



# Application Note

Application Note Number	A-BE47-2020E-TR
Revision	0
Function	Tail Rotor Balance “Old Style”
Airframe	Bell 47
Engine	N/A
E-Setup Number	A-BE47-2020E-TR.asf
ACES Systems Analyzer	Model 2020 w/Tail Rotor Enhanced Software
Firmware Version	2.00 or greater
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 2020 with Enhanced Tail Rotor Performance Software option to perform “Old Style” tail rotor balance on the Bell 47 helicopter. General instructions for the use of the Model 2020 can be found in user manual #2020OM-01. All procedures for track and balance and adjustments should be made in accordance with the Bell 47 Maintenance Manual.

## A. Required Equipment

The following ACES Systems’ equipment is required.

Item	Quantity	Description	Part Number
1.	1	Model 2020 Analyzer	10-100-2020
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	Mount, Sensor, .250	22-430-0056
7.	1	Bracket , Phototach	22-430-0066
8.	1	Reflective Tape	10-400-0176

## Miscellaneous Equipment

Tape, tie wraps or cable clamps to secure cables to airframe.

## B. Equipment Installation

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1. Park the helicopter on a flat surface with the nose facing into the wind.
2. Thread sensor (P/N 69-100-0075) through phototach bracket (P/N 22-430-0066) and into sensor mount (P/N 22-430-0056). Install the assembly on the tail gearbox at the 1:00 position. The sensor should point up. Install phototach (P/N 10-100-1773) into bracket and secure with plastic nut.
3. 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 cable to Tach 1 channel of balancer.

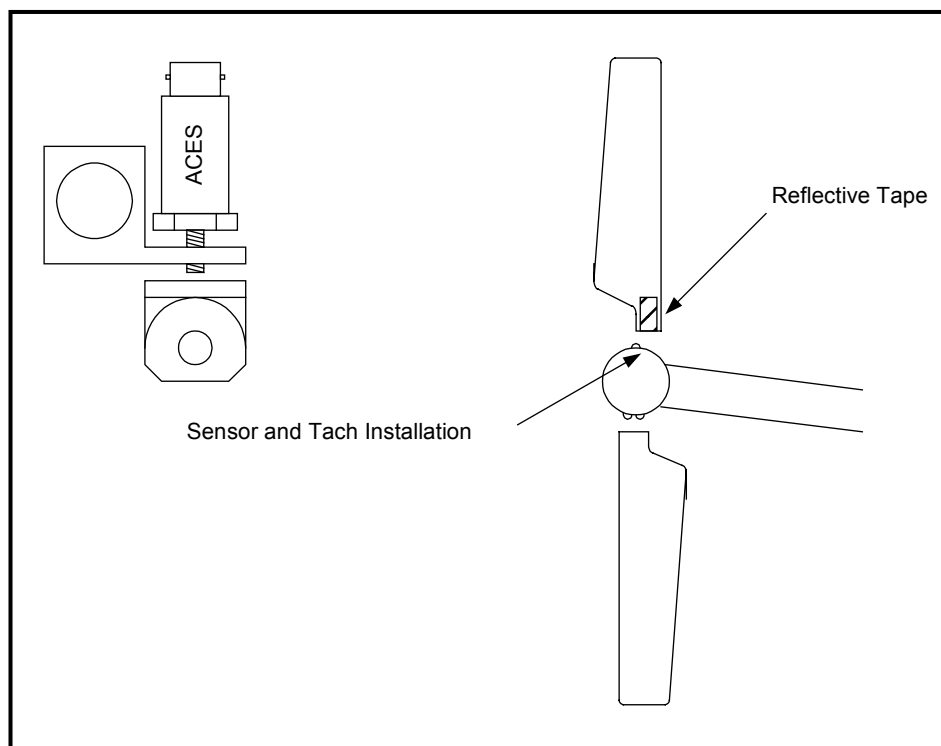
### Note

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

4. Apply a piece of reflective tape to the aft side of one of the tail rotor blades. Ensure the reflective target is in-line with the phototach, the blade with tape becomes the target blade.

## Equipment Installation Diagram

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## C. Analyzer Set Up

1. Turn the analyzer “ON”
2. From the “Main Menu”, select “Tail Rotor Balance” and press **[Enter]**. From the “Tail Rotor Balance” menu, select “Manage Setups” and press **[Enter]**. From the “Manage Setups” menu, select “New” and press **[Enter]**.
3. If setups are already stored in the analyzer, a setup list will be presented. If the Bell 47 is not among this list, press the **[F-1]** key for a “New” setup.

The “Tail Rotor Setup” screen now appears. Enter the tail rotor job setup information as shown in the appropriate fields. When completed, press **[ENTER]**.

