



# Application Note

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## Rolls Royce A250 Series

### Turbine Section Vibration Survey

**Part Number: 11-200-0227**

**AppNote Number: E-R0AL250CEB-2020-VI (Rev. 5.1, Jun 2009)**

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# Application Note

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|-------------------------|----------------------------------|
| Application Note Number | E-ROAL250CEB-2020-VI             |
| Revision                | 5.1 (From Eng Rev 10/2006)       |
| Function                | Turbine Section Vibration Survey |
| Airframe                | Various                          |
| Engine                  | Rolls Royce A250 Series          |
| E-Setup Number          | e-roal250ceb-2020-vi.asf         |
| ACES Systems Analyzer   | Model 2020 Series with EPS       |
| Boot/App Version        | 3.03/3.03 or later               |
| Procedure               | N/A                              |

## Introduction

This Application Note covers the required equipment, equipment installation, analyzer setup, data acquisition and solution process for using the ACES Systems Model 2020HR to perform a turbine section vibration survey on the Rolls Royce A250 Series. General instructions for the use of the Model 2020HR can be found in the Model 2020HR User Manual #2020-OM-01 (P/N 75-900-2020) All procedures and adjustments should be made in accordance with the Engine Maintenance Manual.

## A. Equipment Setup

**Required Equipment:** The following equipment is required to perform a Vibration Survey\*:

| Item | Quantity | Description                                | Part Number   |
|------|----------|--|---------------|
| 1.   | 1        | Analyzer, Model 2020HR                     | 10-100-2020HR |
| 2.   | 1        | Mount, Sens, Turb Vert, A250 (All but B17) | 22-430-0124   |
| 3.   | 1        | Sensor, 6222S-20, W/510 Chg Conv. & Cbl    | Z10-100-1510  |

\*This listing shows the latest design parts. It is acceptable to perform this task using previous designs with the appropriate accessories. For compatibility issues, contact ACES Systems.



**Optional Equipment:** The following equipment may be required as an alternate depending upon aircraft size and engine model when accomplishing the job:

| Item | Quantity | Description                         | Part Number |
|------|----------|-------------------------------------|-------------|
| 4.   | 1        | Mount, Sens, Turb Vert, A250 (B17)  | 22-430-0122 |
| 5.   |          | Cable, Sensor, 991V-2020/4040 25 Ft | 10-320-0158 |

### Miscellaneous Equipment

Tape or tie wraps to secure cables to airframe.

## B. Equipment Installation

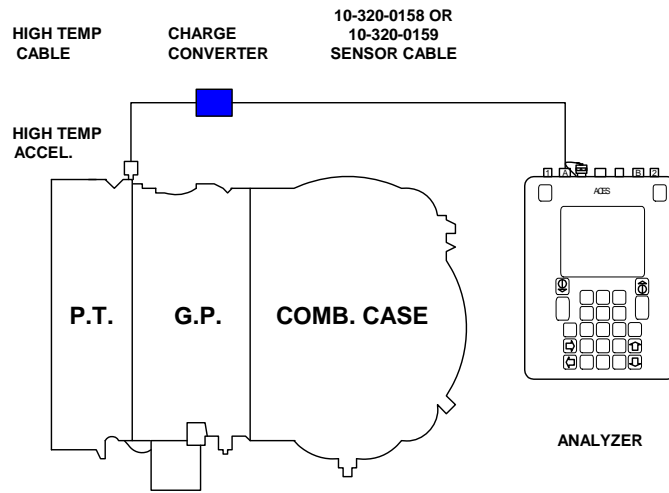
1. Park the aircraft on a flat level surface with the nose into the wind. Place the Model 2020HR Analyzer (Item 1) in the flight compartment.

