in the instrument to a PC before reprogramming (PROFLASHING) the instrument with new firmware. PROFLASHING the instrument will delete all stored information.



Ensure that the drive current is turned on when using an ICP®-type accelerometer, otherwise the measurements will be incorrect.



Mount the sensor properly before taking measurements to ensure their accuracy and consistency.



Use a mild detergent diluted in warm water to clean the instrument. Do not use abrasive or polishing substances, hydrocarbons, petrochemicals or solvents, as they will degrade the plastic casing.



Do not place the instrument or the magnetic mounting base anywhere that the temperature might exceed 140 °F (60 °C). This will degrade the battery pack and magnet.



If the instrument malfunctions, return it to an authorized dealer. Do not attempt to repair the instrument yourself as this will invalidate the warranty.

Operating Overview

You can use the instrument to perform the following tasks:

- Take live, free run measurements for onsite analysis of vibration spectra and waveforms
- Record routes and store vibration data for transferal to a PC (offsite analysis)
- Use keypad entry to enter additional machine information and process inputs
- Balance machines using single and dual plane methods

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

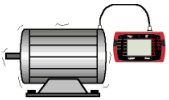
Onsite Analysis

You can measure vibration spectra and waveforms, and analyze these onsite. This is suitable for one-off investigations.

- Set measurement parameters on the instrument.

  Domain = frequency
  Spectral lines = 1600
  Fmax = 1000Hz
  ... etc.

- Measure and analyze the spectrum or waveform.



- Record the data to memory (optional).



- Transfer the data to a PC for further analysis (optional).



Recording Routes

You can take vibration recordings for all monitored machines then transfer these to a PC for analysis.

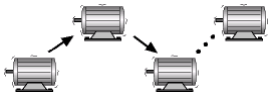
The instrument guides you through a pre-defined data recording sequence known as a route, which you create on a PC then transfer to the instrument (see the Ascent *Software Reference Guide* for instructions). Recording routes are particularly useful if you routinely monitor a large number of machines.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Create a recording route on a PC then transfer it to the instrument.



- Collect data for each item on the recording route as prompted by the instrument.



- Transfer the collected data to a PC for later analysis.



Keypad Entry

You can create keypad entries to define process input values such as current or flow rates. These process input values are entered manually using the keypad, rather than by attaching a sensor to a machine. The collected information can be transferred to a PC along with your normal measurements.

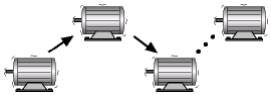
If you include keypad entries in a route the instrument will prompt you when to enter the values. Keypad entries can also be used as on-screen reminders to perform machine checks such as checking temperature and pressure etc.

- Create keypad entries as part of a recording route then transfer these to the instrument.



- Enter the values for each keypad entry item when prompted by the instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



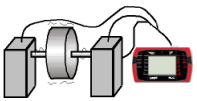
- Transfer the collected values and recordings to a PC for analysis.



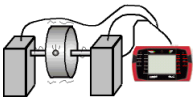
Balancing

You can analyze and correct rotating mass imbalance problems in-situ. A rigid rotor can be balanced in one or two planes.

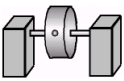
- Take an initial measurement of the imbalance.



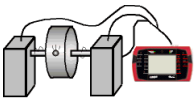
- Attach a trial weight to the balancing plane and take another measurement. For dual plane balancing, do the same for the second plane.



- Attach correction weights to the balancing planes as recommended by the instrument.



- Take a measurement in each plane to confirm that the rotor is balanced. Any residual imbalance can be removed via trim balancing.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 2: Getting Your Bearings

This section describes how to perform basic functions on your instrument.

You will learn to:

- Power up the instrument and turn it off
- Navigate menus and select options
- Enter and edit characters and punctuation
- Replace the on-screen icons with hint labels
- Display detailed help

Keypad Quick Reference



Turn the instrument On/Off.



Cancel/Go Back. A long press takes you back to the Main Menu.



Accept/Go forward to the next menu.



Activate alternate functions for each key. In some menus the keys can perform several functions; to see what options are available press ALT to toggle the key functions.



Help key: expand on-screen icons with easy to see hint labels. A long press displays detailed help text.



Navigate up/down through a list. To move more rapidly through a list, press and hold.

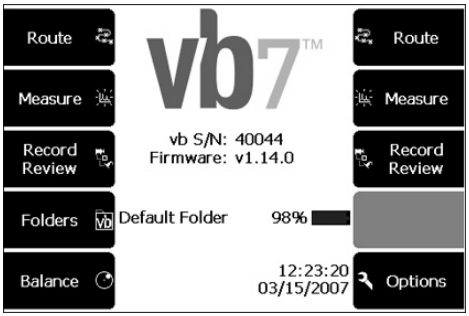


Navigate left/right. Also expands and collapses levels in the navigator and directs movement between split-screen menus e.g. the Record Review Menu.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Powering On/Off

- Press  to power up the instrument or turn it off. The following menu displays at power up.



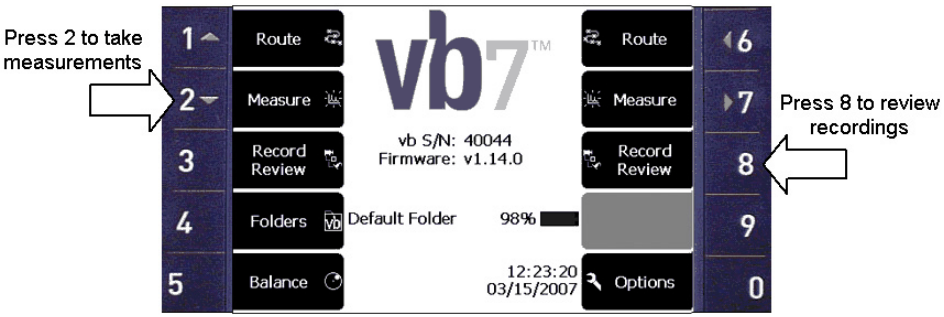
Main Menu

The Main Menu displays details such as the amount of charge remaining in the battery, today's date and time, the instrument serial number and the name of the currently selected folder.

- A long key press on  will always return you to the Main Menu.

Navigating Menus

- To navigate menus, press the key that displays the name of the task you want to perform e.g. to take a measurement, from the Main Menu press  Measure.



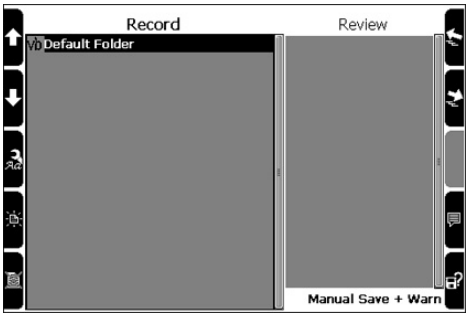
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Returning to a Previous Menu

- To return to a previous menu press X If you have opened several sub-menus, pressing this key will return you to the original menu. A long press will return you to the Main Menu.

Using Navigation Keys and Icons

Use the keypad arrows and on-screen arrow icons to navigate backwards/forward through menus, move up/down and across lists, and expand/collapse structures containing other items. When you are working with large numbers of machines, press to collapse the displayed machine structures. This will speed up navigation as you can move the selection bar from machine to machine, rather than having to scroll through each individual parameter set, location and point.



1 2 Move the selection bar in the direction indicated.

6 Move the selection bar to the top of a single column list.
Move one column to the left in a multi-column list.

7 Move the selection bar to the bottom of a single column list.
Move one column to the right in a multi-column list.

Expand the highlighted machine structure to show its points, locations and parameter sets.
Move to the right-hand side of the screen in a split-screen menu.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Collapse the highlighted machine structure so that only the top level is visible.
Move to the left-hand side of the screen in a split-screen menu.

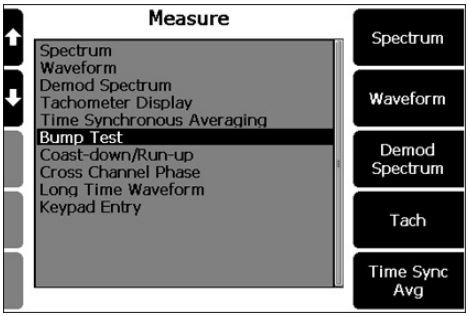
Selecting an Option from a List

When there are a large number of choices available they will display in list format. On-screen arrows allow you to scroll up, down, or across a multi-column list by pressing the arrow keys.

- To select an option from a list use the arrows keys to move the selection bar until your option is highlighted, then press ✓ to select that option.

Example:

- From the Main Menu press 2 Measure.
- To select Demod Spectrum press 1 or 2 repeatedly to highlight this option.
- Press ✓ to select this option.

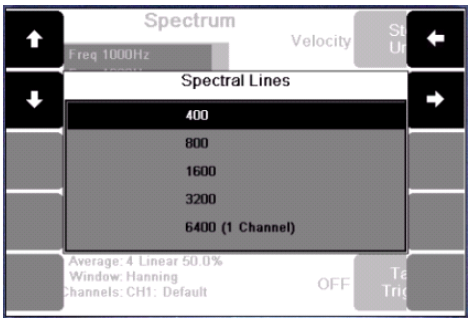


Jumping directly to the end of a list
When there are a large number of options, left and right arrows will display on either side of the screen.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Example:

- From the Main Menu press 2 Measure. (A long key press on X will return you to the Main Menu if you have another menu open.)
- Select Spectrum by pressing 6
- Press 8 Spectral Lines. Left and right facing arrows will appear on the right-hand side of the screen indicating that you can 'jump' to either end of this list.
- To jump to the last entry in the list press 7 Press 6 to jump to the first list entry.

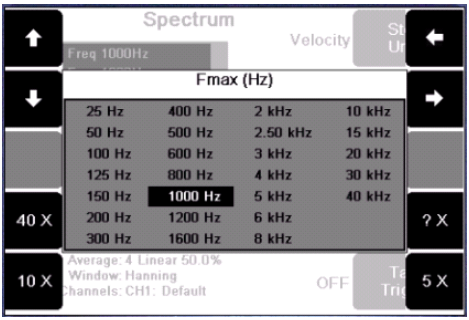


Scrolling through a multi-column list
Lengthy lists are displayed in multi-column format. You can jump across the columns as well as scrolling up/down.

Example:

- Press X to return to the Spectrum Menu, then press 7 Fmax.
- To move to the next column in a multi-column list press 6 or 7

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



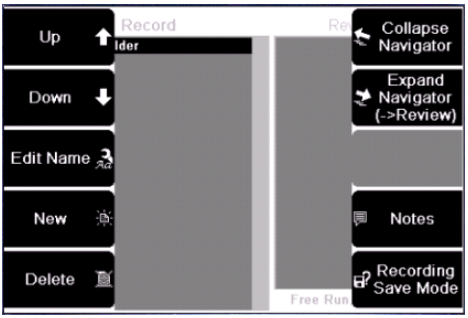
Cancelling an Option

- To cancel an option press **X** This will normally return you to the previous menu. If you have opened several sub-menus, pressing this key will return you to the original menu. A long press will return you to the Main Menu.

Displaying Hint Labels and Detailed Help

Each on-screen icon can also display a hint label. Hint labels are turned off by default so that less screen space is used.

- To display hint labels press **?** The hint labels will disappear when you press another key.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Example:

- From the Main Menu press 3 Record Review. (A long press on X will return you to the Main Menu if you have another menu open.)
- Press ? to display the hint labels and press this key again to hide them.

Press and hold ? to display more detailed help information.

Example:

- From the Main Menu press and hold ? Detailed help text will be displayed.
- Press ? again to hide the detailed help text.

Displaying Alternative Options

Pressing a key causes the instrument to perform the task shown beside that key. For example, in the following picture, pressing 2 will cause the Y Axis of the on-screen chart to expand.

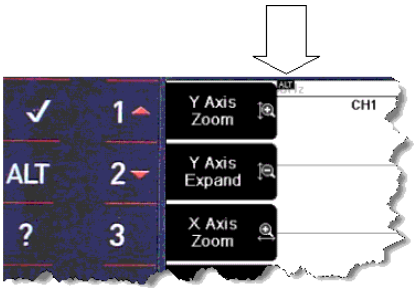


Chart menu before pressing ALT

However, in many menus one key can perform two functions. When this is the case a small ALT icon will appear at the top of the screen (see the arrow in the previous picture). Pressing the ALT key causes

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

a different set of options to appear. The following picture shows the same chart menu after pressing this key.

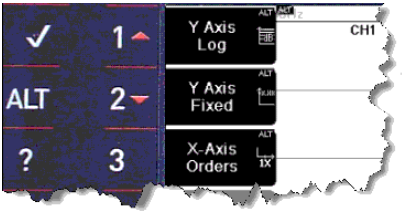


Chart menu after pressing ALT

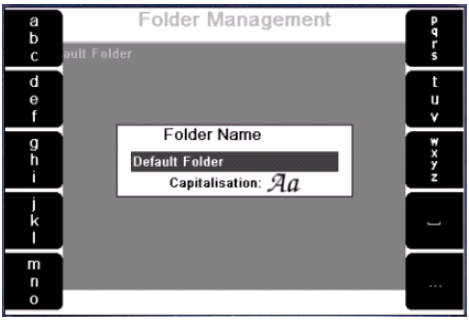
Entering Alphanumeric Characters

Names can be up to 50 characters long and contain a mix of upper case and lower case letters, spaces, numbers and punctuation. To enter letters and numbers use the instrument keys in the same manner as a mobile phone, pressing the keys repeatedly to cycle through the characters until you reach the one you want e.g. to enter the number 7 press 7 four times. Pressing a different key causes the cursor to immediately go to the next space; if you need to use a character that is on the same key as the previous character, pause for a moment until the cursor moves forward so that you don't overwrite your text.

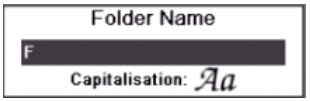
Example:
To rename the currently selected folder to FANS:

- From the Main Menu press 4 Folders.
- Press 3 Edit Name.

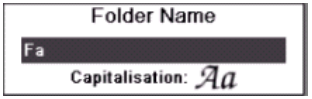
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



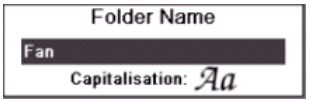
- Press ALT then 5 Clear All to clear the current folder name.
- Press 2 three times until 'F' displays.



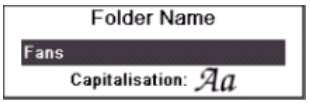
- To enter the letter 'a', press 1 once.



- Press 5 twice to display 'n'.



- Press 6 four times to display 's'.



- To enter a space between words press 9. If you make a mistake and wish to delete a character press X

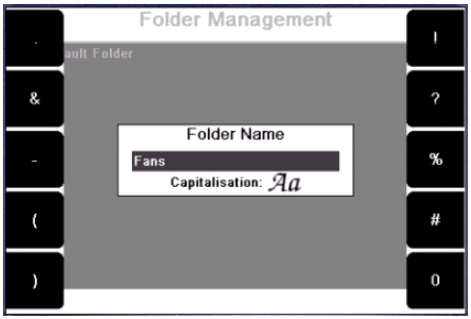
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ALT then ? to display the advanced editing menu containing options for using upper and lower case characters etc.

- When you have finished entering your text press ✓ to save.

Entering Punctuation, Spaces and Special Characters

- To add punctuation, from the alphabetic character screen press 0 to display the punctuation menu.



- To use a punctuation character press the corresponding key. The instrument will then re-display alphabetic characters.

Spaces and special characters

You can insert spaces between words, change from upper to lower case and delete or insert special characters as required. Pressing ? to display hint labels will help you use the various editing commands.

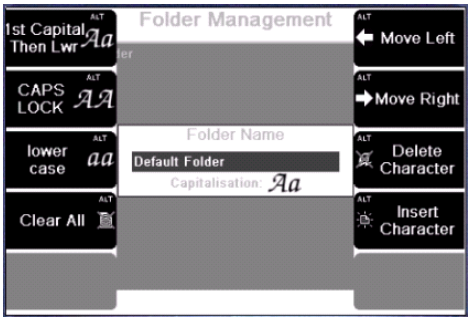
Example:

- From the Main Menu press 4 Folders.

- Press 3 Edit Name.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ALT to activate alternative functions then ? to display the advanced editing menu containing options for lower case letters, deleting characters etc.



Using Other Icons

Each on-screen icon represents a function that you can use to perform a task, such as creating or deleting an item. To perform the task represented by the icon, press the key beside that icon. Remember that you can press ? to display hint labels for each icon.

Use these icons to create your machines.

Use	To do this
	Create a new machine
	Create a new point
	Create a new location
	Create a new parameter set

Use these icons to manage all your items.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Use	To do this
	Create a new item
	Edit the selected item
	Delete the selected item
	Copy the selected item into memory
	Paste the copied item to the highlighted position

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 3: Using Sensors

This section explains which sensors are compatible with your instrument and describes how to use them.

You will learn:

- What sensors may be used with your instrument
- How to use the supplied accelerometer and tachometer
- How to correctly mount a sensor

Supported Sensor Types

The instrument can take measurements using a wide range of sensors. The following table summarizes the sensitivities and types of measurement that can be taken by each sensor.

Sensor Type	Sensitivity	Measurement Types
Accelerometer	mV/g 0.1-10 000	Acceleration Velocity Displacement
Velocity Sensor	mV/in/s 0.1-10 000 mV/mm/s 0.34-90.55	Velocity
Displacement Sensor (or prox probe)	mV/mil 0.1-10 000 mV/µm 0.34-90.55	Displacement
Current Sensor	mV/amp 0.1-10 000	Current

You can define your sensors either in the Ascent software or in the instrument. For information on how to define a sensor using the instrument see Defining and Editing Sensors (page 97).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Mounting Sensors

Your choice of sensor mounting will affect the accuracy and therefore the repeatability of vibration measurements.

For walk around data collection, accelerometers are usually mounted using the supplied magnetic base. However, for optimal high frequency results, they can be stud mounted as described in Permanent Mounting (page 23). You can also apply these instructions to velocity sensors.

You should mount tachometers, displacement sensors, prox probes and current sensors according to the manufacturer's instructions.

Setting up the Accelerometer

Plug the connector of the accelerometer into the instrument's sensor input. Now screw the accelerometer into the magnetic base and attach it to the measurement point using these guidelines:

- Attach the accelerometer to a sturdy, rigidly mounted and non-flexible structure, where vibration from the rotating part of the machine will be accurately transmitted. Do not attach sensors to sheet metal, guards, or any machine structure which is not closely coupled to the source of vibration in the spinning rotor, as the vibration of such a structure will be different to the vibration source.

- The attachment structure must be at least 10 times heavier than the accelerometer itself. Do not mount the accelerometer on lightweight motors or similar parts as the weight of the accelerometer will distort the vibration signal. Use a smaller accelerometer for small structures.

- Attach the accelerometer as closely as possible to, and in line with, the centerline of the bearings to avoid distorted signals.

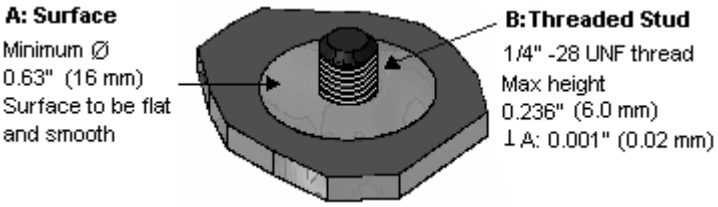
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- The mounting surface should be flat and smooth where the accelerometer makes contact. Attach the accelerometer using the supplied magnetic accelerometer base or a threaded stud on the machine surface. The accelerometer should not move independently of the machine part it is attached to.
- Ensure the accelerometer is oriented correctly as vibration can differ greatly with respect to direction.
- Always attach the accelerometer at exactly the same position as previous measurements if this is an ongoing study of a particular measurement point (mark the position if necessary).
- Keep the accelerometer clear from other cables, ensuring it is not twisted, kinked or tangled.

Permanent Mounting

To mount using the stud method, prepare a mounting spot on the machine following the specifications shown in the diagram.

- Unscrew the magnetic base from the sensor and screw onto the threaded stud. We recommend you use a thread locking compound.



