Application Note

Application Note Number	A-BE205-UH1-2020E-TR-w/o-bal-arms
Revision	1
Function	Tail Rotor Balance (without chordwise balance arms)
Airframe	Bell 205 and UH-1
Engine	N/A
E-Setup Number	A-BE205UH1-2020E-TR-w/o-bal-arms.asf
ACES Systems Analyzer	Model 2020 with Enhanced Performance Software
Firmware Version	2.00 or greater
Procedure	N/A

Introduction

This outline covers the required equipment, installation, analyzer setup, and data acquisition process for using the ACES Model 2020 with Tail Rotor Enhanced Software for performing a tail rotor balance on the Bell Model 205/205A-1, UH-1, and HH-1H Helicopters fitted with a tail rotor without chordwise balance arms. If you are unclear as to the type of tail rotor installed, view the equipment installation diagram section of this application note to determine tail rotor type. General instructions for the use of the Model 2020 can be found in user manual #2020OM-01. Ensure that all maintenance actions are performed in accordance with the applicable maintenance publications.

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	Vibration Sensor, 991D-1	69-100-0075
3.	1	Cable, 991D-1 Sensor, 50 ft.	10-320-0163
4.	1	Phototach	10-100-1773
5.	1	Cable, Tachometer, 50 ft.	10-320-0126
6.	1	Reflective Tape	10-400-0176
7.	1	Bracket, Phototach, General Purpose	22-430-0066
8.	1	Mount, Sensor, 5/16", L	22-430-0036

Miscellaneous Equipment

Tie wraps and adel clamps to secure cables.

B. Equipment Installation

1. Place the Model 2020 in the cabin.
2. Insert 991D-1 sensor (P/N 69-100-0075) through mounting hole in phototach mount (P/N 22-430-0066). Thread the sensor stud into "L" bracket (P/N 22-430-0036) and tighten. Install assembly on one the upper tail rotor gearbox studs. Sensor connector should point to the 12:00 position. See Figure 1
3. Insert phototach into bracket facing tail rotor assembly and secure with plastic nut.
4. Position tail rotor assembly vertical. Place a two-inch piece of reflective tape to the backside of the "Target" blade directly in front of the phototach.
5. With the tail rotor assembly positioned vertical, verify the phototach is aimed at the reflective tape.
6. Connect the end marked "991D-1" of a vibration cable (P.N. 10-320-0163) to the sensor. Wrap the cable forward around the tail boom towards the cabin. Connect the opposite end of the cable, marked "2020", to vibration channel "A" on the Model 2020.
7. Connect end marked "Tach Interface" of a tachometer cable (P.N. 10-320-0126) to the phototach. Wrap the cable forward around the tail boom towards the cabin. Connect the opposite end marked "analyzer" to tachometer channel "1" on the Model 2020.
8. Secure all cables to prevent interference with aircraft controls or rotating components.

B. Equipment Installation Diagram

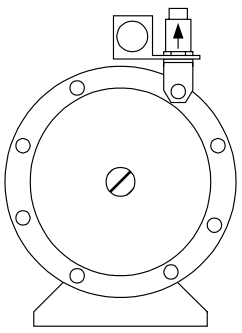


Figure 1, Phototach and Sensor Installation

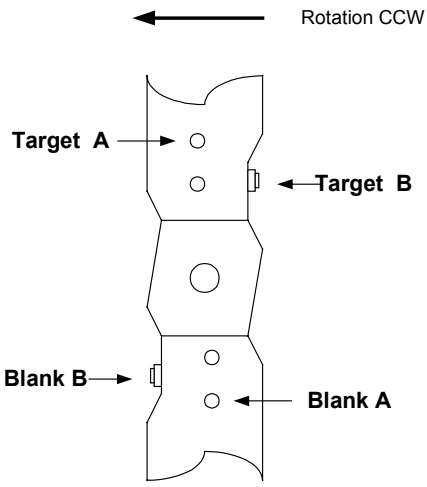


Figure 2, Balance Point Indentification

C. Analyzer Set Up

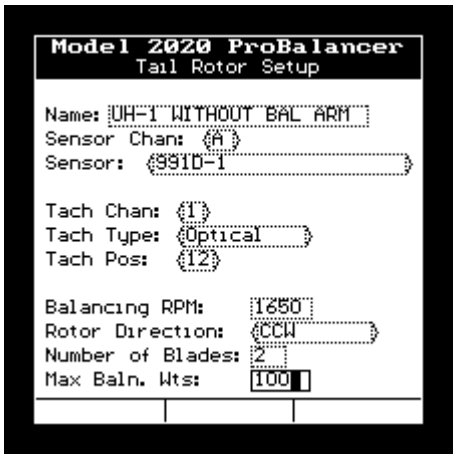
This section provides instruction on how to define and store an enhanced tail rotor balance setup. These steps will only have to be performed the first time you use the analyzer for this purpose, the information will then be stored in the database for future use.

