



# Application Note

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## Bombardier Dash 8

### In-Flight Propeller Balance

Part Number: 11-200-0286

AppNote Number: A-BA-DASH8-2020-PB (Rev. 5.03, Aug 2011)

This Application Note is provided for information only and does not supersede the requirements or guidelines set forth in the applicable engine or airframe maintenance manual. Technology for Energy Corporation assumes no obligation or liability, either expressed or implied, to the Purchaser arising out of the use of this procedure.

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# Application Note

Application Note Number	A-BA-DASH8-2020-PB
Revision	5.03 (From Airframe Rev 2010-10-15)
Function	In-Flight Propeller Balance
Airframe	Bombardier Dash 8
Engine	N/A
E-Setup Number	a-ba-dash8-2020-pb.asf
ACES Systems Analyzer	Model 2020 Series with EPS
Boot/App Version	5.01/5.01 or later
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 Propeller Enhanced Performance Software (EPS) option to perform a Propeller balance on the Bombardier Dash 8. General instructions for the use of the Model 2020 can be found in the Model 2020 User Manual #2020-OM-01 (P/N 75-900-2020). All procedures for Propeller Balance and all adjustments should be made in accordance with the Aircraft Maintenance Manual.

## A. Required Equipment

The following equipment is required to perform a Propeller Balance\*:

Item	Quantity	Description	Part Number
1.	1	Analyzer, Model 2020HR	10-100-2020HR
2.	1	Mount, ¼X28 Sensor, Vibe ¼" Hole	22-430-0056
3.	1	Sensor, Vibe, Accel, 991V	69-100-0064
4.	1	Adapter, Case Bolt (Set of 8)	10-400-0192
5.	1	Scale, Gram, Pocket Pro	75-900-0505
6.	1	Option, 2020 Enhanced Propeller	11-900-0001**
7.	1	Placards, ACES Prop Balance	Z82-100-0117
8.	1	Manual, ACES Guide to Prop Balancing	10-300-0048
9.	1	Cable, Inter, Beech/Dash 8 Bal - 2020/4040	10-320-0164
10.	1	Cable, Interface, Dash 8 to 991V (On Engine)	10-320-0116



\*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.

\*\*Using the Enhanced Propeller Balance Option will require entries on screens not found in the standard 2020 software. If your 2020 does not display all of the following screens, contact ACES Systems to learn about the benefits and availability of EPS.

## Optional Equipment

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The following equipment may be used if both engines are balanced concurrently:

Item	Quantity	Description	Part Number
11.	1	Mount, ¼X28 Sensor, Vibe ¼" Hole	22-430-0056
12.	1	Sensor, Vibe, Accel, 991V	69-100-0064
13.	1	Adapter, Case Bolt (Set of 8)	10-400-0192
14.	1	Cable, Interface, Dash 8 to 991V (On Engine)	10-320-0116

## Miscellaneous Equipment

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Tape or tie wraps to secure cables to airframe.

If adjustments are to be made to the Propeller Balance, use only hardware or balance weights that are specified in the applicable airframe maintenance manual.

## B. Equipment Installation

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1. Place the analyzer ([Item 1](#)) in the flight compartment.
2. Obtain access to the engine compartment.

### NOTE

**Secure and route cables as not to interfere with hot or rotating components and aircraft controls.**

3. Install a 991V Vibe Sensor ([Item 3](#) or [Item 12](#)) into the Vibe Sensor Mount with ¼" Hole ([Item 2](#) or [Item 11](#)). The vibration sensor should be installed with the electrical connector pointing up to the 12:00 clock position.
4. Connect a 991V Interface Cable ([Item 10](#) or [Item 14](#)) to the sensor and route along upper strut. Connect Cable to the 9811-J23 connector receptacle on the engine. ([Figure 1](#))
5. Obtain access to the J24 maintenance connector located behind the cabin wardrobe at relay panel NO.1. Connect interface cable the J-24 then to the 2020 analyzer. ([Figure 2](#))
6. Reinstall any previously removed engine cowlings and prepare aircraft for flight.