Stud Mounting Spot

Caution: Do **not** use a wrench to tighten the sensor as this may cause damage.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Setting up the Tachometer

A tachometer collects information on a machine's rotation speed, providing you with an exact reading of machine speed as a measurement is taken. This is more accurate than using a default RPM as a machine's speed can vary significantly under different loads.

The tachometer also provides information on the angle at which the rotor is vibrating. The angle is measured from a fixed reference mark on the rotor and is called the 'phase angle'. To balance a rotor it is necessary to consider not just the amplitude of vibration but also the phase angle. The amplitude shows the severity of the imbalance and the phase angle indicates the geometry of the imbalance.

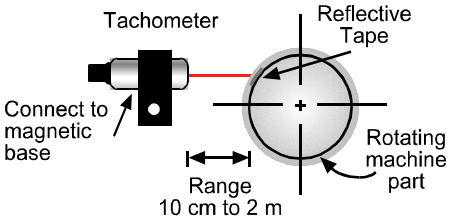
Warning: The laser tachometer is a class 2 laser product. Do **not** stare into the laser beam.

Setting up the tachometer

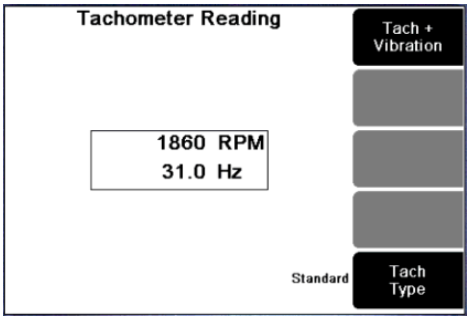
- Locate the drill hole in the tachometer and screw this onto the end of the mounting base movable arm.
- Plug the cable socket into the tachometer connecting pins then turn the locking ring to make a secure connection.
- Locate the TACH input on the instrument and attach the other end of the cable to this.
- Stop the rotor.
- Cut out a small strip of the supplied reflective tape, approximately 5 mm x 15 mm (0.2" x 0.5").
- Stick the reflective tape to a machine part that rotates at the rotor speed e.g. the shaft. This trigger spot should provide a pronounced increase in reflection as it passes under the tachometer light beam. The tape width must be **at least** double the diameter of the light beam spot.
- Mount the tachometer magnetic base to a stationary portion of the machine, convenient to the trigger spot.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Position the tachometer slightly away from the centerline of the rotating machine part in order that it is not 'blinded' by reflections from the surface of the machine part. The sensor should be positioned within the measurement range shown in the following diagram.



- Start the rotor and wait till it is at normal running speed.
- Now test if the tachometer will trigger. From the Main Menu press 2 Measure.
- Press 9 Tach then press 0 Tach Type and toggle this setting to Standard (if using the Commtest supplied tachometer). The screen will display the rotor running speed in RPM and Hz. These values will continuously update but should stabilize, indicating that the tachometer is triggering reliably. If the RPM does not stabilize adjust the position of the tachometer.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Tachometer Signal from a Keyphasor®

Note: Keyphasor® sensors are only supported by multi-channel instruments.

If your machine has a proximity-probe based tachometer sensor (e.g. Keyphasor®), this can be used as the tach signal for your instrument. The sensor should have a buffered front-panel BNC output, to ensure the instrument's measurements can't interfere with pre-existing speed measurements. Keyphasor® Lemo connector tach cables can be purchased through your local Commtest reseller for this purpose.

The Keyphasor® proximity sensor gap should be adjusted so the driver box output is -8 V +/- 2 V (i.e. -6 V to -10 V) when the sensor is over the shaft. This is the normal mid-range position for these sensors. When the sensor is over the keyway its output will be -14 V to -22 V, depending on its make and model.

Using a Strobe

If you have a strobe light with an output signal it should be possible to connect it to the tachometer input of the instrument. (However, there are many strobes on the market with different types of output signal and connectors). If your strobe light has a BNC connector and gives a TTL output (0 to 5) V you can purchase a suitable cable (with a Lemo connector) from Commtest Instruments Ltd via your distributor.

For other types of connectors and signals please consult the FAQ (Frequently Asked Questions) articles on the Commtest website www.commtest.com.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 4: Analyzing Measurements Onsite

This section describes how to take measurements and perform onsite analysis.

You will learn to:

- Take a measurement
- Change how a measurement is displayed
- Perform analysis using cursors and zooming
- Set a measurement's RPM
- Store a measurement

Tips for Taking Measurements

- You should always take measurements using the machine operating mode that is typical for that machine (the typical load and running speed). This is to ensure that the loads on the components, such as bearings, are the same as those that define their wear. For multi-operating mode machines it is best to take measurements when the loads on the bearings are at a maximum and to take all future measurements in the same mode.

- When taking the measurement, try not to lean on the machine and do not put heavy objects (e.g. heavy tool boxes) on it since this will change the vibratory behavior of the machine.

- If there are machines operating nearby that might affect the vibration of the machine you are measuring, stop those surrounding machines if possible.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- In addition to the measurements that you will be taking, if possible, stop and listen to the sound of the machine; look for loose bolts and oil leaks; take note of any machine parts that are vibrating visibly; feel for hot bearings and manually 'feel' the vibration (e.g. with a screwdriver) to look for symptoms that might later aid vibration analysis. This should be done only if it is safe to do so.

- If you have a stroboscope (not included in the instrument kit) you may wish to use it to 'freeze' rotating shafts, belts, couplings etc to observe their operating shapes and relative speeds in order to look for symptoms that might later aid vibration analysis.

Walk-through: Taking Measurements

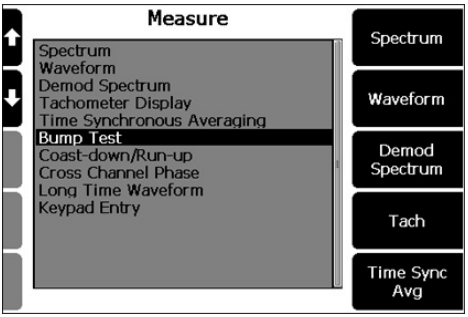
Onsite analysis involves watching a machine's vibration on-screen as it occurs, and analyzing the measurement on the instrument (rather than recording the vibration then transferring it to a PC for later analysis). This method of measuring allows you to take a quick look at a machine's vibration patterns without storing the measurement. (You can choose to save the measurement at any time by creating a machine to save it to, or by selecting an existing machine definition stored in the instrument.)

- Attach the sensor (and tachometer if you are taking rotor speed and phase angle measurements). Now start the machine and allow it to operate under its normal load and running speed.

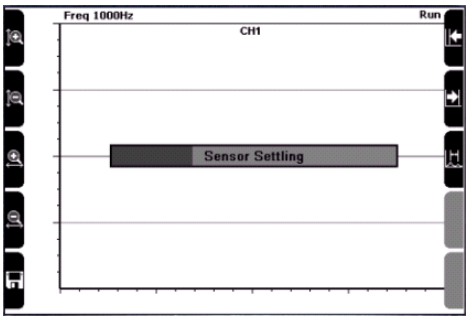
- From the Main Menu press 

Measure.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



- Select your measurement type by using the arrow keys to move the selection bar then press ✓ or by pressing the quick access buttons to the right of the screen.
- The measurement default settings are displayed on-screen. You can change any of these defaults before taking a measurement. See sub-heading 'Changing the default settings' at the end of this topic.
- To start the measurement press ✓ The instrument and sensor will take a short time to settle before measuring begins. Measurements are taken in 'free run' mode, which means that the signal continually updates on-screen until you stop the measurement.



- To stop the measurement press ✓ You can now analyze the measurement on-screen, including displaying the amplitude of spectral peaks and identifying harmonics (see Analyzing Measurements).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

OR

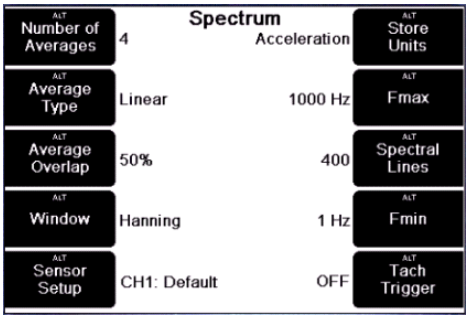
- To stop viewing the measurement and exit without saving press X

OR

- To save the measurement press 5 and select an existing machine location or create a new one (see Saving Measurements on page 40).

Changing the default settings

- To change any of the settings shown on the right of the screen, press the keys beside the on-screen icons.
- To change any of the settings shown at the bottom of the screen press ALT then press the keys beside the on-screen icons. Pressing keys causes the display to cycle through the available options or opens a sub-menu where you can enter a value or choose a value from a list.



Pressing ALT lets you change the measurement setup

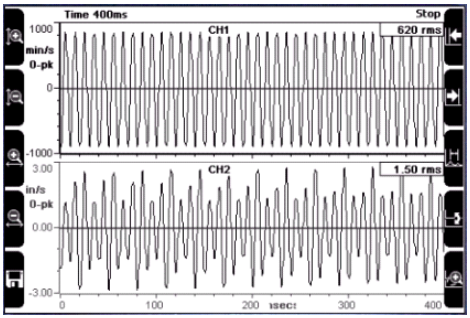
- If a sub-menu opens, make your changes then press ✓ This will apply your settings and return you to the previous menu where you can change further settings if required.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- To select a different sensor press ALT then press 5 Sensor Setup. Press the Change Sensor key opposite your chosen measuring channel then use the left-hand arrow keys to highlight a sensor and ✓ to select it. Press the left-hand arrow key beside your chosen channel to enable it then press ✓ twice to begin measuring.

Working with Charts

You can display a separate on-screen chart for each measurement channel. This allows you to watch multiple 'live' measurements at the same time, freeze all measurements on-screen and compare them together, and also toggle between the charts so that you can view them one at a time.



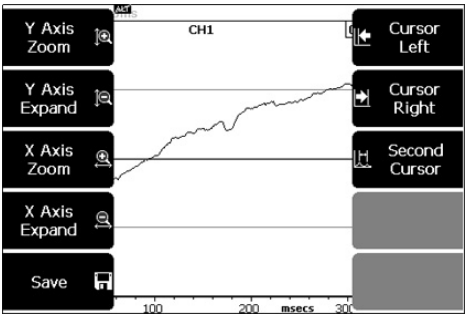
Viewing two waveforms simultaneously

Analyzing Measurements

- To halt a measurement so that you can analyze it press ✓ The overall vibration value will display at the top right of the screen.

- Press ? to display hint labels for analysis options such as zooming and displaying cursors.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Pressing ? *displays analysis options*

Using Cursors

Cursors are a valuable tool for analyzing your data. You can use them to show the amplitude and frequency of a peak, identify harmonics, and show the frequency difference between two peaks.

Placing a cursor on the chart

- Press 6 or 7 repeatedly to activate a cursor and move it across the screen. To move the cursor rapidly press and hold the key.

Placing a second cursor on the chart

- Press 8 Second Cursor. The second cursor will not be immediately visible as it will be placed directly behind the first cursor (the new cursor's values will appear at the top right of the screen).
- Press 6 or 7 repeatedly to move the cursor to either side so that it becomes visible.

Toggling the active cursor

- Press 8 Second Cursor to toggle between the two cursors.

Clearing cursors

- Press ALT then 8 Clear Cursors to remove all cursors and harmonics.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

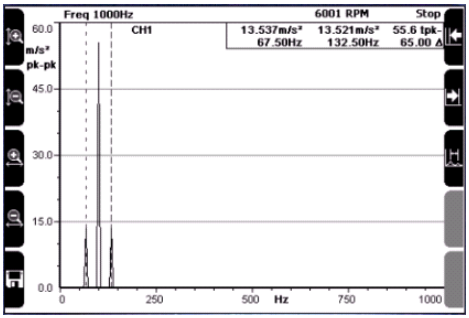
Displaying the amplitude/frequency of a peak

- Press 6 or 7 repeatedly to activate a cursor and move it across the screen. The frequency and amplitude values indicated by the cursor will display at the top right of the screen.

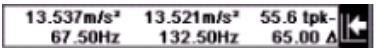
Displaying the frequency or time difference between peaks

- Press 6 or 7 repeatedly to activate a cursor and move it to the first peak.
- Press 8 Second Cursor to add a new cursor to the display and press 6 or 7 repeatedly to move it to the second peak.

  Both cursors' values appear at the top right of the screen. The delta symbol △ will appear on the far right of the screen. The value beside the delta displays the frequency or time difference between the two peaks.



The delta indicates the frequency/amplitude difference of two peaks



Displaying harmonics

- Press ALT then press 6 Harmonics Sidebands. Press 6 or 7 repeatedly to move the cursor over different peaks.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Additional cursors will display at frequency or time values that are whole-number multiples of the frequency or time value indicated by the main cursor.

Turning harmonics off

- Press ALT then press 8 Clear Cursors to remove all harmonics and sidebands.

Zooming

Zooming allows you to take a closer look at a specific area of interest on a chart.

Chart zoom and expansion options

- Magnifying glass icons on the left of the screen indicate that zooming options are available. (If the magnifying glass icons are not visible press ALT toggle them on.) Press ? to display hint labels for zooming and expansion options.

Zooming horizontally (across the chart)

- To expand the peaks of a spectrum or waveform use the right-hand arrow keys to move the cursor to the position of interest and press 3 X Axis Zoom repeatedly to zoom in on the cursor position by a factor of two per key press. The more spectral lines or waveform sample points used, the more times you can zoom.

Zooming vertically and horizontally

- To see low amplitude peaks more clearly move the cursor to the position of interest and press 1 Y Axis Zoom to zoom in by a factor of two per key press.

- Press 3 X Axis Zoom to expand the frequencies on either side of the cursor.

Unzooming

- Press 4 X Axis Expand repeatedly to zoom out horizontally and 2 to zoom out vertically.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Viewing Multiple Charts

When you measure two channels simultaneously each chart will display on-screen. You can view the measurements on both charts at the same time or select a specific chart to work with. (When using analysis options such as zooming, these will only be applied to the selected chart.)

Selecting a chart

- With the charts displayed press ? (You don't have to display the hint labels but this will help.)
- Press 9 Select Chart. The axes of the selected chart will become thicker and darker to indicate that this chart has the focus. Press 9 repeatedly to toggle which chart you wish to work with.

Displaying a single chart

- To make one chart fill the entire screen select the chart as described in the previous instructions then press 0 Chart Zoom.
- To re-display all charts press 0 again.

Changing Chart Layouts

You can toggle the layout of your charts so that they display side by side or stacked on top of each other. You can also specify which of your channels displays on top/bottom, left/right etc.

Selecting a chart layout

- With the charts displayed press ALT then ? to display hint labels.
- Press 0 Change Layout then use the right-hand arrow keys select a chart layout.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Changing where a channel displays within a chart

- With the charts displayed press ALT then ? to display hint labels.
- Press 0 Change Layout then press ? to re-display hint labels.
- Press 9 Select Layout. The border around the selected channel will become thicker and darker to indicate that this chart has the focus. The channel that is *currently* selected will swap places with the channel you choose in the next step (press 9 repeatedly to select a different channel).
- Press 4 Change Channel ID and use the right-hand arrow keys to select the channel that will replace your currently selected one.
- Press ✓ to make the channels switch places. Press this key again to return to the measurement screen.

Setting the Y Axis (Amplitude) Scale

Toggling the left axis scale between Linear, Log and dB will increase or decrease the amplitude of displayed peaks allowing you to see either the bigger picture or a more detailed view of the data. The Linear scale is suitable for most cases. Log scaling (base 10) is more useful for displaying vibration with both very large and very small amplitudes.

- With the measurement displayed on-screen (either still measuring or stopped) press ALT to set the Y axis (amplitude) scaling options.
- Press 1 Linear Log dB repeatedly to toggle between Linear, Log, and dB scaling (vdB and adB scaling are only available when measuring velocity and acceleration respectively).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press 2 Y Axis Max. This is the highest amplitude value that will be displayed on-screen. Use the arrow keys to highlight a value then press ✓ to select.
- Press 3 Y Axis Range repeatedly to toggle the Y Axis range. This selects the lowest amplitude value that will be displayed on-screen relative to your chosen Max Value.
- When you have finished press ✓ to return to the measurement screen.

Fixed Y Axis scale options
Setting a Max dB Value sets the highest value that the amplitude axis can display, so if a peak goes above this value while you are measuring you will not see the top of the peak. When using *Linear* scaling you have two extra display options.

Automatic: This allows the instrument to auto-scale the left axis to accommodate the highest and lowest peaks.

Current: This fixes the Y axis to whatever amplitude is currently displaying, regardless of how large or small the peaks become.

Amplitude Display Units

Your chosen Store Units (acceleration, velocity etc) determine which amplitude scaling options are available. The vdB scale is only available if you are taking velocity measurements and adB is only available if you are taking acceleration measurements. Linear and Log scaling are available for all measurement types. Choose from the following amplitude display units:

Store Units	Max dB Value Linear Scale	Max dB Value Log Scale
Acceleration	m/s^2, mm/s^2	m/s^2, mm/s^2
Velocity	mm/s, µm/s	mm/s, µm/s
Displacement	mil, mm, µm	mm, µm
Current	mA, µA	mA, µA

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Store Units	Y Axis Fixed Linear Scale	Y Axis Fixed Log Scale
Acceleration	automatic, current, mm/s^2	m/s^2, mm/s^2
Velocity	automatic, current, µm/s	mm/s, µm/s
Displacement	automatic, current, m	mm, µm
Current	automatic, current, A	mA, µA

vdB
The vibration velocity level vdB is defined as 20 times the logarithm of the ratio of the RMS velocity level to a reference velocity value (the vdB reference). The value 1e-6 mm/s is an abbreviation for 1x10-6 mm/s and is the SI reference level. The value 1e-5 mm/s is the reference level used by the US Navy and many American industries.

adB
The vibration acceleration level adB (US) is defined as 20 times the logarithm of the ratio of the RMS acceleration level to 1 µg RMS.

The SI version of adB is less commonly used, and has a reference value of 1 $\mu m/s^2$.

Setting the RPM

Setting the 1X RPM allows you to view the chart in orders (for spectra) or revs (for waveforms). You can enter the RPM manually (if you know it), or set the RPM from a spectral 1X peak.

Entering the RPM manually

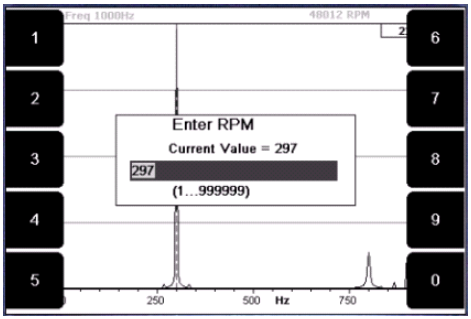
- With a measurement displayed press ALT then 7 Set RPM.
- Enter a value using the number keys then press ✓

Entering the RPM using the 1X peak

- Press 8 Second Cursor then use 6 or 7 to move the cursor to the 1X peak.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ALT then 7 Set RPM. The frequency of your selected peak will be displayed.



- Press ✓ to save this frequency as the RPM value.

Note:
If a tachometer is connected to the instrument, the instrument will use the RPM from this rather than any entered value.

Viewing Orders

When orders are displayed, the frequency axis of a spectral chart is labeled in orders of running speed instead of in Hz or CPM. This allows you to see how closely spectral peaks correspond to the running speed of the machine. In addition, you can move a cursor to a peak of interest - the exact number of orders at that frequency will appear at the top-right of the screen.

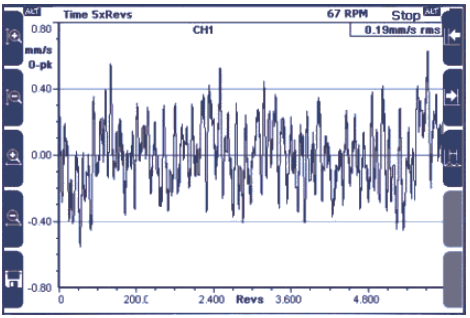
- With a spectral chart displayed, set the RPM as described in the previous topic and press ALT then 3 X-Axis Orders.
- To de-activate orders repeat the previous step.

Viewing Revolutions

When Revs are displayed, the time axis of a waveform chart is labeled in revolutions of running speed instead of your regular measurement units.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- With the waveform chart displayed, set the RPM as described previously. The bottom axis will update to display revs.



