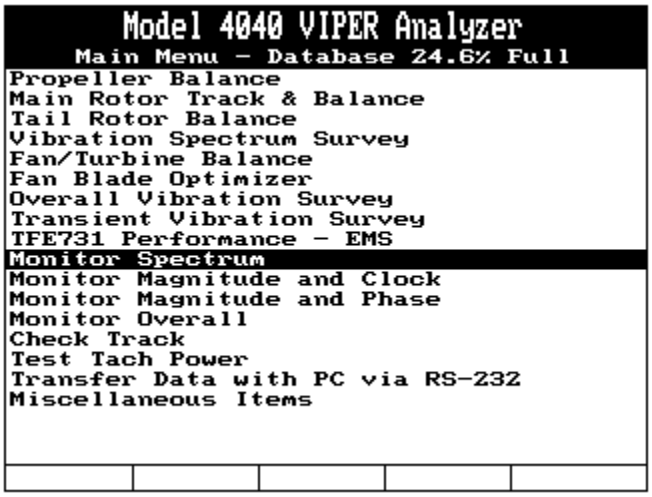
Chapter 12
Monitor Spectrum

(Revision 2, Aug 2007)

"Monitor Spectrum" is an analyzer function that is accessed from the analyzer's Main Menu banner screen. A description of this function follows, along with the information required to complete the menu screens within the function, and the steps necessary to perform the function.

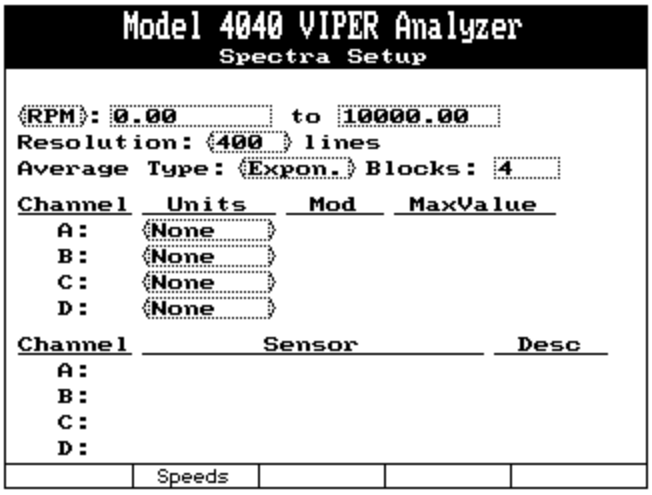
The "Monitor Spectrum" function allows the user to rapidly set up the analyzer to acquire vibration data for troubleshooting, verification of repair, comparison of similar components or "snap shot" recording of pre- or post-maintenance conditions.



12.1 Spectra Setup

12.1.1. Select "Monitor Spectrum" from the Main Menu banner screen.

12.1.1.1. The analyzer will display the "Spectra Setup" banner screen shown in the illustration below. Complete the fields as follows:



12.1.1.2. Determine if the required frequency units are revolutions per minute (RPM) or cycles per second (Hz). Press the [⇒] key to toggle between the frequency unit selections in the field.

12.1.1.3. Use the [⇓] key to move down to the next field. Using the keypad, enter the determined minimum frequency in the "Min Frequency" field. This is the first field directly to the right of the frequency units (RPM or Hz) field. Determine the minimum and maximum frequency requirements. For instance, if the frequency of interest is 300 Hz, you might choose a minimum and maximum frequency that will place the 300 Hz in the center of the range. The minimum might then be 250 Hz and the maximum 350 Hz for instance. You might also consider other factors such as Harmonics. If you want multiples of the fundamental frequency included in the frequency range, determine to what extent that need is (1X, 2X, 3X and so on) then extend the frequency range to include it. For example, 300Hz is the frequency of interest, the fundamental frequency. If you want 3X harmonics included in the frequency range you must multiply the fundamental frequency (300 Hz) X the harmonic range (3X) and arrive at an upper range of 900 Hz.

12.1.1.4. Use the [⇓] key to move down to the next field. Using the keypad, enter the determined maximum frequency in the "Max Frequency" field. This is the first field directly to the right of the word "to" which separates the Min and Max frequency fields.

12.1.1.5. Use the [⇓] key to move down to the next field. Set the Resolution as required at 100, 200, 400, 800, 1600, 3200 or 6400 lines by pressing the [⇒] key to scroll through the selections until the desired resolution is displayed. Unless you are attempting to separate two frequencies that are within close proximity to one another, 100 or 200 lines should suffice for general analysis. Higher resolutions will provide a much sharper image of the specified frequency band but also require more time and memory for acquisition [⇒] key and should only be used when genuinely needed.