Equipment Installation Diagram

Figure 1

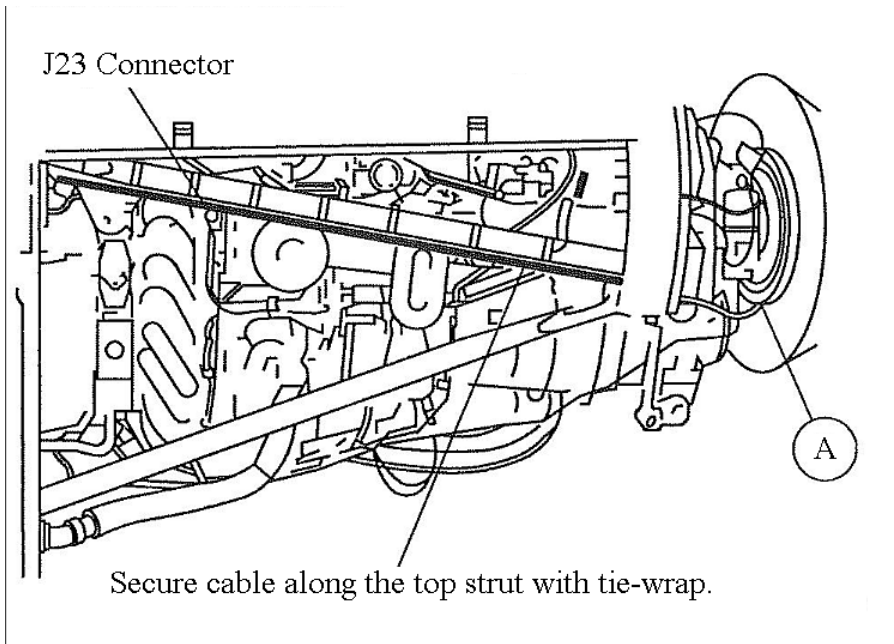
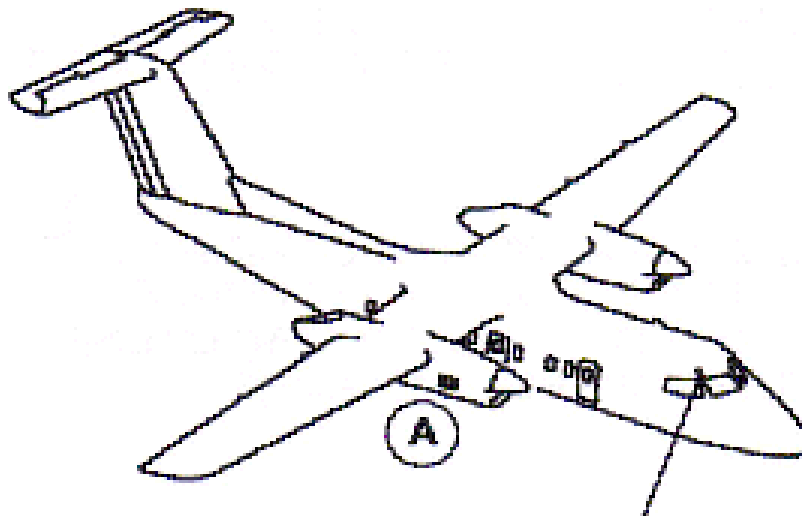
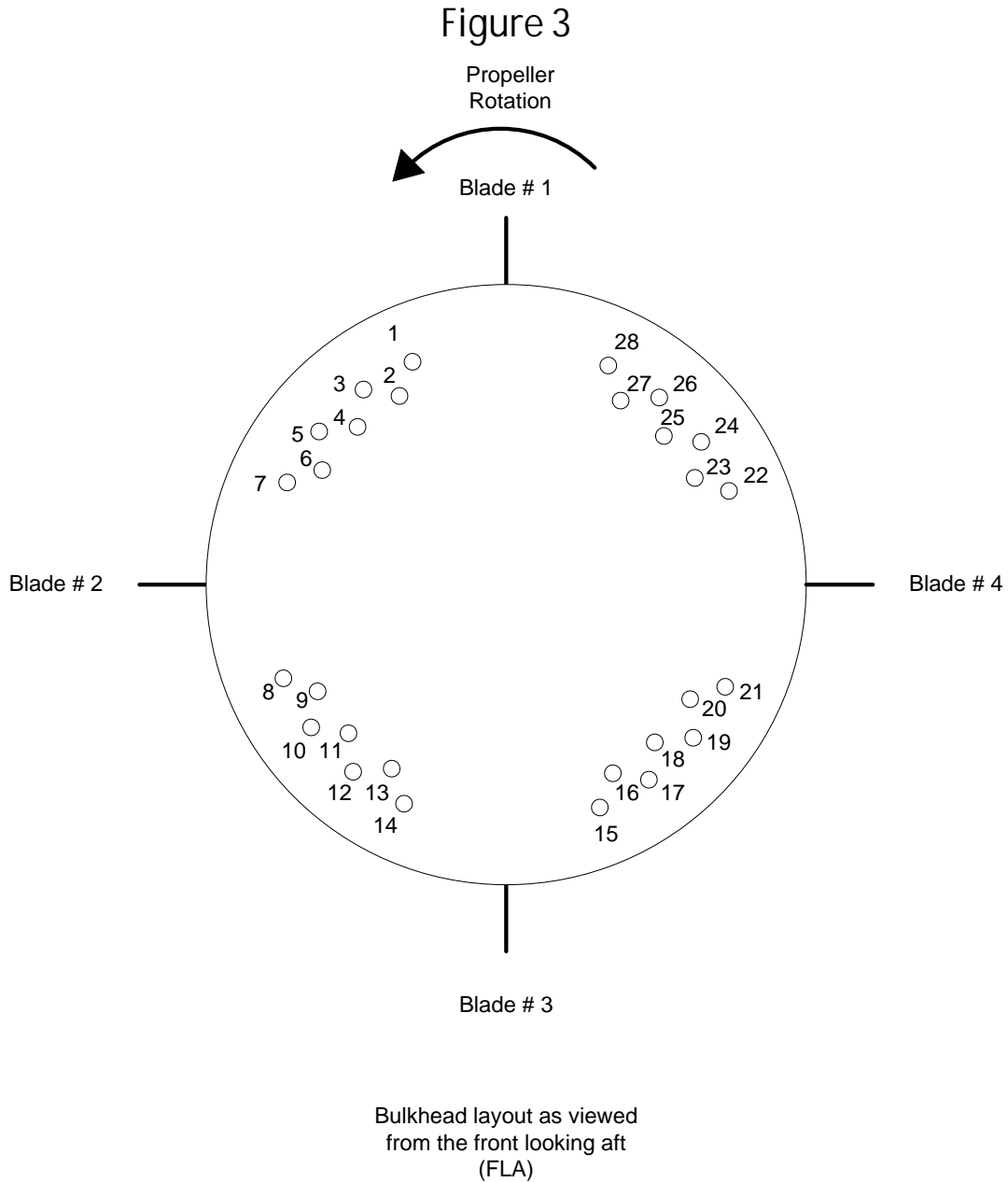