#### NOTE

**Secure and route cables as not to interfere with hot or rotating components.**

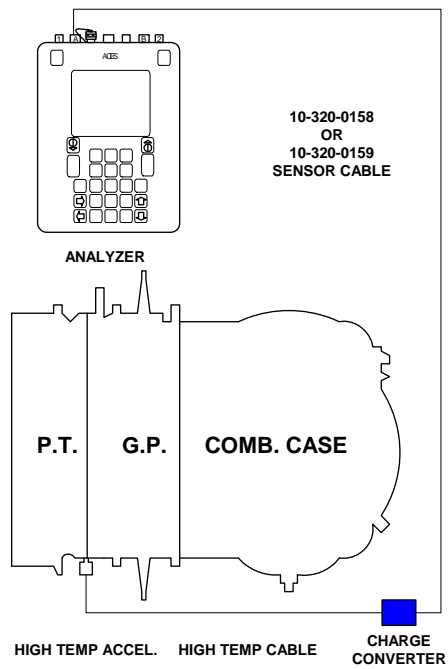
2. Turbine: (all models except B17) Install Sensor Mount (Item 2) on the forward side of the gas producer-to-power turbine support split-line at the 12 o'clock position. Install the High Temperature Sensor (component of Item 3) onto the Sensor Mount. Connect High Temperature Sensor Cable (component of Item 3) to the Sensor and to the 510 Charge Converter (component of Item 3). Connect the end marked "991V" of the Vibration Sensor Cable (component of Item 3 or Item 5) to the Model 510 charge amplifier. Route the cable safely and securely into the cabin area. Connect the end marked "2020" to "CHANNEL A" on the analyzer. (Figure 1)
3. Turbine: (B17 model) Install Sensor Mount (Item 4) on the forward side of the gas producer-to-power turbine support split-line at the 6 o'clock position. Install the High Temperature Sensor (component of Item 3) onto the Sensor Mount. Connect High Temperature Sensor Cable (component of Item 3) to the Sensor and to the 510 Charge Converter (component of Item 3). Connect the end marked "991V" of the Vibration Sensor Cable (component of Item 3 or Item 5) to the Model 510 charge amplifier. Route the cable safely and securely into the cabin area. Connect the end marked "2020" to "CHANNEL A" on the analyzer. (Figure 2)
4. Reinstall any previously removed cowlings.

### Equipment Installation Diagram



250 Series (Except B17)

Figure 1



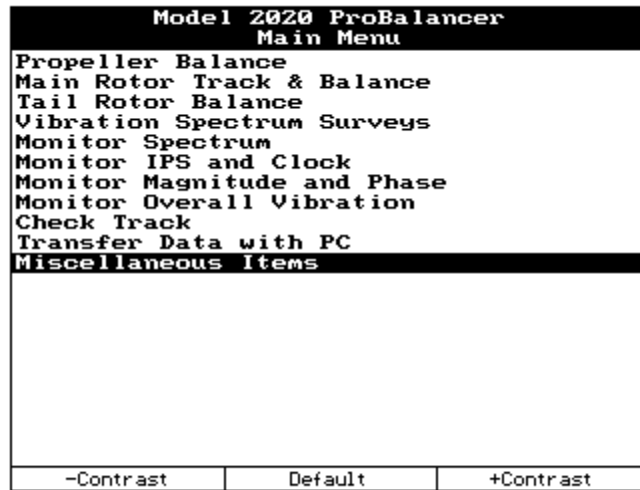
250 B17

Figure 2

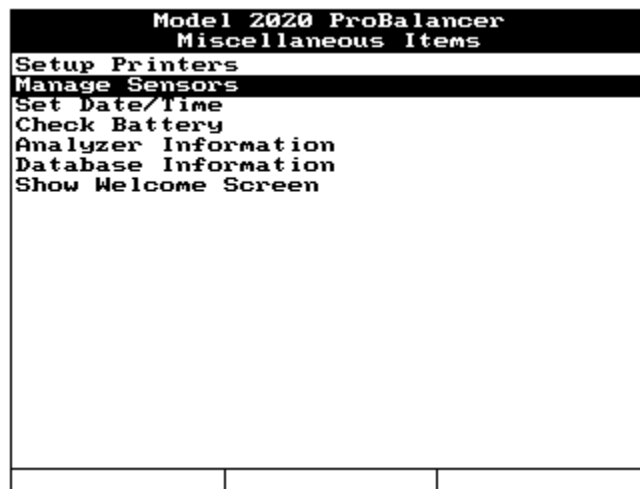
## C. Analyzer Set Up

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1. Insure the analyzer battery is charged prior to starting the job. See the Model 2020HR User Manual #2020-OM-01 (P/N 75-900-2020) Chapter 2 for detailed instructions on battery charging.
2. Turn the analyzer ON by pressing the [ON/OFF] key.
3. You must first define the vibration sensor to be used for this survey. From the Main Menu shown below, select “Miscellaneous Items” and press the [ENTER] key.