Waveform chart displaying Revs on the X axis

Saving Measurements

- Stop the measurement by pressing ✓ then press 5 Save. You now need to select a machine, point and location to save the measurement to or create these now.

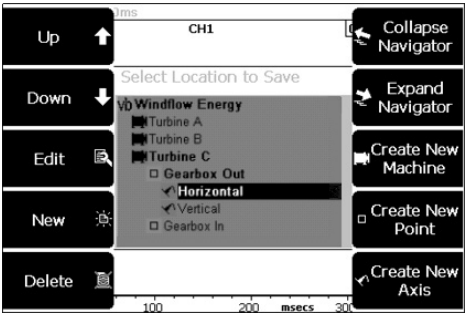
Selecting an existing machine

- Use 1 or 2 to scroll up and down and press 7 Expand Navigator repeatedly to expand out a machine so that its points and locations become visible. Press ✓ to save the recording to your chosen location.

Creating a new machine

- Press 8 Create New Machine. The following image shows the machine creation icons after pressing ? to display hint labels

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Creating a new machine to save the measurement to

- Enter a name for this machine then press ✓
- Repeat this process to create a point □ then press ✓ and use the arrow keys to select a location. Press ✓ until you see the message 'Data Saved'.

Section 5: Setting Measurement Options

This section describes the different parameters used to take measurements and how to apply them.

You will learn:

- What the various parameters are for spectra, waveforms and other measurement types
- How to create parameter sets for taking measurements
- What measurement units and overall scaling options are available
- How to assign sensors to channels

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Setting Measurement Units and Spectrum Scaling

You can choose the standard US or SI units, or choose your own preferences. The table below summarizes the options.

- To set a preference, from the Main Menu press 0 Options then press 2 Measuring Units.
- Press 1 repeatedly to toggle which unit set is displayed. To set your own preferences select Custom then press the keys beside the first option you wish to change.
- Most on-screen options will open a sub-menu; press the keys repeatedly to cycle through the various options. When you have finished press ✓ to save and return to the Measurement Units Menu.

	Units	Spectrum Scaling	Time Waveform Scaling
Accel	g, m/s^2	RMS, 0-pk, pk-pk	RMS, 0-pk, pk-pk, true pk-pk
Veloc	mm/s, in/s	As above	As above
Disp	mm, µm, mil	As above	As above
Current	amps	As above	As above

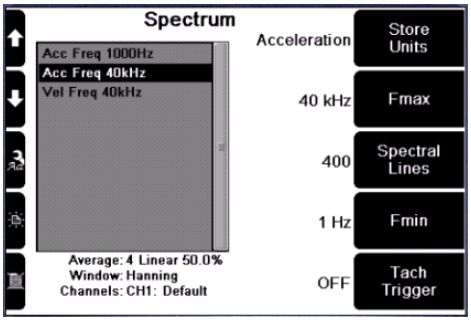
Unit Set	SI	US	Custom
Frequency	Hz	CPM	Hz, CPM
vdB Units	vdB SI (1e-6 mm/s)	vdB US (1e-5 mm/s)	vdB US, vdB SI
adB Units	adB SI (1 $\mu m/s^2$)	adB US (1 µg)	adB US, adB SI
Linear Speed Distance	mm	in	mm, in
Weight	g, kg	lb, oz	lb, oz, tons, kg, g

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Balancing Units			
Quantity	**Acceleration**	**Velocity**	**Displacement**
Units	g	in/s, mm/s	mm, µm, mil
Scaling	RMS, 0-pk, pk-pk		

Setting Measurement Parameters

When you select a measurement type e.g. Spectrum from the Measure Menu the default parameters display on-screen.

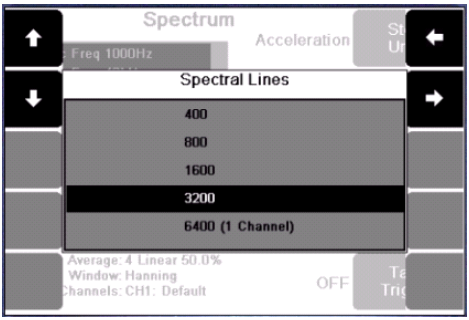


Spectrum measurement setup showing default parameters

Example:

- From the Main Menu press 2 Measure then press 6 Spectrum.
- Press ? to display hint labels then press 4 Create New Paramset.
- The default parameters for a spectrum measurement are displayed. To change a parameter value press the key beside the value's on-screen label. This will cause the parameter to cycle through the available options, or it will open a sub-menu where you enter a value via the keypad or select a value from a list. If you have opened a sub-menu save your changes by pressing ✓

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Spectral lines sub-menu

- To display Averaging parameters and Window type press ALT

Creating Your Own Parameter Sets

To create a new parameter set that you can store and reuse, do the following:

1. Open the menu for the measurement type you want to create (from the Main Menu press 2 Measure then use the arrow keys to select the required measurement type and press ✓ to select it).
2. Press ? to display hint labels then press 4 Create New Paramset to create a new copy of the default parameter set.
3. Press 3 Edit Name and enter a description for this parameter set then press ✓
4. The new parameter set will be highlighted to indicate that it is selected. Press the keys beside the on-screen labels to set your values as described in the previous topic.

Example: Creating a custom spectrum parameter set

- From the Main Menu press 2 Measure then press 6 Spectrum.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

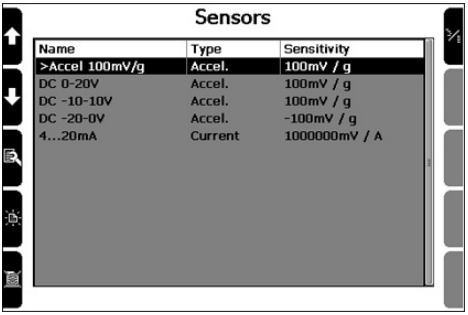
- Press 4 Create New Paramset.
- Press 3 Edit Name and enter a name for this parameter set then press ✓
- Change Store Units to Acceleration. Press 6 repeatedly. The display will cycle through the different unit types as you press the key.
- Set the Fmax to 1500 CPM. Press 7 Fmax then press 5 to set the RPM to 10 x the machine running speed.
- Enter the RPM as 150 then press ✓ twice to return to the Spectrum setup.
- Set the number of Spectral Lines to 3200. Press 8 and use the arrow keys to highlight 3200 then press ✓
- Set the Average Overlap to 62.5%. Press ALT to display Averaging and Window options and press 3 Average Overlap repeatedly to cycle through the values, then press ✓
- Your new parameter set is now ready to use. If you have already defined a sensor and enabled a channel you can now take a measurement by pressing ✓ Assigning sensors to channels is explained in the next topic.

Assigning Sensors to Channels

You must specify which sensor is assigned to each channel. When you take a measurement the instrument will know which sensor is being used and will offer you the appropriate measurement unit and overall scaling options for on-screen display. If you unplug a sensor in order to take a different type of measurement e.g. swapping an accelerometer for a current sensor, you will need to assign this new sensor to the channel.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Main Menu press 0 Options.
- Press 5 Sensor Setup then press Change Sensor opposite your chosen measuring channel. (If this is new sensor that has not yet been defined in the instrument you will need to create a sensor definition before you can assign it to a channel. See Defining and Editing Sensors on page 97.)
- Use the arrow keys to highlight a sensor then press ✓ to assign it to your channel.



- To enable the channel for measuring, press the left-hand key beside your chosen channel. The text will change from --- to 'Enabled' to indicate that this channel can now be used to take measurements.
- Press ✓ twice to return to the Main Menu.

Multi-channel measurements
To take simultaneous measurements, follow the procedure described previously and enable as many channels as required.

Explaining Spectrum Parameters

Fmax

The Fmax is the maximum frequency **displayed** on the spectrum i.e. the frequency range, starting from zero, over which vibration amplitudes are displayed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

In general, the higher the operating speed of the machine, the higher the Fmax needs to be to capture all crucial information. For vibration involving fingered elements such as gear teeth, fan blades, pump vanes, and bearing elements, an Fmax equal to 3 times the number of fingers multiplied by the operating speed is usually sufficient. For vibration not involving fingered elements, an Fmax equal to 40 times the operating speed is usually sufficient.

You can specify the Fmax of a measurement either as an exact value or as a multiple (order) of a machine's running speed.

- Select your measurement type then press 7 Fmax. The options labeled 40 X, 10 X and 5 X represent orders of running speed. The option ? X allows you to enter your own number of orders.
- Press one of the orders keys and enter your machine's default RPM value.
- Press ✓ twice to return to the measurement setup.

When you take the measurement the resulting display will use an Fmax with the specified number of orders (the value will be rounded up to the closest Fmax if an exact match is not available).

Spectral Lines

The resolution of the spectrum increases with the number of spectral lines used i.e. the more spectral lines the more information the spectrum contains. However, the more spectral lines used, the longer the measurement takes. Use many spectral lines only when required e.g. when you need to distinguish between two closely-spaced vibration frequencies or when the Fmax is very large. For coast-down or run-up measurements we recommend a resolution of 400 lines.

Fmin

The purpose of the Fmin setting is to eliminate the 'ski-slope' effect from the low frequency end of the spectra. All spectral lines **below** the Fmin value will be set to zero and will **not** be included in the overall RMS calculation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Tach Trigger

When you select Tach Trigger, measuring begins only when a tachometer pulse is detected. If Tach Trigger is set to OFF the instrument will begin measuring as soon as the settling time has elapsed.

Averaging

When measuring vibration, several spectra are usually measured and averaged to produce an average vibration chart. The averaging process minimizes the effect of random variations or noise spikes that are inherent in vibration signals. Averaging is applied to amplitude values, not to the frequency range.

- From your chosen measurement setup menu press ALT to display the various averaging options.

Number of Averages

The larger the number of spectra used for averaging, the more any noise spikes in vibration signals are reduced and the more accurately true spectral peaks are represented. However, the larger the number of averages, the more data needs to be collected and therefore the longer it takes to obtain the average spectrum. Four averages are sufficient for most cases. Set the number of averages to one if spectra averaging is not required, for example, with run-up and coast-down recordings.

Average Type

Linear averaging is suitable for most cases. The amplitude value at each frequency of a spectrum is added to the same frequency of the next spectrum. The sum is then divided by the number of averages taken.

Exponential averaging is occasionally used during manual measurements to give the advantage of a fast update rate, while maintaining some averaging. The most recent spectra have more influence on the average than earlier measurements. Averaging is continuous until the measurement is stopped.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Peak hold is useful for measuring the maximum amplitude peak that occurs over a period of time, and for measuring resonances during a bump test. Peak hold does not actually average the amplitude values, but records and displays the maximum amplitude of each spectral line.

Average Overlap

Overlapping is a means of collecting and displaying data more quickly. As vibration measurements are collected a percentage of the new data is combined (overlapped) with each subsequent measurement. The higher the overlap percentage, the less newly acquired data is needed to generate a spectrum, and thus the faster the spectrum can be displayed. An overlap percentage of 50% is ideal for most cases.

Window

Note: Windowing is not available with waveforms.

Measured data is usually not directly used to generate a spectrum but is first modified using a 'Window' function. The purpose of windowing is to compensate for certain FFT algorithm limitations that cause signal leakage. Windowing involves multiplying 'blocks' of data values by a suitable mathematical function (window type) to ensure that the data block begins and ends with zero amplitude. This makes the data block appear like a complete wave.

Choosing a window type

You can choose Hanning or Rectangular (no window). Each type of window has characteristics that make it better suited for some applications and less well suited for others. The following table is a general guide only; you should match the window type to the nature of the signal you are trying to capture such as random or transient signals etc.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Window Type	Purpose
Hanning window	Provides the best frequency resolution. The Hanning window is a good general purpose window.
Rectangular	The FFT is not adjusted i.e. this is equivalent to not using a window.

Explaining Waveform Parameters

Equivalent Fmax

The Equivalent Fmax parameter affects the duration of a measurement. A high Fmax reduces the length of time that you can measure the waveform, whereas a low Fmax allows for a lengthier measurement. If the waveform is later transferred to the Ascent program and displayed as a spectrum, this Equivalent Fmax value will be used on the chart.

Number of Samples

The resolution of the waveform increases with the number of samples used i.e. the more samples, the more information the waveform contains. However, the more samples in a waveform, the more memory is used up to store the waveform.

Tip: An easy way to select the number of samples and duration is to let the instrument set them for you. Set the Equivalent Fmax so that it covers your required frequency range; the instrument will select the maximum number of samples and duration that can be used with this Fmax. You can then adjust these values as required.

Duration

The Duration of a waveform is its recording time. The duration value depends on the number of samples selected; increasing the number of samples increases the duration.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Other Measurement Parameters

Bandwidth (available with Demod Spectrum): the bandwidth you select determines which range of frequencies the demodulation process will use. Refer to the topics on demodulation for more information.

Machine speed (available with Cross Channel Phase): when measuring cross channel phase you need to specify which frequency you are investigating - this is typically the machine running speed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 6: Measurement Types and their Uses

This section describes how to setup and take different measurements types.

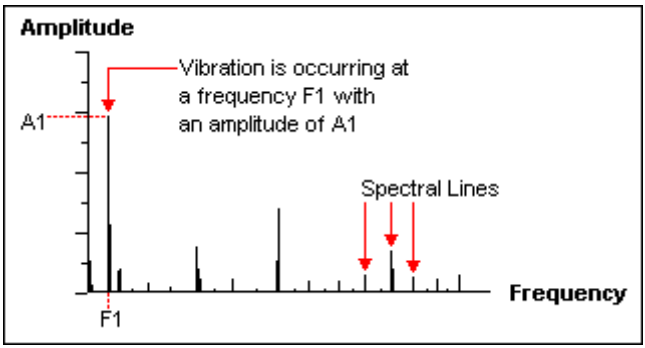
You will learn:

- How to take different types of measurements
- What are some of the uses of different measurement types

Spectrum

A vibration spectrum is a chart of vibration amplitude versus vibration frequency. The vibration spectrum of a machine component shows the frequencies at which the component is vibrating and the amplitude of vibration at each of these frequencies.

Spectra consist of discrete spectral lines displayed at fixed frequency intervals. The height of each spectral line represents the amplitude of vibration at that frequency. The more spectral lines in a spectrum, the higher the resolution of the spectrum (but more memory is used).



A simplified illustration of a discrete vibration spectrum

The key parameters you need to set are the number of spectral lines and the Fmax to ensure that all crucial information is captured.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Main Menu press 2 Measure then press 6 Spectrum.
- Use the left-hand arrow keys to select a parameter set or create a new one by pressing 4 and setting the parameters as required.
- Press ✓ to begin measuring.

Waveform

Waveforms show how vibration levels change with time. A vibration waveform chart represents a series of equally spaced discrete sample points connected by straight lines. The chart shows the vibration level (amplitude) at each time interval during the measurement period. The more sample points in a spectrum the higher the resolution of the waveform (but the more memory used).

The key parameters you need to set are the duration and number of samples.

The duration determines the equivalent Fmax value. If the waveform is later transferred to the Ascent program and displayed as a spectrum this Fmax value will be used on the chart.

The number of samples controls the number of spectral lines used when the waveform is transferred to the Ascent program and displayed as a spectrum.

- From the Main Menu press 2 Measure then press 7 Waveform.
- Use the left-hand arrow keys to select a parameter set or create a new one by pressing 4 and setting the parameters as required.
- Press ✓ to begin measuring.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Demodulation Explained

The demodulation process looks for repetitive patterns created by impact events that lie embedded within a time waveform. The process works by extracting the low amplitude, high frequency impact signals and then tracing an 'envelope' around these signals to identify them as repetitions of the same fault. The resulting spectrum, with the low frequency data removed, will now clearly show the high frequency impact signals and harmonics.

Demodulation is also useful as an early warning device as it detects bearing tones before they are visible in a normal spectrum.

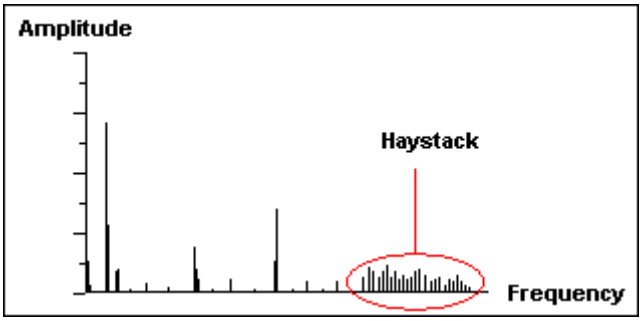
The high frequency signals that demodulation aims to extract are very localized, therefore extra care must be taken to ensure the accelerometer is setup correctly. Ensure that:

- The accelerometer is mounted close to the signal source.
- The accelerometer is well coupled, using either stud mounting or a very strong magnet on bare metal. A handheld probe or stinger is not recommended.
- The accelerometer mounting is consistent between visits otherwise trend plots of overall RMS values will be meaningless.

The bandwidth you select determines which range of frequencies the demodulation process will use. We recommend you use the following procedure to determine an appropriate bandwidth.

- First take a 'quick snapshot' spectrum measurement. From the Main Menu press 2 Measure then press 6 Spectrum.
- Press 4 to create a new parameter set then set the Store Units to Acceleration and Fmax to 20 000 Hz (1200 kCPM).
- Press ✓ to begin measuring.
- Examine the chart for a region of broadband high frequency noise or 'haystack'. Such a haystack might look like the one below.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



- When you set up your demodulation measurement select a bandwidth which includes the haystack but excludes any large individual peaks such as those shown to the left of the haystack in the example diagram.

It is very important that all the large-amplitude/low-frequency peaks are rejected. If there are no significant haystacks displayed, we recommend a standard bandwidth of (2 to 10) kHz (120 to 600) kCPM. When you have determined an appropriate bandwidth proceed with the demodulation measurement.

Analyzing Demodulation Data

Measuring, recording and viewing data is exactly the same as for a Frequency/Acceleration spectrum. The demodulation spectra can also be transferred to Ascent and analyzed using the same techniques as for normal spectra e.g. trend plots, alarms, fault frequencies, bearings and gears.

The following are points to keep in mind when analyzing demodulation data:

- Bearing tones appearing in the demodulated spectrum but not in the normal spectrum are a good early warning indicator. This often points to insufficient lubrication.
- As the bearing deteriorates the baseline noise level increases and bearing tones develop running speed sidebands.
- In the final stages of bearing wear the bearing tones may become less prominent as cracks and pits become more rounded and distributed over the race.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Demod Spectrum

- From the Main Menu press 2 Measure then press 8 Demod Spectrum.
- Use the left-hand arrow keys to select a parameter set or press 4 to create a new one and set the parameters as required. Set the bandwidth first as this will determine the range of available Fmax values.
- Press ✓ to begin measuring.

Tachometer Display

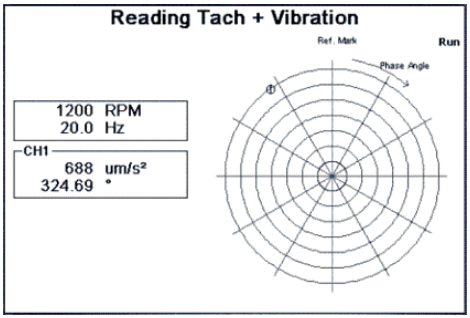
Tachometer Display shows an updating readout of the machine speed. It can also display the amplitude and phase angle of the 1X vibration. This can be used to:

- Verify the machine running speed
- View the phase angle of the vibration relative to the tach signal
- Take a quick preview of the 'out of balance' level

- Connect the tachometer that will be used to measure the RPM. Attach a vibration sensor if you wish to see the vibration amplitude.
- From the Main Menu press 2 Measure then press 9 Tach.
- Select the Standard tachometer or Keyphasor® sensor by pressing 0
- To see the amplitude and phase angle relative to the tachometer signal press 6 Tach + Vibration. Change any parameters as required.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ✓ to take the reading. The Tachometer Reading Menu will display a continuously updating RPM and the equivalent value in Hz.



Time Synchronous Averaging

Time synchronous averaging is a useful vibration analysis technique for distinguishing between spectral peaks that are very close to, but not exact harmonics of, the machine's running speed. After performing a large number of averages, peaks that are whole number multiples of the running speed will still be visible, while those that are non-synchronous will be cancelled out from the spectrum.

