



Application Note

Fokker F70 and F100

Fan Trim Balance

Part Number: 11-200-0287

AppNote Number: A-FOF100-4040-FB (Rev. 1.00, Mar 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.

Copyright © 2010, 2011 TEC Aviation Division. All rights reserved. This document is to be printed and reproduced for personal use only.



Application Note

Application Note Number	A-FOF100-4040-FB
Revision	1.00
Function	Fan Trim Balance
Airframe	Fokker F70 and F100
Engine	Rolls Royce TAY 620/650
E-Setup Number	a-fof100-4040-fb.asf
ACES Systems Analyzer	Model 4040 Viper
Boot/App Version	Boot 3.05/App 3.05 or higher
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 4040 to perform a Fan Trim Balance on the Fokker F70 and F100. General instructions for the use of the Model 4040 can be found in the Model 4040 User Manual #4040-OM-01 (P/N 75-900-4040). All procedures for Fan Trim Balance and all adjustments should be made in accordance with the Aircraft or Engine Maintenance Manual.

A. Required Equipment

The following equipment is required to perform a Main Rotor Track and Balance*:

Item	Quantity	Description	Part Number
1.	1	Analyzer, Model 4040 Viper	10-100-4040CE
2.	1	Cable, Interface, FOKKER 100 to 4040	10-320-0124
3.	3	Cable, Tach, Generic, 50 Ft	10-320-0126
4.	3	Cable, Vibe, 6 Pin Generic, 50 Ft	10-320-0127
5.	1	Option, 4040 Fan Trim Balance	11-900-0006

*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

The following equipment may be required on aircraft where the Tach signal is not routed to the J1251A Test Connector:



Item	Quantity	Description	Part Number
6.	1	Cable, Interface, Fokker 100 Tach, 25 Ft	10-320-0115

The following additional equipment is required to balance both engines simultaneously:

Item	Quantity	Description	Part Number
7.	3	Cable, Tach, Generic, 50 Ft	10-320-0126
8.	3	Cable, Vibe, 6 Pin Generic, 50 Ft	10-320-0127
9.	1	Cable, Interface, Fokker 100 Tach, 25 Ft	10-320-0115

Miscellaneous Equipment

Tape or tie wraps to secure cables to airframe.

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

B. Equipment Installation

- Place the Analyzer ([Item 1](#)) in the flight compartment.
- Attach the Fokker 100-to-4040 Interface Cable ([Item 2](#)) to the J1251A Vibration and Tach test connector behind the panel at the aft end of the aft baggage compartment door. [Figure 1](#) Note that the interface has connections for two vibration and one Tach signal for each engine.
 - If the airframe does not have a Tach Signal routed to the J1251A connector, access the engine under test. Remove the existing connector from the Tach Generator. Connect the end of the 25' Fokker Interface Cable ([Item 6](#)) marked "ENGINE" to the Tach generator on the engine. Safely route this cable to the location of the J1251A connector in the baggage compartment. Connect the end of this cable marked "INTERFACE" to a Generic Tach Cable ([Item 3](#)). ([Figure 3](#))
- Connect the end of one of the 50 foot Generic Vibe Cables ([Item 4](#)) marked "VIBE INTERFACE" to the 6-pin Vibration Lead (marked either "VIBE #" or "VIBE # ALT") of the Fokker 100 Interface Cable marked for the engine you are balancing. ([Figure 2](#))

NOTE:

VIBE #1 is the primary sensor and the VIBE #1 ALT is normally only used if the VIBE #1 sensor is defective. The same holds true for the VIBE #2 and VIBE #2 ALT.

- Connect additional Generic Vibration cables together to facilitate reaching the cockpit. You may route the cable assembly from the aft baggage compartment, up through the cabin floor near the interior fuselage wall, then toward the cockpit or route it along the exterior of the fuselage and through the right side galley service door to the cockpit. If routed on the exterior fuselage, be sure to secure the cable to the fuselage every 36 to 48 inches with duct tape or aluminum speed tape to prevent ground interference or ingestion into the engine.
- Connect the end of the 50 foot Generic Vibe Cable marked "ANALYZER" to the CHANNEL A vibration input of the Analyzer.

6. Connect the end marked “TACH INTERFACE” of one of the Generic Tachometer Cables (Item 3) to the three pin tachometer lead marked “TACH #1” or “TACH #2” (according to which engine you are balancing) of the Fokker 100 Interface Cable.

NOTE

If a Tach signal is not wired to the J125A1 test connector, gain access to the speed probe at the engine being balanced and connect the 25 foot Tach extension cable (Item 6 or Optional Item 9). Route this cable to the area of the J1251A test connector and substitute it for the Tach #1 or Tach #2 cable (as appropriate) on the Fokker 100 Interface Cable.

