
Chapter 6

Tail Rotor Balance

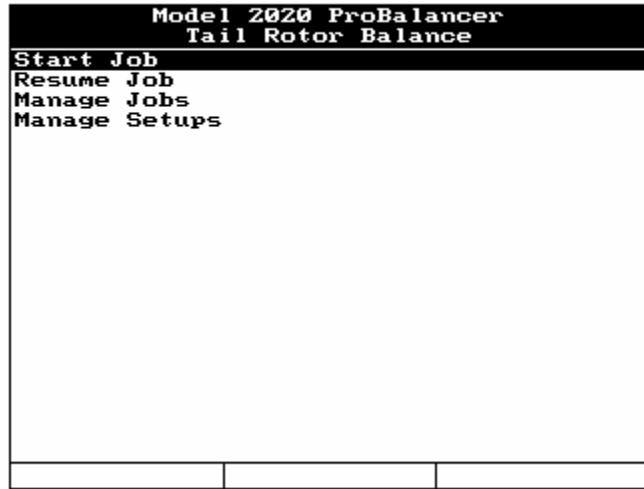
(Revision 2, February 2005)

“Tail Rotor Balance” is an analyzer function that is accessed from the analyzer’s Main Menu banner screen (shown in the illustration below). Selecting “Tail Rotor Balance” from the main menu brings up the “Tail Rotor Balance” banner screen (shown in paragraph 6.1 below). Each of the listings on the “Tail Rotor Balance” banner screen menu are options within the “Tail Rotor Balance” function. Descriptions of each of these options follow, along with the information required to complete the menu screens within the options, and the steps necessary to perform the tail rotor balance function.

Model 2020 ProBalancer Main Menu		
Propeller Balance		
Main Rotor Track & Balance		
Tail Rotor Balance		
Vibration Spectrum Surveys		
Monitor Spectrum		
Monitor IPS and Clock		
Monitor Magnitude and Phase		
Monitor Overall Vibration		
Check Track		
Transfer Data with PC		
Miscellaneous Items		
-Contrast	Default	+Contrast

6.1 - Start Job

Selecting “Start Job” from the “Tail Rotor Balance” banner screen allows you to begin a tail rotor balance job. When you select this option, one of three screens will appear next depending on whether you are using the tail rotor function for the first time, have previously defined tail rotor setups, or have a previously started job stored in the analyzer.



If you are using the analyzer for the first time, the “Tail Rotor Setup” banner screen will appear allowing you to define a new tail rotor setup to use. Proceed to paragraph 6.1.1 “Tail Rotor Setup” for detailed instructions on defining a setup.

If you have previously saved setups stored in the analyzer’s memory, a screen will display the current list of setups. You can then select a setup from this list to use for the job. Proceed to paragraph 6.1.2 to complete a tail rotor balance job.

If another job was already in progress but not completed, the “Incomplete Job” banner screen will be displayed and the analyzer will present a message prompting you to verify that you wish to finish the incomplete job or begin a new job. The screen will display the message; “The last job performed is incomplete. Finish it?” If you wish to return to the unfinished job, press the [F1] “Yes” key and you will be returned to the point where the in-progress job was stopped allowing it to be completed. If you wish to start a new job, press the [F3] “No” key and the screen will then display the list of previously saved setups stored in the analyzer’s memory. Select a setup to use and press [ENTER] to continue. If no setup exists that you want to use, press [F1] “New” and create a setup as shown in paragraph 6.1.1.

6.1.1 - Tail Rotor Setup

The “Tail Rotor Setup” banner screen allows you to define and store a tail rotor balance setup. As shown in the following figure, some fields in this screen have default values that appear automatically. You can use this information, if appropriate, or input your own specific setup information using the keypad. (Refer to Chapter 3, “Using the Model 2020 ProBalancer Analyzer” if you are unfamiliar with using the keypad.)

Model 2020 ProBalancer Tail Rotor Setup	
Name :	SAMPLE
Sensor Chan :	A
Sensor :	991D-1
Tach Chan :	1
Tach Type :	Optical
Tach Pos :	12
Balancing RPM :	2400
Rotor Direction :	CW
Number of Blades :	2
Conditions :	1

To complete the “Tail Rotor Setup” banner screen, do the following:

1. In the “Name” field, use the keypad to enter a name to identify the setup such as the aircraft model. A name must be entered in this field for the setup to be stored.
2. Use the [↓] key to move to the “Sensor Chan” (Sensor Channel) field. Use the [⇒] key to toggle between the available selections for the field which are “A” or “B.” The selection identifies which analyzer vibration channel you are using to measure the tail rotor vibration.
3. Move to the “Sensor” field using the [↓] key. Use the [⇒] key to toggle between the options and select a sensor. If the sensor you are using does not appear as an available selection, you must input a new sensor setup into the analyzer’s memory. See Chapter 13, Section 13.2.2, “Setup Sensors,” for instructions on how to perform this function.
4. Use the [↓] key to move to the “Tach Chan” field. Use the [⇒] key to select and identify which Tach input port on the analyzer you are using to acquire the tachometer signal.
5. Move to the “Tach Type” field using the [↓] key. The selection in the “Tach Type” field identifies which tachometer sensor you are using as the once-per-revolution source. For tail rotors, this will most often be “Optical.” Use the [⇒] key to make this selection.
6. Use the [↓] key to move to the “Tach Pos” field. Use the [⇒] key to select the clock position in hours (1-12) of the point at which the Phototach beam and the reflective tape intersect. The Tach position is entered from the opposite perspective from the phototach, or as if seen from the position you would stand if using a strobe light to acquire a clock angle.
7. Use the [↓] key to move to the “Balancing RPM” field. Using the keypad, enter the expected tail rotor RPM at which the balance will be performed. This selection is only used as an RPM target for starting the job and may be over-ridden while performing the job.
8. Move to the “Rotor Direction” field using the [↓] key. Using the [⇒] key, select the tail rotor direction of rotation as viewed from the opposite perspective from the phototach, or

as if seen from the position you would stand if using a strobe light to acquire a clock angle.

9. Move to the “Number of Blades” field using the [↓] key. Using the keypad, enter the number of blades on the tail rotor assembly you are balancing. Acceptable entries are from 2 to 20 blades.
10. Move to the “Conditions” field using the [↓] key. Use the [⇒] key to enter the different conditions you will operate the helicopter in to balance the tail rotor assembly. In most cases this will be “1” for full power neutral pitch. There will be cases, such as: multiple power settings or multiple pitch settings that require additional conditions.

When all fields are completed to your satisfaction, press [ENTER] to accept the setup.

If this setup has been defined as a result of selecting to start a job with no previous setups stored, a message will appear on the screen, “Store this new setup?” Press the [F1] “Yes” key to store the setup or the [F3] “No” key to skip this process (This query will only be presented if the user assigns a name to the setup in the “Name” portion of the screen.). If using the “Manage Setups” “Edit” or “New” functions, this message will not appear.

NOTE

It is recommended that setups be stored for future use. It is not necessary to create a new setup for similar model aircraft. Once a setup is stored, it may be used again in the future on another aircraft of the same model. This can eliminate time spent on data entry.

