



# Application Note

Application Note Number	A-BRRJ-1725-FB-3.26
Revision	1
Function	Fan Trim Balance
Airframe	Bombardier Regional Jet and Challenger
Engine	CF34
Other Application Notes Required	N/A
ACES Systems Analyzer	ACES 1725 Trim TEC Analyzer
Firmware Version	2.06 or higher
Procedure Cards	CF34 Vibration

## Introduction

This Application Note contains specific directions on how to perform a vibration survey and fan trim balance on Bombardier Regional Jets (RJ) and Challenger with General Electric CF34 engines. This Application Note describes the steps necessary to perform the physical set up of equipment (e.g., analyzer, cabling, sensor mounting, etc.) and the steps necessary to perform the vibration surveys and balance procedures.

## A. Required Equipment

The following ACES Systems' equipment is required.

Item	Quantity	Description	Part Number
1.	1EA	1725 Trim TEC Analyzer Base Kit	1725-110V
2.	1EA	Procedure Card, CF34 Vibration V3.26 or higher	11-100-0054
3.	1EA	Interface, Challenger/RJ Vibration WB (Wide Band)*	10-320-0137
4.	1EA	Lasetach, Model 299	10-100-1300
5.	1EA	Mount, Lasetach	10-100-0369

## Optional Equipment

6.	1EA	Cable, data acquisition, Generic 50 foot, (for 2 eng. Balance)	10-320-0127
7.	1EA	Lasetach, Model 299 (for 2 eng Balance)	10-100-1300
8.	1EA	Cable, tachometer, Generic 50 foot (for 2 eng. Bal)	10-320-0126
9.	1EA	Interface, Tachometer, Challenger/RJ (used to collect speed	10-320-0147

and phase data directly from the tach output of the engine)  
This application will also require two 50 foot tachometer cables PN 10-320-0126 for each engine being connected to the analyzer.

10.	1EA	Interface, 797 Vibration sensor (used to connect an external sensor (797V) for backup if onboard sensor fails.	10-320-0134
11.	1EA	Sensor, Velocity, 797V (used as a backup for onboard sensor)	69-100-0074
12.	1EA	Battery Charger, 220V (for use where 220V power is standard)	10-100-0414
13.	1EA	Interface, Challenger/RJ Vibration NB (Narrow Band)*	10-320-0253

**\* The Challenger/RJ Wide Band Interface will collect data for both vibration surveys and fan trim balance. The Challenger/RJ Narrow Band Interface will collect data for fan surveys and fan trim balance only. Dependent on the serial number of the aircraft, these outputs from the test connector may not match those from the cockpit vibration indicator without the correct cable. Call ACES Systems for details.**

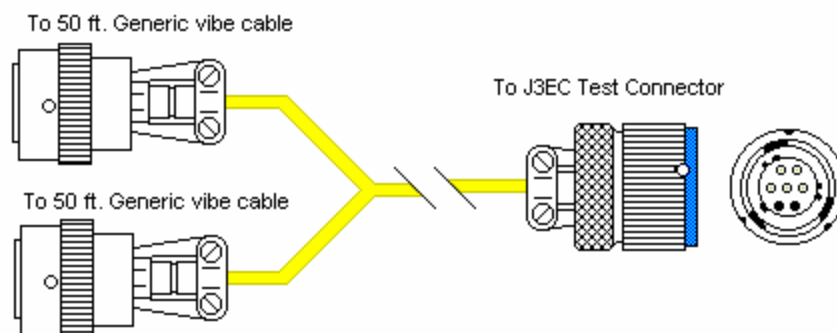
### Miscellaneous Equipment

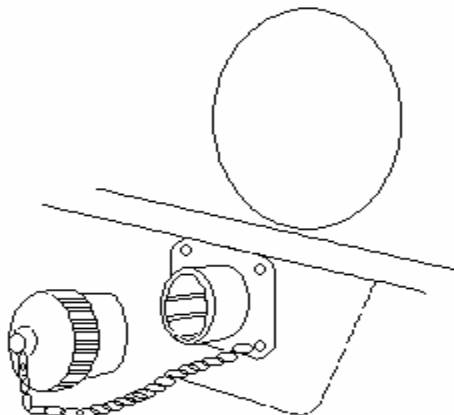
13.	1EA	Socket head screw weights (General Electric Part Numbers) Use only one Part Number when balancing. DO NOT MIX SCREW WEIGHTS OF DIFFERENT PART NUMBERS.	4096T45, or 3024T53, or 9111M35
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## B. Equipment Installation

### Onboard Vibration Monitoring Interface and Cables

1. If connecting to the onboard vibration monitoring system, gain access to the under-floor electronics equipment compartment.
2. Connect the RJ interface, (Item 3) pictured below, to the J3EC test connector of the EVM system. The connector location varies with the series of the aircraft but is generally on the left side of the compartment in the center fuselage area.





J3EC Test Connector (Typical)

3. Remove the floor panel just aft of the center console and between the pilot and copilot seats in the cockpit.
4. Route the socket end of a 50 foot generic vibe cables, (Item 6), down through the open floor panel and toward the rear of the aircraft to the J3EC test connector location.

**NOTE**

When using two cable sets, for two engine balance or vibe survey, it is advisable to identify one of the two cables as the #1 (left) with a wrap of electrical tape or a wire tie at each end. As both cables are otherwise identical, this will avoid confusion when connecting to the analyzer.

5. Connect the 50-foot vibe cable identified as the Number 1 engine cable to the interface connector (item 3) marked as number 1 or left engine. If you are completing a two-engine task, repeat steps 1 through 5 of this procedure for the number 2 or right engine.

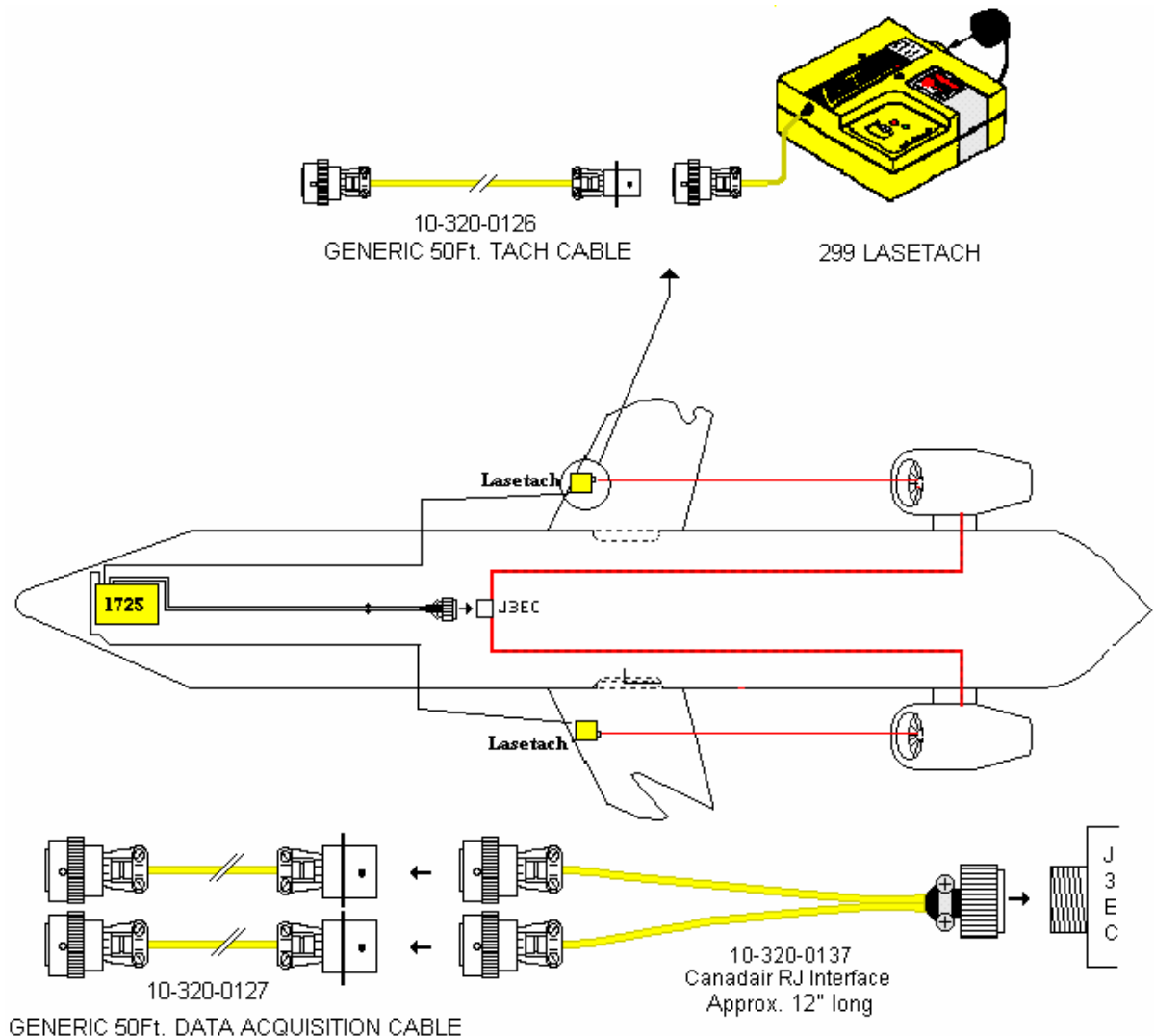
## Equipment Setup: LASETACH (LASER TACHOMETER)