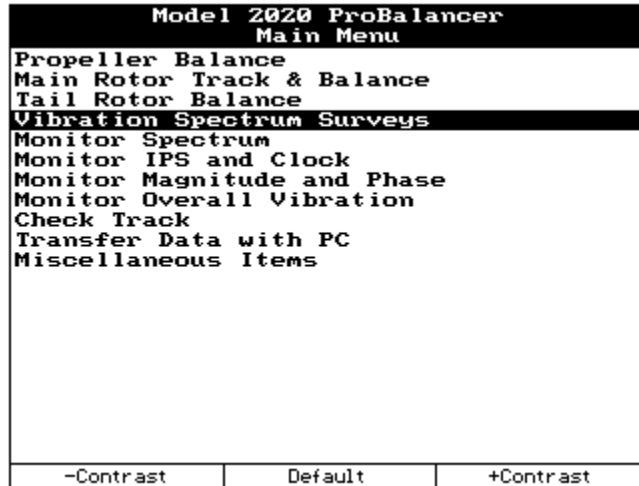


4. From the Miscellaneous Items menu shown below, select “Manage Sensors” and press the [ENTER] key.

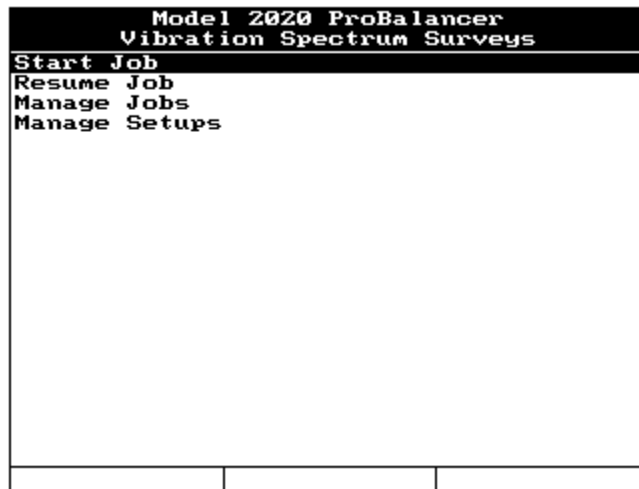


5. From the Manage Sensors menu shown below, select “New” and press [ENTER].





8. From the Vibration Spectrum Surveys menu shown below, select “Start Job” and press the [ENTER] key.



9. If the Rolls Royce A250 Series is listed in the Setup List, select it using the [↓] key, press [ENTER] and go to Section D below. If the Rolls Royce A250 Series is not in the Setup List, press the [F1] “New” key and go to step 10 below.

| Select Setup List |                      |
|-------------------|----------------------|
| 1)                | e-roal250ceb-2020-vi |
| 2)                | BRAND X ENGINE       |
| 3)                | BRAND Y ENGINE       |
| 4)                | BRAND Z ENGINE       |
| New               |                      |

10. The “Spectra Setup” screen now appears. Enter the Spectra Setup as shown below. You can enter any name that is convenient for locating the setup in the future. When completed press [ENTER].

| Model 2020 ProBalancer Spectra Setup |                      |
|--------------------------------------|----------------------|
| Name :                               | e-roal250ceb-2020-vi |
| Min Frequency :                      | 0.0                  |
| Max Frequency :                      | 2000.0 Hz            |
| Resolution :                         | 400 lines            |
| Average Type :                       | Normal               |
| Blocks in Avg :                      | 4                    |
| Measure Inputs :                     | A                    |
| Channel A Desc :                     | TURB                 |
| Channel B Desc :                     |                      |
| Vibration :                          | IPS Mod: Avg         |
| Full Scale Vibration :               | 2.00                 |
| Sensor :                             | 6222S-20 W/510       |
| Edit Conds                           |                      |

11. The “Spectra Conditions” screen will appear next as displayed below. Enter the information as indicated in the illustration below. The readings for this condition will be taken at 100% power turbine speed pulling the maximum amount of power without lifting the aircraft off the ground. Press [ENTER] to continue.

| Model 2020 ProBalancer<br>Spectra Conditions |            |
|--|------------|
| <b>Condition</b>                             |            |
| 1)   | MAX IQ GND |
| 2)   |            |
| 3)   |            |
| 4)   |            |
| 5)   |            |
| 6)   |            |
| 7)   |            |
| 8)   |            |
| 9)   |            |
| 10)  |            |

## D. Data Acquisition

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- The “Customer Information” screen will be displayed, as shown below. Use the analyzer keypad to enter a customer name in the “Name:” field. The analyzer will maintain a list of customer names as new names are entered. If names have been previously entered into this analyzer, you may press the [F1] “Names” key and select a customer’s name from the provided list. Press the [↓] key to move to the next field and use the analyzer keypad to enter the optional aircraft registration and aircraft total time as required. When all fields are complete, press the [ENTER] key to accept and continue.

| Model 2020 ProBalancer<br>Customer Information        |               |
|---|---------------|
| Enter the following optional<br>Customer Information. |               |
| Name:   | CUSTOMER NAME |
| A/C Registration:                                     | N1234         |
| A/C Total Time:                                       | 123.4         |
| Press ENTER to continue.                              |               |
| Names   |               |