The key parameters you need to set are the duration, number of samples and number of averages.

The duration determines the equivalent Fmax value. If the waveform is later transferred to Ascent and displayed as a spectrum this Fmax value will be used on the chart. The number of samples controls the number of spectral lines used when the waveform is transferred to Ascent and displayed as a spectrum.

We recommend you use 16 or more averages in order to remove non-synchronous peaks from the final spectrum.

Note: You **must** use a tachometer or Keyphasor® to trigger your measurements.

- Connect the tachometer or Keyphasor® that will be used to trigger your measurements.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Main Menu press 2 Measure then use the left-hand arrow keys to highlight Time Synchronous Averaging and press ✓
- Use the left-hand arrow keys to select a parameter set or press 4 to create a new one and set the parameters as required.
- If you are creating a new parameter set, select the number of samples, duration and tach trigger source, then press ALT and 1 to set the number of averages.
- Press ✓ to begin measuring.

Bump Test

The bump test is a useful vibration analysis technique to help identify resonance frequencies in a machine's structure. It requires 'bumping' (i.e. hitting) the machine structure when the machine is stopped, while taking a peak hold measurement. Careful selection of the mallet or hammer is required along with the strength and direction of the bump to ensure that suitable frequencies are injected into the structure without causing damage.

- From the Main Menu press 2 Measure and use the left-hand arrow keys to highlight Bump Test then press ✓
- Use the left-hand arrow keys to select a parameter set or press 4 to create a new one and set the parameters as required.
- Press ✓ to begin sampling and 'bump' the machine with a hammer. Repeat several times.

Bump test measurements are taken in free run mode and use peak hold averaging. The instrument will take continuous samples and update the peak value for each spectral line whenever a line exceeds its previous value.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Coast-down/Run up

Coast-down and run-up measuring involves taking a series of recordings with a short delay between them. This technique can be used to study the resonance behavior of a machine as its speed gradually increases during power-up, or decreases during coast-down.

- From the Main Menu press 2 Measure and use the left-hand arrow keys to highlight Coast-down/Run-up then press ✓
- Use the left-hand arrow keys to select a parameter set or press 4 to create a new one and set the parameters as required.
- Press ✓ and select the machine location to save measurements to, then press ✓ again to begin measuring. After the first spectrum has been recorded switch off the machine, or begin ramping its speed up or down.
- Once the machine has stopped rotating, or its speed has been fully adjusted, press X to stop measuring and return to the Coast-down/Run-up Menu.

The measurement location will contain a large number of measurements. You can transfer these to the Ascent software and display them as a waterfall chart, and as a bode plot if you used the tachometer as well.

Recommendations
We recommend using a tachometer to obtain the RPM reading for each measurement as this aids interpretation.

You can set the Recording Interval as either a time interval between recordings, or as a change in machine RPM. We suggest using the latter, with the RPM Difference set to machine speed / 20. This will result in approximately 20 recordings being taken during a complete coast-down or run-up.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

A large number of recordings are taken during a coast-down or run-up. If you intend to repeat the process several times on a machine we recommend you save each set of recordings to a separate location so that they can be easily distinguished.

Cross Channel Phase Explained

Phase analysis is an effective means of diagnosing machine faults such as misalignment, resonance, soft foot and looseness among others. Phase analysis is also useful in distinguishing faults that look like imbalance but are actually caused by something else (such as misalignment, which can show up at 1X RPM similar to imbalance). Knowledge of the phase relationships of various machine faults will help to confirm the existence of a specific machine fault and help to prevent misdiagnosis.

Cross channel phase is a convenient method of taking phase measurements that does not require the use of a tachometer or reflective tape. Instead, phase is measured between two sensors.

Note: When taking measurements, be aware of the direction each sensor is facing. If you are measuring across the coupling in the axial direction you will probably turn the sensors in opposite directions, thereby introducing an additional 180° phase change. Remember to take this into consideration when analyzing the phase measurements.

Recommendations for cross channel phase

1. Determine the exact frequency of interest by using spectra to identify high amplitude peaks at specific frequencies.
2. Position the channel 1 sensor in a location which has high vibration at this frequency. Do **not** move this sensor once testing has started.
3. Try out different locations with the channel 2 sensor, noting the phase and amplitude relationships compared to the fixed channel 1 position.
4. Repeat steps 2 and 3 at any other locations of interest.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Fault Types and their Phase Relationships

Misalignment - High amplitude peaks will appear at 1X, 2X and sometimes 3X the running speed. Look for a 180° (± 30°) phase change across the coupling in the axial direction (for angular misalignment) or radial direction (for parallel (offset) misalignment). Bearing misalignment (cocked bearing) will cause a twisting motion in the axial direction. Look for a 180° (± 30°) phase change from the top to the bottom of the bearing housing or from one side to the other.

Imbalance - A high amplitude peak will appear at 1X the running speed. Confirm that the phase difference from horizontal to vertical on the bearing is close to 90° (± 40°). The phase difference between left and right horizontal locations should be within 30° of the phase difference between left and right vertical locations. If the phase is unstable there may be another reason for a large running speed vibration e.g. looseness or misalignment.

You can investigate the degree of couple imbalance versus force imbalance by looking at the phase difference between the two sides of the machine - if there is little couple imbalance then only a single plane correction may be required to balance the rotor.

Resonance (flexible structures) - High amplitude peaks will appear where natural resonance frequencies of the structure coincide with excitation frequencies (e.g. 1X, other low orders of running speed, blade pass frequency etc). Look for a 0° phase change when both sensors are positioned in the same direction between two stationary points. The phase change will be 180° when there is a stationary point between the sensors.

Resonance (variable speed machines) - To investigate resonance you can vary the machine speed. A phase shift of 180° will occur as machine speed is increased from below a resonance to above a resonance. A 90° phase shift will be present at the resonant frequency. If a machine is running close to resonance, any small speed variation will cause large phase shifts.

Resonance (at a bearing) - Look for a change from the normal 90° phase difference in the horizontal and vertical directions at 1X. When a natural frequency is close to 1X in either direction, that phase

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

angle may be well be on the way towards its 90° phase change so the two phases may no longer be 90° apart (assuming that the structure has a different natural frequency in either direction).

Eccentric belt pulley - A high amplitude peak will appear at 1X the running speed of the pulley. Look for a phase change of either 0° or 180° between the horizontal and vertical readings, which indicates straight line motion instead of the usual 90° difference. This symptom is similar to bearing resonance (described above) but in this case the direction of maximum vibration will be in line with the two belts.

Mechanical looseness - High amplitude peaks will show up at many multiples of the running speed and sometimes even multiples of 0.5X running speed e.g. 1.5X, 2.5X etc. Look for fluctuating phase readings at a location from one recording to the next to the next. Also compare the phase readings at 30° increments around a bearing housing - the phase will be significantly different at each angle.

Mechanical foot looseness (soft foot) - A high amplitude peak will show up at 1X the running speed. Look for a 90° to 180° phase change between the machine foot and its concrete base. The soft foot may also have a different phase measurement from the other feet.

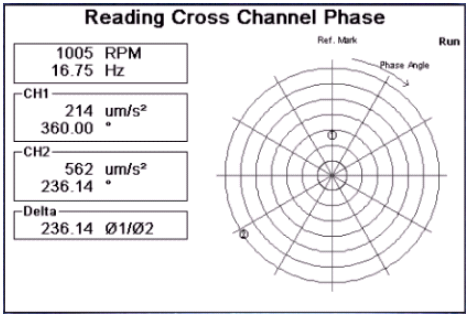
Measuring Cross Channel Phase

The key parameter you need to set is the machine speed. The machine speed can be the actual speed of the machine or the frequency of interest (these are usually the same as the most common fault types you will be looking for occur at the machine's running speed).

- Connect two sensors to the appropriate machine locations.
- From the Main Menu press 2 Measure then use the left-hand arrow keys to highlight Cross Channel Phase and press ✓
- Use the left-hand arrow keys to select a parameter set or press 4 to create a new one then set your units and machine speed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- You will need to assign two sensors and enable both channels. Press ALT then press 5 Sensor Setup and create or select your sensors as required. Press ✓ to continue.
- Press ✓ to begin measuring both channels.



The instrument will perform a spectral peak search on channel 1 at the entered frequency. The frequency of the **actual** peak displays at the top-left of the screen in Hz. The instrument then looks at exactly the same frequency on channel 2 and displays the phase difference Delta <value> $Ø_2/Ø_1$ (CH2 - CH1). The instrument also displays the phase angles and amplitudes of both channels at your chosen peak frequency.

Long Time Waveforms Explained

Long time waveforms allow you to take a continuous recording over a very long time period (over 17 hours), making it particularly useful for capturing transients. Once measuring has begun recordings are taken continuously until your specified time period has elapsed or you manually stop the measurement. The amount of time you can record for depends on the Equivalent Fmax (which determines the sample rate/lines of resolution) *and* how much available memory is left in the instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Measuring Long Time Waveforms

Duration is the total amount of time available for recording and is displayed in seconds. You can record for the full length of time available or set a shorter time period. Your chosen time period is shown on top, while the available time is shown in brackets below this value.

The Equivalent Fmax (which determines the maximum frequency displayed on-screen) will affect the available recording time; a high Fmax reduces recording time, while a low Fmax increases the total amount of time available for recording.

While the instrument is recording you can display the on-screen signal as a waveform, or convert it to a spectral display by pressing Display Type & Resolution and selecting your preferred display type.

- From the Main Menu press 2 Measure then use the left-hand arrow keys to highlight Long Time Waveform and press ✓
- Set your parameters as required and press ✓ repeatedly to move forward through the menus. To view a spectrum instead of a waveform press 8 then ✓ and select your required resolution.
- Press ✓ to begin measuring. During measuring the number at the top of the screen indicates how many recordings have been taken.
- When measuring is complete the screen will display a waveform 'block' (or spectrum if you selected this option) and a trend of the overall power in the last recording. To view the power in another recording use the right-hand arrows to move the cursor.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



- The top chart can also display a trend of the machine speed if you used a speed sensor. To toggle between overall power and RPM press 8

When measuring is finished the selected measurement location will contain many individual recordings. .

When the waveforms are later transferred to the software and displayed as spectra, the equivalent Fmax value will be used on the chart. (The actual sampling rate is 2.56 times higher than this Fmax value.)

Viewing Long Time Waveforms on your PC

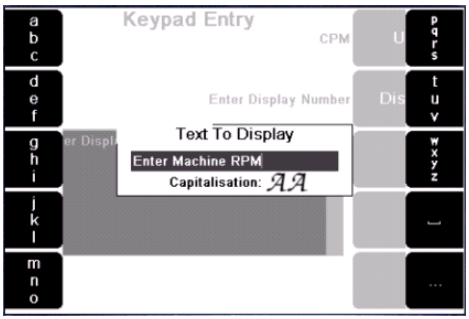
When you have finished recording, the selected measurement location will contain many individual 4096 sample recordings. After transferring these to your PC you can then use the waveform analysis tools to create a high resolution spectrum of the recordings by selecting **Analyze>Partial Waveform Analysis** or **Freq. Based Waveform Analysis** (refer to your Ascent *Software Reference Guide* for full instructions).

Keypad Entry

Keypad entries can be used to collect additional information about your machines, such as temperature or motor current. The person collecting the data must manually enter a numeric value via the keypad, rather than collecting data with a sensor. Full details on the practical applications of keypad entries are contained in the Ascent *Software Reference Guide*.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Main Menu press 2 Measure then use the left-hand arrow keys to highlight Keypad Entry and press ✓
- Use the left-hand arrow keys to select a keypad entry or press 4 to create a new one.
  - If you are creating a new keypad entry, use the arrow keys to highlight it then press 6 to select the type of unit you wish to measure.
  - Press 7 Display and create the text that will display on-screen when you collect the data e.g. 'Enter Machine RPM'.



- Now instead of taking a measurement, press ✓ and enter your value using the keypad.
- Press ✓ to select a machine location to save this data to. Use the left-hand arrow keys to scroll up and down and press 7 (Expand Navigator) repeatedly to expand out a machine so that its points and locations become visible. Press ✓ to save the data to your chosen location.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

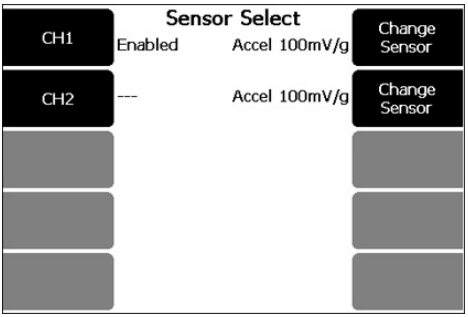
Taking Multi-channel Simultaneous Measurements

Taking a dual-channel measurement uses the same process as taking a single channel measurement. The only difference is that you must enable more than one channel, and save each measurement separately. You do not have to save each channel's measurements as you can selectively choose which ones to keep, e.g. you can save a measurement taken on channel 2 but discard the measurement taken on channel 1.

Setting up Sensors and Channels

- Select your measurement type and parameters as normal and press ALT then 5 Sensor Setup.
- You will need to assign and enable a sensor to each channel you are measuring. Press Change Sensor opposite your chosen measuring channel. (If this is new sensor that has not yet been defined in the instrument you will need to create a sensor definition before you can assign it to a channel. See Defining and Editing Sensors on page 97.)
- Use the arrow keys to highlight a sensor then press ✓ to assign it to your channel.
- To enable the channel for measuring, press the left-hand key beside your chosen channel. The text will change from --- to 'Enabled' to indicate that this channel can now be used to take measurements.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



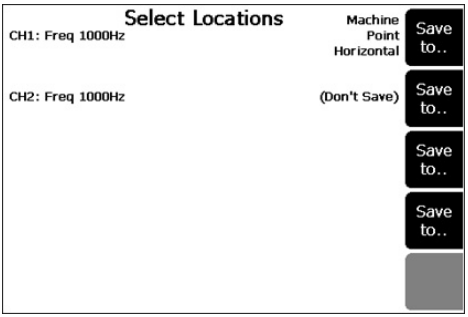
- Repeat this process to enable additional channels then press ✓ twice to begin measuring. To save the measurements refer to the next topic.

Saving Multi-channel Measurements

Note: If you are going to transfer your measurements to the Ascent software, be aware that the program identifies recordings by their location and date/time stamps. If two or more recordings are taken at the *same* time and saved to the *same* location, they will have identical date/time stamp and location details; this will cause the Ascent program to delete one of your measurements. To prevent this we recommend that you adopt best practice and store your recordings in measurement locations that reflect the direction the sensors were placed when the measurement was taken.

1. When you are ready to stop measuring press ✓
2. Press 5 Save. This opens the Select Location to Save Menu.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



3. You can save each channel's measurements or select only those that you wish to keep. Press the right-hand Save key opposite the channel you wish to save.

4. Use the arrow keys to select a location to save the measurement or press ALT if you need to create a new location. (See Storing Measurements on page 40 for more information.)

5. Press ✓ to return to the Select Location to Save Menu. Repeat this process from step 3 to store your other measurement. If you change your mind after saving a measurement press the channel's right-hand Save key again - the text will change to '(Don't Save)'.

6. When you have selected all the measurements you want to save press ✓ The instrument will display 'Data Saved' before returning to the measurement screen.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 7: Taking Recordings (Offsite Analysis)

This section describes how to take recordings with your instrument.

You will learn to:

- Take recordings
- Review and delete recordings
- Attach notes to recordings
- Create and display baselines

Walk-through: Taking Recordings

The following instructions assume that you have already created your machine structures and have assigned parameter sets to the measurement locations.

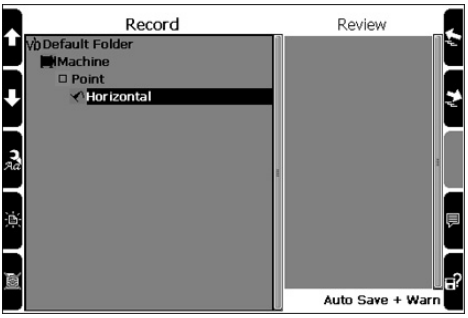
1. Connect your sensors to the appropriate measurement locations. If you are taking tachometer readings, set up the tachometer also.

2. Ensure the folder containing the machines you want to monitor is selected; the name of the currently selected folder will display on the Main Menu beside the 'Folders' label. If you need to select a different folder press 4 Folders and use the arrow keys to highlight your choice then press ✓ This loads the folder and all its machines into current memory and returns you to the Main Menu.

3. Press 3 Record Review to display the machines within this folder. If necessary, select Save by pressing 0 (for a recording this should normally be set to Auto Save. Refer to Recording Save Options on page 72 for more information).

4. Use the left-hand arrow keys to scroll up and down and press 7 Expand Navigator repeatedly to expand out a machine so that its points and locations become visible.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



5. To take an individual recording, highlight the parameter set that you wish to record. If you want to record all parameter sets at a location, highlight the location. The recordings will be taken one after the other in the sequence that they appear in the instrument.

6. To start the first recording press ✓ The instrument and sensor will take a short time to settle before recording begins.

When the recordings are finished the instrument stores them to the correct measurement location and returns you to the Record Review Menu. To take additional recordings, select another parameter set (or select a location to record all parameter sets under that location) and repeat this process from step 5.

Taking Individual and Multiple Recordings

You can choose to record all parameter sets at a location or select the parameter sets individually. This allows you to selectively record data, or speed up data collection by reducing the number of key presses needed to take multiple recordings at a single location.

- To record an individual parameter set, highlight it and press ✓ to begin recording.
- To record every parameter set under a location, highlight the location and press ✓ to begin recording.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Saving Recordings

When you are in the Record Review Menu you have several options for saving your recordings.

Auto Save
The instrument momentarily displays the recorded information on-screen before returning you to the Record Review Menu.

Record & Review
The instrument pauses after each recording so that you can review it on-screen.

- To take the next recording press X This will either return you to the Record Review Menu or, if you have selected a location with multiple parameter sets underneath it, begin taking the next recording.

Free Run, Manual Save
The instrument will continuously record the signal and update the on-screen display.

- To stop measuring press ✓ To save the recording press 5
- To record the next parameter set without saving this recording press X This will either return you to the Record Review Menu or, if you have selected a location with multiple parameter sets underneath it, begin taking the next recording.

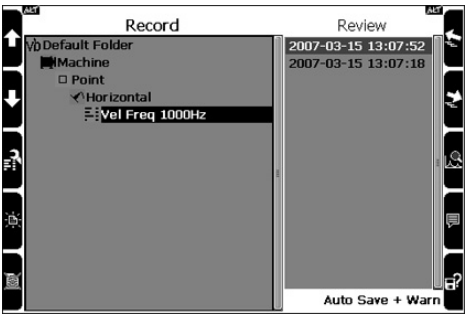
Reviewing Recordings

To review recordings immediately after taking them you can set the instrument's save option to Record & Review; to do this, from the Main Menu press 3 Record Review then press 0 repeatedly until Record & Review displays in the lower right-hand corner of the screen.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To review stored recordings

1. From the Main Menu press 3 Record Review.
2. To select a recording for review, use the left-hand arrow keys to scroll up and down and press 7 Expand Navigator repeatedly to expand out a machine so that its locations and parameter sets become visible.
3. When you highlight a parameter set its associated recordings will appear in the Review column. The newest recording is highlighted at the top of the column. To display the newest recording press 8 Review Selected Recording.
4. To display older recordings press 7 once more to select the Review column; a black border will appear around the column indicating that you can now move up/down through the recordings. Use the left-hand arrow keys to select a recording then press ✓ to display your selection.



The black border indicates all recordings can be reviewed

5. When a recording is displayed you can use cursors, harmonics and zooming to better analyze the data. Press ? to display hint labels and refer to the appropriate topics in Analyzing Measurements (page 31) for details of how to use cursors and zooming.
6. When you have finished reviewing the recording press X to return to the Review column from where you may select

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

another recording for review, or press and hold X to return to the Main Menu.

7. To select recordings from a different parameter set, location or machine, press 6 to navigate back to the machine list in the Record column. A black border will appear around the Record column indicating that you can now select items.

8. Repeat steps 2-4 to review additional recordings.

Deleting Recordings

- To delete an individual recording, access the Record Review Menu and select the recording as described in the previous topic.