1. Assemble the ACES Model 299 Lasetach (item 4) and swivel mount (item 5). Position the Lasetach assembly on top of the wing near the leading edge and secure the base of the swivel bracket to the wing with duct tape or aluminum speed tape.
2. Attach the 50 Ft. TACH CABLE (item 8) to the Lasetach (item 4). (SEE Figure below).

### NOTE

When using two cable sets, for two engine balance or vibe survey, it is advisable to identify one of the two sets as the #1 with a wrap of electrical tape at each end. As both cables are otherwise identical, this will avoid confusion when connecting to the analyzer.

## Equipment Installation Diagram



3. Route the TACH CABLES through the open floor hatch and out the access door at the bottom of the fuselage or through the passenger compartment and through the over wing escape hatch. Take care not to pinch the cables in doors or hatches.

4. Place the analyzer in the cockpit or locate it where it will be used if the technician running the engines will not also conduct the procedure. Connect the various cables for either a one or two engine application as follows:

NOTE

When using two cable sets, for two engine balance or vibe survey, it is advisable to identify one of the two sets as the #1 with a wrap of electrical tape at each end. As both cables are otherwise identical, this will avoid confusion when connecting to the analyzer.

A. Left Engine Data Acquisition Cable (item 6) marked as the **#1 or left engine** to the six pin connector marked "ENGINE 1 A"

B. Left Engine Tach Cable (item 8) marked as the **#1 or left engine** to the three pin connector marked "TACH 1"

C. Right Engine Data Acquisition Cable (item 6) marked as the **#2 or right engine** to the six pin connector marked "ENGINE 2 A"

D. Right Engine Tach Cable (item 6) marked as the **#2 or right engine** to the three-pin connector marked "TACH 2"

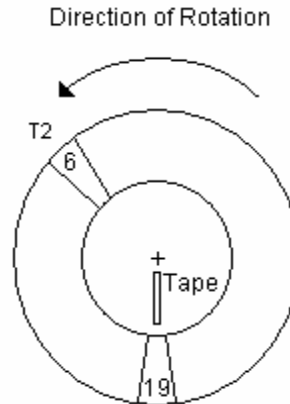
### Equipment Setup: REFLECTIVE TAPE

NOTE

Reflective quality is not the same for all reflective tape.  
Use only 3M brand, #7610 reflective tape for best results.

1. Position the fan so that #6 blade is in line with the T2 sensor (approximately 10 o'clock from forward looking aft.)

2. With the fan in this position, clean the surface of the spinner at the 6 o'clock position with a degreaser and dry thoroughly. Remove the protective backing from a two inch strip of reflective tape and apply the tape at the cleaned (6 o'clock) location. (See Figure below.) Alignment of the laser will be accomplished later in this procedure.



## C. Analyzer Set Up

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### VIBRATION SURVEY

#### PERFORM ENGINE SURVEY (Without Tach)

This survey is conducted to acquire an overall engine vibration. It will provide an indication of the total vibration energy being produced by the entire engine and not the fan assembly alone. For the Fan vibration indications, perform the engine vibration survey with tach. That survey will provide an indication of the balance condition of the fan assembly alone throughout the acceleration range. The fan synchronized survey (with tach) filters out all engine vibrations not directly associated with the fan frequency.

1. If off, Turn the analyzer on by pressing the [ON/OFF] key. If the analyzer is on, press the [RESET] key. An information screen advising you not to exceed established limitations will appear temporarily then automatically be replaced by the "MAIN MENU" screen. (A battery check and report page may also temporarily be displayed dependent on how long the analyzer has been idle.)
2. Select **GE CF34 Vibration V3.26** (or higher) from the Operation Options menu by using the [ARROW] keys, then press [ENTER].

```

Thu 03Aug2000 13:33 1528Kb
TrimTEC Analyzer
Operation Options
1--TFE731 EMS v1.00
2--TFE731/ATF3 Vibration v3.28
3--Allison Engine AE3007 v3.208
4--GE CT7 Engine v2.50
5--GE CF34 Vibration v3.25
Select Function Using ↑↓.

```

## NOTE

If the General Electric CF34 procedure is not loaded in the analyzer, see the analyzer users manual for instructions on "Loading a procedure from a Procedure Card".

A brief information screen, as shown below, will be displayed momentarily. The battery level may not be displayed dependent on the amount of time the analyzer has been idle. Both screens will extinguish automatically after a short time.

```

-----| Tue 03Nov1998 10:26 2147Kb
          WARNING ?
          DO NOT Exceed ANY
          Flight Manual or
          Maintenance Manual Limits
  
```

3. Select the appropriate model using the [RIGHT ARROW] key, then press [ENTER] when the correct model is displayed.

```

-----| Tue 03Nov1998 10:24 2147Kb
          CF34-1A
          Select Model Type
          Model: CF34-1A
          Use ← → Keys To See Models
  
```

## NOTE

At this point, make sure the banner at the top of the screen does not say "DEMO CF34-". If it does not say "DEMO CF34-", go to step 4 below. If, however; it does say "Demo CF34-", then select "4--Enter Normal Mode" and press ENTER.

```

-----| Tue 03Nov1998 10:28 2147Kb
          CF34-3B1
          Main Menu
          1--Perform Engine Survey
          2--Balance Fan
          3--Select Model
          4--Enter Demo Mode
          5--Change Global Settings
          6--Exit
          Select Operation to Perform.
  
```

4. From the Main Menu select “**1—Perform Engine Survey**” with [UP or DOWN ARROW] keys, then press [ENTER].

```

----- Mon 23Nov1998 09:37 2342Kb
          CF34-1A
          Engine Survey

1--Survey Without Tach
2--Survey With Tach
3--Review Engine Survey
4--Equipment Setup
5--On Board Sensor Calibration
6--Exit

Select Operation to Perform.

