
Chapter 5

Main Rotor Track & Balance

(Revision 2, Aug 2007)

This section is intended to familiarize you with the various electronic chart forms and setup screens used with the Viper 4040. First by looking at each of the chart forms found in both the main and tail rotor sections, then by using these forms to create an actual setup.

5.1. – Analyzer Chart Forms

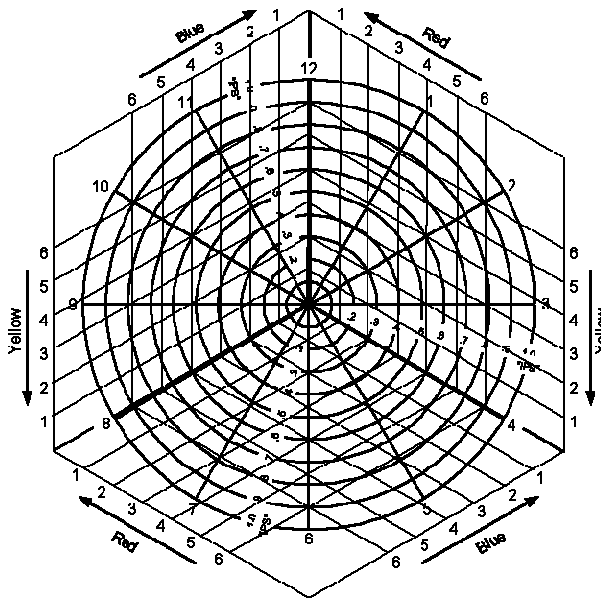
Just as in the case with polar balance charts, there are two types of analyzer chart “forms” used with the 4040 Viper, and one tracking influence setup screen. The chart forms are also categorized as either “Regular” or “Irregular”. The selection of setup type is made within the chart form itself by using either the [⇒] or [⇐] keys to toggle between “Regular” and “Irregular” in the “Chart Type” field, then pressing the [↓] key to move to the next field. The remaining fields in the screen will automatically change if necessary. The tracking influence setup screen is separate from the chart forms and allows entry of the amount of adjustment required to move the blade a specified distance. The paragraphs below describe these forms in detail.

5.1.1. – Regular Chart Forms

A “Regular” chart is one that has all weight positions spaced equally around the chart, all adjustments are of the same type, and all adjustments carry the same ICF. The next paragraphs detail the process for defining both a main rotor and tail rotor “Regular” chart setup. There are slight differences between the two functions that will be noted in the text.

5.1.1.1. – Regular Main Rotor Chart Setup

The main rotor balance chart shown to the right depicts three weight positions, Red, Yellow, and Blue. The move line for each position has been indicated with an arrow, the type of adjustment given below the chart is “Plates”. The ICF is approximately 8 plates per 1.0 IPS. This chart meets all criteria to place it in the “Regular” chart type category; all weight positions have the same ICF and type of adjustment, and all move lines are equally spaced around the chart. Using this chart, follow the example below to properly define a “Regular” main rotor chart setup in the analyzer.



Adjustment = plates

```

Model 4040 VIPER Analyzer
Main Rotor Chart Setup
Name: Vert Flt 1
Type: Regular Sweep Only: No
No Adjustment Bld/Pos: None
Max ICF Update: 100 % R(°): 45
Adj Unit: PLT Adj/IPS: 8.000
Bld/Pos MoveLine Bld/Pos
YELLOW 12 : 00
BLUE 8 : 00
RED

Bld/Pos: in CW or CCW order

+Adj = WtAdd/SwFwd/BlUp/TabUp

Help
  
```

Name: The name of the chart will be automatically inserted from the “Main Rotor Condition Setup” screen and is not editable.

Chart Type: Using the [⇒] or [⇐] key, select the chart type. For this example, the chart type is “Regular”.

Sweep Only: This field is used when defining a chart that utilizes blade sweep *only* as a means of adjustment. If the chart you are defining uses only sweep moves, select “YES” using either the [⇐] or [⇒] keys. Otherwise, leave this field set to “NO”.

No Adjustment Bld/Pos.: This field is used to designate a main rotor blade as a “no adjustment blade”. This feature is used when the OEM suggests that no adjustments be

applied to a particular blade during a track and balance job. An optimized solution is provided by the analyzer that requires no adjustments to the designated “No Adjustment Blade”.

Max ICF Update: This field is used to limit the learning ability for move-line length. The example above uses 100%. With 100% selected any move that exceeds 100% of the expected length for a given adjustment will be ignored by the analyzer for ICF (Influence Coefficient) updates. Using the keypad, enter the desired parameter to be placed in the setup.

R(*) (Rotation in Degrees): This field is used to limit the learning ability for move-line direction. The example uses +/- 45 degrees. With +/- 45 degrees selected, any move line that falls outside of the expected vector for a given adjustment will be ignored by the analyzer and will not update the ICF. Using the keypad, enter the desired parameter to be placed in the setup.

Adj. Unit: Using the keypad, enter a three-letter designator for the type of adjustment utilized by the chart. In this case, “PLT” has been entered to represent *plates*. The designator used in this screen will also be used when the analyzer recommends a solution.

Adj. / IPS: Using the keypad, enter the influence from the chart. This is the amount of adjustment required to reduce a one IPS (Inch-Per-Second) vibration. The ICF for this example is approximately 8 plates per 1.0 IPS, therefore, 8 has been entered in to the “Adj / IPS” field.

Bld/Pos and MoveLine: The lower portion of the screen provides fields for entry of the blade position names and Move Line clock angles. Because this is a “Regular” chart setup, you need only enter the move lines for the first two blade positions; the analyzer will determine the remaining angles.

- Starting with any of the blade positions listed on the chart; enter a name of up to six characters in the first field as shown.
- Press the [↓] key and move one field to the right, now enter the angle (in hours) of the move line for this position. If the move line contains an angle in minutes, press the [↓] key and move to the next field to enter the minutes.

Repeat the name and move line process for the second blade position, then enter the remaining blade position names and this chart is complete.

NOTE

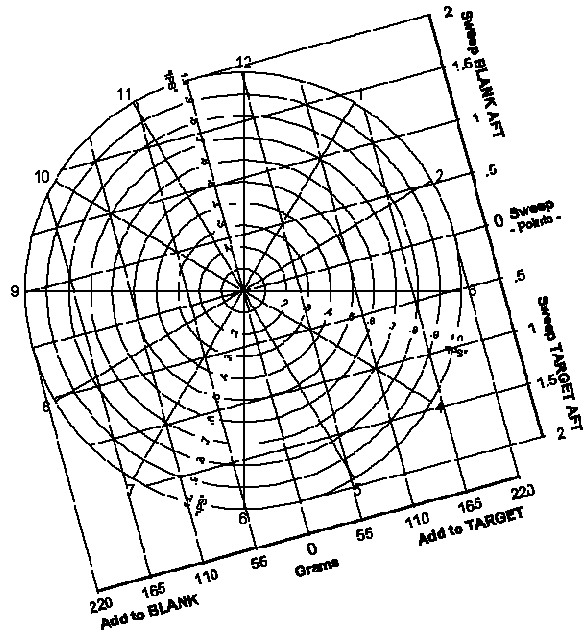
Blade position names must be entered sequentially in either clockwise or counter clockwise order. It does not matter what direction is chosen.

5.1.2. – Irregular Chart Forms

Any polar chart that does not fit the “Regular” category must use the “Irregular” chart form. The next paragraphs detail the setup for both main rotor and tail rotor “Irregular” chart setups.

5.1.2.1. – Irregular Main Rotor Chart Setup

The main rotor balance chart shown to the right presents two different types of adjustments: the addition of weight to target or blank, and sweeping either the target or blank blade aft. The ICF is different for each set of adjustments, 220 grams of weight per 1.0 IPS and 2 points of aft sweep per 1.0 IPS. The move lines for these adjustments are equally spaced, however since the ICF and adjustment types are different, this chart must use the “Irregular” chart form. Using this chart, follow the examples below to properly define an “Irregular” main rotor chart setup in the analyzer.



```

Model 4040 VIPER Analyzer
Main Rotor Chart Setup
Name: Lat Ground-Hover
Type: Irregular Sweep Only: No
No Adjustment Bld/Pos: None
Max ICF Update: 100 % R(°): 45

Bld/Pos Unit Adj IPS MoveLn
TARGET GMS 220.00 1.00 2 : 30
T AFT PTS 2.00 1.00 5 : 30
BLANK GMS 220.00 1.00 8 : 30
B AFT PTS 2.00 1.00 11 : 30

+Adj = WtAdd/SwFwd/BlUp/TabUp

Help
  
```

Name: The name of the chart will be automatically inserted from the “Main Rotor Condition Setup” screen and is not editable.