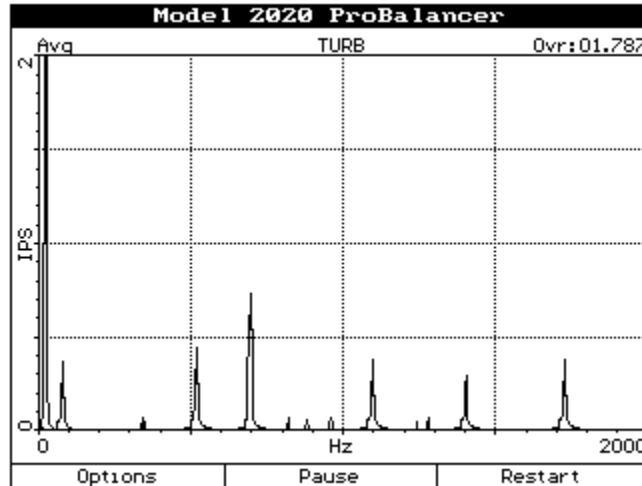
- The next screen to be displayed will be the “Engine Information” screen. Use the analyzer keypad to enter as much information as is applicable. This information is not mandatory, but all entries will appear on the final report.

| Model 2020 ProBalancer<br>Engine Information |                                |                      |
|--|--------------------------------|----------------------|
| <b>Engine 1 Info</b>                         |                                | <b>Prop 1 Info</b>   |
| S/N:   | <input type="text"/>           | <input type="text"/> |
| Type:  | <input type="text"/>           | <input type="text"/> |
| Pos:   | <input type="text" value="1"/> | <input type="text"/> |
| ISO:   | <input type="text" value="0"/> | <input type="text"/> |
| TSN:   | <input type="text" value="0"/> | <input type="text"/> |
| Serial Nos                                   |                                | <input type="text"/> |

- The “Select Aircraft Condition” screen will appear. The condition named “MAX TQ GND” should be highlighted, press [ENTER] to begin data acquisition.

| Model 2020 ProBalancer<br>Select Aircraft Condition |  |          |
|---|--|----------|
| [ ] MAX TQ GND                                      |  |          |
|   |  | Quit Job |

- The analyzer will present the data acquisition screen as shown. This screen allows you to monitor the vibration readings. While monitoring the measurement, you may press the [F3] “Restart” key to restart the averaging process. Use this feature as a way to validate the quality of the measurement. If the averaged readings return to a value similar to those prior to “Restart” being pressed the measurement can be considered good. If the measurement is not similar, you may choose to “Restart” the average again. When you are satisfied with the data quality, press the [ENTER] key to continue.



See the Model 2020HR User Manual #2020-OM-01 (P/N 75-900-2020) Chapter 16 for detailed instructions on how to read the “Converging Vibration Indicator and Scale.”

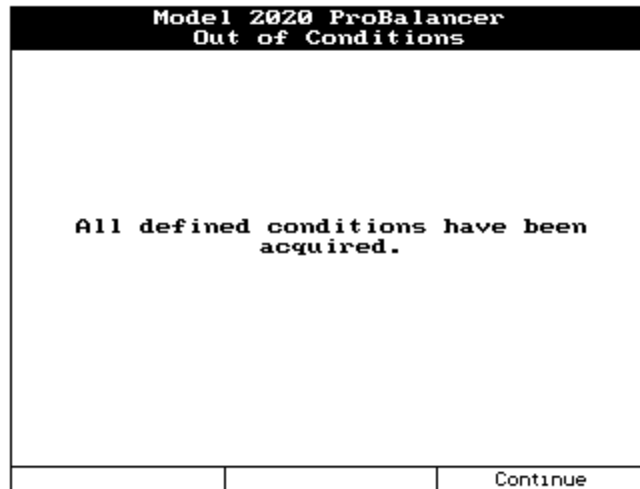
5. The “Store Spectra?” screen will appear. This screen gives you the option of entering notes on the actual N1 and N2 speeds recorded during the run. You can enter values in RPM, Hz or Percent. An entry is not mandatory but can be used for later review. Answer the question “Store the spectral data?” by pressing the [F1] “Yes” key to save the data or the [F3] “No” key to retake the data and return to the “Select Aircraft Condition” screen as in Step 3 above.

The screenshot shows the Model 2020 ProBalancer interface with the title 'Model 2020 ProBalancer Store spectra?'. It contains two input fields: 'Enter actual N1: 95' and 'Enter actual N2: 100'. Below these fields is the question 'Store the spectral data?'. At the bottom, there are two buttons: 'Yes' and 'No'.

## E. Quit Job

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1. Selecting “Yes” from the screen shown in Step D.5 above will cause the “Out of Conditions” screen to be displayed. Press the [F3] “Continue” key to complete and store the job.



2. See the Model 2020HR User’s Manual #2020-OM-01 (P/N 75-900-2020) Chapter 7 for detailed instructions on how to review the Spectral Data.