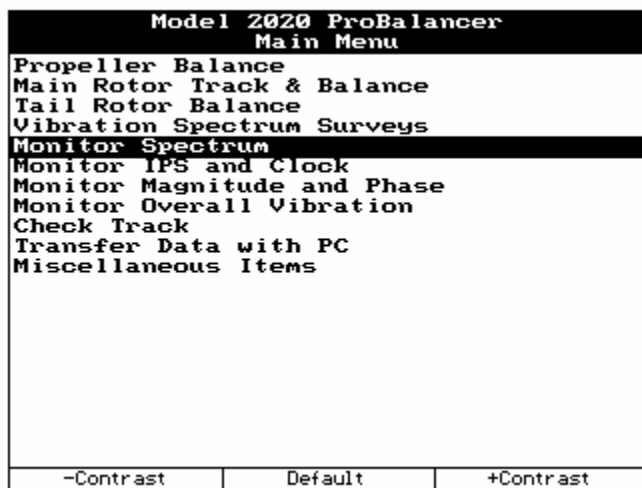

Chapter 8

Monitor Spectrum

(Revision 3, July 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.

To use the “Monitor Spectrum” function, do the following:

1. Select “Monitor Spectrum” from the Main Menu banner screen.

The analyzer will display the “Spectra Setup” banner screen with default values or values entered from the previous job such as those shown in the illustration below.

Model 2020 ProBalancer Spectra Setup	
Name :	SAMPLE
Min Frequency :	0.0
Max Frequency :	60000.0 RPM
Resolution :	200 lines
Average Type :	Normal
Blocks in Avg :	4
Measure Inputs :	A+B
Channel A Desc :	GEN #1
Channel B Desc :	GEN #2
Vibration :	IPS Mod : Peak
Full Scale Vibration :	1.00
Sensor :	991V
Edit Conds	

2. Enter a name for the spectrum in the “Name” field if desired (see paragraph below) using the keypad. (Refer to Chapter 3, “Using the Model 2020 ProBalancer Analyzer” if you are unfamiliar with using the keypad.)

“Name,” “Channel A Desc,” and “Channel B Desc” are optional fields that need not be filled in to use the “Monitor Spectrum” function. However, this information will aid you in differentiating these spectra from other stored spectra should you choose to store it for later review or printing. The “Name” field should be one of your choosing which you will easily recognize and associate with this job. The “Channel A” and “Channel B” descriptions likewise should be a description of your choosing which you and your co-workers easily understand, such as “LAT”, “VERT”, or “GEN #1” and “GEN #2” for instance. All other fields on this screen must be filled in.

3. Use the [↓] key to move down to the next field. Using the keypad, enter the determined minimum and maximum frequency range in the “Min Frequency” and “Max Frequency” fields. Use the [↓] and [↑] keys to move between fields.

Determine the minimum and maximum frequency requirements. For instance, if the frequency of interest is 18,000 RPM (300 Hz), you might choose a minimum and maximum frequency that will place 18,000 RPM (300 Hz) in the center of the range. The minimum might then be 15,000 RPM (250 Hz) and the maximum 21,000 RPM (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, 18,000 RPM (300 Hz) is the frequency of interest, the fundamental frequency. If you want 3X harmonics included in the frequency range you must multiply the fundamental frequency (18,000 RPM (300 Hz)) times the harmonic range (3X) and arrive at an upper range of 54,000 RPM (900 Hz).

4. Use the [↓] key to move to the “RPM” field. 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.

5. Use the [↓] key to move to the “Resolution” field. Set the Resolution as required at 100, 200, 400, or 800 lines by pressing the [⇒] key to toggle 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.

6. Use the [↓] key to move to the “Average Type” field. Select the average type by toggling between the selections in the field using the [⇒] key.

There are two available options, “Normal” and “Peak”. If you select “Normal” the screen will constantly update both the amplitude and frequency. The screen will have a dynamic appearance and change as the input condition changes. If you select “Peak” the analyzer will plot and hold the highest amplitude received on screen. This value will not decrease once plotted, but will increase if an amplitude of higher value is acquired. Consult the appropriate equipment maintenance manual for specific requirements of a vibration survey or for analysis guidelines.

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. 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.

CAUTION

Sensors connected to Channel A and Channel B must be of the same type. Using different sensors during the same job will cause erroneous readings and problems achieving good balance results.

8. Use the [↓] key to move to the “Measure Inputs” field. Toggle between the choices in this field using the [⇐] or [⇒] keys. The available choices are Channel(s) A, B, or A+B. The value in this field identifies which vibration channel input data will be acquired from.

Choosing a single channel for measurement will allow you to select 1,200,000 RPM (20,000 Hz) as the “Max Frequency.” Selecting to sample two channels will allow for a “Max Frequency” of 720,000 RPM (12,000 Hz) on each individual channel.

9. Use the [↓] key to move to the “Channel A Desc” and “Channel B Desc” fields. These fields are defined by you and do not necessarily need to be filled in. The fields will accept any alphanumeric characters entered from the keypad. These fields are used as descriptors for the individual channels such as “LAT” and “VERT” or “GBOX” and “CORE”. The maximum field length is 6 characters.
10. Use the [↓] key to move to the “Vibration” field. The “Vibration” 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 toggle between the selections in the field. The available selections are: 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) and G's (equivalent gravities).

11. Use the [↓] key to move to the “Mod” field. “Mod” is short for unit MODifiers relevant to the engineering units specified in step 10, 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. Use the [↓] key to move to the “Full Scale Vibration” field. The “Full Scale Vibration” 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, 100, 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.

13. Use the [↓] key to move to the “Sensor” field. Use the [←] or [→] keys to toggle through the available sensor selections for the field.

If the desired sensor does appear in the selections, see Chapter 13, Section 13.2.2, “Setup Sensors” for instructions on setting up new sensors that can then be selected in this field.
14. When all required fields in on the “Spectra Setup” banner screen are filled, turn the analyzer off by pressing the [ON/OFF] key.
15. Physically install the sensors and cables required for the task.
16. Return to the analyzer, turn it on, select “Monitor Spectrum” from the Main Menu banner screen to continue with the spectrum monitoring function. All information just entered in the “Spectra Setup” banner screen fields should still appear. This information will remain in each field until you change it.

NOTE

See Chapter 15, “Equipment and Accessory Setup and Troubleshooting”

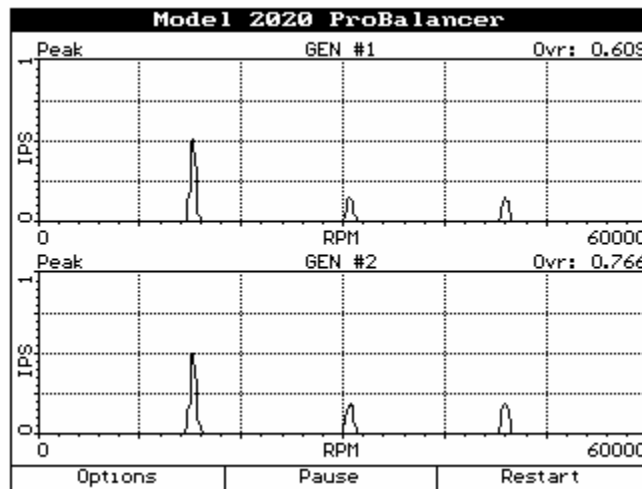
for additional information on installing accessory equipment such as vibration sensors and tachometers.

17. 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.

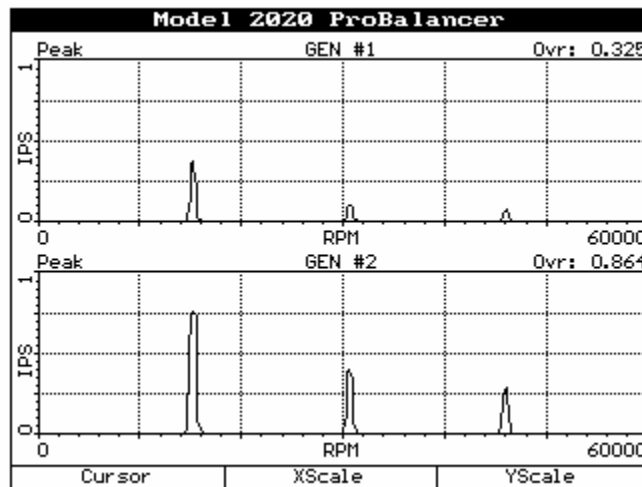
NOTE

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 arrow keys may also be used to immediately **EXPAND** [↑] or **SHRINK** [↓] the Y scale.

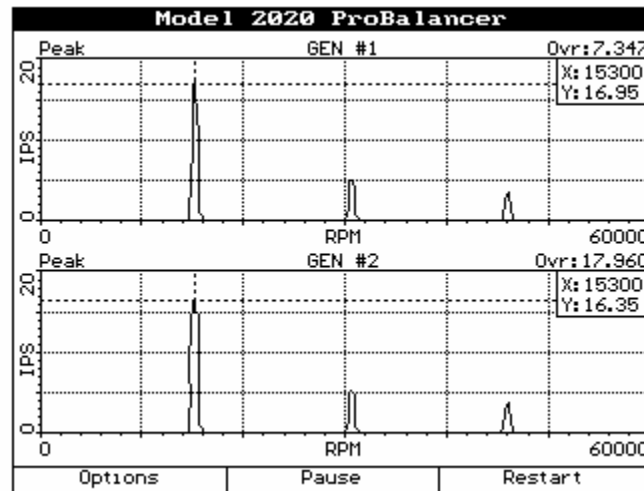
18. When the spectra is displayed, you will also see three function boxes at the bottom of the screen (see following figure) corresponding to the position of the [F1], [F2], and [F3] keys directly below them. The boxes read “Options,” “Pause,” and “Restart.”



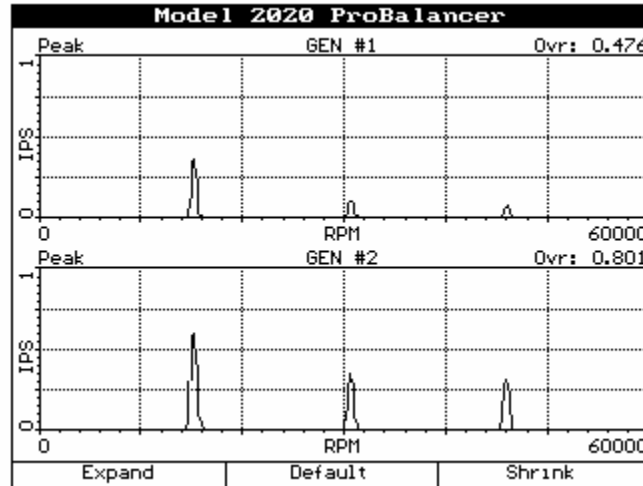
19. Press the [F1] “Options” key to change the [F1], [F2], and [F3] boxes to read “Cursor,” “X scale,” and “Y scale” respectively as shown in the figure below. The functions of the “F” keys will continue to change as the screens change. Steps 20-34 walk you through the various “F” key options that will appear. Use the “F” keys as needed in the monitoring process.



20. Press the [F1] "Cursor" key to change the [F1], [F2], and [F3] boxes to read "Normal," "Harmonic," and "None" respectively.
21. Press the [F1] "Normal" key to produce a normal cursor on the screen accompanied by an X and Y scale value readout box in the upper right corner of each displayed spectra (see following figure). These X and Y values are relative to the current position of the cursor. The cursor can be moved along the X (horizontal) axis of the spectra by pressing the [⇒] or [⇐] keys. Hold down the key for large and rapid incremental changes. The value of the "X" axis (frequency) and "Y" axis (amplitude) will be displayed for the current position of the cursor. Incremental values are determined by the number of lines of resolution specified in the setup screen.



22. Press the [F2] "Harmonic" key to produce multiple harmonic cursors according to the specified frequency range. When this key is pressed, the cursors will appear to the right of the fundamental frequency identified by the left most cursor. For example, if the fundamental frequency is 18,000 RPM (300 Hz), cursors will be placed at 2X (36,000 RPM (600 Hz)) 3X (54,000 RPM (900 Hz)) 4x (72,000 RPM (1200 Hz)) and so on until the upper frequency limit of the screen is met. When the primary cursor (for the fundamental frequency) is moved, the multiple harmonic cursors will automatically follow the movement and position themselves at the new multiple of the fundamental frequency. To remove the harmonic cursor, repeat step 20 and press the "None" key. This will remove all cursors from the screen.
23. Press the [F3] "None" key to remove either a normal or harmonic cursor if currently displayed on screen. The three boxes above the [F1], [F2] and [F3] keys will return to "Options," "Pause," and "Restart" respectively. If no cursor is displayed when pressing this key, only the box nomenclature will change.
24. Press the [F2] "X scale" key to change the [F1], [F2], and [F3] boxes to read "Expand," "Default," and "Shrink" respectively as shown in the following figure.