Chart Type: Press either the [=>] or [=] keys to select the chart type. For this example, select “Irregular”.

Sweep Only: This field is used when defining a chart that incorporates sweeping of the blades as the *only* means of adjustment. If the chart you are defining uses only sweep moves, select “YES” using either the [=>] or [=] keys. Otherwise, leave this field set to “NO”.

No Adjustment Bld/Pos.: This field is used to select one of the main rotor blades where the OEM suggests that no adjustments be used. An optimized solution is provided by the analyzer that requires no adjustments to the designated “No Adjustment Blade”.

Max ICF Update: This field is used to restrict the learning criteria for move-line length. The example uses 100%. With 100% selected, any move line over 100% of the expected length for a given adjustment, and the analyzer will not update the ICF. Using the keypad, enter the desired parameter to be placed in the setup.

R(°) (Rotation): This field is used to restrict the learning criteria for move line direction. The example uses +/- 45 degrees. With +/- 45 degrees selected, any move line that falls outside of the expected vector for a given adjustment, and the analyzer will not update the ICF. Using the keypad, enter the desired parameter to be placed in the setup.

BLD/Pos, UNIT, ADJ, IPS, and MoveLn:

- Starting with any of the correction points on the chart, enter up to six characters for the blade position name in the first field. This example will use positions “TARGET”, “T AFT”, “BLANK”, and “B AFT”.
- Press the [↓] key and move to the “Unit” field, enter a three character abbreviation for the type of correction this position uses. This example will use the abbreviations “GMS” to represent grams and “PTS” to represent points of sweep.
- Press the [↓] key and move to the next field. Enter the adjustment amount portion of the ICF in the “Adj” field. The two amounts of adjustment in our example are “200.00” grams and “2” points of sweep.
- Press the [↓] key and enter the amplitude reference for the amount of adjustment just entered. For this example, the ICF for weight is 220 gram per 1.0 IPS, the ICF for sweep is 2 points per 1.0 IPS, and therefore 1.0 is entered in this field.
- Press the [↓] key to move to the “MoveLn” field and enter the clock angle move line for this point. For the “Add to TARGET” move line, the hour angle is 2, and the minute angle is 30. Perform this for each adjustment point shown on the chart and the setup is complete. The move line for the T AFT position will be 5:30. The move line for the BLANK position will be 8:30. B AFT will have the move line at 11:30.

NOTE

Blade position names must be entered sequentially in either clockwise or counter clockwise order. It does not matter what direction is chosen.

5.1.3. – Tracking Influence Setup

Model 4040 VIPER Analyzer				
Tracking Influence Setup				
Conds	Adj Name	Unit	Adj/in	Max Upd%
Ground-Hover	PCL	Flt	6.000	150
No Adjustment Bld/Pos: (None)				
Tracking Planes: (2) Offset: 2.00 in				
Blades:				
	Name	Plane		
1.	RED	(1)		
2.	YELLOW	(2)		
3.	GREEN	(1)		
4.	BLUE	(2)		
+Adj = WtAdd/SwFwd/BldUp/TabUp				

The tracking influence setup screen is used to define the type and number of adjustment units used to move a blade 1.0 unit of measure at the condition listed.

Conditions: The condition name will be automatically entered and is not editable.

Adjustment Name: Using the keypad, enter a three-character identifier for the adjustment type. Example = PCL (Pitch Change Link), SWP (Sweep), WGT (Weight), and TAB (Tab).

Unit: Using the keypad, enter a three-character identifier for the unit of adjustment type. Example = FLT (Flat), PTS (Points), GMS (Grams), DEG (Degrees), and THO (Thousandths).

Adjustments / in (mm): Enter the number of adjustment units to move the blade 1.0 unit of measure. This will either be requested in Adj/in or Adj/mm depending on the measurement units selected in the initial setup screen. In this example, it will take an adjustment of 6 flats to move the blade tip one inch in ground or hover conditions.

Max ICF Update: This field is used to restrict the learning criteria for track adjustments. The example uses 50%. With 50% selected, any movement over 50% of the expected result for a given adjustment, and the analyzer will not update the ICF. Using the keypad, enter the desired parameter to be placed in the setup.

No Adjustment Bld/Pos.: This field is used to designate a main rotor blade as a “no adjustment blade.” This feature is used when the OEM suggests that no adjustments be applied to a particular blade during a track and balance job. An optimized solution is provided by the analyzer that requires no adjustments to the designated “No Adjustment Blade”.

Tracking Planes: This field is used to designate the number of planes in which the main rotor blades fly. If all blades fly in the same plane, select <1>. If there are two distinct planes for the blade path select <2>.

Offset: This field will only appear after “Tracking Planes” above is set to 2 and the field is exited. This field is used to define the optimum distance between multiple blade planes. The analyzer will use this distance to properly position the groups of blades.

Blades: The blade names will default to those defined previously in the setup. If a change is required, change the blade name to reflect the blades in passing order starting with the blade that is over the nose when the tach and interrupter are aligned. This will be the name used in the track display and when viewing available adjustments.

Plane: This field will only appear after “Tracking Planes” above is set to 2 and the field is exited. This field is used to identify how the blades will be grouped. Blades flying in the same plane require identical “Plane” entries.

Press [ENTER] to save the setup.

5.2. – Setup Process

This section covers the complete setup process in the 4040 Viper for the main rotor balance functions.

5.2.1. – Main Rotor Setup

The following paragraphs illustrate each of the screens necessary to define and store an enhanced main rotor setup.

5.2.1.1. – Main Rotor Setup Screen

Model 4040 VIPER Analyzer			
Main Rotor Setup			
Name:	EXAMPLE 1		
Vertical Chan:	(A)		
Lateral Chan:	(B)		
Sensor:	(991D-1)		
Tach Type:	(Mag(Hi))	Tach Chan:	(1)
Number of Weight Positions:	(4)		
Blades:	(4)	Relative to:	(1)
RPM:	(385)	Trk Units:	(in)
Conditions			
Ground	(Both)	Hover	(Both)
80 KTS	(Both)	120KTS	(Both)
	(Both)		(Both)

The first screen to complete is the “Main Rotor Setup” banner screen. As shown in the example below, 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 4040 Viper” if you are unfamiliar with using the keypad.) Follow the directions below to complete the “Main Rotor Setup” screen.

1. In the “*Name*” field, enter a name for the setup using the keypad. The field will accept up to 20 alphanumeric characters.

CAUTION

Sensors connected to Channel A, Channel B, Channel C and Channel D must be of the same type. Using different sensors during the same job will cause erroneous readings and problems achieving good balance results.

Use the [↓] key to move to the “*Vertical Chan*” (Channel) field. Use the [⇒] key to “toggle” between the selections in this field, either “A”, “B”, “C”, “D”, “A+B”, or “None”. The value selected for this field determines which analyzer channel will be used to measure and display the vertical vibration.

2. Use the [↓] key to move to the “*Lateral Chan*” field. Use the [⇒] key to “toggle” between the selections in this field, either “A”, “B”, “C”, “D”, “A-B”, or “None.” The value selected for this field determines which analyzer channel will be used to measure and display the lateral 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 optional selection, you must input a new sensor setup into the analyzer’s memory. (See Chapter 18 of the Model 4040 Analyzer User Manual, Section titled “Setup Sensors” for instructions on how to perform this function.)
4. Move to the “*Tach Type*” field by pressing the [↓] key. The selection in the “Tach Type” field identifies which tachometer sensor you are using as a once-per-revolution source. For main rotors, this will most often be “Mag (Hi).” Use the [⇒] key to make the selection. The choices are “Mag (Hi)”, “Monopole”, “Tach Gen”, “Dbl Intr”, “Optical”, and “Mag (Lo)”.
5. Press the [↓] key to move to the “*Tach Chan*” field. Use the [⇒] key to select and identify which analyzer tachometer input port you are using to acquire tachometer data. Available channels are 1, 2, 3, or 4.
6. Press the [↓] key to move to the “*Number of Weight Positions*” field. Using the [⇒] key, select the total number of lateral balance weight positions as determined from the lateral balance chart. The maximum number of positions equals 6.
7. Move to the “*Blades*” field pressing the [↓] key. Using the [⇒] key, select the number of blades of the main rotor system you are balancing. The maximum number of blades equals 6.
8. Use the [↓] key to move to the “*Relative to*” field. This selection will determine the reference blade for tracking displays. Selecting “AVG” will present rotor blade positions relative to the average of all blades. Selecting a specific blade number will present all other blade positions relative to the blade number selected. (For more information on tracking, refer to Chapter 16 of the Model 4040 Analyzer User Manual.)