Figure 2

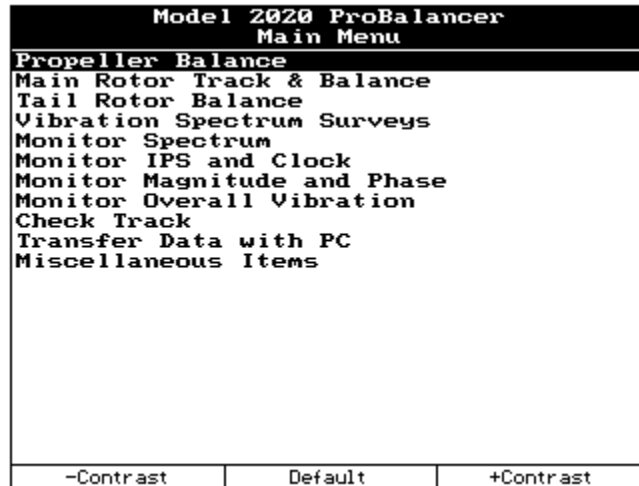


J24 maintenance connector located behind the cabin wardrobe at relay panel NO.1

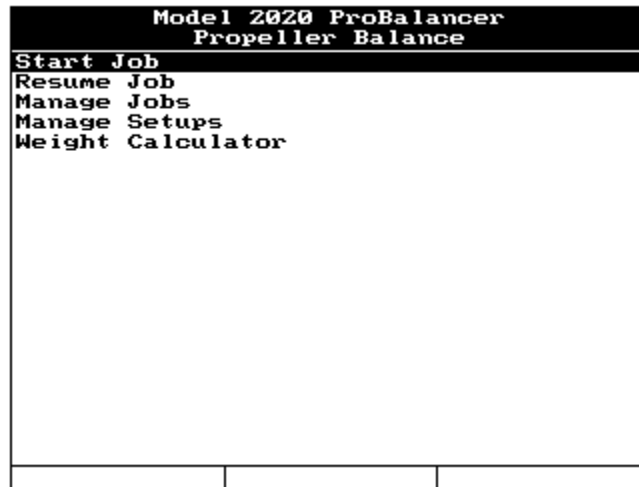


## C. Analyzer Set Up

1. Insure the analyzer battery is charged prior to starting the job. See the Model 2020 User Manual #2020-OM-01 (P/N 75-900-2020) Chapter 2 for detailed instructions on battery charging.
2. Turn the analyzer ON by pressing the **[ON/OFF]** key.
3. From the Main Menu, select “Propeller Balance” and press the **[ENTER]** key.



4. From the Propeller Balance Menu, select “Start Job” and press the [ENTER] key.



5. If the Bombardier Dash 8 is listed in the Setup List, select it using the [↓] key, press [ENTER] and go to [Section D below](#). If the Bombardier Dash 8 is not in the Setup List, press the [F1], “New” key and go to [Step 6 below](#).

Select Setup List	
1)	a-ba-dash8-2020-pb
2)	MULTI ENGINE PISTON
3)	MULTI ENGINE TURBINE
New	

6. Complete the Prop Balance Setup screen per the illustration screen below.

Model 2020 ProBalancer Prop Balance Setup		
Name:	a-ba-dash8-2020-pb	
Eng HP:	2380	Num of Eng's: 2
Balancing RPM:	1050	
Max Baln. Wts:	620	Holes: Yes
Wts relative to:	Sensor	
Rotation (#1):	CCW	(#2): CCW
Tach Type:	Mag(Lo)	
	Eng 1	Eng 2
Tach Pos (FLA):	5:00	5:00
Sens Type:	991V	
	Eng 1	Eng 2
Sens Pos (FLA):	6:00	6:00
Edit ICF		Sensor

