



# Application Note

<b>Application Note Number</b>	A-EUEC155-20-40-TR
<b>Version</b>	0
<b>Function</b>	Tail Rotor Balance
<b>Airframe</b>	Eurocopter EC-155
<b>Engine</b>	N/A
<b>E-Setup Number</b>	A-ECEC155-20-40-TR.asf
<b>ACES Systems Analyzer</b>	Model 4040 or Model 2020 w/Main Rotor Enhanced
<b>Firmware Version</b>	1.0 and 2.00 or greater
<b>Procedure</b>	N/A

## Introduction

This outline covers the required equipment, installation, analyzer setup, and data acquisition process for using the ACES Systems' 4040 Viper or Model 2020 ProBalancer Analyzer with Tail Rotor Enhanced Software for performing an tail rotor balance on the Eurocopter EC-155 helicopter. General instructions for the use of the Model 4040 can be found in user manual #4040OM-01. General instructions for the use of the Model 2020 can be found in user manual #2020OM-01.

## A. Required Equipment

The following ACES Systems' equipment is required.

Item	Quantity	Description	Part Number
1.	1	Model 4040 Analyzer	10-100-4040
2.	1	Phototach	10-100-1773 *
3.	1	Cable, Tachometer, 50 ft.	10-320-0126 **
4.	1	Sensor, Vibration, 991D-1	69-100-0075
5.	1	Cable, Sensor, 991D, 50'	10-320-0163
6.	1	Tail Rotor Phototach Mount	22-430-0105
7.	1	Reflective Tape	10-400-0176

\* / \*\* Part numbers shown are for a "New" design phototach and tachometer cable. It is acceptable to use the "Old" design phototach (P/N 10-100-1772) together with old design tachometer cable (P/N 10-320-0198).

## Optional Equipment

No optional equipment required.

## Miscellaneous Equipment

Tape or adel clamps.

## B. Equipment Installation

1. Place the Model 2020 in the cabin.
1. Park the helicopter on a flat surface with the nose facing into the wind.
2. Install sensor bracket (P/N 22-430-0105) to rear of tail gearbox at the 12:00 position. Install 991D-1 sensor (P/N 10-100-0075) in bracket ensuring that connector faces forward.
3. Install phototach (P/N 10-100-1773) into bracket and secure with nut.
4. Connect phototach cable (P/N 10-320-0126) to phototach and connect sensor cable (P/N 10-320-0163) to sensor and route cables into cabin area. Connect sensor cable to channel A of balancer. Connect phototach to Tach 1 channel of balancer.

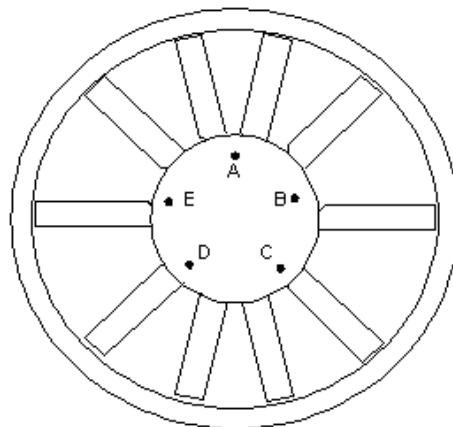
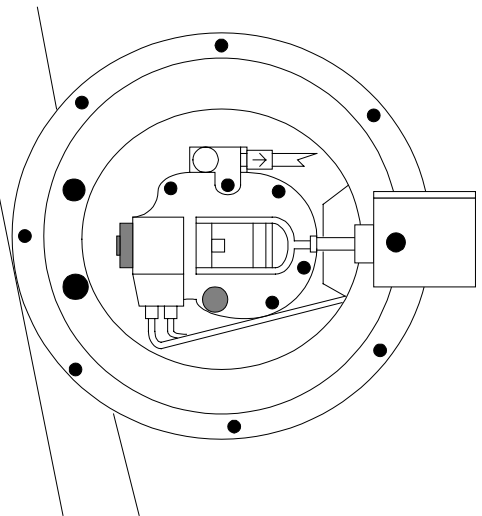
### Note

**Route all cables as not to interfere with hot or rotating components.**

5. Apply a piece of reflective tape to aft side of the casing corresponding to balance point A. Ensure the reflective target is in-line with the phototach.