```

5. From the Engine Survey Menu select “**1—Survey Without Tach**” with [UP] or [DOWN ARROW] keys, then press [ENTER].

```

----- Thu 03Aug2000 13:59 1528Kb
          CF34-1A
          Survey Information

Sensor Type      :  ONBOARD-WB
Engine S/N      :
Engine Cycles   :
Engine Hours    :  0.0000

Use ← → Keys to Select Sensor

```

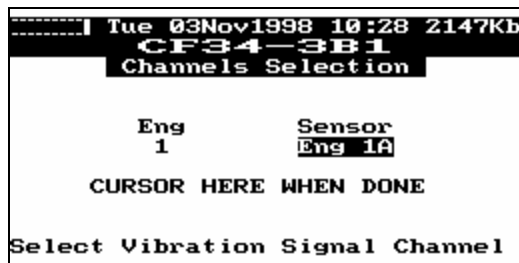
The “Survey Information” screen (shown above) will be displayed. Move between the fields using the [UP ARROW] or [DOWN ARROW] keys. The “Sensor Type” is a toggle selection field. Toggle between the selections using the [RIGHT ARROW] or [LEFT ARROW] keys. Use the “ON BOARD (WB)” or “ONBOARD (NB)” selection if taking vibration data from the EVM test connector, J3EC, beneath the floor of the Challenger or CRJ. If you are using a sensor, which is not available on the list, select “Custom” and configure the analyzer according the specification sheet for the sensor you are using.

#### NOTE

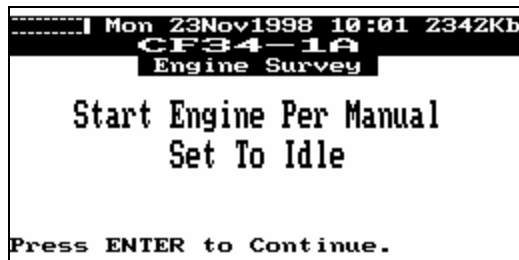
When selecting “ONBOARD (WB)” for Wide Band frequency output, or “ONBOARD (NB)” for Narrow Band frequency output from the J3EC test connector, you must also use the corresponding interface cable for Wide Band or Narrow Band output. See the equipment list at the beginning of this document for part numbers. The Narrow Band (NB) option will not allow you to acquire sufficient data for an engine vibrate survey but will allow you to do a fan vibrate survey and fan trim balance. The Wide Band (WB) option will accommodate all engine vibration survey, fan vibration survey, and fan trim balance requirements but may not match the cockpit indicator for vibration units. If you are attempting to match the analyzer readings with those displayed in the cockpit of the subject aircraft, you must select the appropriate cable and sensor setting for that airframe according to serial number.

The Engine S/N, Engine Cycles, and Engine Hours are all optional fields. If you choose to enter the information for these fields, use the numeric keypad to enter the values for each field. Fractional numbers may be entered by use of the “. MARK” key. When all fields are complete according to your requirements, press [ENTER] to accept the values and continue.

7. The analyzer will display the “Channels Selection” screen shown below. You may select the vibration channel input from the four available on the back of the analyzer. Select 1A, 1B, 2A, or 2B by using the [RIGHT ARROW] or [LEFT ARROW] keys. When your select is displayed, use the [DOWN ARROW] key to move the dark highlight bar over the “CURSOR HERE WHEN DONE” line and press [ENTER] to accept your selection and continue.



8. The “Start Engine” screen shown below will be displayed. Start the engine(s) according to the flight or maintenance manual and allow the engine to warm up at idle speed. When warm up is complete and you are ready to proceed, press [ENTER].



The Survey: Takeoff screen shown below will be displayed. If you are ready to begin the acceleration survey, press [ENTER]. As stated on screen, “After The Spectrum Is Displayed, Start 60 Second Acceleration To Takeoff Power”. You will see two momentary displays that indicate you should “Stand By”. When these screens extinguish the Spectrum will be displayed. At this point begin the acceleration to Take-off power.

#### NOTE

While exceeding 60 seconds for the acceleration is acceptable, DO NOT accelerate the engine to takeoff

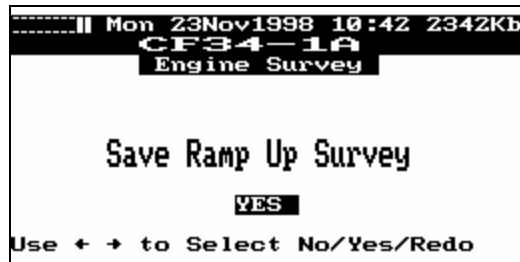
power in LESS than 60 seconds. This amount of time will allow the analyzer to acquire valid data throughout the full speed range.

```
.....| Mon 23Nov1998 10:20 2341Kb
          CF34-1A
          Survey: Takeoff

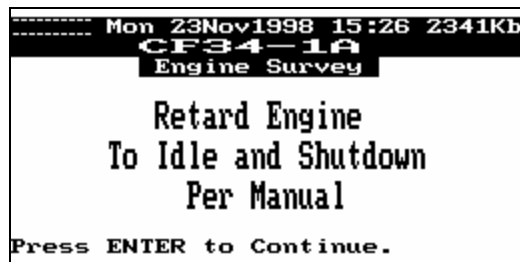
          After The Spectrum Is
          Displayed, Start 60 Second
          Acceleration To Takeoff Power

          Press ENTER to Continue.
```

10. When the acceleration is complete, press **[ENTER]** to terminate data acquisition. The analyzer will display the screen below and give you the option to Save the survey, discard the survey, or reaccomplish the survey. Use the **[RIGHT ARROW]** key to select either **YES**, **REDO**, or **NO** in the answer field. “Yes” will store the survey in the analyzers memory, “Redo” will allow you to retake the data and exercise these options again.



The analyzer will then take you through a similar data acquisition for steady state speeds of Takeoff, 85% N1, and 80% N1. When all required surveys are completed, the analyzer will instruct you to shutdown the engine as shown below.



## VIBRATION SURVEY

### PERFORM ENGINE SURVEY (With Tach)

Performing a SURVEY With Tach will allow the analyzer to determine at what speeds the highest amplitude of fan vibration occurs. These speeds then can be used as target speeds for balance in order to reap the largest benefits from a fan trim balance. Use of the tachometer to synchronize the data acquisition eliminates vibration not associated directly with the rotational speed of the fan.

1. If off, Turn the analyzer on by pressing the **[ON/OFF]** key. If the analyzer is on, press the **[RESET]** key.
2. Select **GE CF34 Vibration V3.26** from the Operation Options menu by using the **[ARROW]** keys, then press **[ENTER]**.

```

----- Mon 23Nov1998 09:35 2342Kb
TrimTEC Analyzer
Operation Options
Page 3 of 3
13--Garrett TPE331 Engine v3.018
14--JT8D Engine Survey v3.208
15--GE CF34 Vibration v3.21

[More]
Select Function Using ↑↓.

```

A brief information screen, as shown below, will be displayed momentarily.

```

----- Tue 03Nov1998 10:26 2147Kb
WARNING !

DO NOT Exceed ANY
Flight Manual or
Maintenance Manual Limits

```

3. Select the appropriate model using the [RIGHT ARROW] key, then press [ENTER] when the correct model is displayed.

```

----- Tue 03Nov1998 10:24 2147Kb
CF34-1A

Select Model Type

Model: CF34-1A

Use ← → Keys To See Models

```

#### NOTE

At this point, make sure the banner at the top of the screen does not say "DEMO CF34-". *If it does not* say "DEMO CF34-", go to step 4 below. If, however; it does say "Demo CF34-", then select "4--Enter Normal Mode" and press ENTER.

```

-----| Tue 03Nov1998 10:28 2147Kb
          CF34-3B1
          Main Menu
-----|
1--Perform Engine Survey
2--Balance Fan
3--Select Model
4--Enter Demo Mode
5--Change Global Settings
6--Exit
Select Operation to Perform.

```

4. From the Main Menu select “1—Perform Engine Survey” with [UP or DOWN ARROW] keys, then press [ENTER].

```

-----| Mon 23Nov1998 12:49 2341Kb
          CF34-1A
          Engine Survey
-----|
1--Survey Without Tach
2--Survey With Tach
3--Review Engine Survey
4--Equipment Setup
5--On Board Sensor Calibration
6--Exit
Select Operation to Perform.