6.1.2 - Customer Information

```
Model 2020 ProBalancer
Customer Information

Enter the following optional
Customer Information.

Name: CUSTOMER NAME
A/C Registration: N1234
A/C Total Time: 123.4

Press ENTER to continue.

Names
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After you complete the “Tail Rotor Setup” banner screen, the next screen that appears is the “Customer Information” banner screen. You do not have to complete this screen, but it is recommended you enter at least a customer name. If entered, this information will appear on the job printout and will assist you in identifying this job when it is stored in the analyzer’s memory. Complete the information fields using the keypad. You can also find a listing of previously used customer names by pressing the [F1] “Names” key to view the “Customer

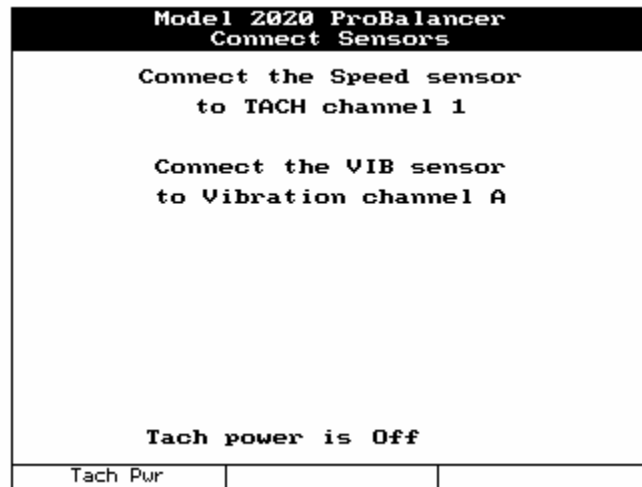
Name List”. If a customer name is displayed, you can use the [↓] key to highlight it and pressing [Enter] will enter this name on the “Name” line of the “Customer Information” screen. When finished entering customer data, press [ENTER] to continue.

NOTE

If no customer information is entered, the job will be commonly labeled “Unnamed” in the resume and manage job lists. This will complicate finding a specific job, as multiple jobs are stored. We recommended you enter a customer name.

6.1.3 – Tail Rotor Equipment Setup

After you complete the “Customer Information” banner screen, the “Tail Rotor Equipment Setup” banner screen will be displayed. Messages that appear on this screen prompt you to perform the physical installation and connection of the tachometer and vibration sensors to the input ports you specified in the setup. Go to paragraphs 6.1.3.1 and 6.1.3.2 for generic vibration sensor and phototach installation instructions.



6.1.3.1 - Vibration Sensor Installation

Install the vibration sensor in the location specified by the applicable balance chart you are using. Be sure to orient the connector in the direction specified by the chart as this will drastically affect the accuracy of the balance chart.

6.1.3.2 - Phototach Installation and Test

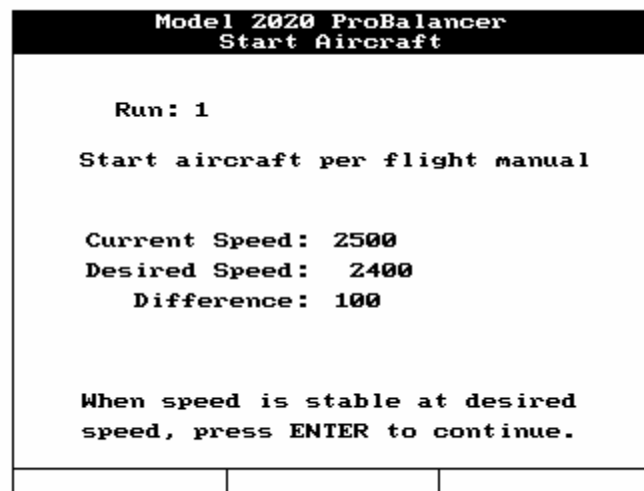
To install and test the Phototach, do the following:

1. Install the phototach in a location on the gearbox or tail boom at a location not more than 18 inches away or closer than 4 inches from the tail rotor component you plan to install tape on.
2. Pick a blade or hub component that will be used as the “Target” blade (This should be defined by the chart you are using.).

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3. Next, rotate the “Target” blade in front of the Phototach. Clean this area thoroughly to insure adhesion of the tape. Check the bottom of the analyzer screen for the message, “Tach Power is OFF.” The Block directly below this statement and corresponding to the [F1] key, is labeled “Tach Pwr.” Pressing the [F1] key will power the Tach. Turning the tachometer power on is not required to start the balance job. This option is only necessary to verify the proper alignment of the phototach and the tape.