7. Connect one of the remaining two generic Tachometer Cables to the end of the first cable and the third cable to the end of the second cable to facilitate reaching the cockpit. You may route the cable assembly from the aft baggage compartment, up through the cabin floor near the interior fuselage wall, then toward the cockpit or route it along the exterior of the fuselage and through the right side galley service door to the cockpit. If routed on the exterior fuselage, be sure to secure the cable to the fuselage every 36 to 48 inches with duct tape or aluminum speed tape to prevent ground interference or ingestion into the engine.
8. Connect the end of the Generic Tachometer Cable marked “ANALYZER” to the TACH 1 input of the Analyzer.

Equipment Installation Diagram

Figure 1

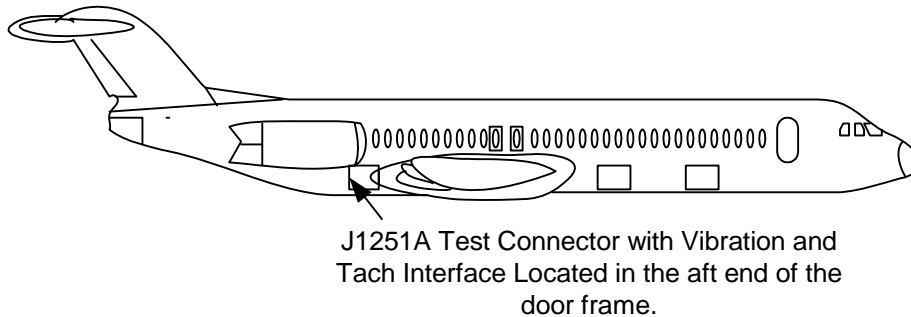


Figure 2

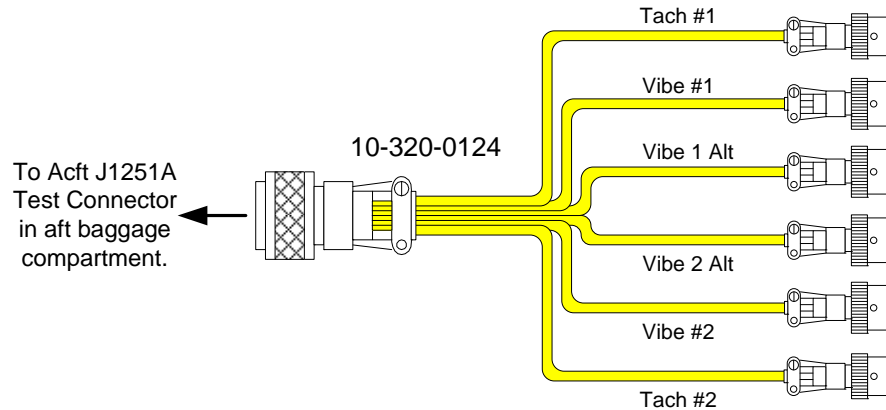
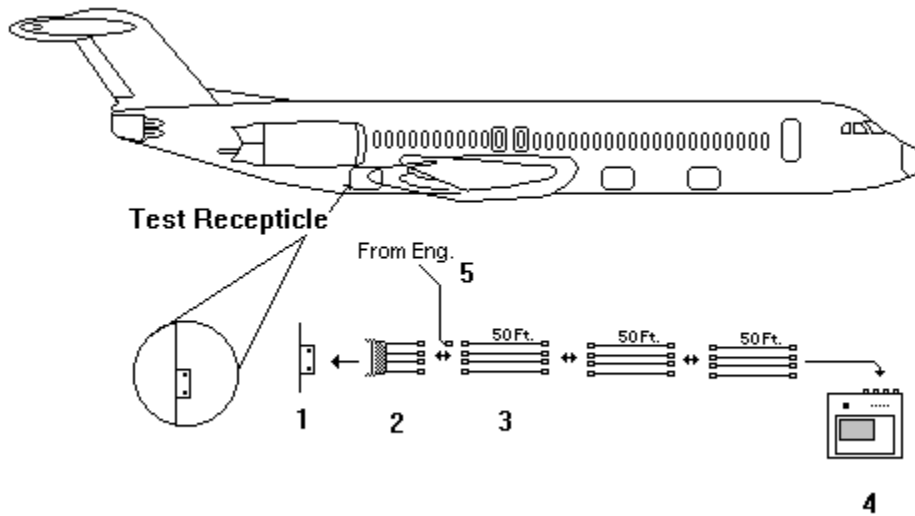


Figure 3



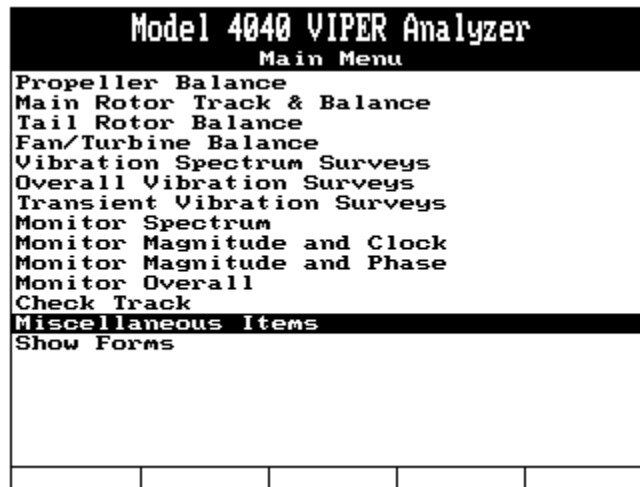
Key:

1. Test connector J1251A.
2. Fokker 100 Interface Cable ([Item 2](#)).
3. 50 foot Generic Tachometer and Generic Vibration Cables.
4. Analyzer (typically located in the cockpit).
5. Alternate tach source cable ([Item 6](#)) (required only for aircraft serial numbers less than 48).