9. Move to the “RPM” field using [↓] key. Using the keypad, enter the approximate maximum expected RPM of the rotor system.
10. Press the [↓] key and move to the “Trk Units”. Use the [⇒] key to select the desired unit of measure to be used by the analyzer when presenting tracking data. Selectable options are either inches or millimeters. (For more information on tracking, refer to Chapter 16 of the Model 4040 Analyzer User Manual.)
11. Using the [↓] key, move to the first field in the grouping of “Conditions”. The fields allow you to define up to six different conditions under which to measure and store data. Each condition name may be a maximum of six characters long and should represent a flight regime at which you wish to record data. Directly to the right of each condition name box is a toggle selection for the type of measurement desired for that specific condition. In each of the measurement type fields, use the [⇒] key to select from the following:
 - “Both” = measurement and storage of both vibration and track for the listed condition
 - “Vib” = measurement and storage of vibration only for the listed condition
 - “Trk” = measurement and storage of track only for the listed condition

When all conditions and measurement types desired have been input to your satisfaction, press [ENTER] to continue.

5.2.1.2. – Tracking Setup Screen

Model 4040 VIPER Analyzer
Tracking Setup

Rotor Diameter: (ft)
Lead/Lag Units: (in)

The “Tracking Setup” screen appears. The purpose of this screen is to allow the user to input the diameter of the rotor being balanced. This information will be required to obtain accurate lead/lag measurements.

1. In the “Rotor Diameter” block, use the keypad to enter a number between 1 and 999999 to include a decimal point.

2. Press the [↓] key to proceed to the unit label field. This is the unit of measure used to identify the diameter described in the above block. The available choices are: “ft”, “in”, “mm”, or “m”. Use the [⇒] key to select the appropriate unit.
3. Use the [↓] key to move to the “Lead/Lag Units” block. This will define the units that the lead/lag measurements are displayed in. Available choices are “in” and “mm”. Use the [⇒] key to select the appropriate unit.

5.2.1.3. Main Rotor Condition Setup Screen

Model 4040 VIPER Analyzer			
Main Rotor Conds. Setup			
	Vert	Lat	Track
	Chart	Chart	Adj.
Conds.	ID	ID	ID
Ground	0	1	0
Hover	1	1	1
80 KTS	2	0	0
120KTS	2	0	0
Limit	0.20	0.20	0.25

Enter ID, or 0 if no adjustment.
Different charts use different IDs.

The “Main Rotor Conds. Setup” screen appears. The purpose of this screen is to allow the user to enter an “ID” number for each polar chart or tracking influence to be used by the analyzer when determining if a solution is required.

- To the left of the screen is a column of fields containing the conditions as entered in the main rotor setup screen. The names are automatically entered and are non-editable.
- To the right of each condition name is a chart “ID” field for each measurement type. If a “0” is entered in an “ID” field, the measurement obtained will be for reference only and will not be used as a basis for correction. If a number is entered in an “ID” field, the setup will require an electronic chart be defined and will result in corrections being given for that measurement vs. condition. If the same “ID” number is given to more than one condition for the **same measurement type**, the data for each of the conditions will be averaged together and a solution presented for the average. Different adjustment types (for example, PCL and TAB) for the same measurement type (i.e. vertical vibration), would require different “ID” numbers for the conditions applicable to each adjustment type.
- The “Limit” fields allow input of a maximum acceptable vibe (for vertical and lateral measurements) and maximum acceptable total track split (when using a tracking influence vs. blade position for corrections). Simply enter the value you wish to use. If the measurements recorded during a job are above this value, the analyzer will present corrections, if the measurements are below, the analyzer will not give an adjustment.

Looking at the example main rotor conditions setup screen above, three charts will be used, two vertical and one lateral. One tracking influence definition will also need to be created. The first chart is for vertical measurements at hover only. The second chart is for the averaged vertical measurements from both FLT 80 and FLT 120. The last chart is for the average lateral measurement from both Ground and Hover. The tracking influence will use track readings from Hover measurements. No other measurements will be used to produce corrections for this setup. Both vertical and lateral vibrations must be 0.20 IPS or greater for the analyzer to present solutions. Track splits must be 0.25 inches or greater for the analyzer to present a solution.

For more “Main Rotor Conditions Setup” screen examples, see paragraphs 5.2.1.3.1, and 5.2.1.3.2.

When you have completed the conditions setup screen, press [ENTER] to accept and continue. Proceed to paragraph 5.2.1.4. for the next main rotor setup screen.

5.2.1.3.1. – Conditions Setup Screen, Example 2

Model 4040 VIPER Analyzer			
Main Rotor Conds. Setup			
Conds.	Vert Chart ID	Lat Chart ID	Track Adj. ID
Ground	0	1	1
Hover	1	1	0
80 KTS	1	0	0
120KTS	1	0	0
Limit	0.20	0.20	0.25
Enter ID, or 0 if no adjustment. Different charts use different IDs.			

In the example main rotor condition setup screen above, only one vertical chart ID, one lateral chart ID, and one tracking adjustment ID have been entered. Based on the ID numbers entered, all of the vertical measurements for Hover, FLT 80, and FLT 120 will be averaged and the solution based on this average. The lateral measurement for both Ground and Hover will also be averaged, with the lateral solution based on this average. Finally, a tracking adjustment based on the recorded track split on the ground will be presented. This type of setup would be used with a ship that requires a pitch change link adjustment on ground based on visual track and a trim tab adjustment based on the vertical vibration in flight.

5.2.1.3.2. – Conditions Setup Screen, Example 3

Model 4040 VIPER Analyzer			
Main Rotor Conds. Setup			
Conds.	Vert Chart ID	Lat Chart ID	Track Adj. ID
Ground	0	1	1
Hover	0	1	1
80 KTS	0	0	2
120KTS	0	0	2
Limit	0.20	0.20	0.25

Enter ID, or 0 if no adjustment.
Different charts use different IDs.

The last example shows one lateral chart and two track adjustment ID entries. The lateral measurements for both Ground and Hover will be averaged, with the solution based on this average. The recorded track split for Ground and Hover will be averaged with one solution based on this average. The recorded track split for FLT 80 and FLT 120 will also be averaged with a second solution based on this average. This is an example of a setup for use on an aircraft that requires pitch change link adjustment for ground and hover visual track, then trim tab adjustment based on visual track in forward flight.

5.2.1.4. – Main Rotor Adjustment Symbol and Solution Logic Setup Screen

Model 4040 VIPER Analyzer	
M/R Adj Symbol & Soln Logic	
Adjustment	Positive Value Meaning
Weight:	ADD
Sweep:	AFT
Blade:	UP
TAB:	UP
Soln:	MAX

The “M/R Adjustment Symbol Setup” screen appears as shown. This screen is used to establish the direction of move for a positive adjustment as determined by the charts. For example, if the selection of “Sweep (AFT)” is made, when the analyzer gives an adjustment for blade sweep to move a blade “4 flats”, the actual movement of the blade is 4 flats aft. A

movement of this same blade forward would be a negative move (-4.0 flats). Look at the polar charts you are using to determine the primary direction of move according to the chart. Use the [↑] or [↓] keys to select the field and the [←] or [→] key to select the option for each of the movement types.

- **Weight:** Weight adjustments should always be entered as the addition of weight.
- **Sweep:** Select “FWD” or “AFT” for the direction of blade movement if adjusting lateral balance using sweep in accordance with a polar chart. If the aircraft does not utilize blade sweep for lateral balance, this field is not applicable.
- **Blade:** Select “UP” or “DOWN” for the direction of blade movement if adjusting pitch change links in accordance with a polar chart.
- **Tab:** Select “UP” or “DOWN” for the direction of blade movement if adjusting trim tabs in accordance with a polar chart.
- **Soln:** The two solution options are “Max” and “All”. When solving for “Max”, the analyzer will present the solution for the highest vibration reading attained for the vertical and lateral sensors. When solving for “All”, the analyzer will present all of the available solutions for vertical, lateral and track readings.