25. Press the [F1] “Expand” key to expand the X scale of the spectra, in effect enlarging the viewing area. You might think of this function as a “Zoom Out” feature. The center of the expanded view will be the position of the cursor prior to pressing the [F1] key. If the view is already at the maximum range of the specified X scale range, no scaling change will occur, however the cursor will be displayed and the X, Y, and overall (Ovr:) values will be shown in the upper right corner of the screen. The [F1], [F2] and [F3] boxes will return to the format described at the beginning of paragraph 18. If you wish to expand the X scale further, repeat the steps described in this paragraph.
26. Press the [F2] “Default” key will return the X scale to the values specified in the setup. This is a quick and easy way to return the expanded or shrunken scale to the default value without the necessity of numerous keystrokes. If the X scale is already at the setup value when the [F2] “Default” key is pressed, the three function boxes will return to the settings in paragraph 18. No other changes will occur.
27. Press the [F3] “Shrink” key to lower the X scale of the spectra, in effect shrinking the viewing area. You might think of this function as a “Zoom In” feature. If the view is already at the minimum of the specified X scale range, no scaling change will occur, however the cursor will be displayed and the X, Y, and overall (Ovr:) values will be shown in the upper right corner of the screen. The [F1], [F2] and [F3] boxes will return to the format described in step 18 above. If you wish to shrink the X scale even further, repeat the steps in this paragraph.
28. Press the [F3] “Y scale” key to change the [F1], [F2], and [F3] boxes to read “Expand,” “Default,” and “Shrink” respectively.
29. Press the [F1] “Expand” key to expand the Y scale of the spectra, in effect enlarging the viewing area. You might think of this function as a “Zoom Out” feature. If the view is already at the maximum range of the specified Y scale range, no scaling change will occur. The [F1], [F2] and [F3] boxes will return to the format described in paragraph 18 above. If you wish to Expand the Y scale even further, retrace the steps from that point as described in the text.

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30. Press the [F2] “Default” key to return the Y scale to the values specified in the setup. This is a quick and easy way to return the expanded or shrunken scale to the default value without the necessity of numerous keystrokes. If the Y scale is already at the setup value when the [F2] “Default” key is pressed, the three function boxes will return to the format described in paragraph 18. No other changes will occur.
 31. Press the [F3] “Shrink” key to lower the Y scale of the spectra, in effect shrinking the viewing area. You might think of this function as a “Zoom In” feature. If the view is already at the minimum of the specified Y scale range, no scaling change will occur on the screen. The [F1], [F2] and [F3] boxes will return to the format described in paragraph 18. If you wish to Shrink the Y scale even further, retrace the steps from that point as described in the text.
 32. Press the [F2] “Pause” key to stop data acquisition and freeze the screen with the latest displayed data. The [F1] and [F3] boxes will change to read “Store” and “Resume,” respectively. The box that corresponds to the [F2] key has no value and is blank.
 33. Press the [F1] “Store” key to display the “Customer Information” banner screen. You may enter optional Customer Information for later identification of the stored spectra (recommended). When the desired information is entered, press [ENTER] to accept and store the information with the spectra and return to the Main Menu.

NOTE

The analyzer will store spectra jobs as long as memory is available. If you are attempting to store a job and the analyzer displays a message saying “You must delete an item before adding a new one,” press the [BACKUP] key and select “Manage Jobs” to delete the spectra of your choosing. This action should free enough memory to store the new data. This is also an indication that you should review and remove or transfer all data that is not necessary.

NOTE

The “Monitor Spectrum” banner screen menu does not contain a store or review option. In order to *review* spectra, you must exit the “Monitor Spectrum” banner screen and select the “Vibration Spectrum Surveys” banner screen menu. See Chapter 7, Vibration Spectrum Surveys for instructions on how to perform this function.

34. Press the [F3] “Resume” key to restart the data acquisition and continue the averaging process with the latest averaged data.