- 6.1 In the "Name:" field, use the analyzer keypad to enter "Bombardier Dash 8". Press the [↓] key to move to the next field.
- 6.2 In the "Eng HP:" (Engine Horsepower) field, use the analyzer keypad to enter "2380". Press the [↓] key to move to the next field.
- 6.3 In the "Num of Eng's:" field, press the [⇒] key until the field reads "2". Press the [↓] key to move to the next field. The remainder of the form will automatically change to reflect a twin engine setup.
- 6.4 In the "Balancing RPM:" use the analyzer keypad to enter "1050". This RPM will be obtained using 75% Torque. Press the [↓] key to move to the next field.
- 6.5 In the "Max Baln. Wts:" field; use the analyzer keypad to enter "620". This is the maximum total amount of balance weights that may be added to the propeller assembly to accomplish the job. You will enter a maximum amount per hole in another screen. Press the [↓] key to move to the next field.

- 6.6 In the “Holes:” field, press the [⇒] key until the field reads “Yes” to indicate there are pre existing holes where balance weights are added that must be defined. Press the [↓] key to move to the next field.
  - 6.7 In the “Wts relative to:” field, press the [⇒] key until the field reads “Sensor”. This indicates the angle to each of the holes is measured from the Vibration Sensor when the Tachometer and Interrupter aligned. Press the [↓] key to move to the next field.
  - 6.8 In the “Rotation (#1):” field, press the [⇒] key until the field reads “CCW” for counterclockwise. Press the [↓] key to move to the next field.
  - 6.9 In the “Rotation (#2):” field, press the [⇒] key until the field reads “CCW” for counterclockwise. Press the [↓] key to move to the next field.
  - 6.10 In the “Tach Type:” field, press the [⇒] key until the field reads “Mag(Lo)” indicating you will use a Magnetic Pickup with Low Output. Press the [↓] key to move to the next field.
  - 6.11 In the “Tach Pos (FLA):” field under the “Eng 1” heading, press the [⇒] key until the field reads “5:00”. This indicates the clock position where the Magnetic Pickup is triggered by the passage of the Interrupter, as viewed from forward of the engine looking aft toward the tail of the aircraft. Press the [↓] key to move to the next field.
  - 6.12 In the “Tach Pos (FLA):” field under the “Eng 2” heading, press the [⇒] key until the field reads “5:00”. This indicates the clock position where the Magnetic Pickup is triggered by the passage of the Interrupter, as viewed from forward of the engine looking aft toward the tail of the aircraft. Press the [↓] key to move to the next field.
  - 6.13 In the “Sens Type:” field, press the [⇒] key until the field reads “991V”. Press the [↓] key to move to the next field.
  - 6.14 In the “Sens Posn (FLA):” field under the “Eng 1” heading, press the [⇒] key until the field reads “6:00”. This will define the sensing axis of the vibration sensor. You can find the sensing axis by determining the direction the electrical connector points as viewed from forward of the engine looking aft toward the tail of the aircraft. For example, if the sensor is off of the centerline of the engine, but the electrical connector is pointing toward the sky, the correct “Sens Posn” entry will be “12:00”.
  - 6.15 In the “Sens Posn (FLA):” field under the “Eng 2” heading, press the [⇒] key until the field reads “6:00”. This will define the sensing axis of the vibration sensor. You can find the sensing axis by determining the direction the electrical connector points as viewed from forward of the engine looking aft toward the tail of the aircraft. For example, if the sensor is off of the centerline of the engine, but the electrical connector is pointing toward the sky, the correct “Sens Posn” entry will be “12:00”.
7. You can potentially reduce the number of runs required to balance the engine if you already know the ICF for the engine type being balanced. To define the ICF press the [F1] “Edit ICF” key from the “Prop Balance Setup” screen.

Model 2020 ProBalancer		
Edit ICF		
	g/IPS	Deg/Rotation
Eng 1A:	340.00	300
Samples:	0	
Eng 2A:	340.00	300
Samples:	0	
Press ENTER to continue, or BACKUP to exit w/defaults.		
Default		

- 7.1 The “Edit ICF” screen will be displayed. Use the keypad to enter “340.00” into the “g/IPS” field adjacent to the “Eng 1A” text. This is the amount of weight, in grams required to offset a 1.0 IPS vibration on this application. Press the [↓] key to move to the next field.
- 7.2 In the “Deg/Rotation” field use the keypad to enter the “Phase Lag” value for the ICF. Press the [↓] key to move to the next field.
- 7.3 The “Samples” value will automatically update as the setup is used in future jobs. Leave the value set to zero and press the [↓] key to move to the next field.
- 7.4 Use the keypad to enter “340.00” into the “g/IPS” field adjacent to the “Eng 2A” text. This is the amount of weight, in grams required to offset a 1.0 IPS vibration on this application. Press the [↓] key to move to the next field.
- 7.5 In the “Deg/Rotation” field use the keypad to enter the “Phase Lag” value for the ICF. Press the [↓] key to move to the next field.
- 7.6 The “Samples” value will automatically update as the setup is used in future jobs. Leave the value set to zero and press the [ENTER] key to exit the screen and return to the “Prop Balance Setup” screen.
8. The “Prop Hole Layout Setup” screen will be displayed as illustrated in the screen below. The “Name:” field will automatically be filled in from the previous screen above. Press the [↓] key to move to the “No. of Holes:” field. Use the analyzer keypad to enter “28” in the field. Press the [↓] key to move to the next field.

