



Application Note

Schweizer Aircraft Corp. 269/300 Series

Tail Rotor Balance

Part Number: 11-200-0091

AppNote Number: A-SC269-2020-TR (Rev 2, July 2004)

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Application Note

Application Note Number	A-SC269-2020-TR
Revision	1 (From airframe data dated May 2003)
Function	Tail Rotor Balance
Airframe	Schweizer Aircraft Corp. 269/300 Series
Engine	N/A
E-Setup Number	a-sc269-2020-tr.asf
ACES Systems Analyzer	Model 2020, Model 2020 with EPS
Firmware Version	2.0 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 the Enhanced Tail Rotor Performance Software option to perform a tail rotor balance on the airframe listed above. General instructions for the use of the Model 2020 can be found in the Model 2020 User Manual #2020OM-01 (P/N 75-900-2020) and Enhanced Performance Software (EPS) Operational Supplement #2020OM-01 Supplement 1 (P/N 75-900-2022). All procedures for track and balance and all adjustments should be made in accordance with the applicable Maintenance Manual.

A. Required Equipment

The following ACES Systems equipment is required.

Item	Quantity	Description	Part Number
1.	1	Analyzer, Model 2020, Turbo ProBalancer	10-100-2020
2.	1	Sensor, Vibe, Accel, 991D-1	69-100-0075
3.	1	Cable, Sensor 991D-1, 50'	10-320-0163
4.	1	Cable, Tach, Generic, 50'	10-320-0126
5.	1	Tachometer, Optical, Phototach	10-100-1773*
6.	1	Mount, Phototach, General Purpose	22-430-0066
7.	1	Reflective Tape	10-400-0176

*This listing shows the latest design parts. It is acceptable to perform this task using previous designs with the appropriate accessories. For compatibility issues, contact ACES Systems.

Optional Equipment

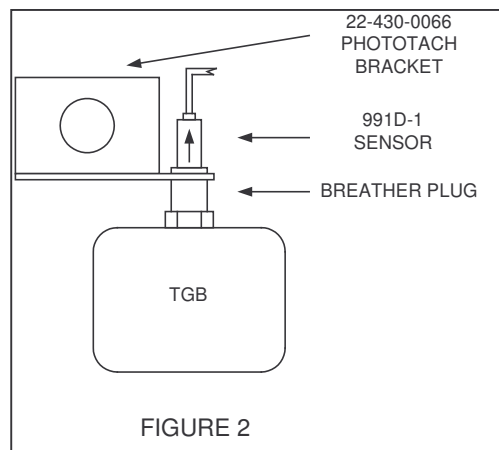
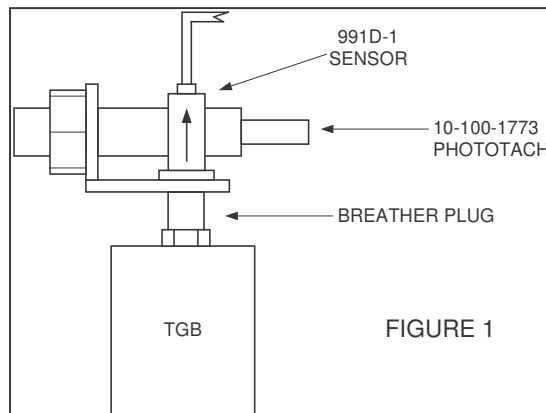
Item	Quantity	Description	Part Number
1.	1	Option, 2020 Enhanced Tail Rotor	11-900-0002

Miscellaneous Equipment

Tape or tie wraps to secure cables to airframe.

B. Equipment Installation

1. Position the helicopter on a flat surface with the nose facing into the wind.
2. Thread Sensor, Vibe, Accel 991D-1 (P/N 69-100-0075) through Mount, Phototach, General Purpose (P/N 22-430-0066) and into the breather plug on the tail rotor gearbox. Install Tachometer, Optical, Phototach (P/N 10-100-1773) into Mount and secure with nut. (Figures 1 and 2)



3. Connect Cable, Tach, Generic 50' (P/N 10-320-0126) to Phototach and connect Cable, Sensor 991D-1, 50' (P/N 10-320-0163) to Sensor and route cables into cabin area. Connect Sensor Cable to Channel A of analyzer. Connect Phototach Cable to Tach 1 of analyzer.

WARNING

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

4. See section D.3 below for proper alignment when applying a piece of reflective tape to the aft side of one of the tail rotor blades. The blade with tape becomes the target blade. (Figure 3)

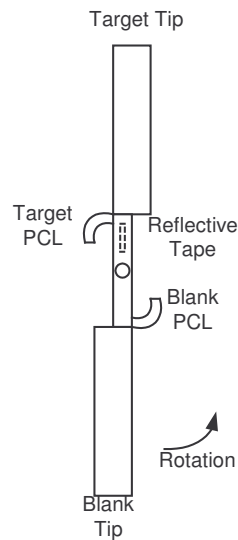


FIGURE 3

C. Analyzer Set Up

1. Turn the analyzer [ON].
2. Enter a new setup as follows; 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. The “Tail Rotor Setup” screen now appears. Enter the tail rotor setup as shown. When completed press [Enter].