- Press 5 to delete the recording.

Attaching Notes

- To add a note, highlight a recording in the Review column then press 9 to open the Note Menu. Refer to the appropriate topics in Working with Notes (page 99) for details of how to create and attach notes to your recordings.

Working with Baseline Recordings

Note: You can only display baseline recordings when taking a recording from the Record Review Menu or from the Route Menu. You cannot display a baseline using the Measure Menu.

The overall vibration power level of the baseline is displayed on the same chart as your current recording. This provides immediate feedback of any change in vibration level and can act as a basic check of the validity of your new recording.

To create a baseline recording, you can either send a baseline from the Ascent program (refer to the Ascent *Software Reference Guide*) or use one of the recordings stored in the instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- To use a stored recording, navigate to the Record Review Menu, press 7 to select the Review column then use the left-hand arrow keys to highlight a recording to use as a baseline - do **not** display the recording.

- Press 0 Set as Baseline. A right-facing arrow will appear beside the recording to indicate that it is a baseline recording.

The next time you take a recording, the baseline overall power level will display in the top-right hand corner of the screen directly underneath the current recording's overall power level. The instrument's LED lights will also indicate the status of the recording relative to the baseline:

- <25% - Red LED on
- <50% - Yellow LED on
- >150% - Yellow LED on
- >200% - Red LED on
- ADConvert overflow - Yellow LED on

Unassigning a baseline

- To remove a recording's baseline designation repeat the instructions for assigning a baseline.
  OR
- Assign the baseline to a different recording. This automatically removes the baseline designation of any previous recording.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 8: Sending and Receiving Information

This section describes how to transfer information between your instrument and the Ascent software.

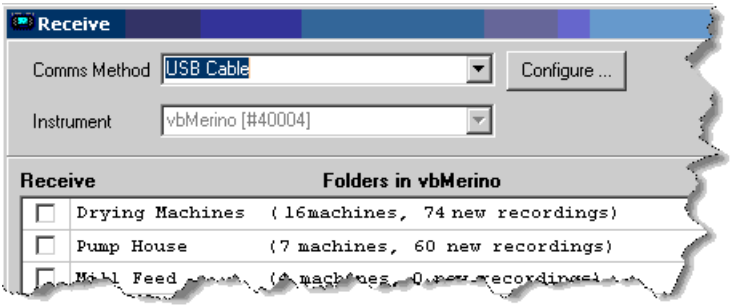
You will learn to:

- Transfer information to and from the instrument
- Synchronize the instrument's timezone with the computer that receives the recordings
- Change the instrument and software network address

Transferring Recordings to the Ascent Program

- If you are using the Commtest supplied data transfer cable, connect this to the USB ports of the instrument and computer.

- Power up the instrument and click the Ascent **Receive** button to establish communication between the software and instrument. Check that the Comms Method in the upper left of the window is correct - select a different option from the drop-down box if required.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- The instrument transfers recordings by sending entire storage folders to the PC. Select which folders you wish to transfer by ticking the boxes.
- Click **Receive** near the bottom-right of the window to begin transferring recordings. When the transfer is complete click **Close**.

Transferring Folders to the Instrument

- If you are using the Commtest supplied data transfer cable, connect this to the USB ports of the instrument and computer.
- Power up the instrument and open the Ascent program. Click the Ascent **Send** button to establish communication between the software and instrument. Check that the Comms Method in the upper left of the window is correct - select a different option from the drop-down box if required.
- Select which folders you wish to transfer by ticking the boxes. Click **Send** near the bottom-right of the window to begin transferring your folders.
- When the transfer is complete click **Close**.

Re-sending Updated Folders

Normally you will create all your machines in the Ascent software and send them to the instrument one time only. If you add or change a route, machine or parameter set in the software, you will need to re-send that folder to the instrument so that it learns about your changes.

Each time you re-send an existing folder from the Ascent software, the send process will overwrite the folder's contents in the instrument. Any machines, routes and parameter sets etc that you have added or deleted in the software will also be added or deleted in the instrument. In addition, all stored recordings are also deleted. This is designed to free up instrument memory and save you the task of manually deleting recordings and machine definitions etc.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Keeping stored recordings
If you wish to keep any recordings stored in the instrument, re-name the folder either in the instrument or the software before re-sending. The instrument will treat this as a new folder so will not overwrite the contents of the existing folder.

Keeping baseline recordings in the instrument
If a recording is marked as baseline in the Ascent software it will be transferred to the instrument when the folder is re-sent. If a different recording is marked as baseline in the instrument this will be replaced with the newly sent baseline.

Synchronizing the Timezone on the Instrument and PC

The instrument's date and time may differ from that of the computer which receives the recordings, particularly if you are sending recordings to a country in a different timezone. You can synchronize the time clock of the instrument with a recipient computer by automatically updating the instrument's date/time each time you transfer data using **Send** or **Receive**.

To use this feature the receiving computer must have 'Synchronize VB Date and Time with the PC' turned on (see the Ascent *Software Reference Guide*, Synchronizing the Instrument Date/Time with your PC).

- From the Main Menu press 0 twice.
- Press 5 Ascent Time Sync to toggle the setting. The following options are available:

  Auto Synchronize the date and time whenever data is transferred.

  Off Do **not** synchronize the date and time i.e. the instrument will continue to use whatever date and time settings that you specify.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Manual Synchronize the date and time only if the timezone is different or the instrument timeclock differs from the computer by more than one minute.

- You will be prompted to update the instrument date/time only when Manual is selected. When the prompt appears press ✓ to synchronize the time or X to keep the instrument's date/time settings.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 9: Using Routes

This section describes how to manage routes with your instrument.

You will learn to:

- Use a route to take recordings
- Change the order in which recordings are collected
- Review recordings during a route
- Take off-route recordings

What is a Route?

A route is an ordered list of measurement locations and pre-defined measurement setups (parameter sets) that you follow when taking recordings. Using a route simplifies the task of taking recordings and minimizes the potential for mistakes. When the instrument is operating in route mode it guides you through each measurement location in sequence.

Before creating a route you must first create the machines and measurement setups, then create the routes by selecting these items and placing them in the desired order. A route can only be made up of machines that are stored within the same folder as the route. You will need to use the Ascent software to create and manage your route library then transfer your folders to the instrument (see the Ascent Software Reference Guide, Creating a Route).

There is no limit to the number of routes you can send to the instrument. Each folder can store any number of routes until the instrument's memory capacity is reached.

Walk-through: Taking Recordings Using a Route

Once you have taken the first recording the instrument will continue to guide you through the remaining route entries. You can take recordings sequentially as they appear in the route list, or change the order as you go by skipping individual route entries or machines. This is particularly useful if a machine is temporarily off limits as it

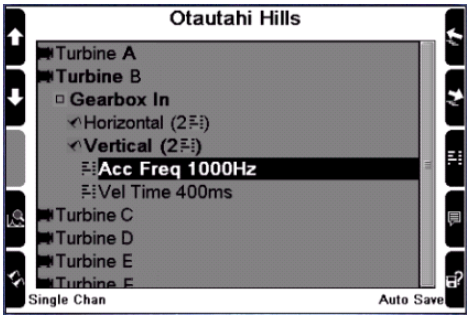
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

allows you to continue taking measurements and return to the machine at a later time.

If a location contains several route entries that don't require a change of sensor, the recordings can be taken automatically one after the other - to do this, move the selection bar over a location so that it is highlighted. If an individual route entry is highlighted the instrument will only collect that route entry then will pause waiting for input from you. If you need to change sensors a message will display informing you which sensor or tachometer to connect.

- From the Main Menu press 1 Route then use 1 and 2 to scroll the list and highlight a route. (To see which machines are listed on your highlighted route use the right-hand arrow keys to expand and collapse the machine list.)

- Press ✓ to select the highlighted route. The screen displays the machines and locations, and the highlight bar indicates where the route will begin. Beside each location is a number indicating how many route entries are due to be recorded. (To see the route entries attached to each location use the arrow keys to expand and collapse the route entry list.)



- Attach your sensor to the location indicated on the instrument screen. If you want to record all parameter sets at this location automatically (rather than manually starting each measurement) highlight the location rather than one of its parameter sets.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ✓ to begin recording. When the first location's recordings are complete the Route Menu displays again with the next location highlighted. A percentage symbol indicates how many of the previous location's route entries were recorded.

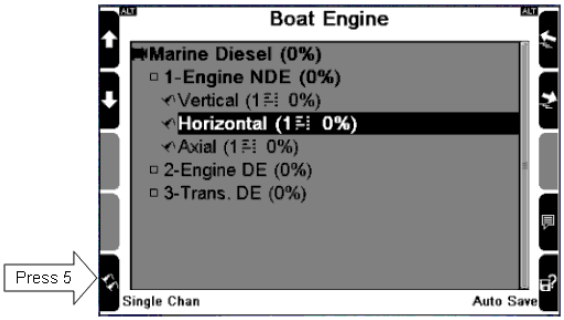
- Press ✓ again to begin the next measurement. Continue to take recordings until all route entries have been recorded.

Recording Multiple Channels on a Route

You can create multi-channel recordings in the Ascent software as part of a route. When you collect the measurements, if a multi-channel recording is required the instrument will prompt you to place the required number of sensors on their respective locations. When you start the recording all measurements will be taken simultaneously.

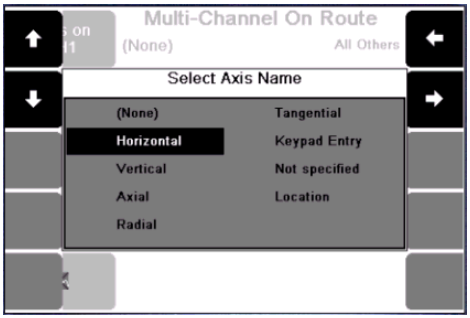
Before you collect the first route recording you need to specify which channel will be used to record each axis e.g. 'use channel 1 to collect all recordings taken on the horizontal axis'. When one channel is designated to a specific axis the other channel becomes the default for collecting recordings on all other axes.

- Select the route you wish to record as described in the walk-through, then with your route displayed press 5 to display the Multi-Channel On Route Menu.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Specify a channel and axis combination. Press 1 Axes on CH1 (or press 2 for CH2) and use the arrow keys to select an axis. Once selected, you must **only** use this channel when taking recordings on your chosen axis (for the duration of this route). Press ✓ to confirm.



- Now you need to tell the instrument to use the **other** channel for all other axes. Press 6 to select CH1 or 7 to select CH2. The text 'All Others' will display. Once selected, you must **only** use this channel to collect measurements (the instrument prompts will remind you to do this).

- To cancel multi-channel recording press 5. The text 'None' will display, indicating that neither channel is designated to a specific axis.

- Press ✓ to re-display your route then begin recording as normal.

Skipping Route Entries and Machines

You can change the order in which you collect recordings by 'jumping' to a different position in the route. This allows you to skip individual route entries, locations or entire machines. This is particularly useful if a machine on your route is temporarily off limits but will be available for recording later that day.

The instrument pauses after each location's parameter sets have been recorded so that you can continue to follow the route as it has

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

been defined, or manually choose the next route entry. Whenever you skip to a different position in the route the instrument will continue the route from that point forward.

To skip individual entries or entire machines you simply move the highlight bar to the next position where you want to begin recording.

- To skip an item, use the left-hand arrow keys to move the selection bar up and down and press 7 repeatedly to expand out a machine so that its locations and route entries become visible.
- Press ✓ to begin recording again at the highlighted position.

Locating Skipped Route Entries

You can locate and record any skipped route entries at any time during your route.

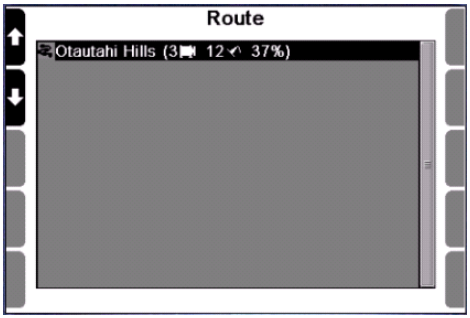
- With your route displayed press ALT then ? to display the hint labels.
- Press 1 (Prev Free Recording) or 2 (Next Free Recording) to jump to the previous or next unrecorded parameter set, then continue recording as normal by pressing ✓

Tracking your Progress Through a Route

As you progress through a route the screen displays the percentage of route entries that have been recorded at each location.

- To see what percentage of the entire route is complete press X to return to the Route Menu. The percentage completed (expressed as the number of route entries that have been recorded) displays beside the route name.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



- To return to the route and resume recording, ensure your route is highlighted and press ✓ twice. The instrument will automatically continue where you left off.

Saving Route Recordings

There are three methods of saving route recordings:

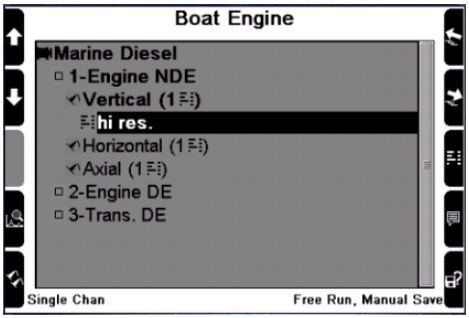
1. Record & Review: The instrument will pause after taking a measurement and continue to display the chart on-screen until you begin the next recording. Use this mode if you want to analyze each machine's condition as you collect the route.

2. Auto Save: This method saves each recording then redisplays the Route Menu so that you can select the next recording. Individual recordings can be reviewed if desired, either immediately after measuring or at any time during route collection (see next topic).

3. Free Run, Manual Save: The instrument takes a continuously updating measurement, allowing you to watch the signal as it occurs on-screen. You can choose to save the measurement or stop measuring without saving. You would normally use this method if you wanted to briefly check each machine's condition and save individual recordings only when a machine required further investigation. (For instructions on manually saving a measurement see Saving Measurements on page 40.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- To select the appropriate recording save mode highlight your route in the Route Menu, press ✓ to display it then press 0 Recording Save Mode repeatedly to toggle the options.

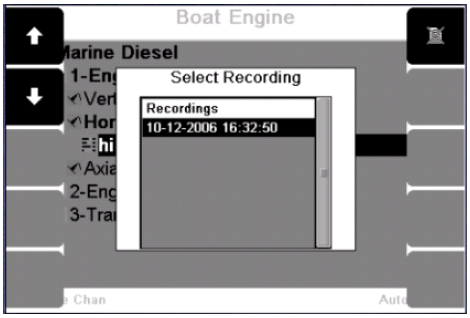


Save options shown at bottom right of screen

Selecting Recordings to Review

- If your route is not currently displayed do this now. From the Main Menu press 1 Route, use the arrow keys to highlight your route then press ✓
- If necessary, use the arrow keys to select a machine and press 7 repeatedly to expand the machine so that the parameter sets display.
- Highlight a parameter set and press 4 Review Recordings.
- If there is more than one recording listed, highlight your route recording (identified by its date/time-stamp) and press ✓ (If you collect the same measurement as an off-route recording, both this and the route recording will appear in the list.)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



- When your recording is displayed you can use cursors, harmonics and zooming to better analyze the data. Press ? to display hint labels and refer to the appropriate topics in Analyzing Measurements (page 31) for details of how to use cursors and zooming.

- When you have finished reviewing the recording press X to return to your route.

Retaking Recordings

Retaking a recording deletes and replaces the original recording with a new one. You can select a location and retake all its recordings or select individual recordings to replace.

- If your route is not currently displayed do this now. From the Main Menu press 1 Route, use the arrow keys to highlight your route and press ✓

- Highlight the machine containing your route recordings and press 7 repeatedly to expand the machine so that the locations and parameter sets display.

- To retake all recordings at a location highlight the location. To retake an individual recording highlight its parameter set.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ✓ You will be prompted to keep or replace recordings, or cancel this action. Press ALT to replace your earlier recordings.

Deleting a Route Recording

- If your route is not currently displayed do this now. From the Main Menu press 1 Route, use the arrow keys to highlight your route then press ✓
- Use the arrow keys to highlight the machine containing the recording and press 7 repeatedly to expand the machine so that the parameter sets display.
- Highlight the parameter set you recorded earlier and press 4 Review Recordings.
- If there is more than one recording in the list, highlight your route recording (identified by its date/timestamp) then press 5 to delete it.
- Press ✓ to return to your route.

Taking Off-route Recordings

When collecting data, you may decide to take additional measurements that are not part of the route sequence. This might be necessary if a machine's vibration pattern does not look as expected when taking the measurement.

- Press and hold X to return to temporarily step out of the route and return to the Main Menu. From here you can set up a new measurement.
- Take and review the measurement as normal, saving it to the machine location if desired. When you next transfer data to the computer, any additional recordings you've saved will be sent along with the collected route.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- To return to the route, from the Main Menu  Route. Use the arrow keys to highlight your route and press  A message will appear asking if you would like to continue. Press  to continue where you left off.

Editing or Deleting a Route

Route creation, editing and deletion is carried out using the Ascent software. You cannot edit or delete routes directly in the instrument. To remove a route you must first delete it in the Ascent navigator, then send that folder to the instrument. Because the folder no longer contains the original route, this route will not appear in the instrument. To edit a route, make your changes in the Ascent navigator then re-send the folder to the instrument.

Note: Deleting a route does not delete the machines and parameter sets that make up the route. These will remain stored in the instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 10: Creating, Editing and Deleting Items

This section describes the procedures for creating folders, machines and other items within the instrument.

You will learn to:

- Create and manage machine structures, sensors and notes
- Copy and delete items
- Rename and edit items
- Attach and remove notes

Storage Capacity and Recording Volume

The instrument's storage capacity is determined by the amount of available memory space, which decreases as more recordings are stored. There is no limit to the number of routes, folders and machines that can be held in the instrument.

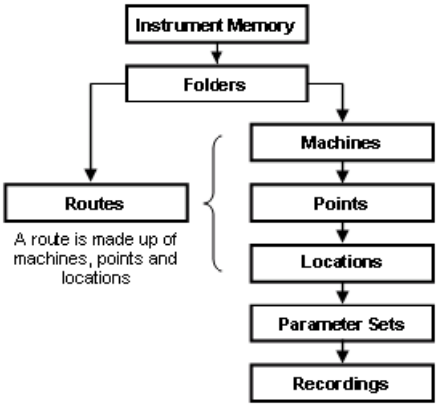
The number of recordings that can be stored depends on the type and setup of those recordings e.g. more 400 line spectra can be stored than 10 minute long time waveforms because the spectra take up less memory space.

How are Recordings Organized and Stored?

Instead of analyzing recordings onsite you can also store recordings in your instrument then transfer them to a PC so they can be analyzed at a time of your choosing. Analysis is best carried out away from machines in a safe, quiet environment.

The instrument uses the following hierarchical data storage structure:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Starting at the bottom of the diagram a **recording** is the data you collect at a particular location on a machine.

A **parameter set** defines a list of measurement parameter values that are used to take a recording. Because parameter sets are stored in the instrument they can be retrieved and reused, which saves time when you are taking large numbers of identical recordings.

A **location** (axis) refers to the direction a sensor is facing when you place it on a machine e.g. horizontal, vertical, tangential etc. Each machine point can have many locations because you can vary the direction (location) of the sensor with each new recording.

A **point** represents a position on a machine that a measurement will be taken e.g. the drive end or driven end.

A **route** is a sequential list of machine measurement locations that you follow when taking recordings.

A **folder** is used to group and identify machines. For example, if you collect vibration data from several factories, you should use a different folder to hold each factory's machines.

Routes, folders, machines, points, and locations are identified by the names you give them. Parameter sets are identified by their parameter value summaries e.g. accel 400 ms or veloc 1000 Hz. Recordings are identified by their date/time stamps.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Working with Folders

Creating a Folder

- From the Main Menu press 4 twice.
- Enter a name for the folder then press ✓
- When you create new machines they will be placed in whichever folder is currently selected. To select a folder use the arrow keys to highlight it then press ✓

Renaming a Folder

- From the Main Menu press 4 Folders.
- Use the arrow keys to select the folder then press 3 Edit Name.
- Edit the name as required then press ✓

Deleting a Folder

- From the Main Menu press 4 Folders.
- Use the arrow keys to select the folder then press 5 Delete Folder.