Model 2020 ProBalancer Prop Hole Layout Setup							
Name : a-ba-dash8-2020-pb							
No. of Holes : 28				Space : Uneven			
Dir (FLA) : CW				Max H. Wt : 62			
Ang	#	Ang	#	Ang	#	Ang	#
23	1	127	10	232	19	337	28
30	2	135	11	240	20		
37	3	142	12	247	21		
45	4	150	13	292	22		
52	5	157	14	299	23		
60	6	202	15	307	24		
67	7	209	16	315	25		
112	8	217	17	322	26		
119	9	225	18	330	27		

- 8.1 In the “Space:” field, press the [⇒] key until the field reads “Uneven”. The screen will immediately change to display the hole layout grid. Press the [↓] key to move to the next field
- 8.2 In the “Dir (FLA):” field, press the right arrow key until the field reads “CW” for clockwise. This is the direction of the hole numbering sequence for the installation. This direction is independent of the method used to determine the location of hole #1 in [Step 8.4 below](#). Press the [↓] key to move to the next field.
- 8.3 In the “Max H. Wt:” (Maximum Hole Weight) field, use the analyzer keypad to enter “62”. Press the [↓] key to move to the next field
- 8.4 Enter the angles as shown in the table above. Keep in mind that these values must be entered by measuring the angle from in front of the propeller looking aft. They must be measured in a clockwise direction. When complete, press the [ENTER] key to accept and continue.

## D. Data Acquisition

1. The “Engine Selection” screen will be displayed next. You have the opportunity to select one engine or both for balancing. Use the [←] or [⇒] arrow key to toggle through the choices, left, right, or both, select the appropriate one and press [ENTER] to continue.

Model 2020 ProBalancer Engine Selection		
<p>You have selected a twin engine setup. Which engines do you wish to balance?</p> <p>Engine selection: <input type="text" value="Both"/></p>		

- The “Customer Information” screen will be displayed, as shown below. Use the analyzer keypad to enter a customer name in the “Name:” field. The analyzer will maintain a list of customer names as new names are entered. If names have been previously entered into this analyzer, you may press the [F1] “Names” key and select a customer’s name from the provided list. Press the [↓] key to move to the next field and use the analyzer keypad to enter the optional aircraft registration and aircraft total time as required. When all fields are complete, press the [ENTER] key to accept and continue.

Model 2020 ProBalancer Customer Information		
<p>Enter the following optional Customer Information.</p>		
<p>Name: <input type="text" value="CUSTOMER NAME"/></p>		
<p>A/C Registration: <input type="text" value="N1234"/></p>		
<p>A/C Total Time: <input type="text" value="123.4"/></p>		
<p>Press ENTER to continue.</p>		
Names		

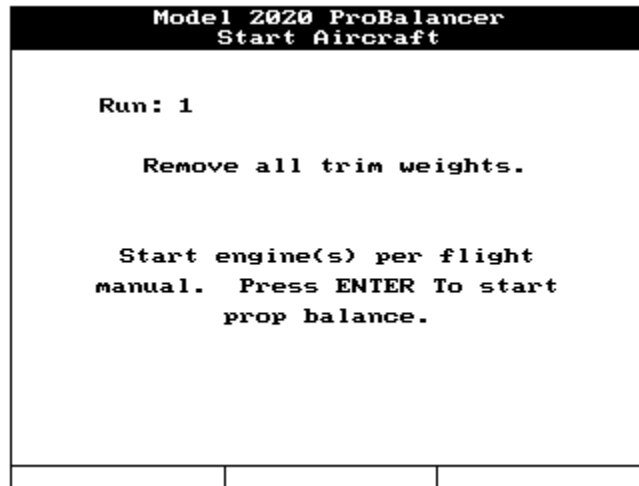
- The next screen to be displayed is the Engine Information screen, as shown below. While all these fields are optional, we highly recommend you fill in as much information as possible to provide better record keeping and search functions in AvTrend. Use the key pad and the arrow keys to complete the fields for the engine. S/N = Serial Number. In the serial number field, you may press the [F1] “Serial Nos” key to select the serial number from a list if this number has previously been entered in this analyzer. Type = Type engine or prop. Pos = position (1 or 2). TSO = Time since overhaul and TSN = Time since new. All fields are filled in using the analyzer keypad except the Pos: field which is selected using the [⇒] key. When all fields are complete, press the [ENTER] key to continue.