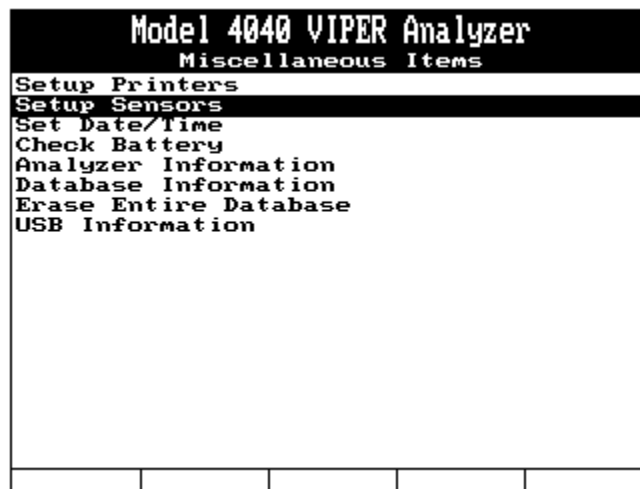
C. Analyzer Set Up

1. Insure the analyzer battery is charged prior to starting the job. See the Model 4040 User Manual #4040-OM-01 (P/N 75-900-4040) Chapter 2 for detailed instructions on battery charging.

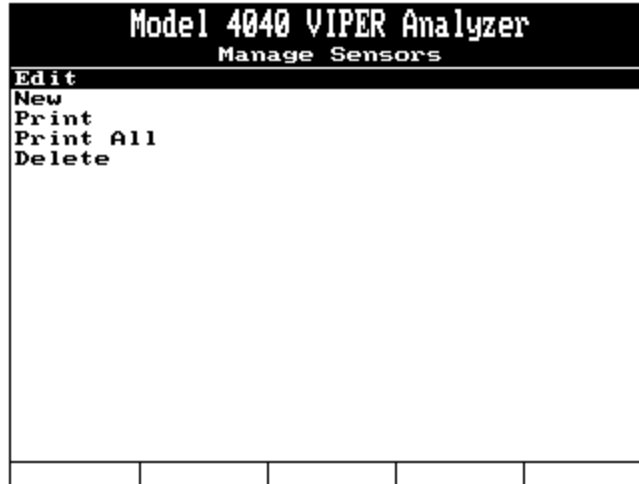
2. Turn the analyzer ON by pressing the [ON/OFF] key.
3. This section will provide you with the steps necessary to enter the Tay Fan Balance Setup into the Analyzer. If the setup has been previously entered, you need not repeat the steps in this section. If the setup is already available in the analyzer, go to [Section D below](#). Otherwise continue with [Step 4 below](#).
4. From the Main Menu shown below, select “Miscellaneous Items” and press the [ENTER] key.



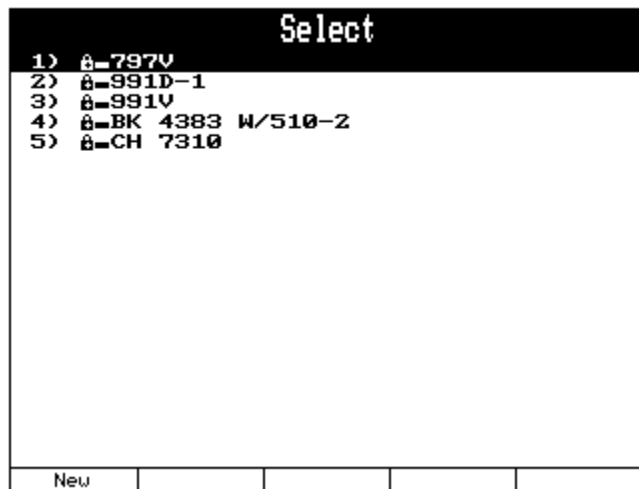
5. From the Miscellaneous items menu, select Setup Sensors, then press [ENTER].



6. From the Manage Sensors menu, select Edit, then press [ENTER].



7. The Select menu will be displayed which lists all sensors currently programmed into the analyzer's memory. If the Fokker 100 Onboard is listed, you need not re-enter it. Press **[BACKUP]** repeatedly until the Main Menu is again displayed and continue at [Step 10 below](#). Otherwise press the **[F1]** "New" key, and proceed with [Step 8 below](#).