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Model 2020 ProBalancer
Tail Rotor Setup
Name: SCHWEIZER 269/300
Sensor Chan: (A)
Sensor: (9910-1)
Tach Chan: (1)
Tach Type: (Optical)
Tach Pos: (12)
Balancing RPM: (3000)
Rotor Direction: (CCW)
Number of Blades: (2)
Conditions: (1)
Max Baln. Wts: (32.0)

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- The “Tail Rotor Chart Setup” screen will define the chart to be used when calculating corrections for a given measurement. Enter the information exactly as it appears in the appropriate fields. When completed, press **[Enter]**.

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Model 2020 ProBalancer
Tail Rotor Chart Setup
Name: SCHWEIZER 269/300
Chart Type: (Irregular)
Num WtPos: (4)

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WtPos	Grams	IPS	Add @
T TIP	0.50	1.00	@ 5:45
B PCL	5.00	1.00	@ 3:30
B TIP	0.50	1.00	@ 11:45
T PCL	5.00	1.00	@ 9:30

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WtPos MUST be in CW or CCW order

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- The setup is now complete, press **[Backup]**, select “Start Job”, press **[Enter]** and then select the “Tail Rotor Setup” that was just created.

D. Data Acquisition

- “Customer Information” screen. It is recommended to complete this screen so that customer information will appear on the printout assisting in identification of the job when it is stored in the analyzer memory. When finished press **[Enter]**.

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Model 2020 ProBalancer
Customer Information
Enter the following optional
Customer Information.
Name: (CUSTOMER NAME)
A/C Registrations: (NI234)
A/C Total Time: (100)
Press ENTER to continue.

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Names

2. “Tail Rotor Equipment Setup”. Information screen that prompts the user to verify equipment installation has been performed in accordance with channel selections that were specified when building the setup.

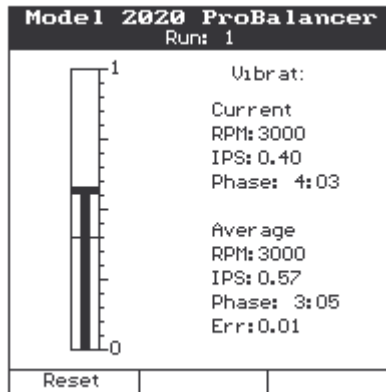
Model 2020 ProBalancer Tail Rotor Equipment Setup		
Install the speed sensor and connect to tach channel 1		
Install vibration sensor and connect to vib. channel A		
Tach power is Off		
Tach On		

3. Install and align reflective tape with Phototach as follows:
- Press [F1] “Tach On”. Align one blade with the phototach.
 - Hold a 2-inch piece of reflective tape, reflective surface facing the Phototach, against the backside of the blade. Do not remove backing at this point.
 - The red “Gate” light on the back of the Phototach should illuminate as the reflective tape is properly aligned in front of the LED. Clean an area of the blade or grip in preparation for mounting the reflective tape.
 - Remove the backing and install the reflective tape on the clean blade or grip surface.
4. “Start Aircraft” screen. This screen allows the user to view the current tail rotor RPM. When the aircraft has been started press **[Enter]**.

Model 2020 ProBalancer Start Aircraft		
Run: 1		
Start aircraft per flight manual.		
Current Speed: 2990		
Desired Speed: 3000		
Difference: -10		
When speed is stable at desired speed, press ENTER to continue.		

- 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 [F1] “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.

See the Model 2020 User Manual #2020OM-01 (P/N 75-900-2020) Chapter 16 for detailed instructions on how to read the “Converging Vibration Indicator and Scale.”



- You will be prompted to “Shut Down Aircraft”.
- Press [F3] to proceed to the “Review Prior Run(s) Data” screen. This screen allows the user to view the vibration readings that were acquired during the regime. Press [F1] to “Retake” the data or [Enter] to continue. Pressing [F3] will “Quit Job”.

Model 2020 ProBalancer			
Review Prior Run(s) Data			
Run	RPM	IPS	Clock
1	3000	0.570	3:06
Retake #1			Quit Job

- The “T/R Sugg. & Inst. Wts” screen will present a suggested solution based on the chart created in the original setup and the vibration IPS and clock reading. You have the opportunity to install the suggested weight corrections or decide on a different corrective action. It is important that the entry under the “Enter Installed Wts” reflect the actual weight amounts and locations used.

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 (-).

To remove all suggested values use the [F2] “Inst=None” key. If you decide you would like to revert back to the suggested weights use [F1] “Inst=Sugg” key.

The [F3] “Quit Job” exits the balance job with no provisions to resume the job at a later point in time. If you wish to leave the job and be able to resume it later, press the [Main Menu] key.

Model 2020 ProBalancer		
T/R Sugg. & Inst. Wts		
Run 1	Suggestion:	
B PCL	2.8	0.0
----- Enter Installed Wts -----		
T TIP	0.0	
B PCL	3.0	
B TIP	0.0	
T PCL	0.0	
Inst=Sugg Inst=None Quit Job		

9. When you have finished with the solution process, press **[Enter]** and you will be taken to the “Start Aircraft” screen as shown in paragraph 4 of this section to continue the balance process.