Model 2020 ProBalancer Engine Information		
<b>Engine 1 Info</b>		<b>Prop 1 Info</b>
S/N:	1234	5678
Type:	SAMPLE	DEMO
Pos:	1	
TSO:	123	
TSN:	456	
<b>Engine 2 Info</b>		<b>Prop 2 Info</b>
S/N:	9012	3456
Type:	SAMPLE	DEMO
Pos:	2	
TSO:	789	
TSN:	123	
Serial Nos		

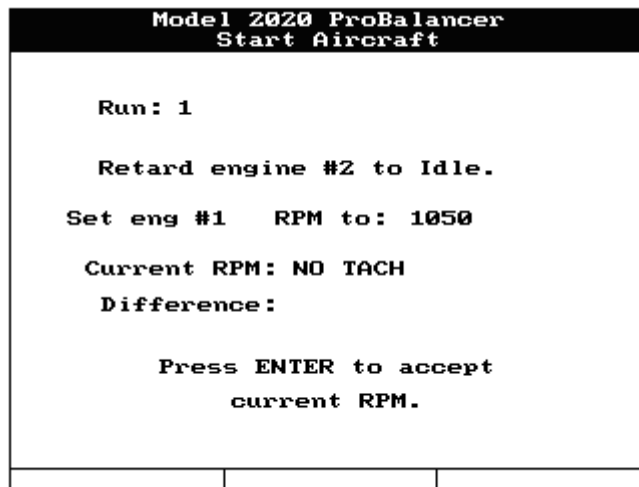
4. The next screen to be displayed will be the Connect Sensors screen as illustrated below. This screen gives instructions on installing sensors and cables. You may also check the PhotoTach alignment by pressing the [F1] "Tach Pwr" key which supplies power to the optical tachometer for checking alignment with the reflective tape.

Model 2020 ProBalancer Connect Sensors		
Connect Left Speed sensor to TACH channel 1		
Connect Right Speed sensor to TACH channel 2		
Connect Left VIB sensor to Vibration channel A		
Connect Right VIB sensor to Vibration channel B		
Tach power is Off		
Tach Pwr		

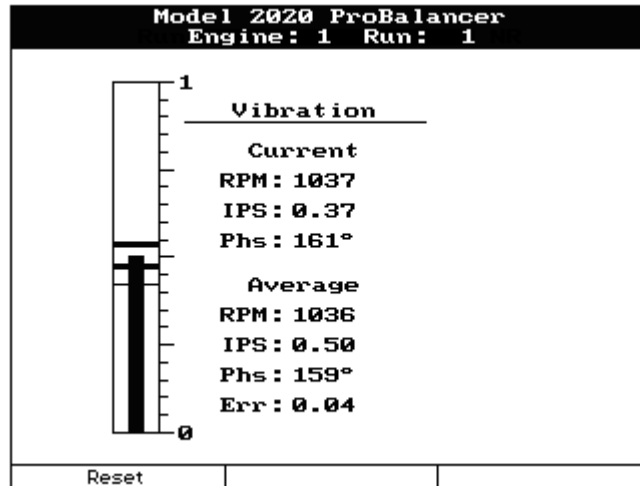
5. The "Start Aircraft" screen will be displayed with instruction to "Remove all trim weights". Remove all previously installed trim balance weights from all hole locations to begin the balance with a clean slate. When you have verified that all weights are removed, press the [ENTER] key to continue.



- The “Start Aircraft” screen will change to provide Current, Actual, and the Difference between the two RPMs. Configure the Condition Levers and Torque settings per the Maintenance Manual instructions to take a vibration reading on the #1 engine. When the Actual RPM is stable and within range of the balance RPM, press the [ENTER] key to continue.

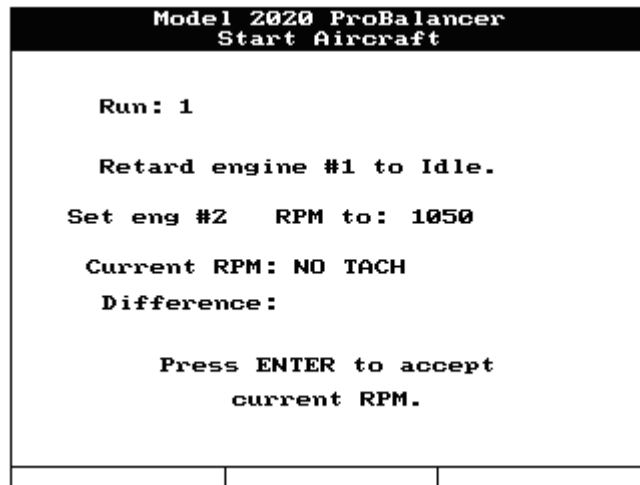


- The analyzer will display the Engine 1, Run 1 screen similar to the one below. Chapter 16 of the Model 2020 User’s Manual gives detailed instructions on how to read the converging scale if you are not familiar with it. Keep the engine set as described in the applicable Maintenance Manual and allow the analyzer to collect data for approximately 10 to 15 seconds. The “Err:” (Error) indication at the bottom of the text portion of the screen should be as steady as possible with very little change before you press [ENTER] to stop acquisition. If the Err is not “0”, this is not an indication of failure or fault, only that the vibration averaging errors cannot be resolved below the displayed level. This Err value will typically be higher as the balancing process reduces the vibration amplitude.

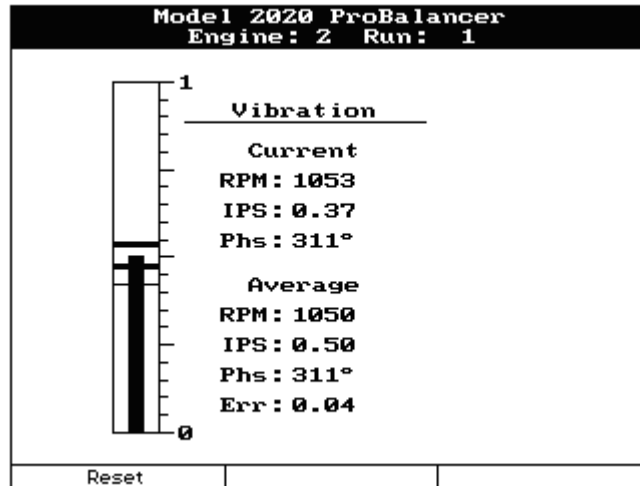


See the Model 2020 User Manual #2020-OM-01 (P/N 75-900-2020) Chapter 16 for detailed instructions on how to read the “Converging Vibration Indicator and Scale.”

- The analyzer will display the “Start Aircraft” screen again, showing the Current, Actual, and the Difference between the two RPMs. Configure the Condition Levers and Torque settings per the Maintenance Manual instructions to take a vibration reading on the #2 engine. When the Actual RPM is stable and within range of the balance RPM, press the [ENTER] key to continue.



- The analyzer will display the Engine 2, Run 1 screen similar to the one below. Chapter 16 of the Model 2020 User’s Manual gives detailed instructions on how to read the converging scale if you are not familiar with it. Keep the engine set as described in the applicable Maintenance Manual and allow the analyzer to collect data for approximately 10 to 15 seconds. The “Err:” (Error) indication at the bottom of the text portion of the screen should be as steady as possible with very little change before you press [ENTER] to stop acquisition. If the Err is not “0”, this is not an indication of failure or fault, only that the vibration averaging errors cannot be resolved below the displayed level. This Err value will typically be higher as the balancing process reduces the vibration amplitude.



10. After pressing [ENTER] the review screen will be displayed as shown in the example below. This is the amplitude and phase angle reading for each engine. You may retake engine #1 data by pressing the [F1] “Retake #1” function key. You may retake engine #2 data by pressing the [F2] “Retake #2” function key. You may retake data for both engines by pressing the [F3] “Retake All” function key. When satisfied with the acquired data, press the [ENTER] key to accept and continue.

Model 2020 ProBalancer				
Review Job				
Run	Left Eng		Right Eng	
	(IPS)	DEG.	(IPS)	DEG.
1	0.50	159	0.67	301

Retake #1      Retake #2      Retake All

11. The “Shutdown Aircraft” instruction screen will be displayed as shown in the example below. Shut down the engine(s) using normal shutdown procedures. When all shutdown tasks are complete, press the [F3] “Continue” key.



12. The Prop Suggested and Installed Weights screen for “Run 1 – Left Engine” as shown below will be displayed. At the top of the screen you will see the Run number. The left side of the screen shows the Suggested weight installation by actual weight and phase angle. Directly below the raw solution you will see a specific weight (in grams) in the left column and a corresponding hole number(s) in the right column where that weight should be installed. The Installed column at the right side of the screen is where you must enter the actual weight and hole number(s) where that weight was installed. Be as accurate as possible with the installed weight as the analyzer will use this information to calculate the follow on influence for the next solution (if required). Notice at the bottom of the screen the instructions: “Remove old, install & enter new weight.” This means that ALL previously installed weights must be removed with each new weight installation. At the bottom of the screen, the three function keys are defined as: **[F1]**, “Inst=Sugg”, press this key to default the Installed columns to the values displayed in the Suggested column. **[F2]**, “Inst=None”, press this key to zero out all weight in the Installed column. **[F3]**, Quit Job, press this key if you are satisfied with the current vibration levels and wish to terminate the balance job, leaving the previously installed weights in place. After the screen is complete per your actions, press the **[ENTER]** key to continue.

In the example below, the optimum “Suggested” weight correction is shown in the left-hand column. This value is achieved using the “Suggested” weight combinations listed below the effective weight value. Use the keypad to enter the “Implemented” values under the right-hand column. If you are not able to match the suggested value exactly, simply enter the value that you can install. As you enter values in the right-hand column, the effective weight at the top of the column, shown highlighted in black below, will update to reflect the new effective weight. When you have entered the value for each hole, review the effective weight. If the Implemented effective weight value does not closely match the Suggested value, you can try to re-weigh one or more holes under the Implemented solution column. In any case, be as honest as possible when entering the values in the Implemented column as the analyzer uses these values to predict future solutions.

Model 2020 ProBalancer Prop Sugg. and Inst. Wts			
Run 1 - Left Engine			
Suggested		Implemented	
170.0	@ 99 °	171.3	@ 100 °
GMS	Hole	GMS	Hole
2.0	6	0.0	6
62.0	7	62.0	7
62.0	8	62.0	8
59.0	9	62.0	9
0.0	0	0.0	1
0.0	0	0.0	1
Remove old, inst. & enter new wt ENTER to proceed to right eng.			
Inst=Sugg		Inst=None	
		Quit Job	

13. The Prop Suggested and Installed Weights screen for “Run 1 – Right Engine”, shown below will be displayed. At the top of the screen you will see the Run number. The left side of the screen shows the Suggested weight installation by actual weight and phase angle. Directly below the raw solution you will see a specific weight (in grams) in the left column and a corresponding hole number(s) in the right column where that weight should be installed. The Installed column at the right side of the screen is where you must enter the actual weight and hole number(s) where that weight was installed. Be as accurate as possible with the installed weight as the analyzer will use this information to calculate the follow on influence for the next solution (if required). Notice at the bottom of the screen the instructions: “Remove old, install & enter new weight.” This means that ALL previously installed weights must be removed with each new weight installation. At the bottom of the screen, the three function keys are defined as: [F1], Inst=Sugg, press this key to default the Installed columns to the values displayed in the Suggested column. [F2], Inst=None, press this key to zero out all weight in the Installed column. [F3], Quit Job, press this key if you are satisfied with the current vibration levels and wish to terminate the balance job, leaving the previously installed weights in place. After the screen is complete per your actions, press the [ENTER] key to continue.

In the example below, the optimum “Suggested” weight correction is shown in the left-hand column. This value is achieved using the “Suggested” weight combinations listed below the effective weight value. Use the keypad to enter the “Implemented” values under the right-hand column. If you are not able to match the suggested value exactly, simply enter the value that you can install. As you enter values in the right-hand column, the effective weight at the top of the column, shown highlighted in black below, will update to reflect the new effective weight. When you have entered the value for each hole, review the effective weight. If the Implemented effective weight value does not closely match the Suggested value, you can try to re-weigh one or more holes under the Implemented solution column. In any case, be as honest as possible when entering the values in the Implemented column as the analyzer uses these values to predict future solutions.

Model 2020 ProBalancer Prop Sugg. and Inst. Wts				
Run 1 - Right Engine				
Suggested			Implemented	
GMS	Hole	Wts	GMS	Hole
227.8	@ 241 °		227.3	@ 241 °
33.3	18		33.0	18
62.0	19		62.0	19
62.0	20		62.0	20
62.0	21		62.0	21
17.3	22		17.0	22
0.0	0		0.0	1

Remove old, inst. & enter new wt  
ENTER to continue; BACKUP = left eng.

Inst=Sugg	Inst=None	Quit Job
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**CAUTION**

At no point should a correction be made that contradicts information in the maintenance manual.

The analyzer will attempt to resolve the vibration and/or track level to 0.00. This may require adjustments that are not practical to duplicate. The technician must determine the closest possible match to the suggestion.

14. If you chose to continue the job, the screen below will be displayed indicating you are ready to start the engine for the next run. [Steps D.5](#) through [D.14](#) will be repeated until the vibration amplitude has been reduced to a satisfactory level, usually three runs total.

Model 2020 ProBalancer Start Aircraft		
Run: 2		
Start engine(s) per flight manual. Press ENTER To start prop balance.		

**E. Quit Job**

1. If you selected [F3] "Quit Job" in [Paragraph D.12](#) or [D.13](#) above you will be presented with the following confirmation screen. If you are certain you want to end the job press [F1] "Yes" and the job will be marked as completed. This choice will generate the message in [Step 2](#) below. Choosing [F2] "No" will take you back to the job in progress.

Model 2020 ProBalancer Update Setup ICFs?		
Do you want to update the setup's influence coefficients based on the result of this job?		
Yes		No

2. Selecting [F1] “Yes” from the screen shown in [Step 1 above](#) will cause the following screen to be displayed. Press [F1] “Yes” if the job went as expected. It is possible to update and store the calculated ICF in the setup. This allows you to refine the ICF and potentially reduce the number of runs required in future jobs using this same setup. Select [F2] “No” if the balance job did not go as expected. This will keep mistakes or poor mechanical condition from influencing the setup causing unnecessary runs when using the same setup in the future.
3. Remove all test equipment and return aircraft to airworthy condition. Insure only permanent weights are mounted on the propeller and that they are mounted in accordance with the manufacturer’s instructions or the *ACES Guide to Propeller Balance* as applicable.