8. Complete the Sensor Setup screen, shown below, as follows:

Model 4040 VIPER Analyzer
Sensor Setup

Name: FOKKER 100 ONBOARD

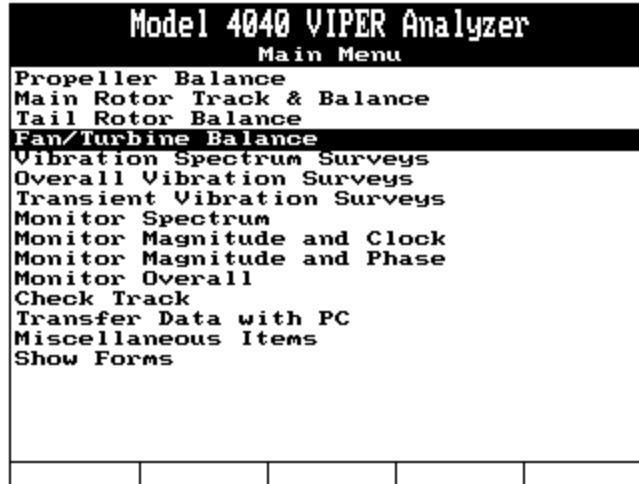
Amplitude Units: IPS

Probe Sensitivity: 1000.000

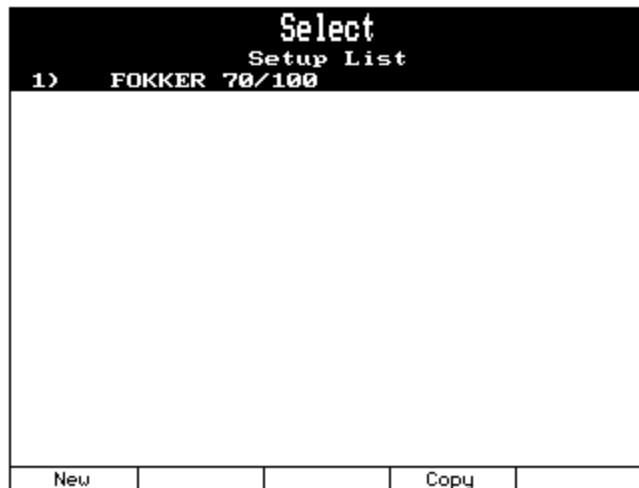
Reverse Polarity: No

Input Type: Differential

- 8.1 In the **Name:** field, enter the sensor name (Fokker 100 Onboard for instance) Press the [↓] key to move to the next field.
 - 8.2 In the **Amplitude Units:** field, use the [⇒] key to select “IPS”. This is the engineering unit of output for the sensor (velocity in this case). Press the [↓] key to move to the next field.
 - 8.3 In the **Probe Sensitivity:** field, enter the mV per engineering unit as specified on the data sheet for the sensor you are using. Sensitivity for the Fokker 100 engine mounted sensor(s) is 1000 mV/IPS. Enter “1000”. Press the [↓] key to move to the next field.
 - 8.4 In the **Reverse Polarity:** field, use the [⇒] key, if necessary, to select” No”, indicating the sensor polarity is not reversed. Press the [↓] key to move to the next field.
 - 8.5 In the **Input Type:** field, use the [↓] key, as necessary, to select “Differential” indicating the type input to the sensor.
9. When all fields are complete, press [ENTER] to accept and save. The screen will return to the “Manage Sensors” screen. From that screen, press [BACKUP] repeatedly until the Main Menu is again displayed.
 10. From the Main Menu, select “Fan / Turbine Balance” and press [ENTER].



11. If there are other setups already in the analyzer, the Setup List banner screen will be displayed. If the Fokker 70/100 is already listed, use the [↓] key to highlight it and press [ENTER]. Then, continue at [Section D](#) below.



12. If the Fokker 70/100 is not listed press the [F1] “New” key and complete the Fan/Turbine Balance Setup screen as follows:

Model 4040 VIPER Analyzer	
Fan/Turbine Balance Setup	
Name:	FOKKER 70/100
Eng Rotation:	CW Viewed From: FLA
Num Baln Planes:	1
Num Optional Planes:	0
Balance Wt Type:	Class
Num Class Wt Sets:	2
Label Detail Wts:	No
Baln Weight Unit:	g
Num Sens/Eng:	1
Num Baln Speeds:	Sel. in Job
Slow Roll RPM:	0
Min Baln RPM:	2000
Actual RPM @ 100%:	8394
Vib Unit:	IPS Modifier: Peak