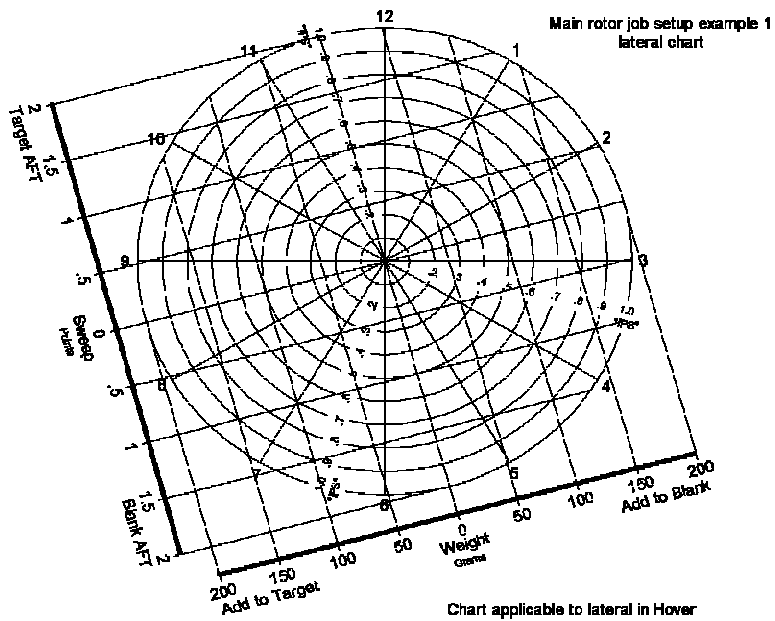
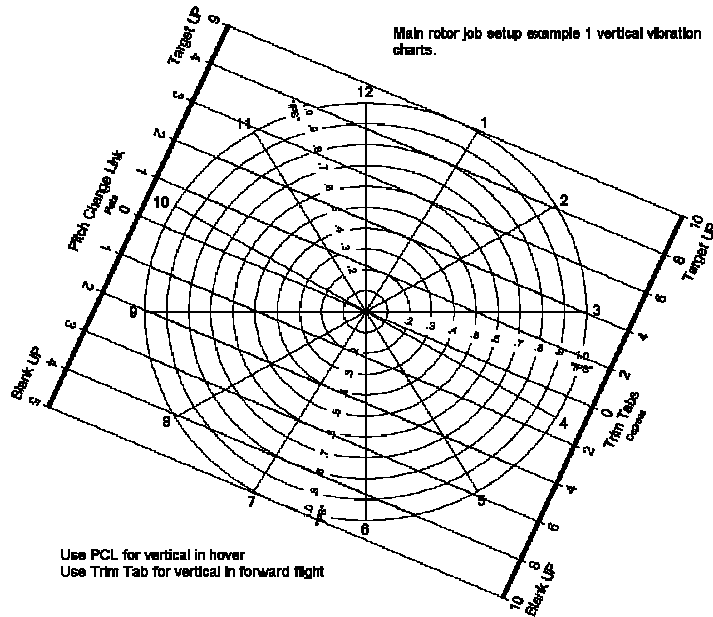
When completed, press [ENTER].

5.2.1.5. – Chart Definition

The final step in the setup process is to define the electronic chart forms as described in section 5.1, Analyzer Chart Forms. Vertical chart(s) will be defined first, followed by the lateral chart(s), then any track adjustment influences required. When all charts have been completed, press [ENTER] to save the setup and return to the “Main Rotor Manage Setups” menu. Follow paragraphs 5.2.1.6 through 5.2.1.6.7 for a complete example of a typical main rotor setup.

5.2.1.6. – Main Rotor Setup Example

This setup example is applicable to a helicopter type that utilizes pitch change link adjustments to correct for vertical vibration in a hover, weight and blade sweep adjustments for lateral vibration in a hover, and blade trim tab adjustments for vertical vibrations in forward flight regimes. The polar charts used for this example are illustrated below.



Rotor diameter: 37.0 Feet. Lead/lag units are read in inches.

Rotor speed: 385 RPM/

5.2.1.6.1. – Main Rotor Setup Screen

Model 4040 VIPER Analyzer			
Main Rotor Setup			
Name:	EXAMPLE 1		
Vertical Chan:	A		
Lateral Chan:	B		
Sensor:	991D-1		
Tach Type:	Mag(Hi)	Tach Chan:	1
Number of Weight Positions:	4		
Blades:	2	Relative to:	1
RPM:	385	Trk Units:	in
Conditions			
Ground	Both	Hover	Both
80 KIS	Both	120KIS	Both
	Both		Both

1. The name of the setup has been labeled as “EXAMPLE 1”.
 2. Vertical vibration will be measured on channel “A”.
 3. Lateral vibration will be measured on channel “B”.
 4. The type of vibration sensor chosen for this setup is the “991D-1”.
 5. The type of tachometer source for this setup is the “Mag(Hi)”.
 6. The tachometer channel for this setup is channel “1”.
 7. Looking at the lateral balance chart presented in paragraph 5.2.1.6, four weight positions have been identified, Target – Blank sweep and Target – Blank weight.
 8. The main rotor is a two bladed system.
 9. Tracking will be displayed relative to blade number “1”.
 10. Rotor speed is 385 RPM.
 11. Track measurements will be displayed in “inches”.
 12. Four conditions have been entered for this job, “GROUND”, “HOVER”, “FLT80”, and “FLT120”. Both track and vibration will be measured and recorded for this setup.
- Press [ENTER] to proceed to the next screen.

5.2.1.6.2. – Tracking Setup Screen

Model 4040 VIPER Analyzer
Tracking Setup

Rotor Diameter: 37.00 (ft)
Lead/Lag Units: (in)

1. Enter “37.00” in the first block using the keypad.
2. Select “ft” for units of rotor diameter.
3. Select “in” for the display units of lead/lag data.

5.2.1.6.3. – Main Rotor Conditions Setup

Model 4040 VIPER Analyzer
Main Rotor Conds. Setup

Conds.	Vert Chart ID	Lat Chart ID	Track Adj. ID
Ground	0	0	0
Hover	1	1	0
80 KTS	2	0	0
120KTS	2	0	0

Limit: 0.20 0.20 0.25

Enter ID, or 0 if no adjustment.
Different charts use different IDs.

Use the sample polar charts in section 5.2.1.6. In the “Main Rotor Conditions Setup” screen above, two vertical charts and one lateral chart have been identified. The first vertical chart, ID number “1”, will be used for a vertical measurement in hover only, while the second vertical chart, ID number “2”, is for the average vertical measurement of both “FLT 80” and “FLT120”. One lateral chart has been identified for the lateral measurement in “Hover” only. The vibration limit for both the vertical and lateral measurements has been set at 0.20 IPS.

This main rotor setup will not use the tracking information measured by the analyzer for any corrections; it will be for user reference only.

When completed, press [ENTER] to continue.

5.2.1.6.4. – Main Rotor Adjustment Symbol and Solution Logic Setup

Model 4040 VIPER Analyzer	
M/R Adj Symbol & Soln Logic	
Adjustment	Positive Value Meaning
Weight:	ADD
Sweep:	AFT
Blade:	UP
TAB:	UP
Soln:	MAX

In the “Main Rotor Adjustment Symbol and Solution Logic” setup screen above, the positive numeric value in a solution screen has been identified as the addition of weight, sweeping a blade aft, moving a blade upwards using either pitch change links or tabs. The solution logic has been set to “MAX” and will present the solution related to the highest vibration readings attained for the vertical and lateral sensors.

Press [ENTER] to continue.

5.2.1.6.5. – “Vertical: Hover” Chart Definition

```
Model 4040 VIPER Analyzer
Main Rotor Chart Setup
Name: Vert Hover
Type: Regular Sweep Only: No
No Adjustment Bld/Pos: None
Max ICF Update: 50 % R(°): 45
Adj Unit: FLT Adj/IPS: 5.000
Bld/Pos MoveLine Bld/Pos
TARGET 12 : 45
BLANK 6 : 45

Bld/Pos: in CW or CCW order

+Adj = WtAdd/SwAft/BlUp/TabUp

Help
```

The “Vertical: HOVER” chart setup screen appears first. Use the vertical vibration chart in paragraph 5.2.1.6, to complete the steps below and properly define this chart.

1. The name of the chart, “Vert: HOVER”, has been automatically entered from the “Main Rotor Conditions Setup” screen and is non-editable.
2. The chart type is “Regular”.
3. This chart uses no sweep adjustments, and is therefore left as “No”.
4. No Adjustment Blade/Pos. is left as “None”.
5. Max ICF Update is “50”%.
6. Rotation is “45” degrees.
7. The type of adjustment applied in accordance with this chart is pitch change link in flats; therefore “FLT” has been entered.
8. The influence co-efficient for the pitch change links is “5.0” flats per 1.0 IPS vibration.
9. The Bld/Pos names entered from the chart are “TARGET” and “BLANK”.
10. The “MoveLine” for moving the “TARGET” blade up is “12:45”.
11. The “MoveLine” for moving the “BLANK” blade up is “6:45”.