### Note

**When routing cables, use caution to avoid rotating components, engine exhaust system, or aircraft controls.**



## C. Analyzer Set Up

This section provides instruction on how to define and store an enhanced engine cooling fan balance setup for the EC-155 helicopter. These steps will only have to be performed the first time you use the analyzer for this purpose, the information will be stored in the database for future use.

1. Turn the analyzer [ON].
2. From the “Main Menu”, select “Tail Rotor Balance” and press [Enter].
3. From the “Tail Rotor Balance” menu, select “Manage Setups” and press [Enter].
4. From the “Manage Setups” menu, select “New” and press [Enter].

### Warning

**It is important that the following setup information be entered exactly as shown, any errors may lead to low performance of jobs during use.**

5. The “Tail Rotor Setup” screen appears, enter the job setup information as shown in the appropriate fields. When completed, press [ENTER].

```

Model 4040 VIPER Analyzer
Tail Rotor Setup
Name: EC-155
Sensor Chan: (A)
Sensor: (991D-1)

Tach Chan: (1)
Tach Type: (Optical)
Tach Pos: (12)

Balancing RPM: 3580
Rotor Direction: (CW)
Number of Blades: 10
Conditions: 1
Max Baln. Wts: 12
  
```

6. The “Tail Rotor Chart Setup” screen now appears. Enter the setup chart influence information exactly as shown.

```

Model 4040 VIPER Analyzer
Tail Rotor Chart Setup
Name: EC-155
Chart Type: (Regular) Num WtPos: 5
Grams/IPS: 16.000
WtPos Add @ WtPos WtPos
A 9 : 15
B 7 : 0
C
D
E

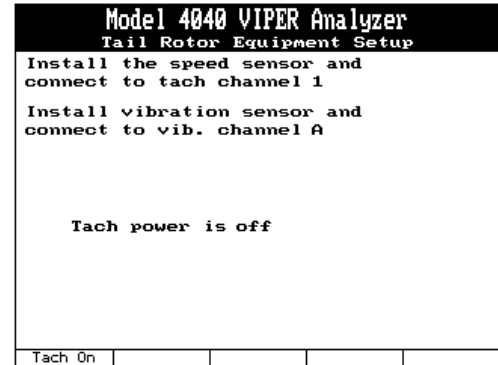
WtPos MUST be in CW or CCW order
  
```

7. When completed, press [ENTER] to save the setup and return to the “Manage Setups” screen. Press [Main Menu] to return to the “Main Menu” screen.



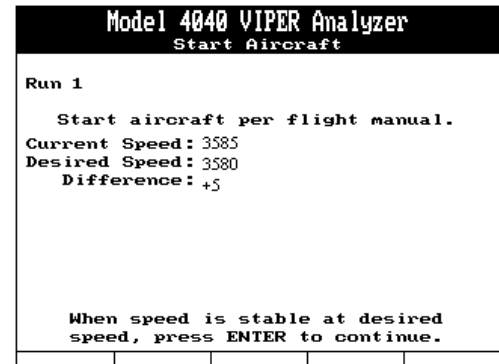
- An equipment setup screen will appear next, directing you to install and connect the vibration sensor and tachometer sensor to the channels assigned in the job setup.

If you wish to verify proper phototach to tape alignment, press the [F-1] "Tach On" key. Rotate the fan until the reflective tape is in front of the phototach and verify the red LED at the rear of the phototach is illuminated. Press [ENTER] to continue.

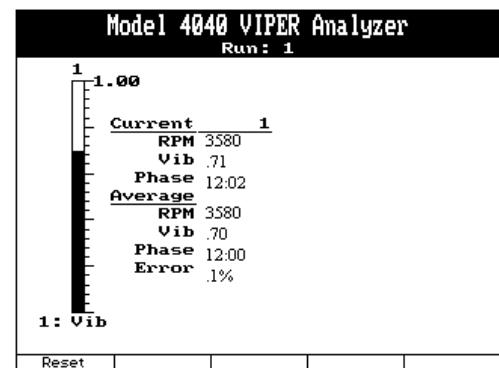


- The Start Aircraft" screen, is presented next. This screen has an rpm monitor to allow verification of the tail rotor speed prior to acquiring vibration data.

When the rotor speed reaches the desired setting, press [ENTER] to continue.