```

5. From the Engine Survey Menu select “2—Survey With Tach” with [UP or DOWN ARROW] keys, then press [ENTER].

```

-----| Thu 03Aug2000 13:59 1528Kb
          CF34-1A
          Survey Information
-----|
Sensor Type      : ONBOARD-WB
Engine S/N       :
Engine Cycles    :
Engine Hours     : 0.0000
Use ← → Keys to Select Sensor

```

6. The “Survey Information” screen (shown above) will be displayed. Move between the fields using the [UP ARROW] or [DOWN ARROW] keys. The “Sensor Type” is a toggle selection field. Toggle between the selections using the [RIGHT ARROW] or [LEFT ARROW] keys. Use the “ON BOARD (WB)” or “ONBOARD (NB)” selection if taking vibration data from the EVM test connector, J3EC, beneath the floor of the Challenger or CRJ. If you are using a sensor, which is not available on the list, select “Custom” and configure the analyzer according the specification sheet for the sensor you are using.

#### NOTE

When selecting “ONBOARD (WB)” for Wide Band frequency output, or “ONBOARD (NB)” for Narrow Band frequency output from the J3EC test connector, you must also use the corresponding interface cable for

Wide Band or Narrow Band output. See the equipment list at the beginning of this document for part numbers. The Narrow Band (NB) option will not allow you to acquire sufficient data for an engine vibrate survey but will allow you to do a fan vibrate survey and fan trim balance. The Wide Band (WB) option will accommodate all engine vibration survey, fan vibration survey, and fan trim balance requirements but may not match the cockpit indicator for vibration units. If you are attempting to match the analyzer readings with those displayed in the cockpit of the subject aircraft, you must select the appropriate cable and sensor setting for that airframe according to serial number.

The Engine S/N, Engine Cycles, and Engine Hours are all optional fields. If you choose to enter the information for these fields, use the numeric keypad to enter the values for each field. Fractional numbers may be entered by use of the “.MARK” key. When all fields are complete according to your requirements, press [ENTER] to accept the values and continue.

7. The analyzer will display the “Channels Selection” screen shown below. You may select the vibration and Tach channel input from the those available on the back of the analyzer. Select Sensor Channel 1A, 1B, 2A, or 2B and Tach Channel 1 or 2 by using the [RIGHT ARROW] or [LEFT ARROW] keys. Move between the fields by using the [UP ARROW] or [DOWN ARROW] keys. Notice at the bottom of the screen that the first line of text says “Power to Tach 1 Light is ON”. This indicates that the optical tachometer is powered so that you may attach reflective tape and align the optical tach at this point. When your desired selection(s) are displayed, use the [DOWN ARROW] key to move the dark highlight bar over the “CURSOR HERE WHEN DONE” line and press [ENTER] to accept your selection and continue

```

----- Mon 23Nov1998 12:49 2341Kb
          CF34-1A
          Channels Selection

Eng      Sensor    Tach
 1       Eng 1A    Tach 1

          CURSOR HERE WHEN DONE

Power to Tach 1 Light is ON
Select Tach Channel, Press ENTER

```

## NOTE

The sensor and tach inputs are software selectable. DO NOT select the same connector for two separate inputs and always insure the indicated selection is the one to which the corresponding cable is connected.

When all connections are made, press the [DOWN ARROW] key until the dark highlight bar is on “CURSOR HERE WHEN DONE”.

## NOTE

The last line of the text on screen will say “Power to Tach 1 Light is ON” At this point you should leave the

analyzer power on, proceed outside to where the Lasetach is mounted and adjust the laser on the reflective tape target. See the "LASER ALIGNMENT" section of this document for specific guidelines.

**\*\*\* RETURN TO THIS POINT AFTER LASER ALIGNMENT \*\*\*  
AND CONTINUE**

8. If you are using two lasers, use the [ARROW] keys to move the cursor over "TACH 2" field and repeat the steps for laser alignment of that Lasetach. If alignment is complete and the cursor is at "CURSOR HERE WHEN DONE" press [ENTER] to continue.
9. The "Start Engine" screen shown below will be displayed. Start the engine(s) according to the flight or maintenance manual and allow the engine to warm up at idle speed. When warm up is complete and you are ready to proceed, press [ENTER].

```
-----| Mon 23Nov1998 10:01 2342Kb
          CF34-1A
          Engine Survey

      Start Engine Per Manual
      Set To Idle

Press ENTER to Continue.
```

10. The Survey: Takeoff screen shown below will be displayed. When you are ready to begin the acceleration survey, press [ENTER]. As stated on screen, "After The Spectrum Is Displayed, Start 60 Second Acceleration To Takeoff Power". You will see two momentary displays that indicate you should "Stand By". When these screens extinguish the Spectrum will be displayed. At that point begin the 60 second acceleration to Take-off power.

NOTE

While exceeding 60 seconds for the acceleration is acceptable, DO NOT accelerate the engine to takeoff power in LESS than 60 seconds. This allows the analyzer to acquire valid data throughout the full speed range.

```
-----| Mon 23Nov1998 10:20 2341Kb
          CF34-1A
          Survey: Takeoff

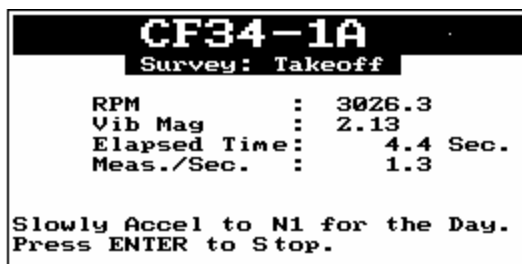
      After The Spectrum Is
      Displayed, Start 60 Second
      Acceleration To Takeoff Power

Press ENTER to Continue.
```

11. After pressing [ENTER] followed by a momentary “Please Stand-By” screen, shown below,

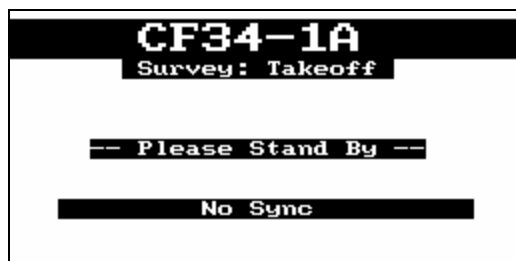


the Survey screen, shown below, will appear. (The “Vib Mag” on this screen was generated in a laboratory environment and is not a valid representation of an actual CF34 vibrate survey. It is an example only.) The vibration magnitude (Vib Mag) is shown in Mils (1000<sup>th</sup> of an inch).



The Elapsed time (in seconds) is to assist you in the timing of the acceleration. The “Meas./Sec.” Or measurements per second indicate how many samples are being taken per second during the survey. The higher the number here, the more accurate the data. Remember that the acceleration may take LONGER than 60 seconds and actually have positive effect but an acceleration of LESS than 60 seconds may reduce the accuracy of the survey data.

If the tachometer input signal is interrupted or lost, the screen below will be displayed. If this occurs, check tachometer connections and the condition of the tachometer and associated equipment such as the reflective tape or tach interface.



12. When the acceleration is complete, press [ENTER] to terminate data acquisition. The analyzer will display the screen below and give you the option to Save the survey, discard the survey, or re-accomplish the survey. Use the [RIGHT ARROW] key to select either YES,

**REDO**, or **NO** in the answer field. “Yes” will store the survey in the analyzers memory. “Redo” will allow you to retake the data and exercise these options again.

## REVIEW ENGINE SURVEY

1. If off, Turn the analyzer on by pressing the **[ON/OFF]** key. If the analyzer is on, press the **[RESET]** key.
2. Select **GE CF34 Vibration V3.26** from the Operation Options menu by using the **[ARROW]** keys, then press **[ENTER]**.

```

----- Mon 23Nov1998 09:35 2342Kb
TrimTEC Analyzer
  Operation Options
    Page 3 of 3
13--Garrett TPE331 Engine v3.018
14--JT8D Engine Survey v3.208
15--GE CF34 Vibration v3.21
-----
                [More]
Select Function Using ↑↓.
  