- 12.1 In the **Name:** field, use the keypad to enter a name that will be familiar to all. "FOKKER 70/100" for example. Press the [↓] key to move to the next field.
- 12.2 In the **Eng Rotation:** field, use the [⇒] key to select "CW" indicating the fan rotates clockwise as viewed from the front looking into the intake. Press the [↓] key to move to the next field.
- 12.3 In the **Viewed From:** field use the [⇒] key to select "FLA" indicating that you are viewing the fan rotation from Forward Looking Aft (FLA) into the engine intake. Press the [↓] key to move to the next field.
- 12.4 In the **Num Baln Planes:** (number of balance planes) field, use the [⇒] key to select "1". Press the [↓] key to move to the next field.
- 12.5 In the **Num Optional Planes:** (number of optional balance planes) field, use the [⇒] key to select "0". Press the [↓] key to move to the next field.
- 12.6 In the **Balance Wt Type:** field, use the [⇒] key to select "Class". The class weights will be defined on another page. Press the [↓] key to move to the next field.
- 12.7 In the **Num Class Wt Sets:** (number of class weight sets), use the [⇒] key to select "2". The TAY has two class weight sets that may be used to trim balance the engine. If you are not using the Post S.B. weights, enter "1" for the number of class weight sets. Press the [↓] key to move to the next field.
- 12.8 In the **Label Detail Wts:** field, use the [⇒] key to select "No". Detail weights are those weights which cannot be removed and occupy holes normally used for adding trim balance weights. If the answer is yes in this field, the analyzer will optimize the balance solution on available holes only. Press the [↓] key to move to the next field.

- 12.9 In the **Baln Weight Unit:** field, use the [⇒] key to select “g” for grams. The class weights for the TAY are measured in inch grams. Press the [↓] key to move to the next field.
- 12.10 In the **Num Sens / Eng:** field, use the [⇒] key to select 1. Press the [↓] key to move to the next field.
- 12.11 In the **Num Baln Speeds:** field, use the [⇒] key to select the total number of speeds (up to 9) you will use for this setup. Optionally, you may choose “Select in Job” which will allow you to specify the number of balance speeds with each new job rather than defaulting to a number you select here in the setup. A single speed is recommended for balancing the TAY by Rolls-Royce. Press the [↓] key to move to the next field.
- 12.12 In the **Slow Roll RPM:** field, use the keypad to enter “0”. Slow roll is a compensating RPM for use in engine applications where proximity probes are used and does not apply to this engine. Press the [↓] key to move to the next field.
- 12.13 In the **Min Baln RPM:** field, use the keypad to enter the minimum speed at which this engine can be balanced. This speed will normally be a speed in the flight range. Use the keypad to enter “2000” in this field. Press the [↓] key to move to the next field.
- 12.14 In the **Actual RPM @ 100%:** field, use the keypad to enter the speed of the fan at 100% rpm. For the TAY, this speed is 8394 RPM. Press the [↓] key to move to the next field.
- 12.15 In the **Vib Unit:** field, use the [⇒] key to select “IPS”. The TAY engine is balanced using velocity units of inches per second. Press the [↓] key to move to the next field.
- 12.16 In the **Modifier:** field, use the [⇒] key to select “Peak”. When all fields are complete, press [ENTER] to accept and continue.
13. The Define Class Weights banner screen will be displayed where each of the class weights used for the TAY fan trim balance will be added to the setup. Complete each field in the screens as follows:

Model 4040 VIPER Analyzer					
Define Class Wts					
Set ID:	PRE SB721039	MaxErr:	0.10		
Num Wts:	13	Placement:	Spread		
Name	Wt	Span	Name	Wt	Span
(The min wt must be a base wt)					
A	0.000	1	BDE-A	75.00	1
B-A	5.000	1			
B	9.500	1			
ZB-A	14.50	1			
C	20.00	1			
BC-A	25.00	1			
D	30.00	1			
BD-A	35.00	1			
E	40.00	1			
BE-A	45.00	1			
ZBE-A	54.50	1			
BZD-A	65.00	1			

- 13.1 In the **Set ID:** field, use the keypad to enter a commonly known name that is easily recognized by all users or the actual part number of the class weight set. This is the part number, which identifies the class weight set used for the TAY.
- 13.2 In the **MaxEff:** field, use the keypad to enter “0.10”. This represents how closely you want the analyzer to match the “Solution” to the “Installed” weight combination. Due to hole location, available weight combinations and vibration level, it may not always be possible to exactly match the exact “Solution” to the “Installed” value.
- 13.3 In the **Num Wts:** field, use the keypad to enter a total number of weights in this class weight set, 13 for the PRE SB721039 set. The first weight will be the “A” weight with a value of “0.00” which means a null weight having no influence on the balance but necessary to fill a hole not being used for balance weights. Press the [↓] key to move to the next field.
- 13.4 In the table below the **Name, Wt,** and **Span** columns, enter the information as shown in the illustration above for the class weights. The name will be the designation of the individual weights, the weight, as measured in grams, for each individual class weight and the span is the number of holes each individual weight or combination of weights cover when installed.
- 13.5 When all information is completed, press [ENTER] to accept and continue.
- 13.6 Repeat this process for the PST SB721039 weight set using the example below. If you are not using the Post S.B. weights, enter <1> under “Num Class Wt Sets” as described in [Step 12.7 above](#).