Working with Machines

If you intend to take large numbers of recordings on a regular basis you should create permanent machine structures so that you can save your recordings to named locations. You can group your machines within different folders so that they can be segregated by type, geographic location, or frequency of data collection etc.

The fastest and easiest way to create your machines is to use the Ascent software to first create your folders, machines and schedule entries, then send these to the instrument. Please refer to the Ascent

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Software Reference Guide, Section 2: Basic Operation, for more information.

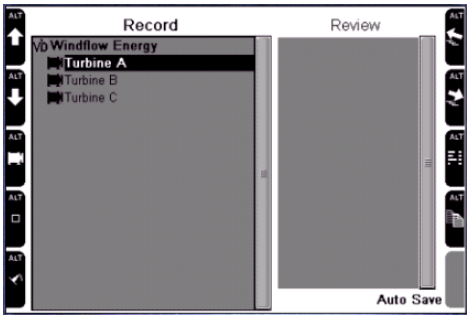
When you create machines and measurement parameter sets in the instrument these are automatically added to the Ascent database when you transfer data from the instrument to your PC.

Creating Machine Structures

Note: You should give each machine a unique name so that they can be easily differentiated. Machines with the same name are differentiated solely on the order they appear in the instrument.

- First select the folder you want to store your machines in. From the Main Menu press 4 Folders and use the left-hand arrow keys to highlight a folder, then press ✓
- Press 3 Record Review then press ALT to display the machine creation icons.

Key	Icon	
3		Machine
4		Point
5		Location
8		Parameter set



- To create a new machine press 3 Add New Machine.
- Enter a name for the machine then press ✓
- To create points, locations and parameter sets, press the keys beside the appropriate on-screen icons and repeat the previous instructions.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Creating Parameter Sets

A parameter set describes the settings that are used to take a measurement. A parameter set includes information such as the type of measurement, Fmax, the units of measurement and number of averages etc.

- To create a parameter set use the arrow keys to select the location to assign it to then press
- Select a measurement type. The screen will display the default parameters for your measurement.
- To assign the *default* parameter set to this location press , or to create a new parameter set press 4 The new parameter set will appear at the top of the list ready for editing.
- To rename this parameter set press 3 Edit Name. Enter a name for this parameter set then press
- Edit the other parameters as required. To assign a different sensor press ALT and refer to the sub-heading below, otherwise press to return to the Record Review Menu.

Changing the default sensor

- To assign a different sensor press 5 Sensor Setup then press Change Sensor opposite your measuring channel and select a different sensor. (To define a new sensor press 4 Create New Sensor. See Defining and Editing Sensors on page 97 for more information.)
- If required, press the left-hand key beside your chosen channel so the text changes to 'Enabled' then press twice to return to the Record Review Menu.

Adding Structures to Existing Machines

- From the Main Menu press 3 Record Review.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- If no machines are displayed press 7 to expand the folder and make the machines visible.
- Use the left-hand arrow keys to select a machine and press 7 repeatedly to expand the machine so that its points and other lower level items are made visible.
- Select the machine, point or location where you want to add the new structure then press ALT to display the machine creation icons.
- Press the appropriate keys beside each icon to create that item.

Copying Machine Structures

You can copy an entire machine or just part of its structure, such as a point or parameter set, and add the copied items to other machines.

Note: Only the machine structure is copied when a new machine is created in this way - recordings are not copied.

- From the Main Menu press 3 Review Record .
- If no machines are displayed press 7 to make them visible.
- Use the left-hand arrow keys to select a machine. To make the points and other lower level items visible press 7 repeatedly.
- Highlight the item you wish to copy then press ALT The copy icon  will appear near the bottom right of the screen.
- Press 9 Copy. The paste icon  will appear near the bottom right of the screen.
- Use the on-screen arrows to choose where your copied item will be pasted then press 0 Paste.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Renaming Machine Structures

Caution: The Ascent software identifies machines structures and sensors by their names. If you rename an item in the instrument the Ascent software will treat this as a new item when data is transferred.

Note: The default locations (horizontal, vertical etc) cannot be renamed. If you want to rename a location from horizontal to vertical, say, simply create a new vertical location on a point and copy any required parameter sets from the horizontal location, then delete the horizontal location.

- From the Main Menu press 3 Record Review.
- If no machines are displayed press 7 repeatedly to make them visible.
- Use the left-hand arrow keys to select a machine. To make the points and other lower level items visible press 7 repeatedly.
- Select the item you wish to rename then press 3 Edit Name.
- Edit the name as required then press ✓

Deleting Machine Structures

Note: Any parameter sets used by a deleted machine will **not** be removed but will remain stored in the instrument so they can be applied to future recordings.

- From the Main Menu press 3 Record Review
- If no machines are displayed press 7 repeatedly to make them visible.
- Use the arrow keys to select a machine. To make the points and other lower level items visible press 7 repeatedly.

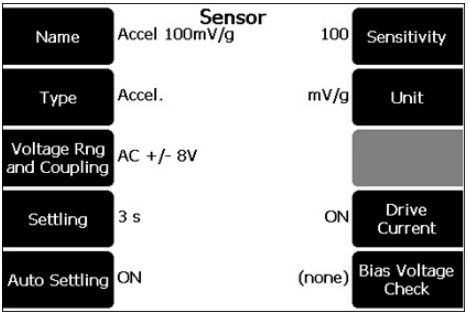
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Select the item you wish to delete then press 5 Delete. Press ✓ when prompted to confirm your action.

Working with Sensors

Defining and Editing Sensors

- From the Main Menu press 0 Options.
- Press 5 Sensor Setup then press Change Sensor opposite your chosen measuring channel.
- To create a new sensor press 4 Create New Sensor or use the left-hand arrow keys to select an existing sensor then press 3 to change its settings.



- Define the settings by pressing the corresponding keys. When you are finished press ✓

1 Edit the Name.

2 Toggle the Sensor Type between acceleration, velocity, displacement and current.

3 Specify the Settling Time. You can specify a Settling Time between 0 seconds and 99 seconds - this will override the Auto Settling option (see below).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4 Toggle Auto Settling ON/OFF. When Auto Settling is ON the instrument will ignore the user-specified settling time (see above) and will automatically select the most efficient settling time for your sensor type.

6 Edit the Sensitivity. The range of sensitivities will vary depending on the selected sensor's Store Unit. To enter a decimal point press ALT then 0

7 Toggle the Store Unit e.g between mV/g and mV/m/s^2 for accelerometers.

8 Toggle the sensor's Drive Current ON/OFF. (Drive Current is the 2.2 mA power supply for ICP®-type accelerometers.

9 Toggle Voltage Ring and Coupling settings.

Notes on defining and editing sensors:

- The Ascent software identifies sensors by their names. If you rename a sensor in the instrument then send the folder to your computer, the Ascent software will be identify this as a new sensor.
- Once a sensor has been defined as a particular sensor *type*, e.g. accelerometer, you will not be able to change the sensor's type if the instrument contains any recordings taken with that sensor; the instrument will associate these recordings with their sensor. If you need to redefine the sensor type, delete all the associated recordings in the instrument first.
- When you set the parameters for a measurement you cannot choose settings that conflict with the type of measurement you are trying to create e.g. if you are measuring acceleration you cannot select a current sensor. When you try to take the measurement the instrument will display a message similar to the following:

  Incompatible Sensor
  Cannot take recording of type: Current
  When using a sensor type Acceleration

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Setting a Default Sensor

When you specify a particular sensor as being the default (and enabled its measuring channel) the instrument will assume that you are using this sensor to take all further measurements. If you wish to change sensors you can do this in the measurement setup screen (select the type of measurement you wish to take and press ALT then 5 to temporarily switch to using a different sensor).

- From the Main Menu press 0 Options.
- Press 5 Sensor Setup then press Change Sensor opposite your chosen measuring channel.
- Use the left-hand arrows keys to highlight your sensor then press 6 Set Default Sensor.

Deleting Sensors

- From the Main Menu press 0 Options.
- Press 5 Sensor Setup then press Change Sensor opposite your chosen measuring channel.
- Use the left-hand arrows keys to highlight your sensor then press 5 Delete Sensor.

Working with Notes

Creating Notes

You can create and store notes of up to 50 characters in the instrument. These can be attached to any part of a machine structure or route item and are transferred with your collected data when recordings are sent to the Ascent database.

- From the Main Menu press 3 Record Review.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press 9 to display the Note Menu then press 4 New Note.
- In the Note Entry Menu press 4 and enter your text. Press 0 to enter punctuation and 9 to enter a space.
- Press ✓ to save the note.

Note: You can create and edit notes in any menu where you see this note icon 

Editing Notes

- From the Main Menu press 3 Record Review.
- Press 9 to display the Note Menu then press 4 Create New Note.
- In the Note Entry Menu press 3 Edit Note and enter your new text. If the note is attached to any items you will be prompted to create a new note.
- Press 0 to enter punctuation and 9 to enter a space.
- Press ✓ to save the note.

Attaching Notes

You can attach notes to any part of a machine structure including parameter sets.

- Use the arrow keys to highlight the item you want to attach the note to.
- Press 9 to display the Note Menu then press 4 Create New Note.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Select a note then press ✓ to attach it to your chosen item. If you want to attach additional notes press 4 again and repeat this process.
- Press ✓ to return to the previous menu. The note icon will appear beside your chosen item to indicate that a note is attached.

Viewing Notes

- To view a note, use the arrow keys to highlight the item with the note attached then press 9 Notes.

Removing Notes

Removing a note only detaches it from a selected item. The note will remain in the Note Entry Menu where it can be selected and attached to other items. To permanently delete a note see the next topic.

- Use the arrow keys to highlight the item with the note attached.
- Press 9 to display the Note Menu and highlight the note you want to remove.
- Press 5 Delete Note then press ✓ to return to the previous menu.

Deleting a Note Permanently

- From the Main Menu press 3 Record Review.
- Press 9 to display the Note Menu then press 4
- In the Note Entry Menu use the arrow keys to select the note then press 5 Delete Note.
- If the note is attached to any items you will prompted to confirm your action. Press ✓ to confirm.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Deleting all Recordings in a Folder

To delete an individual recording please refer to topic Deleting Recordings on page 74.

- To delete every recording in a folder, from the Main Menu press 4 Folders.
- Use the arrow keys to select a folder then press 0 Delete Recordings. Press ✓ to confirm.

Deleting all Stored Information

All folders, machines, parameter sets, recordings and notes etc are stored in a single container called a database. To clear out all your machine structures, customized settings and recordings you can empty the vb7 database. This restores the instrument to its factory default settings.

Use this procedure **only** if the database becomes corrupt, or if you are certain that you no longer require any of the information stored in the instrument e.g. if you plan to resell the instrument. Transfer any information you wish to save to the Ascent software before emptying the database.

Warning: Emptying the database removes **all** information stored in the instrument. You will lose all machines, routes, parameter sets and notes. Only the factory default settings such as axis names, parameter sets and notes will remain.

- From the Main Menu press 4 Folders then press 9 Empty Database.
- Press ✓ twice to confirm.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 11: Balancing Rotors

This section describes the procedure for performing balancing operations with your instrument.

You will learn to:

- Understand the balancing process
- Select appropriate balancing settings
- Set up a balancing job
- Manually enter balancing values
- Use the instrument's suggested balance weight calculations

Methods for Balancing Rotors

The instrument can balance rotors that are rigid and which **do not** flex significantly at their operating speeds.

An imbalanced rotor is one that has an uneven mass distribution that causes the rotor to vibrate when it is rotated. Balancing a rotor requires correcting the uneven mass distribution by adding or removing weight to/from precisely calculated positions on the rotor.

A rigid rotor can be balanced in one plane or two planes i.e. any uneven mass distribution in the rotor can be corrected by adding/removing weights to/from one or two selected cross-sectional planes on the rotor.

For single plane balancing the mid plane of the rotor is usually used as the balancing plane. For dual plane balancing, usually the planes at the extreme ends of the rotor are used; however, other planes on the rotor can be used also.

Since the effect of a rotating weight (i.e. the centrifugal force) increases with the radial distance of the weight, it is common to add weight to, or remove weight from, the rim of the rotor rather than a position close to the centre of rotation. Making weight adjustments at the largest possible radial distance minimizes the amount of weight that needs to be added to or removed from the rotor.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The centrifugal force of a heavy spot on the rotor that causes the rotor to vibrate increases with the square of the rotational speed. The vibration level of the rotor may be acceptable at one speed but not at another. Therefore, it is important to always allow the rotor to settle to its normal operating speed before taking balancing analysis measurements.

Whether a rotor should be balanced in one plane or two planes depends on the dimensions and operating speed of the rotor. The following guideline is commonly used:

Rotor Length to Diameter Ratio	Operating Speed	Balancing Technique
0.5 or less	1000 RPM or less	Single plane balancing
	More than 1000 RPM	Dual plane balancing
More than 0.5	150 RPM or less	Single plane balancing
	More than 150 RPM	Dual plane balancing

Note: Before attempting to balance a rotor you must confirm that the cause of vibration is uneven mass distribution in the rotor. Good balancing results can be obtained only if vibration is caused by uneven rotor mass distribution. Attempting to balance a rotor with other problems will not, in general, reduce the vibration level.

The Balancing Process

A rigid rotor can be balanced in one or two planes. The following steps are involved:

Setting Balancing Parameters - Select the units and balancing method.

Initial Reading - Measure the initial imbalance.

Trial Reading - Attach a trial weight to the balancing plane and take another measurement. For dual plane balancing, the same is also done for the second plane.

Balancing - Attach correction weights to the balancing plane(s) as recommended by the instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Trim Balance - Take a measurement in each plane to confirm that the rotor is balanced. Any residual imbalance can be removed via additional trim balance cycles.

Tips for Balancing

- Before performing a balance job, clean the rotor removing any dirt or loose-hanging material such as rust, flaking paint etc, which may affect balancing results if they fall off later.
- Ensure that any weight(s) you add will not come loose at the normal rotor speed and that it will not obstruct machine motion. If possible, manually rotate the rotor to ensure that the weight does not clash with any part of the machine, keeping in mind that the rotor's center line may shift when operated at its normal speed.
- Ensure the weight of any mechanism used to hold the correction weights in place is included as part of the correction weight. If you are welding on the weight, make sure that the weight of the flux is not included (scrape the flux off before weighing the electrode).
- Ensure that the shape of the correction weight does not cause it to become a dirt trap since dirt accumulated on the weight may cause rotor imbalance.
- It is important to attach the correction weight(s) at the same radial distance that the trial weight was i.e. if the trial weight was attached 'n' mm/inches from the center of the rotor, the correction weight must also be attached 'n' mm/inches from the center of the rotor.

The Tachometer

The tachometer provides the instrument with information regarding the rotational speed of a rotor and the angle at which the rotor is vibrating. The angle is measured from a fixed reference mark on the rotor and is called the ‘phase angle’. To balance a rotor you must consider both the amplitude of vibration and also the phase angle. The amplitude shows the severity of the imbalance and the phase angle indicates the geometry of the imbalance (i.e. the location of the

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

heavy spot). Setting up the Tachometer (page 24) contains information on how to set up the tachometer to measure phase angles.

Suggested Trial Weight Mass and Location

The instrument can assist with balancing operations by calculating an appropriate trial weight mass and location for you. Please refer to topics CH Position and Reference Mark, for help with calculating the trial weight location, and Machine Information, for help with calculating the trial weight mass.

Manually Entering Balancing Information

You have the option to manually enter amplitude and phase values for the initial, trial and trim readings. This allows you to:

- Interrupt the balancing process without saving the values, then re-enter them later and continue balancing.
- Experiment with different trial weight masses and placements to see the effect on the imbalance, without having to attach weights to the machine.
- Calculate the effect of further trim balances.
- Change the units used in a final balancing report by selecting different units then re-entering the collected values.

- To enter a value manually, work through the balancing setup process as normal then press ✓ to take a reading. The icon CH1 123 will appear in the upper left-hand corner of the screen (for a dual plane balance the CH2 icon will also appear).
- To enter your own values for CH1 press 1 (or press 2 for CH2).

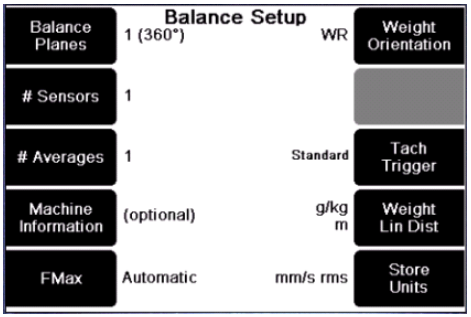
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press 1 to enter an amplitude value and 2 to enter phase. Press ✓ twice to exit and return to the Initial, Trial or Trim Reading Menu and continue the balancing job.

Setting up a Balancing Job

The Balance Setup Menu gives you a large degree of flexibility in how you set up balancing jobs. Many of the setup items are optional; you can also select items in any order you wish e.g. you can select a machine to save the balancing report to at the beginning or end of the process, or perform balancing without saving the report.

- From the Main Menu press 5 Balance.
- Press 1 New Job. This clears any existing setup data from previous balancing jobs.
- Press 3 Setup and use the options in the Balance Setup Menu to apply your preferred balancing settings.



The rest of this section describes the Balance Setup Menu options. Balancing Walk-through on page 116 explains how to use these options when performing a balancing job.

Balance Planes and Weight Positions

Use these options to set the type of balance job (single or dual plane) and specify a weight position reference system i.e. where on

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

the rotor you will place the balance weights in relation to a reference mark.

Balance Planes

- From the Balance Setup Menu press 1 then use the arrow keys to highlight the number of balance planes to use.
- Press ✓ to select. This will display the Balance Weight Setup Menu.

Weight Position (Reference Mark)

Performing balancing operations on a rotor requires you to establish a positioning system for balance weights. To do this you must first establish a reference mark somewhere on the rotor circumference then choose the weight positioning system that is most appropriate for your balance job.

Degrees
Measure the angle in degrees (0° to 359°) from your reference mark. The radius of the rotor must stay constant.

Circumference arc
Measure the linear distance around the outside of the rotor from the reference mark to the balance weights.

 # Fixed positions
Create a fixed number of attachment positions, e.g. drilled and tapped holes, that are equally spaced on a fixed radius from the center of rotation.

To assist with the physical balancing setup you can use a different weight position system for each balancing plane if desired.

- From the Balance Weight Setup Menu press 1 Plane A Weight Position then use the arrow keys to highlight your choice and press ✓ to select.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- If you select circumference arc or # fixed positions this will open the Weight Position sub-menu where you need to specify the rotor circumference or the number of fixed positions. Enter the required value then press ✓
- If you have selected dual plane balancing press 2 Plane B Weight Position and repeat the previous steps for Plane B.
- Press ✓ repeatedly if necessary to return to the Balance Setup Menu from where you will specify your sensor settings. If you selected dual plane balancing, pressing ✓ will automatically take you to the Balance Sensor Setup Menu.

Sensors

This option lets you specify the number and type of sensors you are using. This menu also contains an option that allows the instrument to recommend where to place trial weights (optional).

- If the Balance Sensor Setup Menu is not already displayed press 2 # Sensors from the Balance Setup Menu then select the number of sensors required and press ✓
- Press 6 CH1 Sensor and select a sensor or press ? and edit/create a new one as required (refer to Defining and Editing Sensors on page 97 for more information).
- Press ✓ to return to the Balance Sensor Setup Menu. To specify a 2nd sensor for dual plane balancing press 7 and repeat the previous step.
- If you want the instrument to help you determine where to place your trial weights use the CH Position option on the left-hand side of the screen (see next topic), otherwise skip this step and press ✓ to return to the Balance Setup Menu.

CH Position

Note: This item is optional.

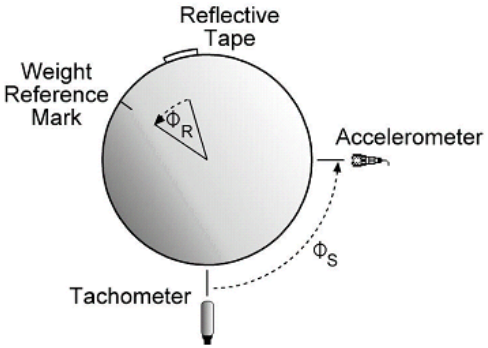
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CH Position is used in conjunction with Reference Mark. The instrument uses this information to calculate where on the rotor you should place your trial weights after taking an initial reading. The aim is to reduce the initial vibration in order to maximize the accuracy of the trial weight readings. The instrument will recommend a trial weight angle based on the following:

- The phase of the initial reading
- The angle between the tachometer and sensor (the CH Position)
- The angle between the tachometer reflective tape and the weight reference mark on the rotor (the Reference Mark)

You need to enter **both** the CH Position and the Reference Mark Location so that the instrument can calculate the trial weight angle. See Reference Mark (page 112) for further instructions.