When completed, press [ENTER] to continued.

5.2.1.6.6. – “Vertical: FLT 80 – FLT120” Chart Definition, Example 1

Model 4040 VIPER Analyzer		
Main Rotor Chart Setup		
Name:	Vert 80 KTS-120KTS	
Type:	Regular	Sweep Only: No
No Adjustment Bld/Pos:	None	
Max ICF Update:	50	% R(°): 45
Adj Unit:	DEG	Adj/IPS: 10.000
Bld/Pos	MoveLine	Bld/Pos
TARGET	12	: 45
BLANK	6	: 45
Bld/Pos: in CW or CCW order		
+Adj = WtAdd/SwAft/BlUp/TabUp		
Help		

The “Vertical: FLT 80 – FLT120” chart setup screen appears next. Use the vertical vibration chart in paragraph 5.2.1.6, to complete the steps below and properly define this chart.

1. The name of the chart, “Vert: FLT 80 – FLT120”, has been automatically entered from the “Main Rotor Conditions Setup” screen and is non-editable.
2. The chart type is “Regular”.
3. This chart uses no sweep adjustments, and is therefore left as “No”.
4. No Adjustment Blade/Pos. is left as “None”.
5. Max ICF Update is “50”%.
6. Rotation is “45” degrees.
7. The type of adjustment applied in accordance with this chart is trim tab in degrees; therefore “DEG” has been entered.
8. The influence co-efficient for trim tab adjustment is “10.0” degrees per 1.0 IPS vibration.
9. The Bld/Pos names entered from the chart are “TARGET” and “BLANK”.
10. The “MoveLine” for moving the “TARGET” blade up is “12:45”.
11. The “MoveLine” for moving the “BLANK” blade up is “6:45”.

When completed, press [ENTER] to continued.

5.2.1.6.7. – Lateral Hover Chart

```

Model 4040 VIPER Analyzer
Main Rotor Chart Setup

Name: Lat Hover
Type: Irregular Sweep Only: No
No Adjustment Bld/Pos: None
Max ICF Update: 50 % R(°): 45

Bld/Pos Unit Adj IPS MoveLn
TARGET GMS 200.00 1.00 8 : 30
T AFT PTS 2.00 1.00 11 : 30
BLANK GMS 200.00 1.00 2 : 30
B AFT PTS 2.00 1.00 5 : 30

+Adj = WtAdd/SwAft/BlUp/TabUp

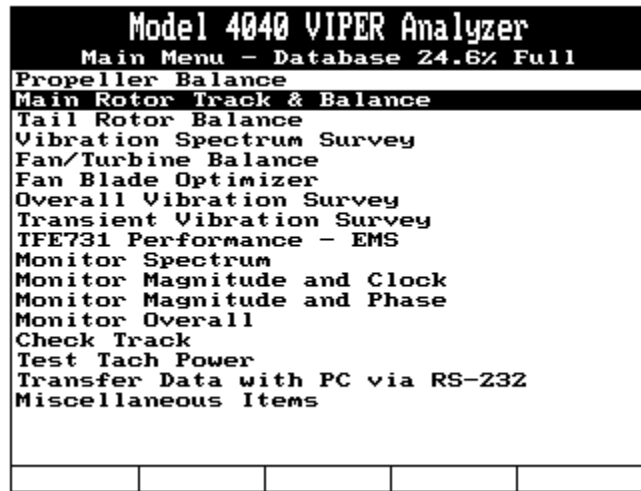
Help
  
```

The last chart defined will be “Lateral: HOVER”. Use the lateral vibration chart in paragraph 5.2.1.6, to complete the steps below and properly define this chart.

1. The name has been automatically entered as “Lat: HOVER” from the “Main Rotor Conditions Setup” screen and is non-editable.
2. The type of chart is “Irregular”.
3. Although this chart does utilize a sweep adjustment for balancing, it is not the *only* type of adjustment used and therefore requires this entry to be left set as “No”.
4. No Adjustment Blade/Pos. is left as “None”.
5. Max ICF Update is “50”%.
6. Rotation is “45” degrees.
7. The first Bld/Pos name entered is “TARGET”, utilizing an adjustment unit of “GMS” weight. The influence co-efficient for this point is “200.00” grams adjustment per “1.0” IPS vibration. The Move line for this position is “8:30”.
8. The second Bld/Pos name entered is “T AFT”, utilizing an adjustment unit of “PTS”. The influence co-efficient for this point is “2.00” points adjustment per “1.0” IPS vibration. The Move line for this position is “11:30”.
9. The third Bld/Pos name entered is “BLANK”, utilizing an adjustment unit of “GMS” weight. The influence co-efficient for this point is “200.00” grams adjustment per “1.0” IPS vibration. The Move line for this position is “2:30”.
10. The last Bld/Pos name entered is “B AFT”, utilizing an adjustment unit of “PTS”. The influence co-efficient for this point is “2.00” points adjustment per “1.0” IPS vibration. The Move line for this position is “5:30”.

When completed, press [ENTER] to save and exit this setup.

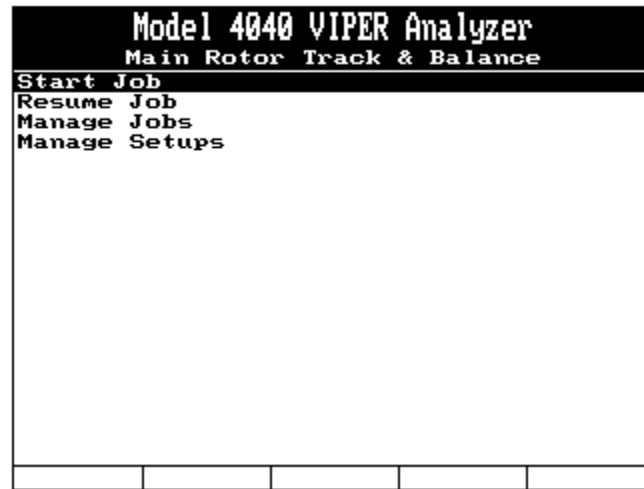
5.3. – Main Rotor Balance Process



The following paragraphs present the main rotor track and balance process and its associated screens and are intended to familiarize the user with the data acquisition and correction capabilities of the 4040 Viper.

Prior to starting a new main rotor track and balance job, you must first select the “Main Rotor Track & Balance” option from the main menu. Do this by highlighting the “Main Rotor Track & Balance” option from the “Main Menu” screen using the [↓] key and pressing [ENTER].

5.3.1. – Starting a New Job



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

- *If you are using the analyzer for the first time*, the “Main Rotor Setup” banner screen will appear allowing you to define a new main rotor setup to use. Refer to paragraph 5.2.1 “Main Rotor Setup” for detailed instructions on defining a setup.
- *If you have previously saved setups stored in the analyzer’s memory*, a screen displaying the list of setups will be displayed. You can then select a setup from this list to use for the job. Proceed to paragraph 5.3.2 “Setup List”
- *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. Do you want to RESUME work on 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 and allowed to complete it. If you wish to continue with starting a new job, press the [F5] “No” key, and the screen will then display the “Setup List”. Proceed to paragraph 5.3.2.

If the analyzer has been used previously, a list of customer names will have been stored and are accessed by pressing the [F1] “Names” key. A name can then be selected from this list for use with this job.

When finished, press [ENTER].

5.3.4. – Tracking Selections

```
Model 4040 VIPER Analyzer
Tracking Selections

Track Device: Tracker
- For Optical Tracking Only -
Number of Rotations: 50
Inches To Blade Tip: 114
```

The “Tracking Selections” screen is displayed, allowing you to choose a tracking device for use with the job. This screen will always be presented at the start of a new job to allow selection of a tracking device or when resuming a job to ensure the device has not been changed.

- The tracking device field is a toggle selection of either “Tracker” or “Strobe.” Use the [⇒] or [⇐] keys to select the tracking device being used.