ACES VIPER Analyzer					
Define Class Wts					
Set ID:	PST SB721039		MaxErr:	0.10	
Num Wts:	16	Placement:	Spread		
Name	Wt	Span	Name	Wt	Span
(The min wt must be a base wt)					
A	0.000	1	BCE-A	56.70	1
B-A	5.000	1	B2D-A	58.80	1
B	9.500	1	BDE-A	64.70	1
ZB-A	14.50	1	BZE-A	70.60	1
C	18.90	1			
BC-A	23.90	1			
D	26.90	1			
E	32.00	1			
BE-A	37.80	1			
ZBD-A	41.40	1			
CD	45.80	1			
BCD-A	50.80	1			

14. The Balance Plane information screen, shown below, will be displayed. Complete each field in the screen as follows:

ACES VIPER Analyzer	
Balance Plane Information	
Plane:	1
Posn Type:	Hole
Num Positions:	12
Num Usable:	6
RivetWt:	0.000
Spacing:	Even
Position Num Dir:	CCW from FLA
MaxWt/Position:	70.60
MaxWt/Plane:	228.6
Wt Set:	PST SB721039
Trial Wt:	14.50
Angle of #1 Posn:	0

- 14.1 In the **Plane ID:** field, use the [⇒] key to select the plane identification number “1”. Press the [↓] key to move to the next field.
- 14.2 In the **Posn Type:** field, use the [⇒] key to select “HOLE”. This is the name for the individual positions. Your choices include Hole, Position, or Blade. Press the [↓] key to move to the next field.
- 14.3 In the **Num Holes:** field, use the keypad to enter “12”. Press the [↓] key to move to the next field.
- 14.4 In the **Num Usable:** field, use the keypad to enter “6”. This defines the maximum number of holes that may contain weight at one time. Press the [↓] key to move to the next field.
- 14.5 In the **Spacing:** field, use the [⇒] key, if necessary, to toggle the field to read “Even” indicating that the twelve weight holes are evenly spaced. Press the [↓] key to move to the next field.
- 14.6 In the **Hole Num Dir:** use the [⇒] key, if necessary, to toggle the field to read “CCW” for counter clockwise. This indicates the numbering direction of the weight holes is in a counter clockwise direction as viewed from forward of the engine looking into the intake. Press the [↓] key to move to the next field.
- 14.7 In the **from** field, use the [⇒] key, if necessary, to toggle the field to read “FLA” to indicate that the holes will be numbered in increasing value as viewed from Forward Looking Aft. Press the [↓] key to move to the next field.
- 14.8 In the **MaxWt/Hole :** field, use the keypad to enter a value equal to the maximum amount of weight that may be added to each hole. In this case, that value is the weight of the largest weight in the class weight set, 70.60 grams for the PST SB721039 weight set or 75.00 for the PRE SB721039 weight set. Press the [↓] key to move to the next field.

- 14.9 In the **MaxWt/Plane** : use the keypad to enter a value equal to the maximum total allowable for all weights on the fan. The highest maximum weight per hole is 75 grams and the maximum number of holes that can be used is six for a total of 450 grams. Enter “450” and press the [↓] key to move to the next field.
- 14.10 In the **Wt Set** : field, use the [⇒] key, if necessary, to toggle the field to read the name or part number of the class weight defined earlier in [Step 13.1 above](#) that you will be using. Press the [↓] key to move to the next field.
- 14.11 In the **Trial Wt:** field, use the analyzer keypad to enter the weight of a single class weight (from the class weight set being used) you wish to use as a trial weight. This weight is intended only to change the measured condition of the first run so that an influence can be calculated for the fan based on the measured change. A class weight value in the mid range of the set is acceptable for this trial weight. Press the [↓] key to move to the next field.
- 14.12 In the **Angle of #1 Hole:** field, use the keypad to enter “0”. This indicates the No. 1 hole is at 0 (360) degrees. Press [ENTER] to accept the settings and proceed.
15. The Sensor Information screen will be displayed. Complete the screen as follows:

Model 4040 VIPER Analyzer				
Sensor Information				
Eng ID:	1			
Tach Chan:	1	Tach Type:	Optical	
Tach Pos (FLA):	12	:	00	
Full Scale Vibration:	1.00			
Sensor Type	Ch	Desc	Pos	Targ
FOKKER 100 ONBOARD	A		12	0.100

- 15.1 In the **Eng ID:** field, use the keypad to enter a single numeric value of 1 or 2, indicating the position of the engine being balanced. Press the [↓] key to move to the next field.
- 15.2 In the **Tach Chan:** field, use the use the [⇒] key to select the Tach channel you wish to use. This must be the Tach channel, 1, 2, 3, or 4, where you connect the Tach input cable for this engine. Press the [↓] key to move to the next field.
- 15.3 In the **Tach Type:** field, use the [⇒] key to select the type of tachometer you are using. If using the signal from the engine, select “OPTICAL”. Press the [↓] key to move to the next field.

- 15.4 In the **Tach Pos (FLA)**: (tachometer position as viewed from forward looking aft), use the [⇒] key to select a clock position where the N1 probe is positioned on the engine. This should be approximately 12:00 for most applications. If this value is incorrect, the analyzer will compensate for the incorrect position and locate it automatically by using the test weight installation. Press the [↓] key to move to the next field.
- 15.5 In the **Full Scale Vibration**: field, use the [⇒] key to select the highest amplitude you reasonably expect to experience for this balance job. Amplitude of 1.00 IPS is sufficient for the TAY. Press the [↓] key to move to the next field.
- 15.6 Under the **Sensor Type** column, use the [⇒] key to select “FOKKER 100 ONBOARD” from those sensors programmed into your analyzer. Press the [↓] key to move to the next field.
- 15.7 In the **Ch** field, use the [⇒] key to select the channel you will connect the incoming vibration signal to, A, B, C, or D. Press the [↓] key to move to the next field.
- 15.8 In the **Desc** field, use the keypad to enter a description of the channel-identified sensor such as #1, Fan or L. Press the [↓] key to move to the next field.
- 15.9 In the **Pos** (position) field, use the [⇒] key to select the approximate clock position of the vibration sensor on the engine as viewed from forward looking aft into the intake. If you are not sure of the position, select “UNK” for unknown. The analyzer will compensate for the unknown position and locate it automatically by using the test weight installation. Press the [↓] key to move to the next field.
- 15.10 In the **Targ** (target amplitude) field, use the keypad to input amplitude you wish to achieve as a maximum acceptable vibration using this setup. The analyzer will continue to provide solutions until this value is achieved. When all fields are complete, press [ENTER] to accept.

D. Data Acquisition

1. The “Job Identification” 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 4040 VIPER Analyzer				
Job Identification				
Name: CUSTOMER NAME				
A/C Registration: N1234				
A/C Total Time: 123.4				
Press ENTER to continue				
Names				

- Use the keypad to enter the optional Engine Information as required. In the fields with < > ends, use the [⇒] key to toggle through the available selections. In the fields with || ends, use the keypad to enter information directly.

Model 4040 VIPER Analyzer				
Engine Information				
Position:				
1				
Engine:				
S/N				
Type				
TSO	0			
TSN	0			
Cyc	0			
Serial Nos				

- If you elected to Select Balance Speeds in the Job (see [Step C.12.11 above](#)) the “Define Fan/Turbine Balance RPM” banner, shown below, will be displayed. Complete the screen as follows:

Model 4040 VIPER Analyzer				
Fan/Turbine Balance Speeds				
Num Balance Speeds: { 1 }				
Enter Speeds As N% or Defined RPM				
<u>Spd All Sensors</u>				
1	0.0			
Use Actual Speeds for Later Runs				
Survey				

- 3.1 In the **Num Baln Speeds:** field, use the [⇒] key to select the number of balance speeds for this job. You may choose up to nine speeds. One (1) speed is recommended for the RR Tay. Press the [↓] key to move to the next field.
 - 3.2 In the **Enter Speeds As N% or Defined RPM** field, use the keypad to enter the desired balance speed. See [Step 3.4 below](#) for an alternate method of completing this field. Press the [↓] key to move to the next field.
 - 3.3 The **Use Actual Speeds for Later Runs** field can be toggled between this selection and **Use These Speeds for ALL Runs**. Use Actual Speeds for Later Runs means that the analyzer will store the RPM used on the first run and suggest this speed for all subsequent runs. Use These Speeds for ALL Runs will tell the analyzer to use the defined speed as the target for each run.
 - 3.4 Press the [F1] “Survey” key to perform a Fan Vibration Survey. The analyzer will use this survey to find the engine speed with the highest vibration level. The analyzer will then automatically enter this speed into the field described in [Step 3.2 above](#).
 - 3.5 Press [ENTER] to accept and continue.
4. The Define Fan / Turbine Balance ICFs banner screen will be displayed. Complete the screen as follows:

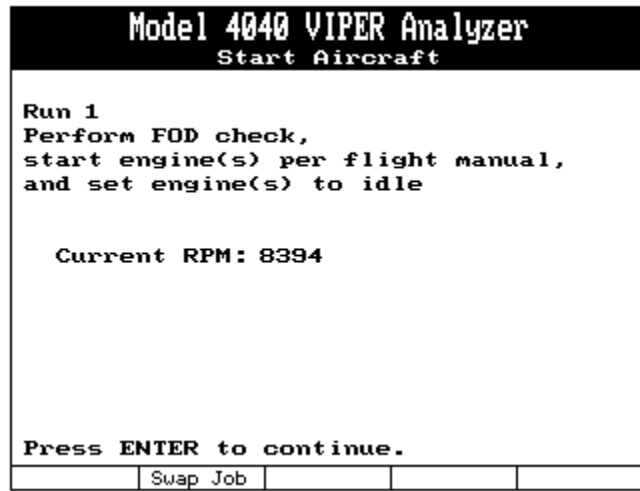
Model 4040 VIPER Analyzer				
Define Fan/Turbine Balance ICFs				
Plane ID: 1				
Spd Sensor 1				
	g/IPS	Deg		
1	75.00	325		

- 4.1 In the **1** row, and in the **g/IPS** (grams per IPS) column, enter “75.00” to indicate an influence of 75 grams per IPS. Press the [↓] key to move to the next field.
- 4.2 In the **1** row, and in the **Deg** (Degrees) column, enter 325.
5. The Fan / Turb Balance Equipment Setup screen will be displayed. Follow the on screen instructions for installing and attaching sensors and cables. Notice that there is a message near the center of the screen reading “Tach power is off”. This indicates the tachometer circuit is currently not powered, which is correct for the TAY.