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]**.

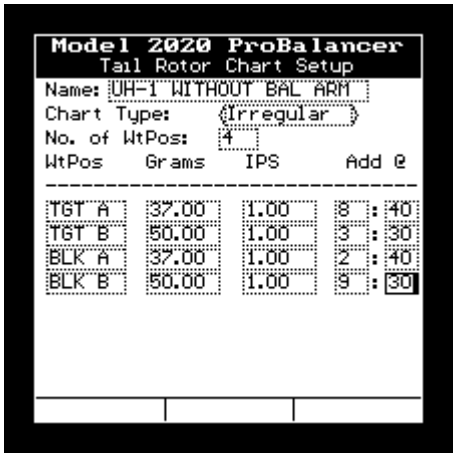
Warning

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 now appears. Enter the tail rotor job setup information as shown in the appropriate fields. When completed, press **[Enter]**.



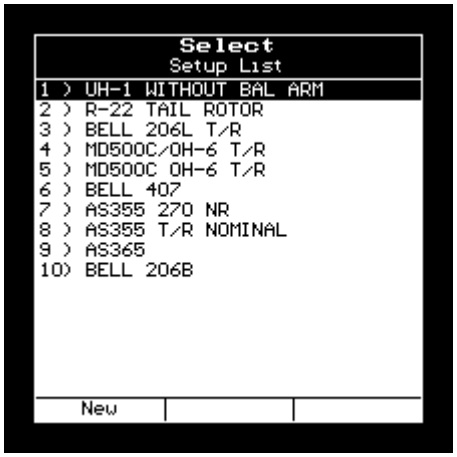
6. The "Tail Rotor Chart Setup" screen now appears. Enter the setup chart influence information exactly as shown. When completed, press **[Enter]** to save the setup and return to the "Manage Setups" screen. Press **[Main Menu]** to return to the "Main Menu" screen.



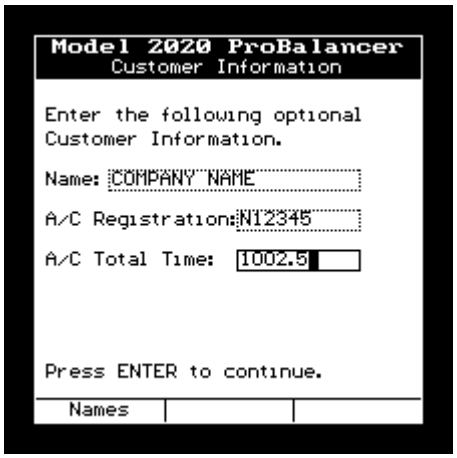
D. Data Acquisition

This section presents the steps necessary to start a balance job, acquire vibration data, and record corrections performed prior to the next run.

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 "Start a Job" and press **[Enter]**.
4. Next, if the UH-1 setup is already stored in the analyzer's setup list, select it and press **[Enter]**. If it is not present, press **[F-1]** for a "New" setup. Define a new setup as described in the section titled "Analyzer Setup".



5. The "Customer Information" screen appears. You may enter this optional customer information and press **[Enter]** or skip this step by simply pressing **[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.



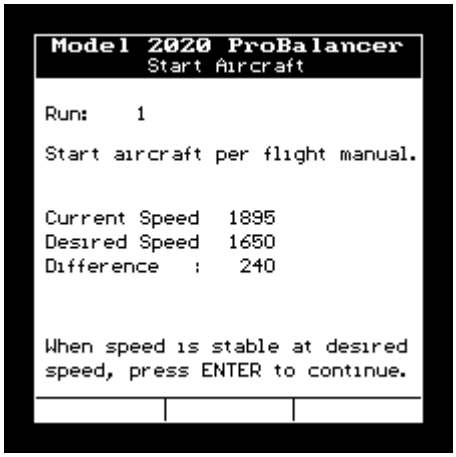
6. An equipment setup screen will appear next, directing you to install and connect the vibration sensor and tachometer sensor to the channels assigned in the job setup.