 4. Cut a piece of reflective tape approximately 1.5 to 2 inches long and hold it in front of the Phototach on the “Target” blade or component. Observe the back of the Phototach for the red LED gate light to illuminate. Adjust the position of the tape on the target blade until this occurs.
 5. When satisfied with the position, mark it, then remove the backing and attach the tape to the target. Verify that the red LED gate light still illuminates with the tape in front of the Phototach.

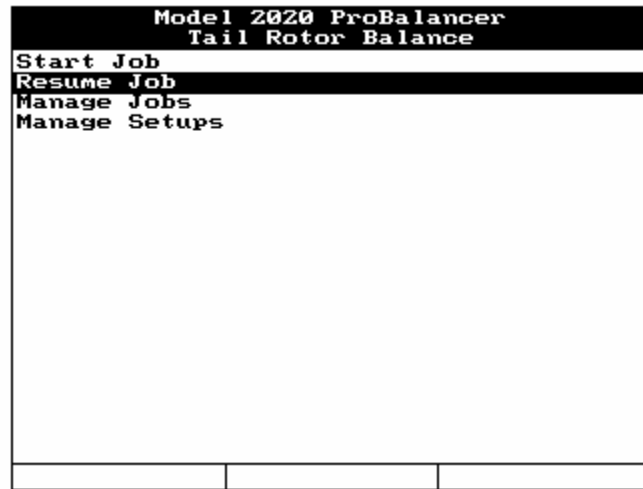
When you have completed the physical equipment setup tasks, press [ENTER] on the analyzer to continue with the tail rotor balance job.

6.1.4 - Start Aircraft



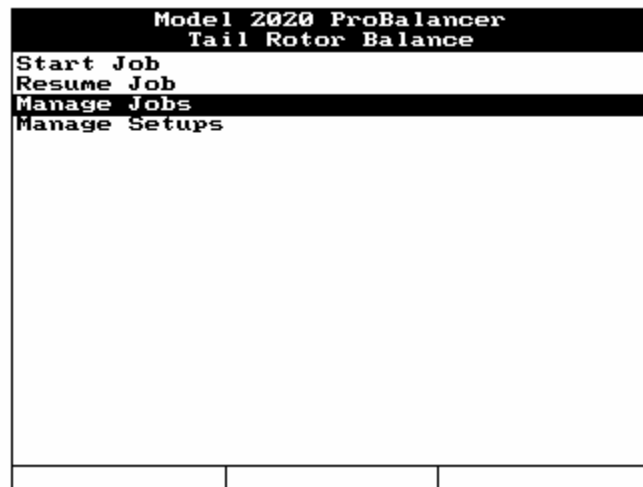
The analyzer will display the “Start Aircraft” banner screen shown in the illustration above. This screen shows the current speed in RPM, desired speed, and the difference between the two. When the current speed matches the desired speed, press [ENTER] to begin acquiring a measurement. If you choose to use a different RPM setting than that which is defined in the setup, simply press [ENTER] when the RPM signal is satisfactory to continue. Refer to your aircraft’s flight manual for aircraft start and operation instructions.

6.2 - Resume Job

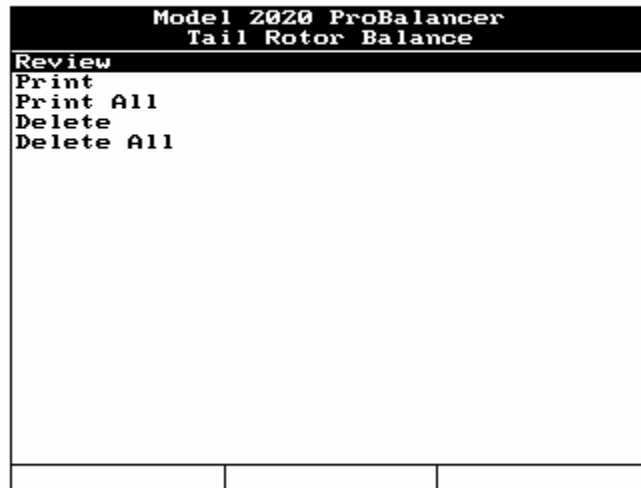


Selecting “Resume Job” from the “Tail Rotor Balance” banner screen menu allows you to select an unfinished job to resume. Using the [↓] key, highlight the job you wish to complete from the list of incomplete jobs, and press [ENTER]. You will be taken to the last step completed in the job process and allowed to complete it.

6.3 - Manage Jobs



Selecting “Manage Jobs” from the “Tail Rotor Balance” banner screen menu (shown above) presents several sub-menu choices (shown below) to choose from. These choices allow you to “manage” previously stored job data in the analyzer.



6.3.1 - Review

Selecting the “Review” option presents a list of stored jobs on the “Job List” banner screen. Customer names preceded by “*” are incomplete jobs. Jobs identified only by customer name are completed jobs. You can select one job for on-screen viewing. When viewing is complete, press the [BACKUP] or [ENTER] key to exit the screen. The analyzer will then return you to the "Manage Jobs" menu screen to select another function.

6.3.2 - Print

The “Print” option presents a list of stored jobs on the “Job List” banner screen. From the list, you may select one job for printing. See Chapter 14, “Printing,” for a detailed explanation of how to set up the analyzer to print.

6.3.3 - Print All

The “Print All” option sends all currently stored jobs to the printer. When you select “Print All,” a message will appear on the analyzer’s “Print All Jobs” banner screen asking you to verify that you want to print all jobs. Answer the prompt, “Are you sure?” by pressing the [F1] key for “Yes” or the [F3] key for “No.” If you choose the “Yes” answer, ensure your printer is prepared (paper, print cartridge, etc.) to complete the number of jobs stored. The “Yes” answer will send *all* currently stored jobs to the printer. The “No” answer will return you to the previous menu.

6.3.4 - Delete

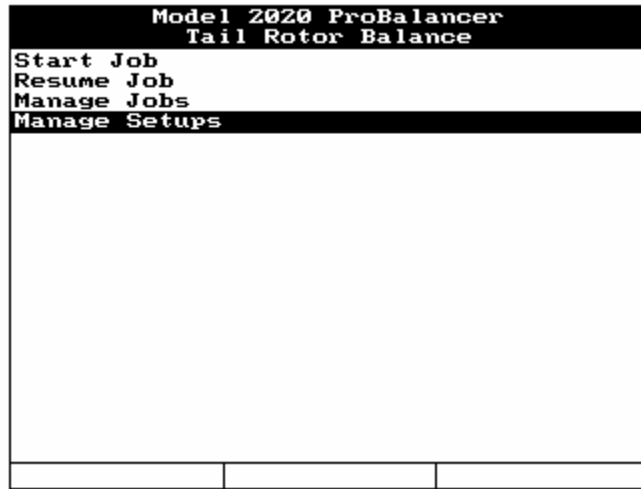