Model 4040 VIPER Analyzer				
Fan/Turb Balance Equipment Setup				
Install the speed sensor and connect to tach channel 1				
Install vibration sensor and connect to vib. channel A				
Remove all trim weights.				
Tach power is Off				
Tach Pwr				

6. The Start Aircraft banner screen will be displayed. The Run number is indicated at the top left of the screen followed by the information message “Remove all trim weights.” Insure all previously installed trim balance weights have been removed. Start the engine(s) and watch for the Current RPM indication on the analyzer screen. When an indication of RPM is noted, allow the engine to warm up to normal operating temperature then accelerate the engine until the Current RPM and the Desired PRM on screen match as closely as possible. The Difference indication will show how many RPM difference there is between the Current and the Desired RPM. When the speeds are matched, allow the engine to stabilize for a short

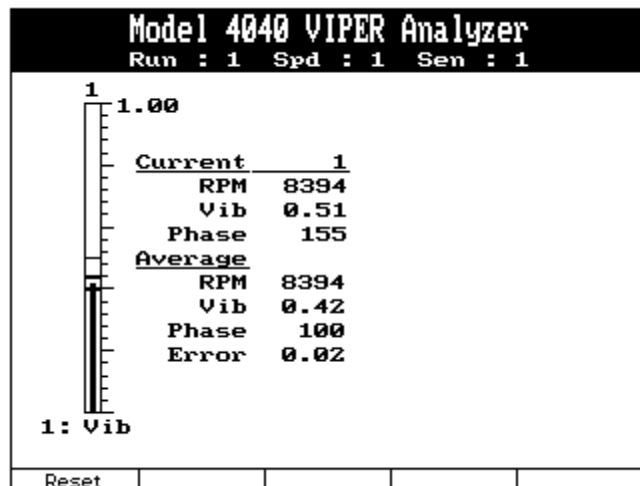
time and make any minor adjustments necessary, and then press [ENTER] to continue. You may press the [F2] “Swap Job” key to return immediately to the Main Menu.



7. The Run 1, Spd 1, Sen 1 banner screen shown below will display the information for the first run. Indications of the Current and Average RPM, Vibration amplitude, and phase angle are displayed to the right of the converging scale. See the Viper 4040 User Manual, Chapter 20, Reading Spectrum and Scales for a detailed description of how to read the converging scale. After indications are stable, press [ENTER] to accept the collected data and continue. This screen will repeat for each of the speeds specified for balance. When all speeds are collected, the screen will automatically proceed to the shutdown message shown in [Step 9 below](#).

Note

Data shown in these screens are for illustration only and do not reflect actual data corresponding to the RR TAY engine.



8. The Review Prior Run(s) Data will be displayed for your review of the data collected up to this point. You may view data from all runs by scrolling through the available run data using

those suggested, use the arrow keys to navigate the matrix and indicate your exact installation. This is very important in that the analyzer will use this information to calculate an influence for subsequent runs. Notice the function keys at the bottom of the screen are labeled for the options of [F1] “Inst=Sugg” (install the suggested weights in the suggested holes), [F2] “Inst=None” (Install None or no weights), [F3] “Sel Pla/W” (select a different Plane or weight set), [F4] “Graph” (display a graph of the suggested weight locations) and [F5] “Quit Job” When all fields are complete, press [ENTER] to accept and continue.

Model 4040 VIPER Analyzer			
Fan/Turb Suggested/Installed Wts			
Run 1 Remove Old Wts, Inst. New Wts			
Name: Plane 1, PRE SB721039			
Hole	Suggested	Hole	Installed
7	C	7	C
8	B	8	B
9	B-A	9	B-A
10	B	10	B
12	C	12	C
1	A	1	A
1	A	1	A
1	A	1	A
1	A	1	A
1	A	1	A
1	A	1	A
Total: Soln = 31.500 @ 245		Total: Inst = 31.568 @ 245	
Inst=Sugg	Inst=None	Sel Pla/W	Graph
Quit Job			

- The Start Aircraft banner screen will be displayed for the next sequential run as indicated in the upper left portion of the screen. From this point, the sequence of events from paragraph will repeat until the fan vibration is reduced to an acceptable level. Normally this goal will be attained in one to three runs.

Model 4040 VIPER Analyzer			
Start Aircraft			
Run 2			
Perform FOD check, start engine(s) per flight manual, and set engine(s) to idle			
Current RPM: 8394			
Press ENTER to continue.			
Swap Job			

F. Quit Job

- Press the [F5] “Quit Job” button from any screen on which it is displayed. This will mark the job as complete. If the ICF is drastically different than the ICF currently stored in the setup,

the analyzer will prompt you to store the results of the job into the setup. If the job went well and the engine balanced quickly, it is a good idea to save the ICF back into the setup. This is a valuable tool in reducing the number of runs when this setup is used in the future.