   If you wish to verify proper phototach to tape alignment, press the **[F-1]** "Tach On" key. Rotate the tail rotor until the reflective tape is in front of the phototach and verify the red LED at the rear of the phototach is illuminated. If the LED is not illuminated, refer to 2020 Users Manual. Press **[Enter]** to continue.

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

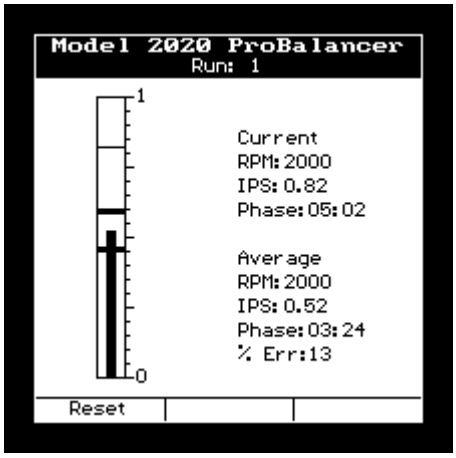
   If the rotor speed reads, "NO TACH" and the aircraft has been started, refer to the 2020 Users Manual.

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

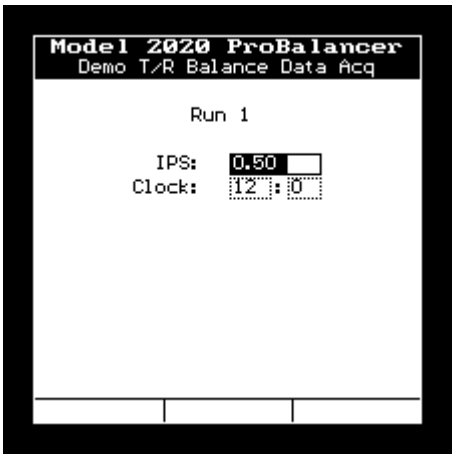


8. The analyzer will present the data acquisition screen as shown. This screen allows you to monitor both the current and averaged vibration readings. While monitoring the measurement, you may press the **[F-1]** "Reset" key to restart the averaging process. Use this feature as a way to validate the 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.

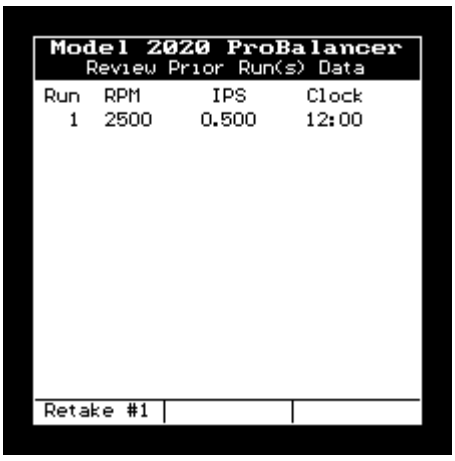


9. The analyzer will now present the “Review Prior Run(s) Data” screen as shown. If you wish to re-measure the data just acquired, you may press **[F-1]** “Retake”. If you wish to continue, press **[Enter]**.

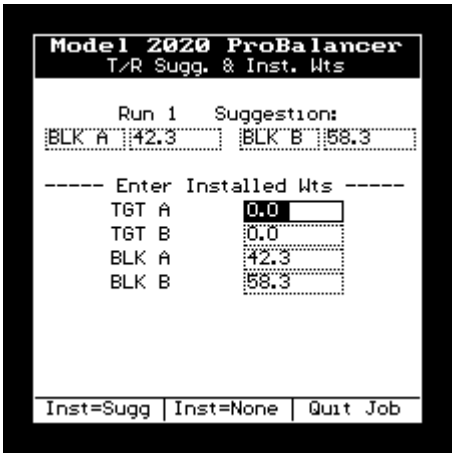


10. Shutdown aircraft and press **[Enter].**

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



12. The solution screen will now present the recommended corrections for the current run. The example shows a solution of adding 42.3 grams to "BLK A", and 58.3 grams "BLK B". Refer to figure 2 when installing weights to ensure correct location.



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.

The important point to remember when installing weights and recording their positions is that the influence for the next run will be updated by the result 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-3]** "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 or turn the analyzer [OFF].

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

Application Note

Bell 205/UH-1

Tail Rotor Balance (without chordwise balance arms)

Part Number: 11-200-0014

AppNote Number: a-be205uh1-2020e-tr-wo-bal-arms