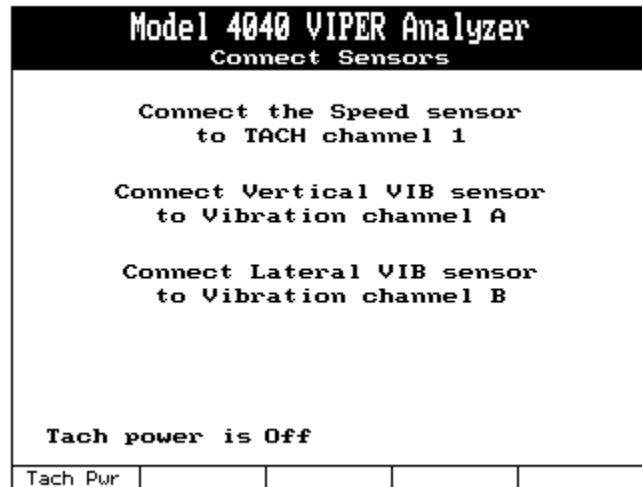
If you select “Tracker,” press the [↓] key and move to the lower portion of the screen to input the following:

- Using the keypad, enter the number of revolutions for which you will acquire track data. The minimum entry is 20 and the maximum is 99, however, it is highly suggested that you use no less than 50 for the number of rotations to measure track. This will result in greater accuracy from the tracker.
- Using the keypad, enter the distance, in inches, from the tracker’s location (usually the cockpit) to the blade tips at 12:00 with the interrupter over the magnetic pickup, or reflective tape in front of the Phototach.

See the Model 540 Optical Tracker User Manual, Document Number 540-OM-01, for a detailed description of the optical tracker’s operation.

When finished, press [ENTER].

5.3.5. – Connect Sensors



The “Connect Sensors” banner screen will be displayed next. Messages that appear on this screen prompt you to perform the physical installation and connection of the tachometer and vibration sensors to the input channels you specified in the applicable setup.

- You must use the vibration sensor installation locations as specified by the applicable polar charts. The orientation of the sensor is key to the accuracy of the chart, if the sensor is installed in a direction other than that specified, the phase (clock) angles will be incorrect and solutions will not be accurate.
- If you are using a magnetic pickup for the speed sensor, install and set the gap as directed in the applicable maintenance manual or polar chart.
- It is permitted to use the Phototach for the main rotor one per revolution source. If using a Phototach as the tachometer, refer to paragraph 5.3.5.1 “Optical Tachometer Setup”.
- Also at this time, install any ship’s power and strobe cables as needed.

When completed, press [ENTER].

5.3.5.1. – Optical Tachometer Setup (Optional)

To install the optical tachometer, do the following:

- If not specifically provided by an ACES Systems Application Note or manufacture’s directions, locate a position that allows the Phototach to be installed not more than 18 inches away or closer than 4 inches from a rotating main rotor component. This component will be used to install the reflective tape to serve as the once-per-revolution tachometer source for the analyzer. Connect and route the tachometer cable from the Phototach to the analyzer.

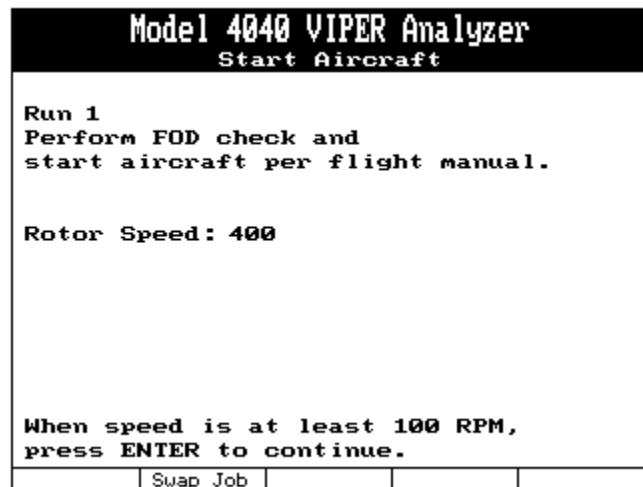
NOTE

If possible, the location of the Phototach should allow for the reflective tape to trigger it when the main rotor is in the reference position as specified by the balance chart. This will provide a direct correlation of the clock angles produced by the analyzer and the charts. If this is not possible, the clock positions on the chart will have to be rotated based on the vibration results from the first applied correction.

- While still in the “Connect Sensors” banner screen, a message is presented near the bottom that reads “Tach Power is Off”. The Block directly below this statement and corresponding to the [F1] key, is labeled “Tach Pwr.” Pressing the [F1] “Tach Pwr” key will power the Tach. Turning the tachometer power on is not required to start the balance job; this step is only accomplished to verify the proper operation of the Phototach.
- Rotate the main rotor until the target object is aligned with the Phototach. Clean this area thoroughly to insure adhesion of the tape.
- Cut a strip reflective tape (3M Tape, Model 7610) approximately 1.5 to 2 inches long. With the tape backing still in place, hold the tape in position on the target object, then verify the red LED “Gate Light” indicator light on the back end of the Phototach is illuminated. This indicates the position of the tape is correct.
- Remove the tape backing and attach reflective tape at that location. Be sure to smooth out any wrinkles or bubbles in the tape. Insure the edges are smoothed and attached.

Once the above steps are completed and good “Gate Light” signal is present, press [ENTER] to proceed with the job.

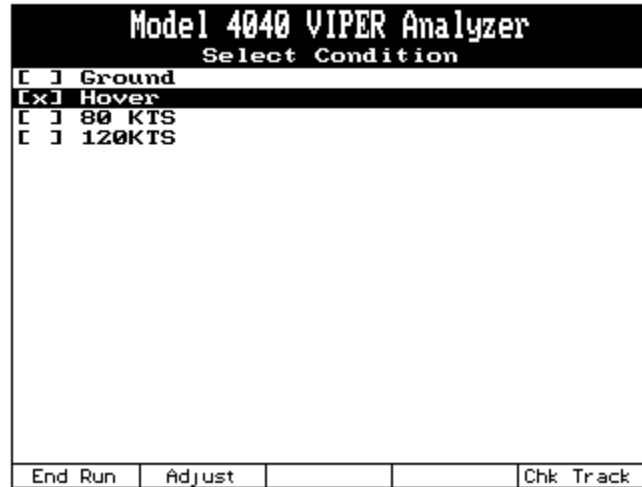
5.3.6. – Start Aircraft



The analyzer will now direct the user to “Perform FOD check and start aircraft per flight manual”, refer to the aircraft’s flight manual for all aircraft starting and operational instructions. This screen allows you to view the current main rotor RPM. When the aircraft has been started and RPM is stable, press [ENTER] to continue.

The [F2] “Swap Job” key allows you to return to the Main Menu without rebooting the analyzer. This allows you to quickly and easily switch between various jobs.

5.3.7. – Select Aircraft Condition



The “Select Condition” screen appears listing the conditions that were defined in the setup; each preceded by a set of brackets. To measure a condition, highlight it using the [↓] key and press [ENTER]. If a condition has already been measured, an “X” will be inserted between the brackets. You may re-measure a condition if desired, however all data previously measured for that condition will be over-written and subsequently lost.

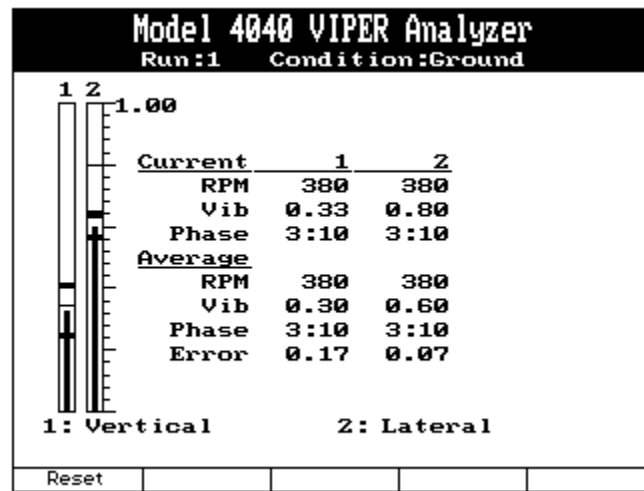
- When all desired conditions have been measured, pressing the [F1] “End Run” key will terminate the current run and direct you to shut down the aircraft. Go to paragraph 5.3.10.

If during the current run, the [F2] “Adjust” key becomes visible, the analyzer has collected enough information to present a solution. The solution presented will depend on the conditions measured and the charts defined in the setup. For example, in our sample setup paragraph 5.2.1.6.3, we defined only two charts for use with the aircraft in a hover:

- Vertical balance and Lateral balance. In the example screen above, only hover measurements have been acquired. Therefore the only solutions the analyzer could present would have to be for either vertical balance or lateral balance.
- The process for measuring and recording track data is covered in the measurement screens. However, if you wish to check the track measurement without recording, you may press the [F5] “Chk Track” key. This will bring up the tracking screens and allow acquisition of a track measurement with **no storage**. To measure and record tracking, it must be done from the “Review Data” screen as shown in paragraph 5.3.9.