```

A brief information screen, as shown below, will be displayed momentarily.

```

----- Tue 03Nov1998 10:26 2147Kb
WARNING !
-----
          DO NOT Exceed ANY
          Flight Manual or
          Maintenance Manual Limits
  
```

3. Select the appropriate model using the **[RIGHT ARROW]** key, then press **[ENTER]** when the correct model is displayed.

```

----- Tue 03Nov1998 10:24 2147Kb
CF34-1A
-----
          Select Model Type
          Model: CF34-1A
-----
Use ← → Keys To See Models
  
```

## NOTE

At this point, make sure the banner at the top of the screen does not say "DEMO CF34-". If it does not say "DEMO CF34-", go to step 4 below. If, however; it does say "Demo CF34-", then select "4--Enter Normal Mode" and press ENTER.

```
-----| Tue 03Nov1998 10:28 2147Kb
          CF34-3B1
          Main Menu
1--Perform Engine Survey
2--Balance Fan
3--Select Model
4--Enter Demo Mode
5--Change Global Settings
6--Exit
Select Operation to Perform.
```

4. From the Main Menu select "**1—Perform Engine Survey**" with [UP or DOWN ARROW] keys, then press [ENTER].

```
-----| Mon 23Nov1998 16:33 2341Kb
          CF34-1A
          Engine Survey
1--Survey Without Tach
2--Survey With Tach
3--Review Engine Survey
4--Equipment Setup
5--On Board Sensor Calibration
6--Exit
Select Operation to Perform.
```

5. From the Engine Survey Menu select "**3—Review Engine Survey**" with [UP or DOWN ARROW] keys, then press [ENTER]. A momentary screen will appear to inform you how many surveys are available for review, such as "12 Surveys Available". This screen will extinguish, then the "Review Survey" menu screen shown below will be displayed.

```
-----| Mon 23Nov1998 16:30 2341Kb
          CF34-1A
          Review Survey
1--View Survey
2--Print Survey
3--Erase One Survey
4--Erase All Surveys
5--Exit
Select Operation to Perform.
```

6. From the Review Survey Menu select "**1—View Survey**" with the [UP ARROW] or [DOWN ARROW] keys, then press [ENTER]. The View Survey banner screen shown below will be displayed. All surveys, both with and without tach will be available for viewing. As shown at the bottom of the screen, use the [UP ARROW] or [DOWN ARROW] keys to scroll through

the available surveys. When the information for the survey you wish to view is displayed, press **[ENTER]**.

```

----- Mon 23Nov1998 16:48 2341Kb
          CF34-1A
          View Survey

CF34-1A          Ramp Up
      (No Tach)
      Mon 23Nov1998 12:36:58
      Survey 1 of 1

Use ↑↓ Keys To Scroll
Press ENTER To Select

```

7. The View Survey Information screen shown below will be displayed. The information screen allows you to compare the information and verify that this is the survey you wish to view. When the information is verified, press **[ENTER]** to view the survey.

```

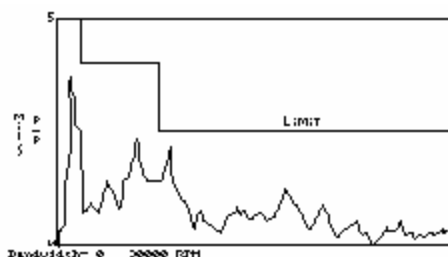
----- Mon 23Nov1998 16:48 2341Kb
          CF34-1A
          View Survey Information

Mon 23Nov1998 12:36:58
Engine Model : CF34-1A
Engine S/N   :
Engine Cycles : 0
Engine Hours : 0
Sensor Type  : ON BOARD

Press ENTER to Continue.

```

8. The survey will be displayed as shown in the example below. (This example does not reflect actual data). The Limit line is provided as a general reference for maximum allowable amplitudes at the different frequencies. From this screen you may print the survey by pressing the **[PRINT]** key. You may also press **[ENTER]** which will exit the survey screen and return you to the Review Survey screen as shown in items **5.** and **6.** above. From this Menu you may choose “**2—Print Survey**” and also produce a print of the survey. This Menu screen also gives you the options to manage your survey data by using the Erase functions.



## BALANCE FAN

Prior to initiating the fan trim balance procedure, you should decide the method you will use. The analyzer will allow you to use from one to five speeds to accomplish the balance and to balance using one of three different class weight sets. The first decision should be the number of balance speeds. A wider range of balance speeds will produce a balance job that lowers vibration and noise over a speed range while not reducing it to its lowest possible level at any single speed. A more narrow speed range or a single speed will lower the vibration at specified speeds but may actually increase vibration and noise at other speeds outside the specified speed(s). You may also specify the balance speeds or have the analyzer choose them for you from a fan survey. Once you have decided on speeds and weight class, proceed to step **1.** below.

1. If off, Turn the analyzer on by pressing the [ON/OFF] key. If the analyzer is on, press the [RESET] key.
2. Select **GE CF34 Vibration V3.26** from the Operation Options menu by using the [ARROW] keys, then press [ENTER].

```
----- Thu 03Aug2000 13:33 1528Kb
TrimTEC Analyzer
Operation Options
1--TFE731 EMS v1.00
2--TFE731/ATF3 Vibration v3.28
3--Allison Engine AE3007 v3.208
4--GE CT7 Engine v2.50
5--GE CF34 Vibration v3.25
-----
Select Function Using ↑↓.
```

A brief information screen, as shown below, will be displayed momentarily.

```
----- Tue 03Nov1998 10:26 2147Kb
WARNING ?
DO NOT Exceed ANY
Flight Manual or
Maintenance Manual Limits
```

3. Select the appropriate model using the [RIGHT ARROW] key, then press [ENTER] when the correct model is displayed.

```
----- Tue 03Nov1998 10:24 2147Kb
CF34-1A

Select Model Type

Model: CF34-1A

Use ← → Keys To See Models
```

## NOTE

At this point, make sure the banner at the top of the screen does not say "DEMO CF34-". If it does not say "DEMO CF34-", go to step 4 below. If, however; it does say "Demo CF34-", then select "4--Enter Normal Mode" and press ENTER.

4. From the Main Menu, select "5—Change Global Settings" using the [UP ARROW] or [DOWN ARROW] keys, then press [ENTER].

```
----- Tue 24Nov1998 16:15 2340Kb
CF34-1A
Main Menu
1--Perform Engine Survey
2--Balance Fan
3--Select Model
4--Enter Demo Mode
5--Change Global Settings
6--Exit
Select Operation to Perform.
```

5. The Global Settings screen will be displayed as shown below. The four fields have default settings from top to bottom as follows: **RPM, 1, Enabled,** and **YES**. If these settings satisfy your needs, you need only ensure the "Set to Default :'" field reads YES then move the cursor to "CURSOR HERE WHEN DONE" using the [UP ARROW] or [DOWN ARROW] keys and press [ENTER]. If you have decided on a multi speed balance, or wish to change any of the other fields, you may move between the fields using the [UP ARROW] or [DOWN ARROW] keys and change the values in the fields by using the [RIGHT ARROW] or [LEFT ARROW] keys. The Survey Freq Units may be changed to RPM or Hz (Hertz). The Num (number of) Balance Speeds may be selected from 1 thru 5. The High/Low Tooth may be set to either Enable or Disable and the Set to Default to either YES or NO. If any of the field values were changed from the default settings, this field must be set to NO. When all settings are per your requirements, move the cursor to "CURSOR HERE WHEN DONE" using the [UP ARROW] or [DOWN ARROW] keys and press [ENTER].

```

----- Tue 24Nov1998 16:15 2340Kb
CF34-1A
Global Settings
Survey Freq Units : RPM
Num Balance Speeds : 5
High/Low Tooth : Enabled
Set to Default : NO
CURSOR HERE WHEN DONE

Press ENTER if Done

```

6. The screen will return to the Main Menu as shown below. Select “2—Balance Fan” using the [UP ARROW] or [DOWN ARROW] keys and press [ENTER].

```

----- Tue 24Nov1998 16:15 2340Kb
CF34-1A
Main Menu
1--Perform Engine Survey
2--Balance Fan
3--Select Model
4--Enter Demo Mode
5--Change Global Settings
6--Exit
Select Operation to Perform.