The “Delete” option presents a list of stored jobs on the “Job List” banner screen. From the list, you may select one job for deletion. After making your selection, the “Delete Job” banner screen will appear, asking you to verify your intent to delete the selected job by pressing the [F1] key for “Yes” or the [F3] key for “No.” You may wish to print the job for

reference or permanent record prior to deleting. Once deleted, the job cannot be retrieved from the analyzer.

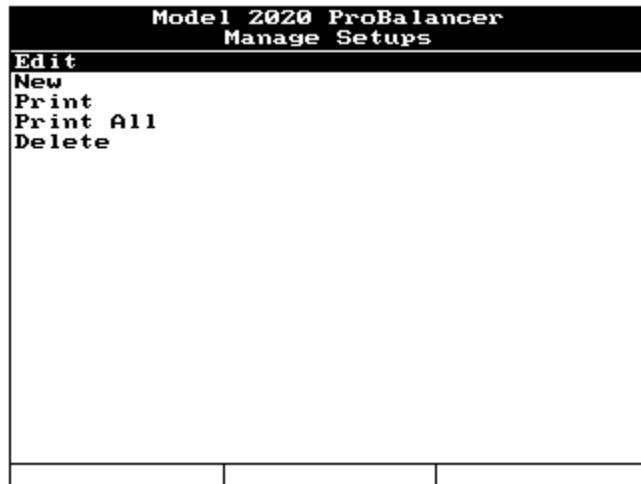
6.3.5 - Delete All

The “Delete All” option will delete all currently stored jobs. After selecting this option, the “Delete All Jobs” banner screen will appear, asking you to verify your intent to delete all the jobs by pressing the [F1] key for “Yes” or the [F3] key for “No.” You may wish to print the jobs for reference or permanent record prior to deleting. Once deleted, the jobs cannot be retrieved from the analyzer.

6.4 - Manage Setups



Selecting “Manage Setups” from the “Tail Rotor Balance” banner screen menu (shown above) presents several sub-menu choices (shown below) to choose from. These choices allow you to “manage” setups you have stored previously in the analyzer.



6.4.1 - Edit

Selecting the “Edit” function displays the “Setup List” screen. Select the setup you wish to edit. The screen will display the “Tail Rotor Setup” screen. Edit the setup as necessary and press [ENTER] to store and exit the edited setup screen. If no setups are stored in the analyzer, the “Tail Rotor Setup” banner screen will appear allowing you to define and store a new setup. Detailed instructions can be found in paragraph 6.1.1, “Tail Rotor Setup.”

6.4.2 – New

When the “New” function is selected, the “Tail Rotor Setup” banner screen appears allowing you to define and store a new setup. Do this as described in paragraph 6.1.1, “Tail Rotor Setup.”

6.4.3 - Print

The “Print” option presents a list of stored setups on the “Job List” banner screen. Ensure your printer is turned on and connected to the analyzer with the COMM/Print cable supplied with your analyzer. Select the setup you wish to print and press [ENTER]. (See Chapter 14, “Printing,” for a detailed explanation of how to set up the analyzer to print.)

6.4.4 - Print All

Selecting “Print All” sends all currently stored setups to the printer. When making this selection, you will be asked to verify “Are you sure?” by pressing the [F1] key for “Yes,” or the [F3] key for “No.” If choosing the “Yes” answer, ensure your printer is prepared (paper, print cartridge, etc.) to complete the number of jobs stored. The “Yes” answer will send *all* currently stored setups to the printer. The “No” answer will return you to the previous menu.

6.4.5 - Delete

The “Delete” option presents you with a list of stored setups. From the list, you may select one setup for deletion. If you wish to delete all stored setups, you must delete them individually. After making your selection, you will be asked to verify your intent to delete the selected job by pressing the [F1] key for “Yes,” or the [F3] key for “No.” We highly recommend you print the setup for reference or permanent record prior to deleting them. Once deleted, the setups cannot be retrieved from the analyzer.