When all desired conditions have been measured, press the [F1] key to end the current run.

5.3.8. – Data Acquisition



Upon selecting to acquire a measurement, the data acquisition screen appears. The screen banner will contain the run number as well as the condition being measured. Within the screen, the analyzer will present the “Current” and “Average” RPM, IPS level, and Phase (Clock) angle readings. The averaged measurement will be used when calculating solutions. There is also an error value indication associated with the averaged measurement.

NOTE

The error value will typically lower rapidly when the amplitude of vibration is high. When the amplitude reaches a lower level (Approx. < 0.05 IPS) the error value may remain high. This is a normal response and is not cause for alarm.

- Press the [F1] “Reset” key to restart the measurement and averaging process at any time. This may be performed as a means of validating the quality of a measurement. If, after the reset key is pressed, the average measurement does not return to approximately the same value shown before, the quality of the measurement may be questionable. If this occurs, repeat the averaging process and try it again until the measurement values are similar both before and after resetting.

When the error reaches its lowest level, press [ENTER] to stop the acquisition process.

5.3.9. – Review Data

Model 4040 VIPER Analyzer				
Review Data				
Run 1 Condition: Ground				
Vertical: 0.30 IPS @ 3:10				
Lateral: 0.60 IPS @ 3:10				
Track Data: No				
Press F1 to retake data.				
Press F5 to take track data.				
Press ENTER to continue				
Retake				Track

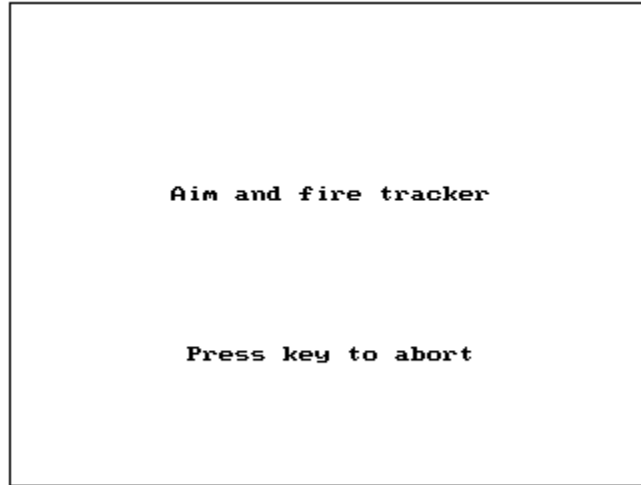
The “Review Data” screen will now appear presenting the vibration data for the current run and condition.

This screen also offers a chance to retake the measurement by pressing the [F1] “Retake” key. Pressing this key returns you to the data acquisition screen, paragraph 5.3.8.

If you wish to measure and record track for this run and condition, press the [F5] “Track” key. Proceed to paragraph 5.3.9.1.

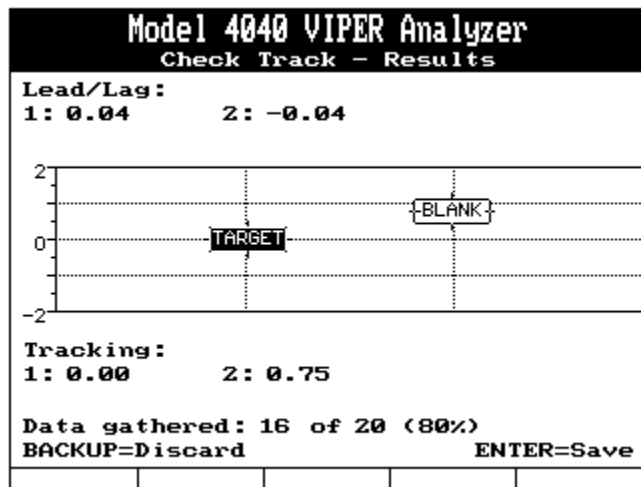
When you have finished reviewing the data, press [ENTER] to return to the “Select Conditions” screen in order to acquire more measurements or to end the run. See paragraph 5.3.7 “Select Aircraft Condition”.

5.3.9.1. – Track Measurement



If you select [F5] to measure track, a screen will appear prompting you to “Aim and Fire Tracker”. At this point, the tracker is energized and ready to use. Verify the presence of a solid amber light at the bottom of the LED aiming lights. If present, raise the tracker into the rotor disk and align until the green LED’s illuminate. Press and release the trigger once while holding the tracker with the green LED’s illuminated. The amber LED should now pulsate. When the amber LED is completely extinguished the tracker has measured the desired number of revolutions as entered at the start of the job.

5.3.9.2. – Check Track – Results



A screen will appear presenting the track data just acquired. This data will be shown in both graphical and numerical format. The sample data above was taken relative to blade one, the “TARGET” blade. You can see that the TARGET blade is shown lagging 0.04 inches and the BLANK blade is shown leading 0.04 inches. You will notice that the track of the TARGET

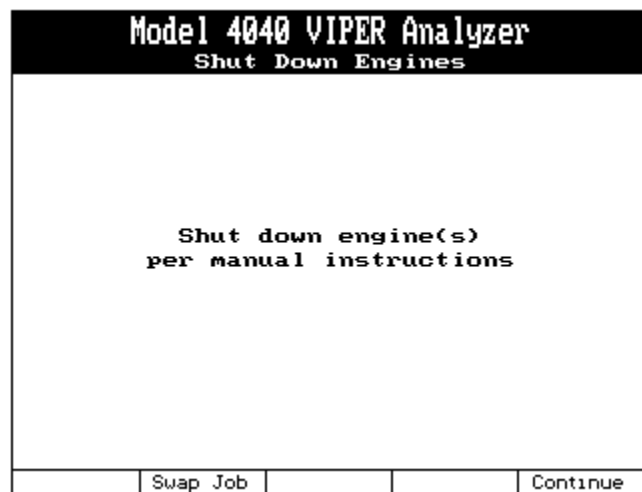
blade zero and the BLANK blade is shown to be 0.75 inches high. The lower portion of the screen shows the number of valid data packets the tracker sent to the analyzer.

NOTE

If the number of data packets gathered is less than 75 % of the total rotations defined in paragraph 5.3.4, select the [F5] “Track” option upon returning to the review data screen as described in paragraph 5.3.9.

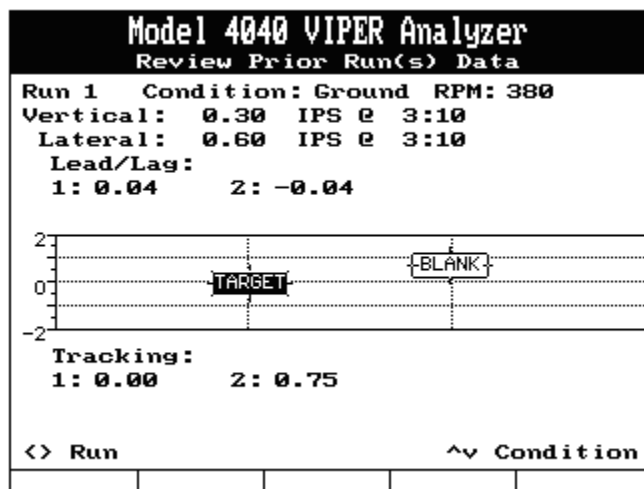
When you have finished reviewing the track, press [ENTER] to return to the “Review Data” screen.

5.3.10. – Shut Down Engines



When you have chosen to end the current run, the analyzer will prompt you to shutdown the aircraft. You can use the [F2] “Swap Job” key to return to the Main Menu without rebooting the analyzer or [F5] “Continue” key to move to step 5.3.11.

5.3.11. – Review Prior Run(s) Data



The “Review Prior Run(s) Data” screen appears as shown. The data will be displayed in the order of the current run and first condition measured. From this first screen, press the [↓] key to proceed to the next condition measured for the current run. Press the [↑] key to return to the previous condition.

If the current run is number two or greater, pressing the [←] key will move to the same condition as on the previous run. Press the [⇒] key to return to the current run. Always observe the run number and condition name at top of the screen to identify the data you are viewing.

When you have completed reviewing the data, press [ENTER] to continue to the solution screens.

5.3.12. – Solution Screens

The number and type of solutions presented will depend upon the data gathered and the limits that were set for each of the measurement types in the “Conditions Setup” screen when the setup was defined. Solutions will be presented in the following order: Vertical, Lateral, then Track.