12.1.1.6. Use the [⇓] key to move to the "Average Type" field. Select the average type by scrolling through the selections in the field using the [⇒] key until your selection is displayed. There are three available options, "Expon". "Normal" and "Peak". If you select "Expon" the screen will constantly update both the amplitude and frequency. The screen will have a dynamic appearance and change as the input condition changes. The analyzer will continue to collect data until stopped by pressing [ENTER] or the acquisition time selected in Conditions for the current running condition expires. If you select "Normal" the analyzer will acquire only the total number of blocks specified in step 12.1.1.7 below, then automatically stop data acquisition, average the collected blocks and plot them on screen. If you select "Peak" the analyzer will plot and hold the highest amplitude received on screen. These values will not decrease once plotted, but will increase if amplitude of higher value is acquired. The analyzer will continue to collect data until stopped by pressing [ENTER]. Consult the appropriate equipment maintenance manual for specific requirements of a vibration survey or for analysis guidelines.

12.1.1.7. Use the [⇓] key to move to the "Blocks in Avg." field. Enter the number of data blocks you wish to be used in the calculations. This is the total number of samples taken, and then averaged before being plotted on the screen. The default is four. The valid range is 0 to 999. Remember that higher numbers of averaging, while providing more reliable data, also require more time. The default of 4 is sufficient for most applications.

12.1.1.8. Use the [⇓] key to move to the "Units" column of the Channel A row. The "Units" field determines the engineering units in which the amplitude, or "Y" axis, of the spectra will be displayed. Consult the appropriate equipment maintenance manual for specific requirements of a vibration survey or for analysis guidelines. Use the [⇐] or [⇒] keys to scroll through the selections in this field. The available selections are: G's (equivalent gravities), IPS (Inches Per Second), mm/sec (millimeters per second), cm/sec (centimeters per second), Mils (1/1000th of an inch), Microns (1/1000000th of a meter), ubars (Millibars), Pascals, Volts, m/s/s (meters per second per second), cm/s/s (centimeters per second per second, db (decibels), Special and None.

NOTE

Selecting Mils in this block will not allow you to select any accelerometer input in step 12.1.1.12 below. If an accelerometer is being used, you must also use an external converter to convert the actual input to the analyzer to velocity (IPS) input.

12.1.1.9. Use the [⇓] key to move to the "Mod" (Modifier) field. This is Modifiers relevant to the engineering units specified in step 12.1.1.8, above. Use the [⇐] or [⇒] keys to toggle through the available selections in the field which are: Peak, Pk-Pk (Peak to Peak), Avg. (Average), and RMS (Root Mean Square). Consult the appropriate equipment maintenance manual for specific requirements of a vibration survey or for analysis guidelines.

12.1.1.10. Use the [⇓] key to move to the "MaxValue" field. The "MaxValue" field is a toggle selection field. Use the [⇐] or [⇒] keys to toggle through the available selections for the field. The available selections are: 0.01, 0.02, 0.05, 0.10, 0.20,

0.50, 1.00, 2.00, 5.00, 10.0, 20.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100, 110, 120, 130, 140, 150, 200, 500, 1000, 2000 and 5000. This scale refers to the number of engineering units of vibration amplitude specified in the previous field. The full scale indicates the maximum *vibration* amplitude you expect to acquire or the maximum amplitude of interest. Choose the amplitude that will adequately display the full amplitude of any specified limits as a minimum. If you do not expect amplitudes in excess of what would normally be experienced for the equipment application, set this field as low as possible while still allowing sufficient space to display the maximum limitations as stated above.

NOTE

Amplitudes encountered above the setting in this field may cause the analyzer to overload. It is best to set the Full Scale Vibration higher than needed as opposed to lower than needed so the overload does not cause a fatal error. You can recover from the overload by pressing the [Main Menu] key and starting the process again from the beginning. However, avoiding an overload will save you time in the process.

12.1.1.11. Repeat steps 12.1.1.8 through 12.1.1.10 for all channels you intend to use for this job.

12.1.1.12. Use the [⇓] key to move to the "Sensor" column for "Channel A" row. Scroll through the choices in this field using the [⇐] or [⇒] keys. The available choices are dependent on the number of sensors you have programmed into your analyzer. (See chapter 18 Miscellaneous Items, for sensor setups.)

12.1.1.13. Use the [⇓] key to move to the "Channel "Desc" column for "Channel A" row. You define this optional field. The field will accept any alphanumeric characters entered from the keypad. This field is used as a description for the individual channel such as "Lat" and "Vert" or "GBox" and "Core."