- If the Balance Sensor Setup Menu is not already displayed press 2 # Sensors from the Balance Setup Menu, select the number of sensors to use then press ✓.
- Press 1 CH1 Position and enter the angle from the tachometer to your sensor (Φ_S) then press ✓ For dual plane balancing, repeat this step if you want the instrument to recommend trial weight placement angles for both planes.



After you take the initial reading the instrument will display the suggested trial weight angle in the upper right of the screen.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Notes:
Angles are measured in the direction you designate as your Weight Orientation i.e. with rotation or against rotation.

If you are performing a dual plane balance you should only use this option in cases where each balance plane is physically close to its sensor, and the two planes are separated from each other by a distance greater than the rotor diameter. In particular for overhung rotors this option should only be used for single plane balancing on the closest bearing and balance plane, to help with reducing the static imbalance only. The CH2 sensor and weight reference mark must be in line with those of CH1.

Averages

Averaging the 'out of balance' values can increase the accuracy of your measurements, allowing the instrument to make more precise recommendations for the size and placement of balance weights. A higher number of averages produces more accurate measurements, but lengthens the recording time accordingly.

Machine Information

Entering machine information is optional. It allows you to specify some of the physical properties of the machine being balanced.

Rotor Weight, Diameter and Speed

Entering the rotor's weight, diameter and speed helps the instrument to calculate the appropriate size and placement of trial weights based on your machine's physical properties. The aim is to calculate a trial weight which will cause a significant change from the initial reading.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Balance Setup Menu press 4 Machine Information and use the on-screen options to enter your values. If you need to enter a decimal point press ALT then 0
- If you need to change a measurement unit e.g. for rotor weight or diameter, return to the Balance Setup Menu and press 9 Weight Lin Dist. Change the units as required then press ✓

After you take the initial reading the instrument will display the suggested trial weight mass in the upper left of the screen.

Reference Mark

Note: This item is optional.

Reference Mark is used in conjunction with CH Position. The instrument uses this information to calculate where on the rotor you should place your trial weights after taking an initial reading.

You need to enter **both** the Reference Mark Location and the CH Position so that the instrument can calculate the trial weight angle. Refer to topic CH Position for more information.

- If the Balance Machine Menu is not already displayed press 4 Machine Information from the Balance Setup Menu.
- Press 9 Reference Mark and enter the angle from the tachometer reflective tape to your reference mark then press ✓ If these marks are aligned with each other enter zero.

After you take the initial reading the instrument will display the suggested trial weight angle in the upper right of the screen.

Weight Orientation

Weight Orientation allows you to choose where to place balance weights on a rotor, relative to the rotor's direction of rotation.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

With rotation **(WR)** means you choose a reference point then place your weights forward of that point in the direction of rotation (i.e. in the same direction as the rotor turns).

Against rotation **(AR)** means that if the rotor is turning forward then you place your weights backwards from the reference point (i.e. in the opposite direction of the rotor's rotation).

Ensure that with the rotor stationary you *measure angles* in the direction specified. Do **not** rotate the rotor in the direction specified.

Tach Trigger

Tach Trigger allows you to specify whether you are using a standard tachometer or a Keyphasor®.

Weight Lin Dist

Weight Lin Dist allows you to specify the measurement units for linear speed distance, balance weights and rotor weight.

- To change the displayed units press 9 Weight Lin Dist then press 8 to cycle through the linear speed options or 9 to open the Weight Units Menu where you can set balance and rotor weight units.
- When you have set your units press ✓ to navigate back to the Balance Setup Menu.

Store Units

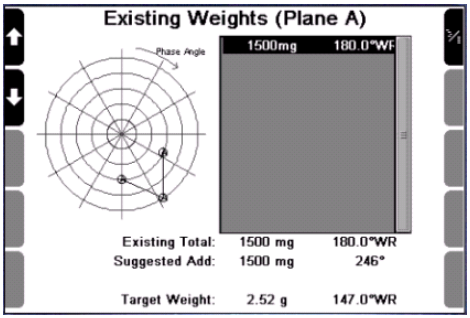
Store Units allows you to specify your preferred measurement units and overall scaling for balancing jobs.

Combining Trim Weights

As you continue to fine-tune a balance job, you may end up with several trim weights fixed at various angles on the balancing planes. You can combine all trim weights for an individual plane into one weight/angle solution using the Reorder Weights calculator.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- After taking a trim reading press ✓ to display the Trim Weight Menu.
- Press the left-hand arrow key beside Plane A (or Plane B) then press 0 (Reorder Weights). The Existing Weights Menu displays the locations and amounts of your individual trim weights, the weight vector (Existing Total), and the target weight and angle (the trim weight/angle solution you hope to achieve).



- Use the left-hand arrow keys to highlight one of the trim weights you want to remove then press 6 Remove or Keep. The calculator will re-calculate the suggested weight/angle accordingly. You can experiment with different remove/keep combinations by repeating this process (to replace a removed weight press 6 again).
- When you are satisfied with the suggested weight calculation press ✓ to continue. To exit the menu without combining any trim weights, replace any removed weights before continuing.

Reviewing Previous Balancing Jobs

- From the Main Menu press 5 Balance then 2 Select Machine.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Use the left-hand arrow keys to highlight a machine. All balancing jobs associated with that machine will display in the right-hand Recordings column.
- Press the right-hand arrow key 7 select the Recordings column; a black border will appear around it indicating that you can now browse through the recordings.
- The newest balance job is highlighted at the top of the column. Press ✓ to display the selected recording or use the left-hand up/down arrow keys to select another.
- In the Balancing Menu press 8 View and Save to see the Balancing Report.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 12: Balancing Walk-through

This walk-through guides you through the process of balancing a rotor using single and dual plane balancing. Dual plane balancing requires additional steps; these extra steps are indicated with this symbol 

You will learn to:

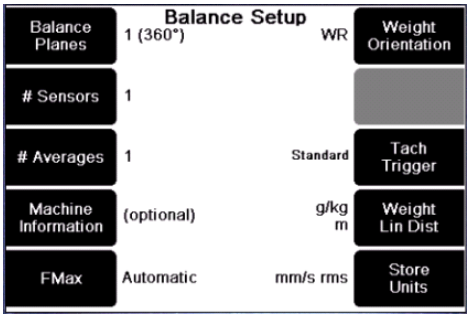
- Take initial imbalance measurements
- Set up and apply trial weights
- Balance the rotor using correction weights
- Perform trim balancing to further reduce the vibration
- Save and review your balancing job
- Produce balancing reports

Step 1. Set up a new Balance Job

- From the Main Menu press 5 Balance then press 1 New Job to clear any previous settings.

- Press 3 Setup. Use the options in the Balance Setup Menu to choose the required settings for your balancing job.

  The following screen shows the settings that were selected for this walk-through.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Step 2. Take an Initial Reading

- **Stop the machine**.
- Attach the sensor to the bearing housing closest to the rotor. For best results attach it in the radial direction in which the machine is most flexible (and vibrates the most).



Attach a sensor to each of the bearings supporting the rotor. It is not important how the sensors are paired or which sensor is attached to which end.

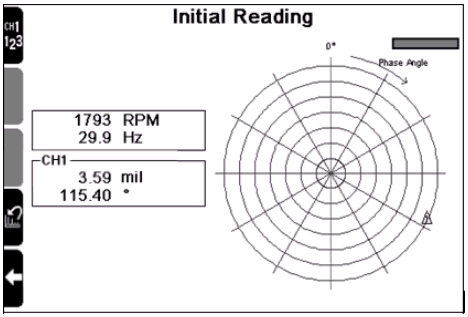
- Set up the tachometer (see Setting up the Tachometer on page 24).
- **Start the machine** and let the rotor settle to its normal operating speed. Since the vibration level depends on the speed of the rotor it is important to take all readings while the rotor is operating at its normal speed.
- From the Balance Setup Menu press ✓ to take the initial reading. The initial reading measures the 'out of balance' level of the rotor.

  After a few seconds, the instrument displays the speed of the rotor in RPM and Hz, the vibration level due to the imbalance (i.e. amplitude at 1X the rotor speed), and the phase angle of the vibration. Note that our measurement shows an amplitude of 3.59 mil. The aim is to reduce this to an acceptable level.



For dual plane balancing two sets of values will display.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



- Wait for the readings to stabilize then press ✓

Step 3. Take a Trial Reading

- **Stop the machine**.
- Establish a reference mark on the balancing plane. This will be used to measure the angular position of the trial weight and the final balance weights. The reference mark can be at **any** position around the balancing plane. It does not need to be referenced to the tachometer reflective tape position.

In dual plane balancing, establish a reference mark on Plane B also. It does not need to correspond with the Plane A reference mark.

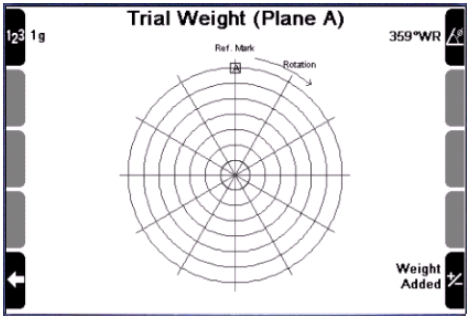
- Attach a trial weight to the balancing plane. It is important that the trial weight is not too large, as this may damage machine bearings, and not too small as its effect will be imperceptible. Your trial weight must be of sufficient mass to change the imbalance by approximately 30% in amplitude or 30% in phase (these figures are the industry norm). This will allow the instrument to perform its calculations accurately.
- The trial weight position should be near the rim of the rotor but can be at any angular position. Starting at the reference mark, measure the angular position in the direction you specified for the Weight Orientation. This will be either WR (with rotation) or AR (against rotation).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- In the Trial Weight Menu press 1 and enter the value for your trial weight. If you need to enter a decimal point press ALT then 0

- Press ✓ to return to the Trial Weight Menu then press 6 and enter the position of your trial weight in relation to the reference mark.

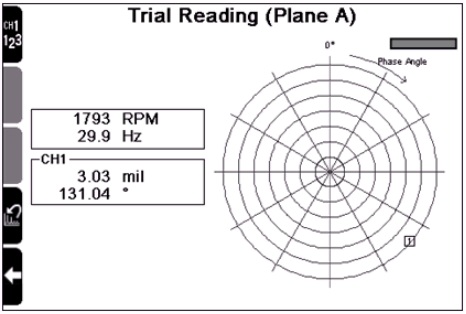
- Press ✓ to return to the Trial Weight Menu and press 0 to specify whether you are adding or removing (drilling out) weight. Press ✓ to return to the Trial Weight Menu again.



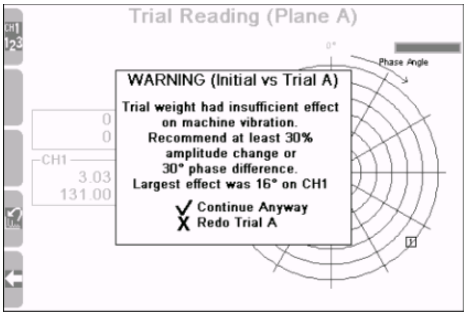
- Replace safety covers, **start the machine again**, and let the rotor settle to its normal operating speed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ✓ to take a reading of the imbalance with the trial weight added. After a few seconds, the instrument displays the speed of the rotor in RPM and Hz, the vibration level with the trial weight added (i.e. amplitude at 1X the rotor speed), and the phase angle of the vibration. Note that our measurement now has an amplitude of 3.03 mil (a very slight decrease from the original 3.59 mil). The trial weight has not significantly affected the imbalance.

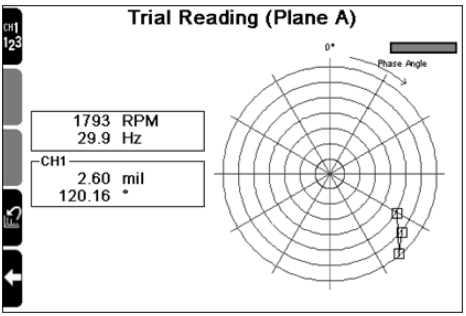


- Wait for the readings to stabilize then press ✓ Because the trial weight was not of sufficient mass to affect the imbalance the instrument displays a warning prompt. You can redo the trial reading several times if required or continue with balancing.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

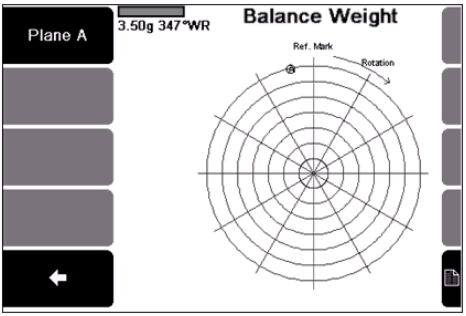
- The instrument then displays the prompt 'Trial Weight Removed?' Press the appropriate key. You can redo the trial reading several times if required or continue with balancing. Here we have added trial weights twice more to obtain a new trial reading.



Perform the same procedure for Plane B (attach a trial weight, enter its position and specify whether weight is being added or drilled out). If you are removing trial weights the Plane A trial weight **must** be removed before performing the Plane B trial reading.

Step 4. Balance the Rotor

With Initial and Trial Readings completed the Balance Weight Menu will now display. The instrument displays the weight required to correct the initial imbalance and the angular position at which it must be attached.



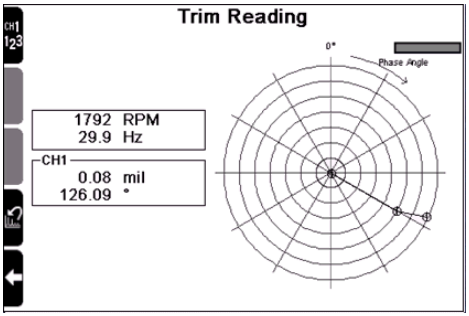
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- **Stop the machine**. If you are removing trial weights as you go, do this now before attaching your correction weight.
- Attach or remove the recommended correction weight as indicated by the instrument then proceed to Trim Balance.

For dual plane balancing two sets of values will display.

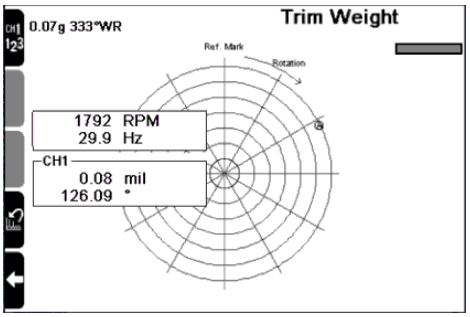
Step 5. Perform Trim Balancing

- Replace safety covers, **start the machine again** and let the rotor settle to its normal operating speed.
- Press ✓ to take a trim reading. After a few seconds the instrument displays the vibration level with the imbalance corrected.



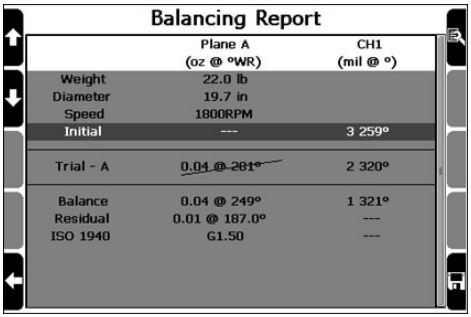
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Press ✓ to accept this measurement. The instrument will now display the details of additional weight adjustments required to trim balance the rotor (i.e. to further reduce the level of vibration/imbalance). You can end balancing at this point or continue with another reposition of trim balance weights, as indicated, to improve on the balance level. Repeat trim balancing until you are satisfied with the results.



Step 6. Viewing and Saving Balancing Jobs

- This step is optional. To view the Balancing Report Menu press 0 The screen displays the results of your initial and trial readings, the balance reading and any trim balances.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Saving the balance job

- From the Balancing Report Menu press 0 Save Balance Job. Select or create a machine to save this balancing job to then press ✓ The balance job will be saved to this same machine in the Ascent database the next time you transfer the containing folder to a computer.

Note: You can save multiple balance jobs to a single machine to create a 'history' of balancing.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 13: Utilities

This section describes how to use the utility functions of your instrument.

You will learn to:

- Set the date and time
- Synchronize the instrument date/time with the Ascent software
- Adjust the LCD display
- Manage the battery pack
- Free up instrument memory
- Upgrade the instrument firmware

Setting the Date and Time

You can set the time in 12 hour or 24 hour format. Recordings are date- and time-stamped according to this clock. The instrument adjusts the date and time automatically to accommodate leap years and daylight savings. You can also select your local time zone automatically (see next topic).

- From the Main Menu press 0 Options.
- Press 0 Date/Time then press 2 to set the date or 3 to set the time.
- Press the number keys to enter your values; the cursor will automatically advance to the next position. If you enter an incorrect number press the key repeatedly until the cursor returns to the beginning of the line then start again.
- Press ✓ to save your changes.

Adjusting the Date Format

- From the Date Time Menu (see previous topic) press 0 repeatedly to change the date display format.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Selecting your Local Timezone

- From the Main Menu press 0 Options.
- Press 0 Date/Time then press 4 Edit Timezone.
- Use the arrow keys to highlight your local timezone then press ✓ to select.

Adjusting Sound Volume

- From the Main Menu press 0 Options.
- Press 8 Sound. The Sound Management Menu contains a Play key 2 so that you can preview the effect your adjustments will make on the volume.
- Use the right-hand arrow keys to adjust the volume or turn sound off.
- Press 2 to test the volume then press ✓

Adjusting Screen Contrast

- From the Main Menu press 0 Options.
- Press 6 LCD Contrast Backlight. The screen displays a chart and text so that you can preview the effect your adjustments will make on the display.
- Use the 6 and 7 keys to increase or decrease the screen contrast then press ✓

Turning the Backlight On/Off

The backlight consumes a relatively high level of power and will automatically turn off after a timeout period (see Setting Backlight Timeout (page 128)).

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Main Menu press 0 Options.
- Press 6 LCD Contrast Backlight.
- Use the 1 and 2 keys to adjust the backlight brightness or turn it off then press ✓

Battery Features

The instrument is powered by a rechargeable custom Lithium Ion battery pack with a normal operating range of 6.0 V to 8.4 V.

Warning: Do not detach the battery pack from the instrument for more than 10 minutes as this will cause the date/time to be lost. However, all data will be retained.

Warning: Before charging the battery pack, ensure that the power transformer used is an approved power adaptor 12 V 3 A output, center positive, and that the voltage and frequency of your mains AC power matches that of the power adaptor. Do **not** use the plug-pack transformers supplied with previous Commtest instrument versions.

The power adaptor supplied in the kit provides the correct DC voltage. The optional car adaptor charging lead may also be used to charge the battery pack in a vehicle with a 12 V negative-chassis power system.

The instrument is equipped with an internal backup component that protects data and settings in case the battery pack is momentarily removed from the instrument. The backup component is kept charged by the battery pack if the battery pack is functioning normally. The instrument has a number of inbuilt features which help ensure that the battery pack is always sufficiently charged.

Below 7 Volts the instrument automatically turns off the backlight to prevent further power draining and displays a flashing battery icon as a reminder to recharge the battery.

At 6.5 Volts the instrument automatically powers down to conserve power.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Recharging the Instrument

- Plug the power transformer into a standard power outlet and attach the connector to the instrument's charger socket. You can continue to use the instrument while the battery is charging.

Estimating the Operating Time

The instrument can estimate its operating time based on the amount of current remaining in the battery and the average current usage. The true operating time before the battery runs flat will depend on how you use the instrument. You can check the estimated operating time in the Battery and Power Management Menu.

- From the Main Menu press 0 Options.
- Press 9 Battery Pwr Mngmnt. The Est Time Left is displayed in the middle of this screen.