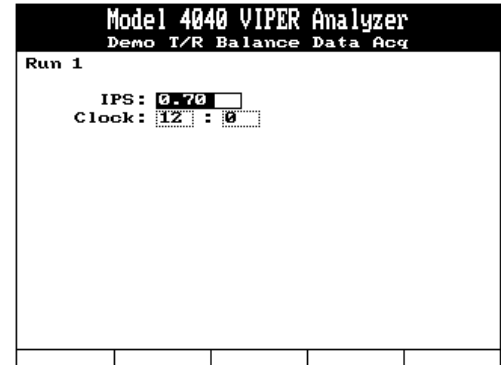


- The analyzer will now present the data acquisition screen. This screen allows you to monitor both the current and averaged vibration readings. While monitoring the measurement, you may press the [F-1] "Reset" key to restart the averaging process. Use this feature as a way to validate the quality of the measurement, if the averaged readings return to a value similar to that prior to being "Reset", the measurement can be considered good. If the measurement is not similar, you may choose to reset the average again.

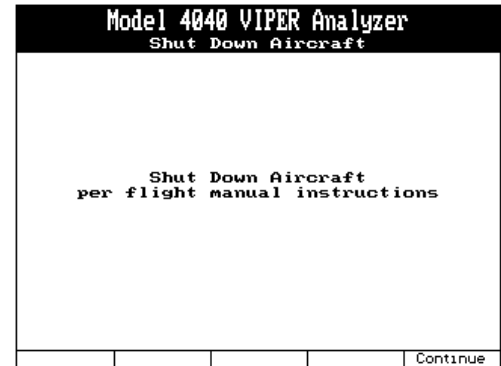


When the % error shown has reached its lowest point, press [ENTER] to stop the acquisition process.

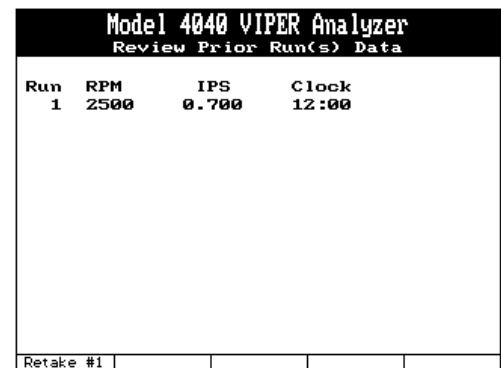
- The analyzer will now display the imbalance reading. Press **[Enter]** to continue.



- Shut down the aircraft and press **[Enter]** to continue.



- The analyzer will now present the “Review Prior Run(s) Data” screen as shown. If you wish to re-measure the data just acquired, you may press **[F-1]** “Retake”, otherwise, press **[ENTER]** to continue.



12. The solution screen will now present the recommended corrections for the current run.

The example shows a solution of adding 10.4 grams to position E and 2.0 grams to D.

Using the keypad, record the actual weight(s) installed between runs and their location, if you choose to remove weight from an opposite or alternate position, enter the negative adjustment. Do this by moving the highlight to the appropriate field, press the [SPACE +/-] key to produce a negative symbol (-), then enter the value of the adjustment. You must then erase the default solution as presented by the analyzer or both values will be used to calculate the new influence.

Model 4040 VIPER Analyzer	
T/R	Suggested/Installed Weights
Run 1	Suggestion:
Chart:	EC-155
D	2.0 E 10.4
Enter Installed Weights:	
A	0.0
B	0.0
C	0.0
D	2.0
E	10.4
Inst=Sugg	Inst=None
Quit Job	

The important point to remember when installing weights and recording their positions, is that the influence for the next correction will be updated by the vibration results from the first solution, therefore you should be as accurate as possible when recording adjustments made.

If you have changed the values in the installed fields and wish to return reset the original solution, press the [F-1] “Install = Suggested” key.

If you wish to start the next run and not record any adjustments performed, press the [F-2] “Install = None” key. This will delete all data entered in the installed fields.

If you wish to terminate this job, press the [F-5] “Quit Job” key, and the job will be stored as completed.

#### Note

Using the [F-3] “quit job” option will terminate the ability to resume or restart the job at a later date.

If you wish to leave the job and be able to resume it later, press the [Main Menu] key.

When you have finished with the solution process, press [ENTER] and you will be taken to the “Start Aircraft” screen, as shown in paragraph 7 of this section, to start the next run.



# Application Note

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## **Eurocopter EC-155**

## **Tail Rotor Balance**

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Part Number: 11-200-0084

AppNote Number: a-euec155-20-40-tr

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