```

7. From the Balance menu, select “1—Start Balance Procedure” using the [UP ARROW] or [DOWN ARROW] keys, then press [ENTER].

```

----- Tue 24Nov1998 16:15 2340Kb
CF34-1A
Balance
1--Start Balance Procedure
2--Review Balance Job
3--Resume Balance Job
4--Equipment Setup
5--On Board Sensor Calibration
6--Exit
Select Operation to Perform.

```

8. The BALANCE INFO screen shown below will appear. The first line of the screen indicates that “Power to Tach 1 Light is ON”. At this point you may wish to exit the aircraft and complete or verify the Laser Tachometer or optical tachometer alignment. The remainder of the page contains seven fields that you may either select from available choices or fill in using the keypad. The first of these is the “Engines to Baln (balance) and indicates the number of engines you intend to balance during this procedure.

```

CF34-1A BALANCE INFO
Power to Tach 1 Light is ON
Engines to Baln : 1
Sensor Type : ONBOARD-WB
Initl Baln Plane: Spinner Rear
Socket Head Wgts: 4096T45Pxx
Engine S/N :
Engine Cycles :
Engine Hours : 0.0000
Use + - Keys to Select Sensor

```

Use the [RIGHT ARROW] or [LEFT ARROW] keys to toggle the field to 1 or 2. Move between the fields by using the [UP ARROW] or [DOWN ARROW] keys. If you selected 2 engines to balance the screen will change as shown below to accommodate information for 2 engines. Information will be entered or selected in the same manner for both screens.

CF34-1A BALANCE INFO			
Power to Tach 1 Light is ON			
Engines to Baln :	2		
Sensor Type :	ONBOARD-WB		
Initl Baln Plane :	Spinner Rear		
Socket Head Wgts :	4096T45Pxx		
Eng	S/N	Cycles	Hours
1			0.0000
2			0.0000
Use ← → Keys to Select Sensor			

The second field “Sensor Type” indicates the sensor you intend to use for this balance job. Use the [RIGHT ARROW] or [LEFT ARROW] keys to scroll through the list of available sensors. The “ON BOARD (WB)” selection indicates that you intend to connect to the J3EC test connector of the aircraft and use the signal provided by the onboard engine vibration monitoring system, wide bandwidth output. If the sensor you are using does not appear in the list, choose CUSTOM and enter the type and sensitivity of your sensor.

#### NOTE

When selecting “ONBOARD (WB)” for Wide Band frequency output, or “ONBOARD (NB)” for Narrow Band frequency output from the J3EC test connector, you must also use the corresponding interface cable for Wide Band or Narrow Band output. See the equipment list at the beginning of this document for part numbers. The Narrow Band (NB) option will not allow you to acquire sufficient data for an engine vibrate survey but will allow you to do a fan vibrate survey and fan trim balance. The Wide Band (WB) option will accommodate all engine vibration survey, fan vibration survey, and fan trim balance requirements but may not match the cockpit indicator for vibration units. If you are attempting to match the analyzer readings with those displayed in the cockpit of the subject aircraft, you must select the appropriate cable and sensor setting for that airframe according to serial number.

The “Initl Baln Plane” (Initial Balance Plane) is the location where you will add weights for the balance initially. You will be allowed to change balance planes during the balance job if necessary. The available selections are Spinner Rear, Spinner Front, or Fan Disk.

The “Socket Head Wgts:” are the balance weights you will use to accomplish the balance job. Verify the part number of your class weights before making this selection. The available choices are 4096T45Pxx, 3024T53Pxx, and 9111M35Pxx.

#### CAUTION

Do not mix class weights of different part numbers. Balance solutions are calculated and presented based on the weight class you choose at this point. Different part numbers may end in the same PO# but are not the same weight value from one part number to the next.

The engine S/N (serial number), Cycles and Hours are all entered from the keypad and are optional information. We recommend you fill in these fields for later identification of specific balance jobs.

When all fields are selected and filled in accordingly, press [ENTER] to accept the values and proceed.

9. The channel selection screen will be displayed as shown below. In the “Eng” column are the numbers 1 and 2 indicating a two-engine fan balance has been selected. In the “Sensor” column the defaults of “Eng 1A” for engine 1 and “Eng 2A” for engine 2 are shown. Likewise, in the “Tach” column, “Tach 1” for engine 1 and “Tach 2” for engine 2 are shown. Both the Sensor and Tach values may be changed as desired. These values indicate the input, at the back of the analyzer, where the Sensor and Tach cables for the indicated engine should be connected. In other words, the sensor and tach cables coming from Eng 1 should be connected to the Eng 1A vibration input and Tach 1 tachometer input respectively. If you wish to change the inputs, scroll through the fields using the [UP ARROW] or [DOWN ARROW] keys, then change the values using the [LEFT ARROW] or [RIGHT ARROW] keys. After making your selections, insure the respective input cables are connected accordingly. At the bottom of the screen you will see a line a text stating “Power to Tach (1 or 2) Light is ON”. This indicates power is being supplied to the indicated optical tachometer to facilitate application of reflective tape and tachometer alignment. To power the opposite tachometer, use the [UP ARROW] or [DOWN ARROW] keys to move the dark cursor to any field in that Eng number line. When selections are make and tachometer alignment is complete (as necessary), press [ENTER] to accept the settings and continue.

```

----- Wed 25Nov1998 08:10 2338Kb
          CF34-1A
          Channels Selection

Eng      Sensor      Tach
 1       Eng 1A      Tach 1
 2       Eng 2A      Tach 2

          CURSOR HERE WHEN DONE

Power to Tach 1 Light is ON
Select Vibration Signal Channel

```

#### NOTE

The sensor and tach inputs are software selectable. DO NOT select the same connector for two separate inputs and always insure the indicated selection is the one to which the corresponding cable is connected.

When all connections are made, press the [DOWN ARROW] key until the dark highlight bar is on “CURSOR HERE WHEN DONE”.

#### NOTE

The last line of the text on screen will say “Power to Tach 1 Light is ON” At this point you should leave the analyzer power on, proceed outside to where the Lasetach is mounted and adjust the laser on the reflective tape target. See the “LASER ALIGNMENT” section of this document for specific guidelines.

**\*\*\* RETURN TO THIS POINT AFTER LASER ALIGNMENT \*\*\*  
AND CONTINUE**

10. The “Define Influence Coefficient” screen, as shown below will be displayed. The screen contains three possible selections. “1—Influence From : Default” will use the influence stored in the balance procedure. This is the value provided by the engine manufacturer or test facility. It is used as a starting point if you have no recently calculated influence for the engine. Select this influence if this is the first time you have used this procedure. “2—Influence From : Previous” will use the most recently calculated influence from previous balance jobs using this analyzer. The influence is re-calculated after each balance job and therefore becomes more accurate. Use this selection AFTER at least one job has been completed using the Default influence as described above at least one time. “3.—Influence From : Editing” will allow you to manually enter a known influence for the engine. This selection is particularly useful if you are attempting to balance an engine known to react in a non linear fashion. You should use this selection if you have an influence for this type of engine. Move between the selections using any of the four [ARROW] keys.

```

----- Wed 25Nov1998 08:10 2338Kb
              CF34-1A
Define Influence Coefficient
1--Influence From: Default
2--Influence From: Previous
3--Influence From: Editing

Select Operation to Perform.

```

If you select “3—Influence From : Editing” the screen below will be displayed allowing you to enter the Sensor Magnitude and Lag values.

```

----- Wed 25Nov1998 08:51 2338Kb
              CF34-1A
Edit Influence Coefficient
Sensor 1 Infl Mag: 8.0000
Sensor 1 Infl Lag: 0.0000
      CURSOR HERE WHEN DONE

Press ENTER if Done

```

When entries are complete, use the [DOWN ARROW] keys to move the cursor over the “CURSOR HERE WHEN DONE” and press [ENTER].