Conserving Battery Power

The length of time you can operate the instrument will depend on how it is used and what settings you apply. You can adjust the following settings to reduce your power consumption and increase the instrument's operating time.

- Sound volume
- Screen brightness/contrast
- Backlight brightness and timeout period
- Sleep Mode timeout
- Shutdown timeout

Setting Backlight Timeout

The backlight will turn off automatically after the timeout period has elapsed (60 seconds by default). If a measuring period exceeds the backlight timeout, the backlight will remain on during measuring and will turn off when measuring is complete.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Main Menu press 0 Options.
- Press 9 Battery Pwr Mngmnt.
- Press 3 Turn Off Backlight and enter a value in seconds then press ✓

Setting Sleep Mode Timeout

Sleep mode turns the instrument off if no keys are pressed for a set period of time (15 minutes by default). This method of auto-powering off the instrument conserves battery charge and allows for fast powering up (approximately 1 second). However, it is less battery efficient than using the Complete Powerdown option because the internal module remains on. The instrument will power down completely once the complete powerdown period has elapsed (see next topic).

When recording a route, powering up the instrument from sleep mode will return you to the last displayed menu. In all other cases the instrument will display the Main Menu.

- From the Main Menu press 0 Options.
- Press 9 Battery Pwr Mngmnt.
- Press 4 Enter Sleep Mode and enter a value in minutes then press ✓

Powering up the instrument

- To power up the instrument from sleep mode press ⏻ as normal.

Setting Complete Powerdown Timeout

Complete powerdown turns the instrument off if no keys are pressed for a set period of time (2 hours by default). It is similar to sleep mode but reduces battery power consumption by a greater margin as the instrument powers down completely.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- From the Main Menu press 0 Options.
- Press 9 Battery Pwr Mngmnt.
- Press 5 Complete Powerdown and enter a value in minutes then press ✓

Checking how much Memory is Available

The Memory Menu displays information on the instrument's memory capacity, the amount of memory in use, and the number of folders, schedule entries and recordings stored in the instrument.

- From the Main Menu press 0 Options.
- Press 4 Memory to display the instrument's memory usage. Press ✓ to return to the Options Menu.

Freeing up Instrument Memory

The vb7 instrument has a standard memory size of 1 GB, which gives you virtually unlimited storage capacity for routes, recordings and notes etc.

To free up memory, we recommend you regularly transfer recordings to a PC and delete those that are not required. For instructions on deleting recordings and other items, refer to the appropriate topics in Creating, Editing and Deleting Items (page 90).

Upgrading an Instrument Using Proflash

From time to time Commtest will release new versions of instrument firmware. These firmware upgrades allow you to take advantage of product enhancements and new features that were created after your instrument was purchased. To re-program an instrument with

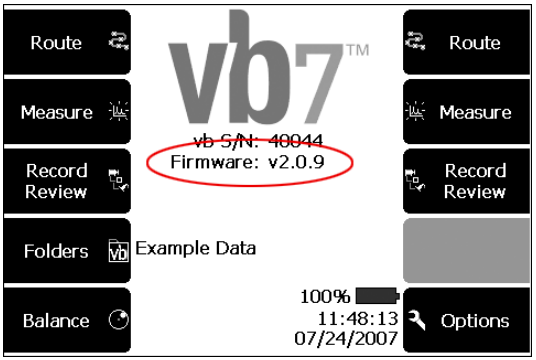
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

newer firmware you must PROFLASH the instrument with a new firmware file.

Warning:
PROFLASHING will restore the instrument to the factory default state and delete all stored information. This includes folders, routes, machines, parameter sets, recordings and balance jobs. If you wish to save any of this information, please transfer all folders to the software before PROFLASHING your instrument.

- To check if a newer firmware version is available, visit our website at www.commtest.com and check the Info and Downloads page. You will need to register your instrument to receive a login and password, then you can log in and download the latest firmware file.

- Compare the website firmware file's version number with your current instrument firmware to see if it is newer. Power up the instrument so that the Main Menu displays. In the middle of the screen look for the text 'Firmware vX.xx' (where X.xx is the current firmware version number). If the instrument firmware number is lower than the website firmware number it means the website file is newer; download the file and proceed with the PROFLASH.



In order to Proflash a vbX series instrument such as the vb7 vibration analyzer, you must first add the instrument to the Ascent software. If you have not done so already, follow the **Add vbX Instrument to Ascent** procedure below. If your instrument has been added

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

previously, or is a vbx000 series instrument (such as a vb3000 vibration analyzer), skip to the **Begin the Proflash** section below.

Add vbX Instrument to Ascent

- With the instrument powered on, connect and turn on the battery charger.
- Connect the instrument and the PC using the supplied communications cable (USB or Ethernet).
- Start the Ascent software on the PC.
- In the Ascent software, select **Edit>Manage>vb Instruments...** The **Manager - VB Unit** window will open.
- If your instrument is a vbX series instrument (such as a vb7 vibration analyzer, for example) click the **Add** button then select the **vbX series** instrument type. The **Add vbX** window will open.
- Check the right-hand panel of the **Add vbX** window. If your vbX instrument is listed (identifiable by its serial number), click the **Add Selected vbX** button or double-click the instrument name. Confirm that you wish to add the instrument in the confirmation popup. Your vbX instrument is now added to the Ascent software.

Note: If your instrument was not displayed in the right-hand panel, continue through the steps below. Otherwise see the **Begin the Proflash** section below.

- If you are using a USB cable, type the instrument's IP address into the **IP address:** field then click the **Test** button within the **USB** area of the **Add vbX** window. If you are using an Ethernet cable, type the instrument's IP address into the **IP address:** field then click the **Test** button within the **Network** area. If you do not receive a confirmation popup stating that the instrument has been located, check the USB or Ethernet IP configuration on the vbX instrument.

Note: To view the instrument's current IP address configuration, open the **Network** menu on the instrument. In the vb7 vibration

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

analyzer, for example, this is located within the main menu's **Options** screen. The IP address displayed in the instrument's network screen should match the IP address displayed in the **IP address:** field immediately to the left of the **Test** button in the Ascent software's **Add vbX** window. If they do not match, change the address in the **Add vbX** window's IP address field to match the instrument IP, then click the **Test** button again. If this doesn't work, check that the instrument is correctly connected to the PC, that no firewall agents are active on the PC, and that the vbX driver has installed correctly (uninstall the driver, disconnect the instrument from the PC then reconnect to reinstall the driver).

- Once the instrument has been detected, click the **Yes** button on the vbX instrument detection popup to add the instrument to the Ascent software. Your vbX instrument is now added to the Ascent software.

Note: Once your vbX instrument has been added to Ascent, you can view and adjust its properties by double-clicking the instrument name in the **Manager - VB Unit** window (**Edit>Manage>vb Instruments...)**. You must return to the instrument properties window to Proflash the instrument and to set the instrument's IP address.

If you use your vbX instrument through a network connection and you want the instrument to obtain an IP address from your network DHCP server, set your vbX instrument's IP as follows:

- Open the **Manager** window (**Edit>Manage>vb Instruments...)** and double-click your vbX instrument. The instrument's **vbX Properties** window will open.
- Within the **Ethernet** area of the **Setup** tab, check the box beside **Obtain an IP address automatically via DHCP**.
- Click **OK.**

If Ascent is unable to connect to your vbX instrument, try the following:

- Open the Manager window (Edit>Manage>vb Instruments...). and double-click your vbX instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- Within the **Ethernet** area of the **Setup** tab, click Locate.
- Click OK.

Begin the Proflash

- With the instrument powered on, connect and turn on the battery charger.
- Connect the instrument and the PC using the supplied communications cable. If you want to save any information that is still stored in the instrument you should transfer this now.
- Start the Ascent software on the PC.
- In the Ascent software, select **Edit>Manage>vb Instruments...** The **Manager - VB Unit** window will open.
- Double-click your instrument (identifiable by its serial number) in the new window. The instrument properties window will open.

Note: if your vbX series instrument is not listed, it has not yet been added to the Ascent software. See the procedure **Add vbX Instrument to Ascent** above.

- Click the **Proflash** button in the vbX Properties window's Setup tab (or, if Proflashing a vbx000, such as a vb3000, under the 'Tasks' tab). The **Proflash** window will appear, listing the available firmware version(s) stored on your PC.

Note:
If Ascent locates more than one firmware file within the selected folder, it will list all versions present. The recommended vbX version will be highlighted at the top of the list. The text **Recommended** will also be displayed beside the recommended firmware revision under the **Suitability** column. You must select the recommended/suitable vbx000 update manually.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

- With the recommended firmware version highlighted, click **Proflash** (or **Proflash now!** for vbx000 instruments). PROFLASHING the instrument takes approximately one to two minutes. The instrument will display a series of progress messages then prompt you to reset the instrument. Do **not** interrupt the PROFLASH process as this will damage the instrument.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Section 14: Troubleshooting

Contacting Technical Support

If you have any problems please contact Commtest support staff directly for assistance. Our e-mail address is help@commtest.com.

We also provide a searchable knowledge base of frequently asked questions (FAQ) on our website at www.commtest.com.

Resetting a Non-responding Instrument

Warning: If the instrument does not respond to any key press while it is operating it will continuously draw power until it is reset and turned off. You must reset a non-responding instrument as soon as possible.

Resetting the instrument will not delete previously stored data or settings.

- In any menu hold down  +  until the instrument powers off then re-starts.

Troubleshooting Network Communications

Note: This topic only applies to vbX series instruments such as the vb7 instrument.

Setting the USB network address
vbX series instruments (such as the vb7 vibration analyzer) and the Ascent program use a default USB network address to communicate. This address should not need to be changed unless the default network settings collide with those of your current networks. You can test this by observing if other network connections are lost while the instrument is connected to your computer, and are restored when you unplug the instrument. To fix

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

this problem you can change the USB network settings in the instrument and Ascent program.

Notes:
Your changes will only take effect once the instrument hardware is reset.

If you change the network address you must change it in both the instrument and software so that they can communicate (this does not apply if you are only changing the last digit of the IP address).

- From the instrument's Main Menu press 0 Options then press 3 Network.
- Press 3 USB and use the number keys to enter your new IP address, netmask and gateway. Press ✓ after you enter each item.
- Press ⏻ + 5 to reset the instrument hardware and apply your changes.
- Connect the Commtest supplied data transfer cable to the USB ports of the instrument and computer and power up the instrument.
- In the Ascent program select **Edit>Manage>vb Instruments...**
- Double-click the instrument from the list of those available. If no instrument is shown see Transferring Files to the Instrument for instructions on adding your vbX series instrument to Ascent.
- Enter the new IP address into the **IP address:** field in the **USB** area, then click **Test**.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Setting the Ethernet network address

- Power on your instrument and plug it into the network using an Ethernet cable. When the **Manager - VB Unit** window appears, select your instrument with the mouse then click **Edit**.
- Click the 'Setup' tab window.
- In the 'Set vbX IP Address' field enter the new IP address, netmask and gateway (the gateway is optional).
- Click **Set Address**. A message will appear informing you that the IP address has changed and the vbX screen will display a message asking you to reset the instrument. Press 5 +  to perform the reset.
- Click **OK** twice to close the Ascent windows.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Appendix: Specifications

Specifications	Model vb7	Remarks
Sensors		
Sensor input	2 channels	Simultaneous sampling
Sensors	Accelerometer, Velocity, Displacement, Current	
AC coupled range	16 V peak-peak	Allows for ± 8 V sensor output swing (± 80 g)
DC coupled ranges	0 V to 20 V, -10 V to 10 V, -20 V to 0 V	e.g. for reading prox-probe gap
Connectors	BNC	Safety feature: Break-free inline connector
Analog to digital conversion	24-bit ADC	
Sensor excitation current	0 mA or 2.2 mA (configurable), 24 V maximum	2.2 mA required for ICP®-type accelerometer
Sensor detection	Warns if short circuit or not connected	
Tachometer		
Sensor	Laser sensor with reflective tape included in kit	Sensor triggers when the tape reflects its beam
Laser sensor range	10 cm to 2 m nominal	Dependent on size of reflective tape
Other Sensor types supported	Contact, TTL pulse, Keyphasor®	vb has optically isolated input
Power supply to sensor	6 V to 8 V, 50mA	Battery voltage with current limit
TTL Pulse rating	3.5 V (4 mA) min, 28 V (6 mA) max, off-state 0.8 V	
Keyphasor® threshold	13 V ± 1 V	
Speed range	30 RPM to 300 000 RPM (0.5 Hz to 5 kHz)	
Parameter Indication		
Maximum levels	> 1000 g (10 000 m/s2), > 1000 in/sec (25 000 mm/s), > 100 in (2500 mm), > 10 000 Amps	Effective limit is sensor sensitivity and output voltage
Dynamic signal range	> 95 dB (typical at 400 line resolution)	Acceleration and velocity
Harmonic distortion	Less than -70 dB typical	Other distortions and noise are lower
Units	g or m/s2, in/s or mm/s, mil or mm or µm adB, vdB, Amps	0-peak, peak-peak or RMS. Auto-scale by 1000x when required US & SI options for both adB & vdB
Magnitude & Cursors	Overall RMS value, dual cursors, harmonics	Digital readouts on chart
Accuracy	± 1% (0.1 dB)	For DC level (%F.S.) & AC measured at 100 Hz
Frequency response	± 0.1 dB from 10 Hz to 15 kHz; ± 3 dB from 1 Hz to 40 kHz	Acceleration and velocity. From value measured at 100 Hz High freq. response also applies to DC ranges
Spectrum Display		
Fmax possible ranges	25, 50, 100, 125, 150, 200, 300, 400, 500, 600, 800Hz 1, 1.2, 1.6, 2, 2.5, 3, 4, 5, 6, 8, 10, 15, 20, 30, 40 kHz	Or equivalent CPM values Or orders-based from 1X to 999X
Fmin possible range	0 to Fmax	vb instrument zeroes all spectral lines below Fmin
Resolution	400, 800, 1600, 3200, 6400 lines	3200 lines max. for dual channel measurements
Frequency scale	Hz, CPM, Orders	Linear scale with zooming
Amplitude scale	Acceleration, velocity, displacement or current	Linear or log scales, auto or manual scaling.
Window shapes	Hanning, rectangular	
Overlap	(0, 12.5, 25, 37.5, 50, 62.5, 75, 87.5) %	Dependent on Fmax and number of lines
Number of averages	1, 2, 4, 8, 16, 32, 64, 128	Increases sampling time proportionally
Averaging types	Linear, exponential, peak hold, synchronous	
Demodulation bandwidths	20 bandwidth options	From 125 Hz to 1250 Hz up to 16 kHz to 20 kHz
Waveform Display		
Number of samples	1024, 2048, 4096, 8192, 16 384	
Time scale	10 ms to 256 seconds	Or orders based from 1 to 999 revs
Time synchronous averages	1, 2, 4, 8, 16, 32, 64, 128	Only available when tachometer triggered
Long time waveform	Up to 10 kHz Fmax	
Logging Features		
Output formats	vb screen, transfer to Ascent PC-based software	
Data storage	1GB non-volatile flash memory	Virtually unlimited recording storage!
Data storage structure	Folders / machines / points / locations / routes	No limits are applied, 50 character names
Max Folder size	10 000 measurement locations	
Keypad Entry value range	± 999 999.999 999	50 character prompt string
Balancing		Planes 1, 2
Speed range	30 RPM to 60 000 RPM	
Measurement type	Acceleration, velocity, displacement	
Weight modes	Angle 0° to 360°, fixed position, circumference arc	e.g. weights on fan blades, linear dist around circumference
Manual data entry	Yes	Allows re-entry of previous balance jobs
Storage	Against machines in data structure	No limits are applied

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications	Model vb7	Remarks
Display & Communications	Graphic Grayscale LCD	
Resolution	480 x 320 pixels (HVGA)	
Viewing area	4.6" x 3.1" (117 x 79) mm	
Backlight	White LED, 4V, 100 Cd/m2	
Communications with PC	USB and Ethernet	PROFLASH allows vb software to be upgraded
Battery & Charger		
Battery Type	Custom Lithium Ion pack, 7.4 V, 4500 mAh	
Operating time	10 hours	Backlight on (60 second timeout)
Charger type	Internal charging, automatic control	External Power pack 12 V DC, 3 A output, included in kit
Charge rate	3 A nominal	3 hours for complete charge
Mechanical		
Size	9.9" W x 5.8" L x 2.4" H (252 x 148x 60) mm	
Weight	2.6 lb (1.2 kg)	Including strap
Environment		
Operating Temp	14 °F to 122 °F (-10 to 50) °C	
Storage Temp & Humidity	-4 °F to 140 °F (-20 to 60) °C, 95% RH	
EMC	EN61326	
Ruggedness	4' (1.2 m) drop onto concrete	Procedure: 26 drops following MIL-STD-810F-516.5-IV

Revised 15 March 2007. While every effort has been made to provide the most accurate information we advise that information in this document may contain technical inaccuracies or typographical errors. Commtest Instruments Ltd may at any time and without notice make improvements and/or changes in the products described in this information.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Index

A

Accelerometer

- drive current • 2, 97
- sensitivity • 21
- setting up • 22
- specifying settings • 97

adB • 37

- scaling • 36, 37
- units • 37, 42

Amplitude

- scale • 36
- units • 37, 42

Amplitude and phase • 62

AR (against rotation) • 112

Averaging • 48, 111

- exponential • 48
- linear • 48
- number of • 48
- overlap • 49
- peak hold • 48
- time synchronous • 57

B

Balance weights • 107, 108, 111

- placing • 112

Balancing

- against rotation • 112
- circumferance arc • 108
- degrees • 108
- fixed positions • 108
- initial reading • 104, 109, 117
- reference mark • 108, 109, 112
- report • 114, 123
- trial reading • 104, 118
- trim balance • 104, 113, 122
- units • 113
- walk-through • 116
- WR (with rotation) • 112

Baseline recordings • 74

Battery

- conserving power • 128
- features • 127
- recharging • 128

C

Channels • 35

- assigning sensors to • 45, 67
- multi-channel measuring • 67, 68, 82

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Charts • 31
scaling • 36, 37, 42
working with multiple charts • 35
zooming • 34
Zooming charts • 34
Copying items • 19, 95
Crosss channel phase • 62
Cursors • 32

D

Date and time • 125
Deleting items • 96
all stored information • 102
folders • 92
notes • 101
recordings • 74, 88, 102
routes • 89
sensors • 99
Delta • 32, 62
Demodulation • 54, 55, 56
bandwidth • 51
Drive current • 2, 97

E

Exponential averaging • 48

F

Firmware, upgrading • 130
Fixed positions • 108
Fmax • 46, 47
equivalent Fmax • 50
Fmin • 47
Folders, defining, working with • 90, 92
transferring to the software • 76

H

Harmonic cursors • 32

I

Incompatible sensor • 97
Initial reading • 104, 117

K

Keypad entries • 6, 65
Keyphasor • 26

L

LCD screen • 126
Linear averaging • 48
Log range • 36

M

Machines, defining, working with • 92

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Measurements
measurements analyzing • 31
saving • 40
taking • 27, 28
Memory, capacity • 90, 130
available amount • 130
deleting all information • 102
freeing up • 130
use of • 47, 50

N

Notes • 99

O

Off-route recordings • 88
Orders • 39
Overall (power level) • 42, 74
Overlap percentage • 49

P

Parameter sets, defining, working with • 43, 44
Peak hold averaging • 48
Phase angles • 56, 60, 61, 62
PROFLASH, firmware upgrading • 130

R

Recordings
deleting • 74, 102
multi-channel • 67, 68
reviewing • 72
saving • 72
taking • 70
Report, balancing • 114, 123
Resetting the instrument • 136
Resolution • 47, 50
Revs, waveforms • 39
Routes, working with • 80
off-route recordings • 88
skipping route entries • 83
RPM, setting • 38
rpm displaying • 56

S

Sensors
mounting • 22
sensitivity • 21
supported types • 21
Settling time • 97
Spectral lines • 47
Strobe, using • 26

T

Tachometer • 24, 56
triggering • 48

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Time synchronous averaging • 57

Trial reading • 104, 118

Trim balance • 104, 122

U

Upgrading the instrument • 130

V

vdB • 37

  scaling • 36, 37

  units • 36, 37

W

Windowing • 49

WR (with rotation) • 112

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP