WiVib Wireless
Monitoring

WiVibTrend Lite
User's Manual

Revision 1.1
May 2009

ICON RESEARCH

CONTENTS

CHAPTER 1 - Overview

1.1 *WiVibTrend Lite* Features

WiVibTrend Lite is a comprehensive monitoring software package that operates with the *WiVib* wireless vibration acquisition unit from Icon Research. Its primary functions are:

- acquire dynamic and static measurements from one or more *WiVib*'s;
- trend the measured data and allow viewing of historical data;
- compare with preset alert/alarm limits and advise operators of out of limit conditions;
- allow display of current and historical spectral traces and other time data.

The features of the *WiVibTrend Lite* application are:

- Simple step-by-step setup of measurement hierarchy;
- Measurements can be taken from one or more *WiVib* devices;
- Straightforward user operation – just four main screens;
- Two modes of data acquisition - continuous or timed (wake-up mode);
- Comparison of all measurements against preset alert and alarm levels;
- Clear alarm displays, both on hierarchy, in tabular format and in 'traffic lights' summary;
- Overlays of trended data;
- Ability to view historical trended data with simple pan and zoom timebase functions;
- View of detailed time domain and spectral data, both current and historical with full cursor readout.

This manual will explain how to set up and run a system measuring a variety of different parameters.

1.2 Installation

Installation is from either CD or USB memory stick.

Installation from CD
If AutoRun is enabled on your computer drive, the installation menu will be displayed. Click on **Install Software** and select *WiVibTrend Lite*. If installation does not run automatically, then use Windows Explorer to select the drive with the label *WiVib Suite*, and run the application called *WiVibSuite.exe* which will be in the root folder.

Installation from USB Stick
When a USB drive is inserted, the Windows Autoplay dialogue box will appear. Select *WiVib Suite Installation* and click **OK**. Click on **Install Software** and select *WiVibTrend Lite*. If the Autoplay box does not appear, then use Windows Explorer to

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select the drive with the label *WiVib Suite*, and run the application called *WiVibSuite.exe* which will be in the root folder.

Note that, if you wish to copy the files from the CD or USB stick to your computer and install from your computer, then ensure that all the files are kept in their original folders, otherwise installation may fail.

In either case, a shortcut will be placed on your desktop. Click on the shortcut to launch *WiVibTrend Lite*. If you wish to print a copy of this manual, it is available on the CD/USB stick.

CHAPTER 2 – *WiVibTrend Lite* Basics

2.1　Basic Screen Controls

There are four main screens in *WiVibTrend Lite* and each is accessed by clicking on the appropriate button at the bottom of the screen. These buttons are always visible.

- Click **SETUP** *to access the SETUP* configuration screen
- Click **TREND** to access the *TRENDED DATA* screen
- Click **HIST** to access the *HISTORICAL TRACE* screen
- Click **LIVE** to access the *LIVE TRACE* screen.

Logging occurs all the time and data is displayed in the *Trend* screen. If you access another screen at any time, measurements will still be read and stored, so no data is lost.

Also available are **Print** and **Save** controls that enable a hardcopy of the screen currently being displayed to be printed, or to be stored in a filename of the user's choice.

Refer to the screen display below to see these features.
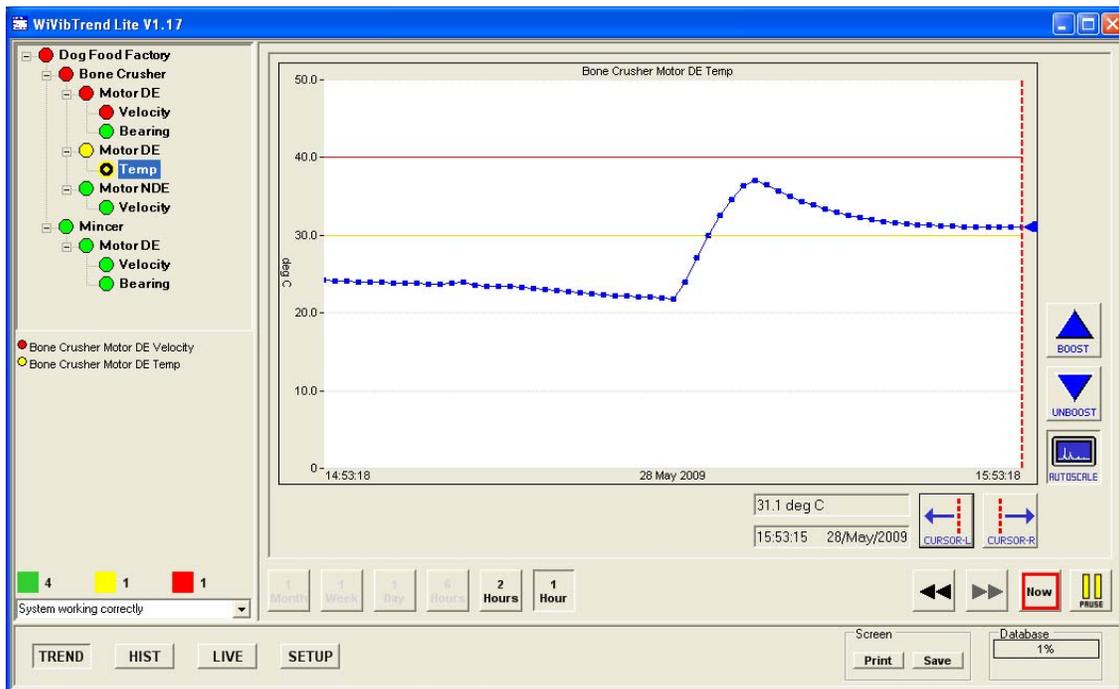
2.2　Example Application

In this manual we will go through the steps required to set up a simple logging application, and how to view and analyse the measurements recorded.　The

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configuration will be fairly concise, but will illustrate all the features of *WiVibTrend Lite*. The number of points being measured can be expanded as required.

What we have is a plant called the *Dog Food Factory*. On the plant we are measuring taking measurements on two machines, namely a *Bone Crusher* and a *Mincer*. On the *Bone Crusher*, we are measuring the velocity vibration, bearing condition and temperature of the Motor Drive End *(Motor DE)*, together with the velocity vibration of the Motor Non-Drive End (*Motor NDE*). On the *Mincer*, we are measuring the velocity vibration and the bearing condition of the Motor Drive End (*Motor DE*). Therefore, in total we are taking six measurements. Note that we are using the same point (ie. the same accelerometer) to measure velocity and bearing condition.

This means that we have an accelerometer and temperature sensor fitted to the *Motor DE* of the *Bone Crusher*, a second accelerometer on the *Motor NDE* of the *Bone Crusher*, and a third accelerometer on the *Motor DE* of the *Mincer*. So we have three accelerometers and one temperature sensor, thus requiring four channels (three dynamic and one DC coupled) of a *WiVib*. We will use channels 1 thru 3 for the accelerometers and channel 5 for the temperature.

The hierarchy below summarises the configuration, and specifies which channels of the *WiVib* we will use.

Measurement Hierarchy				WiVib Allocated	Channel Number
Plant	**Machine**	**Point**	**Measurement**		
Dog Food Factory					
	Bone Crusher			*WiVib #1*	
		Motor DE			*Chan 1*
			Velocity		
			Bearing		
		Motor DE temp			*Chan 5*
			Temperature		
		Motor NDE			*Chan 2*
			Velocity		
			Bearing		
	Mincer			*WiVib #1*	
		Motor DE			*Chan 3*
			Velocity		

Note the following points from the table above:
- The hierarchy sequence is *Plant … Machine … Point … Measurement*.
- A *WiVib* can be allocated to one or more *Machines*.
- One channel of a *WiVib* is allocated to each *Point* ie. a sensor is physically mounted and it is connected to the corresponding channel.
- In this example, there are two sensors (an accelerometer and a temperature sensor on the *Motor DE)* – they therefore have to be configured separately as the sensors are connected to different channels.
- There are different types of measurement available (eg. velocity, bearing condition, temperature, acceleration etc).

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The above table is a useful template when designing your own system configuration. You can add further information in additional columns eg. sensitivity of the sensor on each channel, your measurement parameters (bandwidth, number of spectral lines etc).

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CHAPTER 3 – Setting Up Your System

3.1   Steps Required to Set Up Your System

Setting up, or configuring, of the system is carried out in the *SETUP* screen, accessed by clicking on the **SETUP** button. This screen enables you to define all the measurements that you want to take, and it generates the necessary database template automatically.
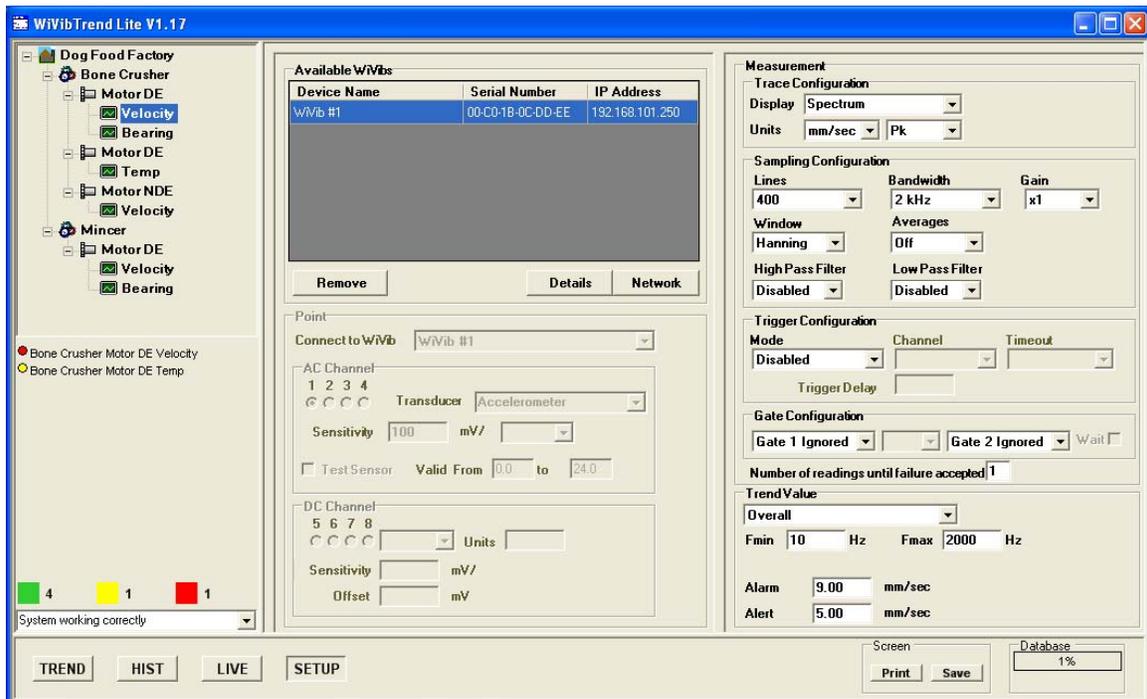
There are a number of steps that should be followed to configure your system, and these are summarised below:
1. Decide what measurements you want to make on your machinery and define your hierarchy accordingly;
2. Allocate *WiVib* channels to the measurement points;
3. Set up measurement parameters for each measurement;
4. Define how often you want to take measurements.

We will now look at each of these steps in detail, referring to the example discussed in the previous chapter.

3.2   Defining Measurement Hierarchy

The *SETUP* screen is shown below. The *Plant … Machine … Point … Measurement* hierarchy is in the left panel.

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On installation, there will be only one entry at each level on the hierarchy. These can be renamed as you require. Further sub-levels are added by right-clicking on an entry and setting up the required parameters. Start by right-clicking on *My Hierarchy* to display the following pop-up menu.

```
Rename
Disable
-----------
Add Machine
Delete
-----------
Move Up
Move Down
-----------
Cut
Copy
Paste
```

You can now rename your plant as you wish (*Dog Food Factory* in our example) by clicking **Rename**. Right-click on *My Machine* and rename it to *Bone Crusher*. Now right-click on *Dog Food Factory* again and this time click on **Add Machine**. Enter your second machine ie. *Mincer*. Note that you can rename any level of the hierarchy at any time later.

Now we want to add measurement points to the machines. Right-click on one of the machines to display the following box pop-up menu.

```
Rename
Disable
-----------
Add Point
Delete
-----------
Move Up
Move Down
-----------
Cut
Copy
Paste
```

Use **Rename** and **Add point** to define the names of the points eg. *Motor DE*.

We are now ready to add measurements to the points we have defined. Right-click on each point and to bring up the pop-up menu.

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```
Rename
Disable
─────────────────
Add Measurement
Add Speed
Add Sensor Test
Delete
─────────────────
Move Up
Move Down
─────────────────
Cut
Copy
Paste
```

Use **Rename** and **Add Measurement** to enter the measurement points (eg. *Velocity*) on each point as per our example. As before, you can rename, delete, copy and move measurements by right-clicking on any measurement and using the screen that appears. Note that two new entries are available, namely **Group** and **Ungroup**. These enable compatible measurements to be taken simultaneously. See the section on *Specifying Simultaneous Measurements* for details.