11. The “Get Balance Speed” screen will be displayed with the default speeds for the number of balance speeds specified above in step 5. This example indicates a five-speed balance has been selected. To accept the default speeds, move the cursor over the “CURSOR HERE WHEN DONE” line using the [UP ARROW] or [DOWN ARROW] keys and press [ENTER]. To enter speeds of your choosing, move the cursor to the speed you wish to change by using the [UP

**ARROW]** or **[DOWN ARROW]** keys. Enter the new speed from the keypad. You may enter the speed as either an actual RPM or as a % N1. The analyzer will recognize either format. You may also wish to find the five highest vibration amplitude speeds by completing a Fan Vib Survey. To use this function, move the cursor over the “Do Fan Vib Survey” line and press **[ENTER]**.

```

----- Wed 25Nov1998 08:16 Z338Kb
CF34-1A
Get Balance Speed
No.      Speed
Speed 1: 66.000
Speed 2: 72.000
Speed 3: 77.000
Speed 4: 85.000
Speed 5: 92.000
Do Fan Vib Survey
CURSOR HERE WHEN DONE
Press ENTER if Done

```

If you selected “CURSOR HERE WHEN DONE” you have indicated that you accepted the default, or modified speeds displayed on the screen. The screen below will be displayed. Notice that the bottom of the screen has changed asking you to verify that “All Inputs (are) Correct? The YES/NO toggle answer and the end of the question defaults to YES. If you have made a mistake in the input speeds or wish to change them or do the Fan Vibe Survey, press the **[RIGHT ARROW]** key one time to toggle the answer to NO then press **[ENTER]**. Otherwise, if the speeds are correct, simply press **[ENTER]** while the answer field reads “YES”.

```

----- Wed 25Nov1998 10:09 Z334Kb
CF34-1A
Get Balance Speed
No.      Speed
Speed 1: 66.000
Speed 2: 72.000
Speed 3: 77.000
Speed 4: 85.000
Speed 5: 92.000

All Inputs Correct ? YES
Use ← → to select, then ENTER

```

12. The screen will display an information message telling you to remove all trim balance weights as shown below. To acknowledge and proceed, press **[ENTER]**.

```

----- Wed 25Nov1998 11:20 Z334Kb
CF34-1A
Balance Preparation

Remove All
Trim Balance Weights
For Engines 1-2

Press ENTER to Continue.

```

13. The screen will display an information message telling you to start the engine or engines according to directions given in the aircraft operations manual. When the start sequence is complete, press **[ENTER]** to continue.

```
..... Wed 25Nov1998 11:20 2334Kb
CF34-1A
Balance Run 1 Eng 1 Spd 1

Start Engine(s) Per Manual
Set To Idle

Press ENTER to Continue.
```

14. The screen will display an information message saying “Check Idle Stand-By” This indicates the analyzer is attempting to acquire the tach signal.

```
..... Wed 25Nov1998 11:20 2334Kb
CF34-1A
Balance Run 1 Eng 1 Spd 1

Check Idle RPM
Standby...
```

15. Wait for indication of a valid tach signal or error message as displayed below. If the “PROBLEM Bad Tach” message is displayed, check connections and tach setup as required.

```
..... Wed 25Nov1998 11:20 2334Kb
CF34-1A

PROBLEM
Bad Tach

Press any key to continue.
```

16. If a valid tach is detected, the screen will display the Check Idle RPM screen shown below. (This screen was produced with an artificial input and does not represent an actual Idle RPM for the CF34). Press [ENTER] to continue.

```
..... Wed 25Nov1998 11:20 2334Kb
CF34-1A
Balance Run 1 Eng 1 Spd 1

Check Idle RPM

N1: 40% RPM: 2996

Press ENTER to Continue.
```

17. The Balance Run 1 Eng 1 Spd 1 (Balance run one, Engine number 1, and number 1 speed) screen will be displayed. The screen will direct you to set the engine speed for the number 1 engine to N1: XX% RPM: XXXX, where X represents the actual N1% and RPM. It will also

direct you to Monitor Speed on Next Screen. Note the N1 % and press [ENTER]. Do not begin acceleration yet.

```

----- Wed 25Nov1998 11:20 2334Kb
          CF34-1A
Balance Run 1 Eng 1 Spd 1

Set Engine 1 To
N1: 66%  RPM: 4884
Monitor Speed on Next Screen
Press ENTER to Continue.

```

18. When the screen changes, the information screen below will be displayed. When an actual RPM is acquired, the screen will automatically extinguish.

```

----- Wed 25Nov1998 11:20 2334Kb
          CF34-1A
Balance Run 1 Eng 1 Spd 1

Standby...
Measuring RPM For
Eng 1 Speed 1

```

19. The screen below will then be displayed. At this time, accelerate the engine to match the “DESIRED” speed. The “MEASURED” speed is the speed, both in %N1 and in actual RPM, the engine is currently attaining. Continue to make power lever adjustments until the DESIRED and MEASURED speeds are as close as possible. Allow approximately five seconds for speeds to stabilize, make additional adjustments as necessary. When the two speeds match at near as possible, press [ENTER].

```

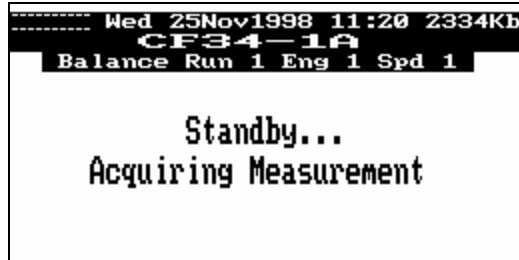
----- Wed 25Nov1998 11:20 2334Kb
          CF34-1A
Balance Run 1 Eng 1 Spd 1

Item      N1      RPM
Desired : 66 %   4884
Measured: 41 %   3007

Set to Desired, then Press ENTER

```

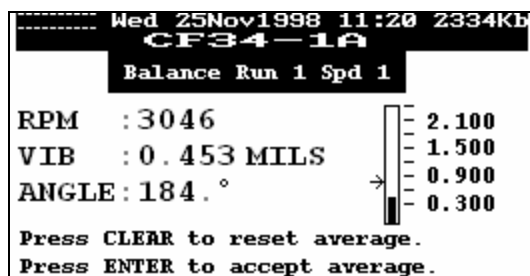
20. The information screen shown below will be displayed until data is acquired then it will automatically extinguish.



21. If a tachometer signal is not acquired in a preset amount of time, the error screen shown here will be displayed. If this occurs, check connections. It may be necessary to shut down the engine and check laser alignment and reflective tape condition if an external optical tachometer is being used. If the tachometer signal was successfully acquired, this screen will not be displayed.



22. When the tachometer and vibration signals are acquired, the screen shown below will be displayed. The banner, just below the “CF34-1A” indicates that this is Balance Run 1 Spd (speed) 1. In the center of the screen and to the left side, the averaged RPM, VIB (vibration amplitude in MILS), and ANGLE (phase angle location of the out of balance condition). To the right side of the screen you will see an indicator which has the appearance of a thermometer. There is an adjacent scale to the right of the thermometer and a small arrow point to the left of and pointing toward the thermometer. The small arrow will move rapidly up and down the scale to indicate the current vibration amplitude as measured on the scale. The darkened portion in the center of the thermometer indicated the running average of all collected vibration amplitudes. At the bottom of the screen, two lines of text read “Press CLEAR to reset average.” and “Press ENTER to accept average.” Pressing the CLR key on the analyzer keypad will clear all averaged readings and begin the averaging process again. Pressing ENTER will accept the displayed readings which will then be used to calculate a balance solution.



23. If you have chosen a multiple speed balance, the screen will change to a screen similar to the one shown below. Repeat steps 18 through 23 above for each of the speeds specified for the balance job.

```
----- Tue 01Dec1998 09:01 2328Kb  
CF34-1A  
Balance Run 1 Spd 2  
  
Set Engine To  
N1: 59% RPM: 4366  
Monitor Speed on Next Screen  
Press ENTER to Continue.
```

24. When data collection for all speeds is complete and you have exited the last acquisition screen, an information screen directing you to Shut down the engine will be displayed. Shut down the engine and press [ENTER] to exit the screen.

```

----- Tue 01Dec1998 09:01 2328Kb
          CF34-1A
          Balance Run 1

          Retard Engine
          To Idle and Shutdown
          Per Manual

Press ENTER to Continue.

```

25. The Vib Summary screen below will be displayed. It presents the starting and current vibration amplitude levels. For run 1, these levels will be identical as no balancing solutions have yet been applied. Near the bottom of the screen, the Current Balance Plane, an Action Select line and associated information line are displayed. Notice that in the first screen, the Action Select line reads “Stop Balance on Any Planes”. This is the default when the vibration level is below the manufacturers specified maximum vibration level. As indicated in the information line below it, you may change the Action Selection by pressing either the [LEFT ARROW] or [RIGHT ARROW] keys. You may choose to: Stop Balance on Any Planes, Continue to Balance on Current Plane, or Change Balance Planes to Spinner Front as illustrated in three figures below. If you choose to Stop Balance, the analyzer will display the message “This Job Has Been Completed” and return you to the Balance menu screen.

```

----- Tue 01Dec1998 09:01 2328Kb
          CF34-1A
          Vib Summary: Run 1

          Starting Level 0.283
          Current Level 0.283

Current Plane: Spinner Rear
Stop Balance on Any Planes
← →: Sel Cont./Change Plane/Stop

```

```

----- Tue 01Dec1998 09:01 2328Kb
          CF34-1A
          Vib Summary: Run 1

          Starting Level 0.283
          Current Level 0.283

Current Plane: Spinner Rear
Continue Baln on Current Plane
← →: Sel Cont./Change Plane/Stop

```

```

----- Tue 01Dec1998 09:01 2328Kb
          CF34-1A
          Vib Summary: Run 1

Starting Level 0.283
Current Level 0.283

Current Plane: Spinner Rear
Change to Spinner Front Plane
← →: Sel Cont./Change Plane/Stop

```

26. Any continuation of the balance job will present you with an optimized balance solution. After selecting a CONTINUE action and pressing [ENTER], the solution screen, similar to the one shown below will be displayed.

```

----- Tue 01Dec1998 09:01 2328Kb
          CF34-1A
          Solution Run 1
          On the Spinner Rear
          Attach Trial Weights:
          P02 1.00 G In Hole #27

          To Attempt Solution of:
          0.8 G At 24 Degrees
          (Closest Blade #27)

Press ENTER to Continue.

```

27. Review the solution and assemble the required class weight combinations to install. Install the weights as directed or as near as possible. Press [ENTER] to continue. The information screen shown below will be displayed instructing you to “Record The Weights Installed On The Fan Between Run 1 and Run 2”. Make note of the actual weights and their locations you installed and press [ENTER].

```

----- Tue 01Dec1998 09:01 2328Kb
          CF34-1A
          Fan Balance

          Record The Weights
          Installed On The Fan
          Between Run 1 and Run 2

Press ENTER to Continue.

```

28. The Fan Installed Weight screen below will be displayed. A layout of the hole pattern and a darkened hole will give you a graphic display of where the solution weight was recommended. The graphic is displayed from the viewpoint of Forward Looking Aft (FLA). The text to the right displays the PO# of the weight, its actual weight value in grams, and the recommended hole number for placement. If this is the solution you actually applied, you need only move the dark cursor to the “CURSOR HERE WHEN DONE” line and press [ENTER]. If your installation was different, move the dark cursor between the fields using the [UP ARROW] or [DOWN ARROW] keys until the field you wish to change is highlighted by the cursor. Change the value of the field using the [RIGHT ARROW] or [LEFT ARROW] keys. When the screen reflects

the actual solution you applied, again move the cursor to the “CURSOR HERE WHEN DONE” line and press [ENTER].



29. The screen will display the Solution and the actual Installed weight and angle. Directly below these values, the option to “Re-Enter Weights? Yes or NO” is displayed. If you disagree with the information or wish to change it, select YES and press [ENTER]. You will be returned to the previous screen, as seen in item 29 above, where you may correct any mistakes. If you are satisfied the values are correct, use the [RIGHT ARROW] or [LEFT ARROW] keys to toggle the answer field to NO, then press [ENTER]. The screen will advise you to Start Engines as described in item 14 above. The process will then be repeated until an acceptable vibration level has been attained.

## LASER ALIGNMENT

1. Rotate the fan until the reflective tape on the spinner is positioned at the 6 o'clock position. Clock position is from the Front of the engine, looking aft into the intake.
2. Ensure the Lasetach is securely mounted and connected as described in Equipment Setup. Also check to make sure the Lasetach is securely mounted to the Swivel Head of the Lasetach Mount. (See figure 3 below). If it is loose, tighten by turning the Lasetach clockwise on the mounting stud while holding the Swivel head with the other hand.
3. Remove the plastic aperture cap from the Lasetach.
4. Turn the Laser ON/OFF switch on top of the Lasetach to the ON position.
5. The **BEAM ON** indicator (red) light adjacent to the Laser ON/OFF switch should now be illuminated.
6. Place the open palm of your hand in front of the aperture. The laser beam should be visible on your palm.

### WARNING

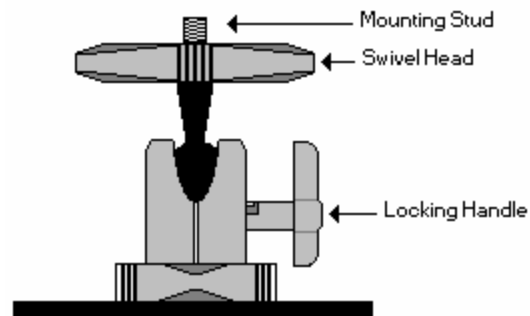
Do not look into the aperture of the Lasetach. Avoid direct eye exposure. Eye damage may occur due to direct exposure to laser radiation.

7. Loosen the Locking Handle of the Lasetach mount (see figure below) so that the Lasetach swivels with a slight friction. Using the “gunsight” method, sight along the side of the Lasetach using one hand while holding the Locking Handle with the other. If you have trouble acquiring the laser beam visually, you may use a free hand to sight on. No injury will occur as a result of the

laser being projected on your skin. Project the laser on your finger tip, then sight over the top of your finger to align the laser on the tape. Move your finger to check the position and readjust as necessary. You may also choose to have someone hold a sheet of white paper near the target for easier acquisition. When the laser beam strikes the tape, it will be bright very visible. When the laser is on target, center the beam on the length of the tape and immediately tighten the Locking handle by turning it clockwise. Remove both hands from the Lasetach and recheck the alignment.

**8.** The laser should now be approximately in the center of the two-inch span of the tape. If minor adjustments are necessary, loosen the Locking Handle only *SLIGHTLY*. Make adjustments as necessary and re-tighten.

**9.** When satisfied with the laser position, rotate the fan several times by hand. When the tape passes through the laser position, the GATE (green) light on the Lasetach should turn on as the tape enters the beam and off as it exits. If this test is successful, return to the cockpit and select the opposite Tach. Repeat steps **1.** through **9.** above for the second Lasetach. When complete, return to the cockpit and continue with the Equipment Setup section of this document.





# Application Note

---

## Bombardier Regional Jet

### Fan Balance

Part Number: 11-200-0015

AppNote Number: a-brrj-1725-fb-326

This Application Note is provided for information only and does not supercede the requirements or guidelines set forth in the applicable engine or airframe maintenance manual. Technology for Energy Corporation assumes no obligation or liability, either express or implied, to the Purchaser arising out of the use of this procedure.

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