The analyzer will present all of the solutions that are possible from the data gathered for the current run. This means that it is possible for the analyzer to give two adjustments that would affect the other adversely. The user will ultimately be responsible for determining which adjustments to make and which to discard.

For instance, in the following sample screens, the analyzer will recommend solutions for both the pitch change links and the main rotor blade trim tabs for the same run. If you were to make both of these adjustments, chances are, this would over-correct causing counter-adjustments on the next run. Most likely in this case, and depending on the amount of PCL

adjustment, the trim tab adjustment would be skipped and only the pitch change link adjustment would be made.

As stated earlier, the solutions presented by the analyzer are based on the charts defined in the setup and the measurements acquired for the current run. These influences will be updated each time the analyzer is used. For the updates to be accurate, you must enter exactly the adjustments performed, or skipped. If the analyzer presents a solution and you choose not to apply it on the current run, you are required to zero out the adjustment entries in the recording screen for that particular adjustment.

5.3.12.1. – Example Solution Screen #1

Model 4040 VIPER Analyzer			
M/R Suggested/Installed Adjustments			
Run 1			
Name: Vert Hover, FLT			
Bld/Pos	Suggested	Installed	
TARGET	4.00	4.00	
BLANK	0.00	0.00	
+Adj = WtAdd/SwFwd/BlUp/TabUp			
Inst=Sugg	Inst=None		Quit Job

For our sample job, the first adjustment given is for a vertical measurement at hover. The adjustment type to be applied is “FLT” or flats of a pitch change link. The line at the bottom of the screen serves as a reminder that a positive adjustment is intended to move the blade up.

For this measurement, the analyzer’s recommended adjustment is to raise the Target blade by 4.00 flats. This solution has been automatically entered in the appropriate “Installed” field. If you are able to make this adjustment exactly as entered, all that is necessary to continue is pressing the [ENTER] key. If an adjustment is made other than raising the Target blade 4.00 flats, you must enter this in the appropriate “Installed” field using the keypad.

- Pressing the [F1] “Inst=Sugg” key will return any “Installed” field that has been edited to the original values presented by the analyzer.
- Pressing the [F2] “Inst=None” key will delete all “Installed” field entries. This function is used when a particular adjustment is to be skipped on the current run.
- Pressing the [F5] “Quit Job” key will exit the current job and store it as complete.

Warning

Using the [F5] “Quit Job” function will close the job and not allow resuming at a later time. If you wish to stop the job temporarily, press the “Main Menu” key or simply turn the analyzer off.

When you have finished entering the adjustments performed, press [ENTER] to continue to the next screen.

5.3.12.2. – Example Solution Screen #2

Model 4040 VIPER Analyzer			
M/R Suggested/Installed Adjustments			
Run 1			
Name: Vert 80 KTS-120KTS, DEG			
Bld/Pos	Suggested	Installed	
TARGET	5.00	5.00	
BLANK	0.00	0.00	
 +Adj = WtAdd/SwFwd/BlUp/TabUp			
Inst=Sugg	Inst=None		Quit Job

The second solution the analyzer gave for our sample job is for the average vertical measurement from flight at 80 knots and flight at 120 knots. The adjustment type for this chart is degrees of trim tab. For the current run, if you chose to make the pitch link adjustment as recommended in the previous screen, you would most likely skip the trim tab adjustment. Do this by pressing the [F2] “Inst=None” key and then [ENTER].

5.3.12.3. – Example Solution Screen #3

Model 4040 VIPER Analyzer		
M/R Suggested/Installed Adjustments		
Run 1		
Name: Lat Hover, GMS		
Bld/Pos	Suggested	Installed
TARGET	200.00	200.00
I CHD	0.00	0.00
BLANK	0.00	0.00
B CHD	0.00	0.00
+Adj = WtAdd/SwFwd/BlUp/TabUp		
Inst=Sugg	Inst=None	Quit Job

The last correction given for our sample job is for the lateral ground measurement. The solution type for this adjustment is grams of weight or points of blade sweep. The solution presented for this screen is to add 200.00 grams to the target blade.

NOTE

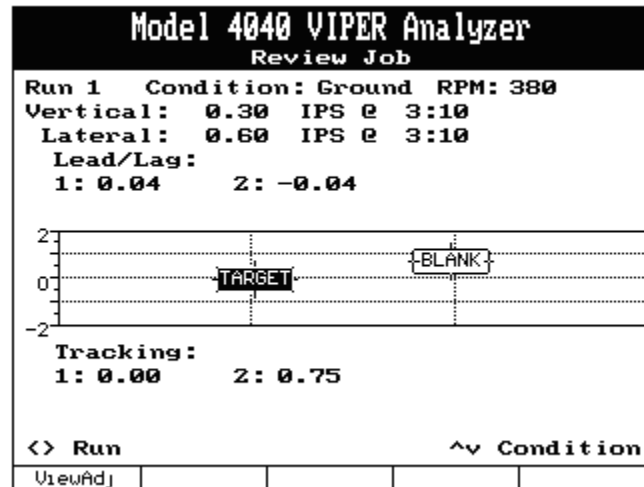
The analyzer will attempt to give solutions that “resolve to zero” in all cases. This may nullify the ability to make some adjustments with any degree of accuracy. If this occurs, it is the user’s responsibility to adjust the amount either up or down to achieve a quantifiable adjustment. Remember that the analyzer will update the influence co-efficient between every run based on the vibration results from the previous adjustment.

When the last solution screen has been updated, pressing [ENTER] will take you to the “Start Aircraft” screen for the next run.

5.4. – Main Rotor Manage Data Functions

The main rotor “Review Job” function presents chart information, correction history, and influence co-efficient for the job. The following paragraphs will describe these new screens and how to navigate through them to review this information.

5.4.1. – Main Rotor Review Job



Upon selecting to review a job, the “Review Job” screen will appear as shown above. The run number and condition name are displayed at the top of the screen along with the vibration and track measurements acquired for the current run and condition listed.

- To review different conditions within the same run, press either the [↑] or [↓] key.
- To review data for a different run, press either the [←] or [→] key.
- To view adjustments made for the current run, press the [F1] “ViewAdj” key. See paragraph 5.4.2.

5.4.2. – View Main Rotor Track and Balance

Model 4040 VIPER Analyzer			
View M/R Track & Balance			
Run 1			
Name: Vert Hover, FLT			
<u>Bld/Pos</u>	<u>Suggested</u>	<u>Installed</u>	
TARGET	4.60	4.60	
BLANK	0.00	0.00	
<> Run		^v Adj Type	
ViewMeas	ViewChart		

The “View Main Rotor Track and Balance” screen appears as shown above. This screen presents both the suggested and installed adjustments for the run number and chart name displayed.

- Press either the [↑] or [↓] keys to view different chart types for the same run.
- Press the [←] or [→] key to change the current run.
- Press the [F1] “ViewMeas” key to return to the “Review Job” screen as shown in paragraph 5.4.1.
- Press the [F2] “View Chart” key to view the polar chart influence information for the job as shown in paragraph 5.4.3.

5.4.3. – View Main Rotor Chart

Model 4040 VIPER Analyzer				
View M/R Chart				
Name: Vert Hover				
Type: Regular				
Def Mag: 5.00				
<u>Bld/Pos</u> <u>Mag Ratio</u>				
All 1.00				
^v Chart				
ViewMeas	ViewAdj			ICFs

The “View M/R Chart” screen gives the chart name, chart type, default magnitude of adjustment, name and adjustment ratio of each blade position.

- Pressing the [↑] or [↓] keys will toggle between multiple chart types if more than one is defined for the setup.
- Press the [F1] key to “ViewMeas” and return to paragraph 5.4.1.
- Press the [F2] key to “ViewAdj” and return to paragraph 5.4.2.
- Press the [F5] key to view the “ICF” changes recorded during the job as shown in paragraph 5.4.4.

When completed reviewing, press [ENTER] to return to the manage data menu.

5.4.4. – View Main Rotor Chart ICFs

Model 4040 VIPER Analyzer		
View M/R Chart ICFs		
<u>Run</u>	<u>Mag.</u>	<u>Rotate</u>
1	10.000	0 °
2	12.000	10 °
3	12.200	12 °

The “View M/R Chart ICFs” screen shows how the influence coefficient magnitude and rotation was changed as a result of the correction made on each run. Because the analyzer continues to learn between runs, it is very important to ensure accurate data entry for the actual correction made during each run.

- Press [ENTER] to return to the “Review Job” screen explained in paragraph 5.4.1.