```
Rename
Disable
─────────────────
Add
Delete
─────────────────
Move Up
Move Down
─────────────────
Cut
Copy
Paste
─────────────────
Group
UnGroup
```

Note that, for larger systems, you can use the **Cut**, **Copy** and **Paste** commands to save repeating entries for machines that have the same configuration. For example, you can copy and entire machine (and its sub-levels), paste it and then rename it to make a duplicate machine.

Additional types of measurements can be selected from this menu including **Add Speed** (which takes a tacho measurement, assuming a trigger signal is available) and **Add Sensor Test** that checks for accelerometer bias voltage within definable limits.

You can also change the order of the hierarchy using the **Move Up** and **Move Down** commands. You can also delete any level of the hierarchy, and its sub-levels, using

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the **Delete** command. If you wish to temporarily disable a measurement without deleting it, then click **Disable**. You can re-enable it at any time later.

At this point, we have defined the measurements that we want to take. We will now assign these to our *WiVib*'s.

3.3   Allocating WiVib Channels

The number of points we are measuring is known, so we can now decide how many *WiVib*'s we need, and which channel will be allocated to each measurement point.

First, the *WiVib*'s need to be configured to match your network. This is done using the *WiVibConfig* utility. We shall assume that, for our example, the *WiVib* has been configured for your network.

On the SETUP screen, a list of WiVib's that are on the network will appear in the *Available WiVibs* box. In our example this is one. Its Name, Serial Number and IP address are displayed. Note that each *WiVib* must have a unique name (as specified in *WiVibConfig*.

You can remove any units that are no longer on the network by clicking **Remove**. and you can verify the network settings of any unit by clicking **Network** (though the network settings can only be changed using *WiVibConfig*).

Click on any point (eg. *Motor DE*) and certain fields in the *SETUP* screen will be available for editing. Define the *WiVib* that you wish this point to connect to by selecting it from the *Connect to WiVib* drop-down list. Now click on the radio button for the channel allocated to this point. It is always assumed that channels 1 to 4 are connected to an accelerometer. The sensitivity of the accelerometer can be adjusted here also*.* Repeat this for all points, making sure that no more than one point is allocated to each channel.

Channels 5 to 8 (modified in the *DC Channel* area of the screen) allow for virtually any DC coupled sensor type to be connected. In our example, a temperature sensor is connected to channel 5. Its sensitivity is 10mV/degC. Therefore, click channel 5 radio button. In the *Units* field enter *degC*, and in the *Sensitivity* field enter *10*. If a 4-20mA sensor is being used, clicking on the *4-20mA* selection automatically sets the offset required for this type of sensor, or an offset can be entered manually in the *Offset* field.

If you are unsure about the sensitivity of a sensor connected to channels 5 to 8, select the point in the hierarchy, click on the **Autoset** button and enter two calibration points. The sensitivity and offset will then be calculated for you.

3.4   Defining Measurement Parameters

The measurement parameters can now be entered for each measurement.

In the hierarchy, click on a measurement (eg. *Velocity*). The fields in the right-hand pane of the *SETUP* screen are ready for editing. Each field is clearly labelled for the

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parameter being defined. The changes you make are written to the database when the screen is exited. There is no need to save the setups manually.

The default frequency band for the overall value that will be trended for a measurement is 10Hz (*Fmin*) to 1kHz (*Fmax*). *Fmin* and *Fmax* can be modified as required. This is a useful way of setting band alarms. Simply define another measurement and set *Fmin* and *Fmax* to reflect the band required.

Different types of overall values are available when a spectrum is selected. *Overall* is the RMS sum of the spectrum, *Peak* is the highest spectral component and *Floor Avg* is the level of the ground floor. Floor average is useful in monitoring bearing lubrication.

For time domain measurements, there is also a range of overall options. The *Impacts over* selection is useful for monitoring compressors and other reciprocating plant. It counts the number of impacts over a certain level over the period of the data acquisition.

Alert and Alarm limits are defined here. These will appear as yellow and red lines on the trend graph.

Repeat the above procedure for all measurements.

3.5   Defining Measurement Intervals

Finally, the timing of when measurements are taken is specified. This is defined for each *WiVib* independently so the scan rate can vary from *WiVib* to *WiVib*. For example, it might be desirable to monitor critical machinery more often than peripheral plant.

Select a *WiVib* from the *Available WiVibs* list and click **Details**. The screen below will appear.

The left pane shows current *WiVib* settings. The right pane selects between continuous data acquisition (Continuous Mode) or timed intervals (WakeUp Mode).

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WakeUp mode is exactly what it says – the *WiVib* powers down between sets of measurements and wakes up after a pre-determined interval.

For continuous acquisition, select *Continuous Mode*. The *WiVib* will scan through all the measurements in the hierarchy, and the data is sent back for display. The next scan sequence begins immediately.

In Wakeup Mode, the interval between each scan is set in the field *Wakeup Every*. Select the desired interval from the drop-down list. The unit will power down between each scan sequence. It is possible to synchronise wake-up to a particular time. For example, if *Synchronise to* is set to a time of 13:15:00, *Wakeup Every* is set to two hours, and the time now is 17:00, then the device will wake up at 17:15 and every two hours thereafter.

[Tip: For systems with a large number of *WiVib*'s, it is helpful to stagger the synchronisation of each device by a few seconds, or even a minute. This prevents all the *WiVib*'s waking up together and all trying to connect to the host computer simultaneously. Battery life is optimised if *WiVib*'s are not waiting to be serviced by the host].

In Wakeup Mode, if a *WiVib* wakes up and cannot connect to its network (perhaps because the network is down for maintenance), the device will time out (ie. turn off) in order to conserve battery power. This wait time is set in *Power Down Timeout*. Alternatively, the timeout function can be disabled.

When in WakeUp Mode, it is possible to instruct a *WiVib* to stay on when it wakes up at the next interval. This is useful for diagnosing problems on machinery. Refer to the section on the *LIVE* screen to see how this function is enabled.

3.6   Specifying Simultaneous Measurements

On certain *WiVib* devices (eg. the *WiVib-4/4 Pro)* channels can be programmed to take their measurements simultaneously. This feature is essential when taking, for example triaxial measurements and orbits, and has the advantage of reducing battery consumption as the device in powered for a shorter time.

For measurements to be taken simultaneously, they must be on channels on the same device and have their measurement parameters exactly the same (eg. all must be velocity with the same bandwidth, number of spectral lines etc). To specify which channels you want to take simultaneously, hold down the **[Control]** key (**Ctrl**) on your keypad and click on the appropriate measurements. The selected measurements will be highlighted in blue as shown below.

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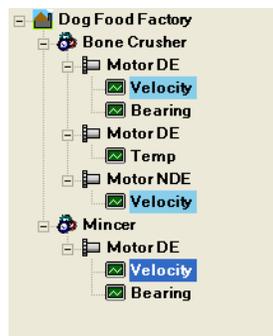
Then right-click on the on the last measurement selected to display the pop-up menu below and click **Group**.

```
Rename
Disable
----------------
Add
Delete
----------------
Move Up
Move Down
----------------
Cut
Copy
Paste
----------------
Group
UnGroup
```

Note the following:
1. The selection process checks that all measurement parameters are the same before allowing a measurement to be grouped. If the measurement highlight does not turn blue, check its parameters.
2. If you subsequently change a measurement parameter for a grouped measurement, that parameter is changed for all measurements within that group.
3. You can ungroup measurements at any time by clicking **Ungroup**.

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CHAPTER 4 – TREND Screen

4.1   TREND Screen Features

Clicking on the **TREND** button brings up the *TREND* screen. A typical screen is shown below.
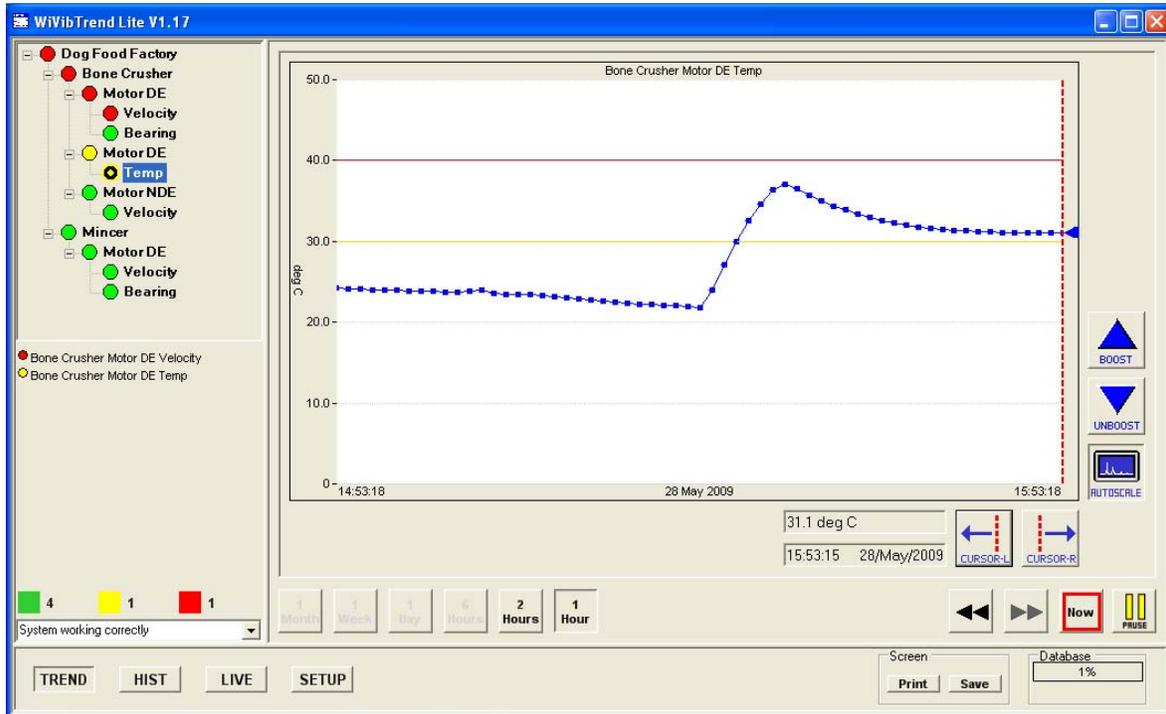
The display features of the *TREND* screen are described below.

4.2   Trend Display

The main display shows a trend of amplitude versus time for measurements selected on the hierarchy on the left panel. (How to select and overlay will be described later). A blue line is the selected trace and a blue dot is a measurement. A trace with blue dots is called the primary trace. If the trace is of spectral measurements, then each dot represents the overall vibration value. If the measurement is a temperature, for example, then the temperature value at that time is shown. The cursor can be placed on any measurement point for readout in the panel below.

The red line on the display shows the alarm limit set for that measurement, and the yellow line shows the alert limit.

Also, if the cursor is placed on a particular point and the **HIST** button is pressed, then the trace (eg. the spectrum) of that measurement is displayed. The cursor can be moved by clicking on the screen or using the **CURSOR L** and **CURSOR R** buttons. The Y-axis scaling can be boosted and unboosted using the buttons on the right, or

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autoscaled at any time by clicking **AUTOSCALE**.   Clicking **BOOST** or **UNBOOST** switches off the autoscale function.

4.3   Alert and Alarm Displays

The coloured button next to each entry in the hierarchy shows the current alert/alarm status of that item. Yellow means that the point is in alert and red that it is in alarm. The worst status of a measurement point permeates up to machine level. If, for example, the Motor DE of a machine was in alert and the Motor NDE was in alarm, then the machine status would be in alarm ie. red.

The table below the hierarchy shows a summary of alert and alarm points. This is useful if the size of the hierarchy is such that it cannot fit onto the panel, and slider bars are in use.

Finally, a 'traffic light' system indicating how many points are OK, are in alert or are in alarm is shown below the alarm summary table. The example shows that four points are OK, one is in alert and one is in alarm.

The System Status Field is below the 'traffic light' display. This will indicate any system issues such as a bias voltage out of range, or a WiVib that was expected to return data at a certain time but has not connected.

4.4   Selecting Traces and Overlaying

To select the primary trace that you want to display (ie. the trace with measurement dots) simply click on the measurement name in the hierarchy. The selected measurement has a black ring in its status button.

Secondary traces can be selected to overlay by clicking on the status button next to the measurement. If the secondary trace has the same units as the primary trace (eg. they both have units of mm/sec), then the secondary trace is coloured blue (but with no dots). If the units are not the same, the trace is coloured grey. A black dot appears in the status button to indicate that that measurement has been selected as a secondary trace.

4.5   Viewing Current and Historical Data

WiVibTrend Lite has simple controls for looking at historical trend data, and moving back to current time. The buttons below the trend screen eg. **1 Hour**, **1 Day** etc select the time period that is displayed on the screen. The left and right double arrows move backwards and forwards (or "pan") through time. To return to current time, simply click **NOW** and the right side of the display will shift to the present computer time.

It is possible to look at data gathered some time ago by simply selecting a long period eg. **1 Week** and use the left double arrow to go back in time. Position the cursor over the area of interest and click, for example, **6 Hours**. The time period will expand over that time. Click **NOW** when you have finished to go back to current time.

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4.6   Managing Data

Measurements from the WiVib's on the system are stored in a database. It is possible to archive and restore data, and to delete measurements as required. This is done by right clicking on the main display in the *TREND* screen. Three options will appear, namely **Archive Measurement Samples**, **Restore Measurement Samples** and **Delete Measurement Samples**. For archiving and deleting, start and finish date ranges can be selected. Archiving puts the data into a file with user-selectable file name, and restoring retrieves any archived file.