Model 2020 ProBalancer	
Tail Rotor Setup	
Name:	BELL 47 OLD STYLE
Sensor Chan:	(A)
Sensor:	SS10-1
Tach Chan:	(1)
Tach Type:	Optical
Tach Pos:	(12)
Balancing RPM:	1500
Rotor Direction:	(CW)
Number of Blades:	2
Max Baln. Wts:	10

4. The Tail Rotor Chart screen now appears. Enter the setup chart influence information exactly as shown. When finished, press **[Enter]**.
5. Setup complete. When finished press **[Enter]**, **[Backup]** and **[Start Job]**.

Model 2020 ProBalancer			
Tail Rotor Chart Setup			
Name:	BELL 47 OLD STYLE		
Chart Type:	(Irregular)		
No. of WtPos:	4		
WtPos	Grams	IPS	Add @
A	1.50	1.00	3 : 45
B	4.00	1.00	3 : 10
C	1.50	1.00	9 : 45
D	4.00	1.00	9 : 10

### Warning

**It is important that the following setup information be entered exactly as shown, as errors may lead to possible failure of jobs performed with this setup.**

## D. Data Acquisition

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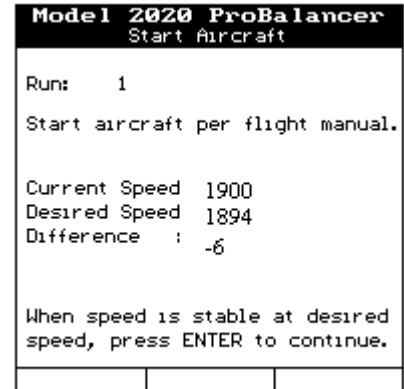
1. Turn the analyzer **[ON]**. From the “Main Menu”, select “Tail Rotor Balance” and press **[ENTER]**. From the “Tail Rotor Balance” menu, select “Start a Job” and press **[ENTER]**.
2. Next, select the Bell 47 setup from the analyzer’s setup list, select it and press **[ENTER]**.
3. The “Customer Information” screen appears. You may enter this optional customer information and press **[ENTER]**. If you have used the analyzer prior to this job, you will be able to recall a list of names to select from by pressing the **[F-1]** “Names” key. It is recommended that you enter at least a customer name, as it will aid in recalling the data at a later date.

Model 2020 ProBalancer		
Customer Information		
Enter the following optional Customer Information.		
Name:	CUSTOMER NAME	<input type="text"/>
A/C Registrations:		<input type="text"/>
A/C Total Time:	0	<input type="text"/>
Press ENTER to continue.		
Names		

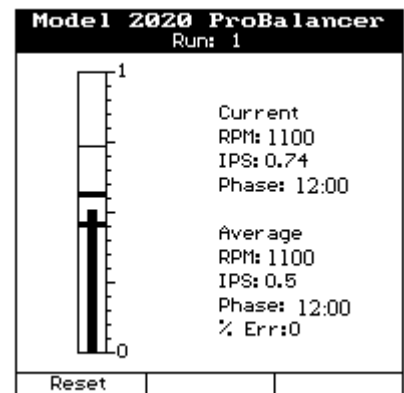
4. The equipment setup screen will appear next, directing you to install and connect the vibration sensor and tachometer sensor to the channels assigned in the job setup. Press **[ENTER]** to continue.

Model 2020 ProBalancer		
Tail Rotor Equipment Setup		
Install the speed sensor and connect to tach channel 1		
Install vibration sensor and connect to vib. channel A		
Tach power is off		
Tach On		

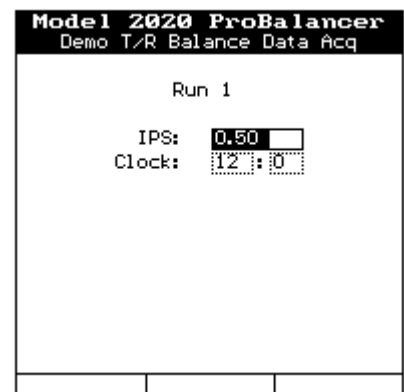
- The “Start Aircraft” screen as shown is presented next. This screen has an rpm monitor to allow verification of the tail rotor speed prior to acquiring data. When the rotor speed is as desired, press **[ENTER]** to continue.



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



- The balancer will now display the imbalance reading . After review press **[Enter]**.





**Note**

**It is important to remember that when installing or removing weights and recording their positions that the influence used for the next run will be updated by the result from the previous run's solution, therefore be as accurate as possible when recording adjustments made regardless whether the recommended solution is implemented. The only entries on this screen should reflect the actual solution implemented.**



# Application Note

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## **Bell 47**

## **Tail Rotor Balance “Old Style”**

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Part Number: 11-200-0093

AppNote Number: A-BE47-2020E.TR

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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