12.1.1.14. Repeat steps 12.1.1.12 through 12.1.1.13 for each of the channels you intend to use for this job.

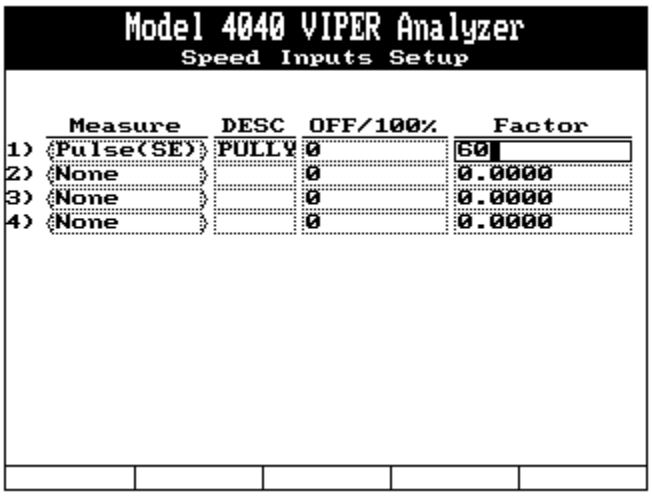
12.1.2. Speeds

12.1.2.1. Press the [F2] "Speeds" key from the Spectra Setup screen shown above in paragraph 12.1.1.1. The Speeds option allows you to measure several types of speed inputs for synchronizing with the vibration input or to provide an entry field for reference where no actual speed input is available. This allows you to view amplitude, in the selected engineering units, relative to the speed of the machine or component being monitored.

12.1.2.2. The column of numbers to the left side of the fields represents the four speed input channels, TACH 1, 2, 3, and 4. In the "Measure" field, use the [⇒], and [⇐] keys to select the type of input. The available selections are: NONE (where no speed input or reference is used), PULSE S-H (Pulse, Single ended – High), Volts S (volts – single ended), PULSE D–H (Pulse Differential – High), Volts D (Volts Differential), PULSE S – L (Pulse, Single ended – Low), PULSE D – L (Pulse Differential – Low), and ENTERY (A user entered speed reference).

NOTE

Where selections vary between an "S" and a "D" suffix are necessary, the selection is dependent on whether the input is single ended (S) or differential (D). Where selections between an "L" and an "H" suffix are necessary, the selection is dependent on whether the required gain for the incoming signal is Low (L) or High (H). Generally a signal below 1 volt peak will require you to use the High gain (H) selection and inputs of over one volt Peak will require you to use the Low gain (L) selection.

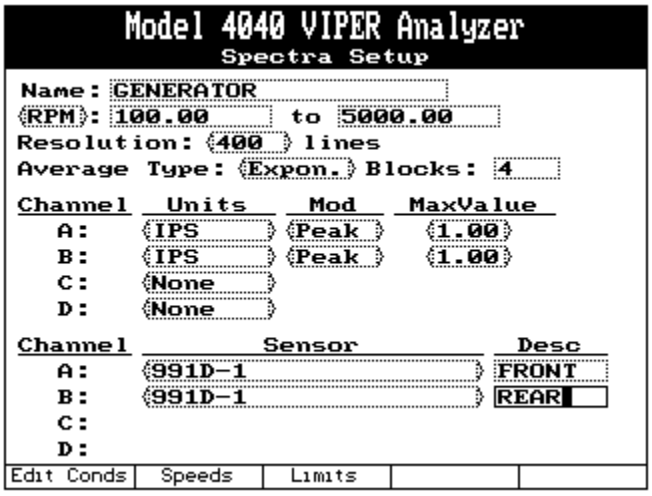


12.1.2.3. The "DESC" column is the descriptive name for the tachometer input such as "N1, N2, Fan, or Turbine. Enter up to five alphanumeric characters in this field using the analyzer keypad.

12.1.2.4. The "OFF/100%" column is used when the VOLTS selection is made in the "Measure" column described in paragraph 12.1.2.2 above. This field is used to enter the offset if measuring a DC voltage, or the frequency at 100% of component speed if measuring frequency in Hertz (Hz). Use the keypad to enter the value in the OFF/100% field.

12.1.2.5. In the "FACTOR" column, enter the multiplier for the DC voltage or Hertz to attain the actual component speed. If measuring a voltage, the speed is equal to OFF + voltage x Factor. If using a Pulse input, the RPM is equal to Hertz x Factor. The analyzer assumes the input to be relative to Hz (cycles per second) so that an input of one pulse per revolution (one-per-rev) would require a FACTOR of 60 (1 per-rev X 60 Hz assumed) to equal Revolutions per minute (RPM). Enter the factor using the keypad.

12.1.2.6. Repeat the steps from paragraph 12.1.2.2 through 12.1.2.5 for each of the four channels you intend to use for this job the/or press [ENTER] to accept your settings and exit back to the Spectra Setup screen.



12.1.3. Monitor

12.1.3.1. Install the sensors and cables required for the task.

12.1.3.2. Start the component you are checking (engine, generator, etc.). When the component is at normal operating condition (speed, temp, etc.) press the [ENTER] key to begin acquiring data. When monitoring is complete, press [ENTER] again to stop data collection.

NOTE

When the spectrum is displayed on screen, press the [⇐] or [⇒] key to produce a NORMAL CURSOR immediately at the frequency where the highest amplitude is displayed. The keys may also be used to immediately EXPAND [⇑] or SHRINK [⇓] the Y scale.