The percentage of the available database space that has been used is displayed at the bottom right side of the main screen. If the database is approaching its maximum capacity, warning messages will appear. The green indicator bar turns to yellow when the database is 90% full. At this point the oldest measurement is discarded for each one taken, thus minimising expansion of the database. The indicator turns red when 95% capacity is reached and no further data can be taken.

Right-clicking on the *Database* panel brings up the dialogue box below. As can be seen, it is possible to define the maximum number of samples stored and the maximum size of the database. The default database size is 500Mbytes, and a registration code (eight hex digits, available from the factory) is required to extend it. You can limit the number of samples stored to any number you wish. This is helpful in keeping your data to the size you wish. Once the maximum number of samples has been reached, the oldest measurement is discarded and the latest one stored.
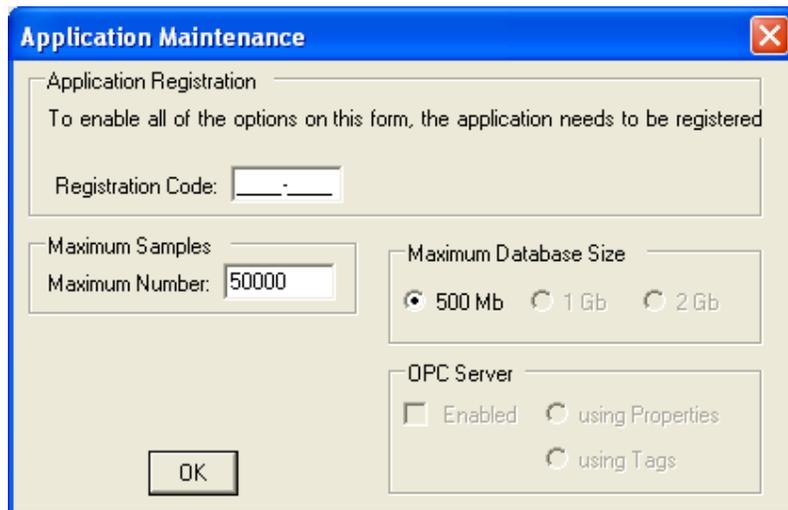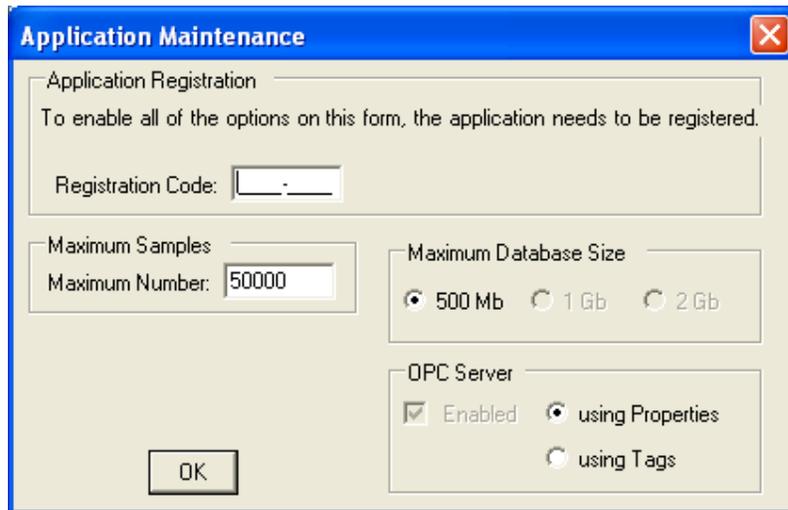

4.7   OPC Option

In addition to the local display of data within *WiVibTrend Lite*, it may be also be configured to run an OPC server. This enables other systems that can provide an OPC Client to gain access to the current measurements held within WiVibTrend Lite. The OPC server provided is compliant with versions 1.0. 2.0 and 3.0 of the OPC specification.

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The OPC server provides access to all of the trends, traces (both timewave and spectrum) and the status of any item in the hierarchy. In addition, the status of the *WiVib*'s and sensors in use are also available. The definitions of how the OPC arranges its hierarchy tags is contained within the document *WiVibTrend Lite OPC DA Server*.

The OPC server does not run as standard but is enabled by right-clicking on the *Database* panel and ticking the *Enabled* box. It will then be available whenever WiVibTrendLite is running. The screen below shows the OPC selection panel. Note that a registration code (eight hex digits, available from the factory) is required to enable the OPC server.

CHAPTER 5 – LIVE and HIST (History) Screens

5.1   LIVE and HIST Screen Features

Clicking on the **LIVE** button brings up the screen that shows live data ie. it displays the latest full trace of the measurement selected as the primary trace in the *TREN*D screen.   For example, when displaying *Motor DE Velocity* on the *TREND* screen, clicking on **LIVE** will display the full spectrum of the latest measurement.

Clicking on the **HIST** button brings up a copy of a trace that has been previously stored. The trace is selected in the *TREND* screen by placing the cursor on one of the blue dots on the primary trace selected. The time and date of when the trace was measured are shown in the readout box below. So, the sequence is simply to select a trace to view in the *TREND* screen and then click **HIST**.

A typical *LIVE/HIST* screen is shown below.
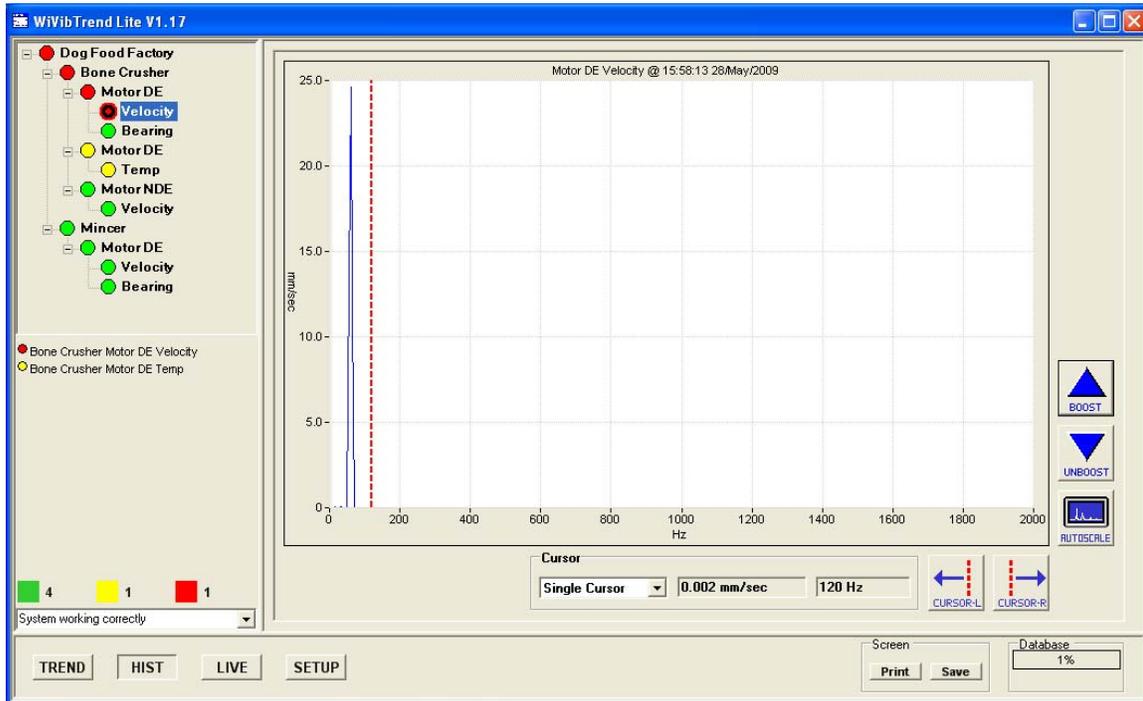
As can be seen, the alert and alarm panels are unchanged. The viewing area shows the trace selected, in this example a spectrum. Cursor readout is available.   The cursor can be disabled or set to peak detect using the drop-down menu list.   The cursor can be moved by clicking on the screen or using the **CURSOR L** and **CURSOR R** buttons. The Y-axis scaling can be boosted and unboosted using the buttons on the right, or autoscaled at any time by clicking **AUTOSCALE**.   Clicking **BOOST** or **UNBOOST** switches off the autoscale function.

It is possible to zoom into a particular area of the graph by holding down the right mouse button and dragging the box generated across the area of interest. The

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display zooms into the selected area when the button is released. Click **AUTOSCALE** to return to normal view.

When in WakeUp Mode, it is possible to instruct a WiVib to stay on when it wakes up at the next interval. This is useful for diagnosing problems on machinery. In the *LIVE* screen, and when in WakeUp mode, the following screen item will appear below the main trace.
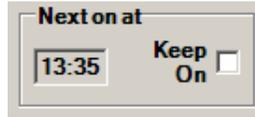
The screen shows when the next wakeup time is due and, by checking the **Keep On** box, the *WiVib* currently being displayed will stay on at the next wakeup. Additionally, a button labelled **RESUME** will appear at the bottom right hand side of the screen. Clicking **RESUME** puts the WiVib back into Wakeup mode. If more than one WiVib has been selected to stay on, clicking **RESUME** will show a selector box where the choice can be made as to which WiVib's stay on.

It is possible to display the x-axis of a spectrum as frequency in Hz or in RPM. Right-click on the display and select accordingly.

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