Wake Survey Test Procedure

These are the instructions for conducting the wind tunnel wake survey test. They should be followed as closely as possible in order to ensure repeatability of results, as well as keep the equipment and test operators from harm.

Test Supervisor name		Date		
Model being tested (fin & air brake combo)				
1.0	Equipment Set Up			
	1.1 Ensure that all electrical connections are in place			
	1.1.1 Follow attached wiring diagram	[]		
	1.2 Ensure that all tubing is in place			
	1.2.1 From side static pressure probe to MKS press <i>reference side P2 of transducer, vent sense (</i>	ure transducer (attach (p1) to ambient) []	to	
	1.2.2			
	1.2.3 From top of rear pitot probe to top port of Set	ra transducer []		
	1.2.4 From side of rear pitot probe to bottom port o schematic of plumbing to transducers and bi instrumentation system	f Setra transducer[] <i>Atta</i> lock diagram of	ich	
	1.3 Turn on computer	[]		
	1.4 Start Lab VIEW Wake Survey VI			
	1.4.1 Change output file name to include date of tes	st []		
	1.5 Power-up Field Point and Transducers	[]		
	1.6 Ensure that the computer is receiving data from field poin checking output file.	nt by taking data point and []	l	
2.0	Model Set Up			
	 2.1 Make sure that all sections of the rocket are firmly connected [] 2.1.1 Nose cone, body sections with mounting hole (the two body sections are now glued together), fin section (rotate 45 deg into locked position which should locate the fins 45 deg from the mounting rod), & drag device section (rotate 45 deg to offset drag devices 45 deg from fins which will place the drag device at 0 and 90 deg with the mounting rod) 			
	2.2 Make sure that the wind tunnel is free of debris	[]		
	2.3 Place mounting rod with attached rocket model through t	the top of the wind tunnel		
	plexiglass and mounting disk.			
	2.3.1 Slide rod and rocket as far up through the top possible to allow the wind tunnel removable v complete the wind tunnel	of the wind tunnel as wall to be slid into place to)	
	2.4 Replace the wind tunnel removable wall	[]		
	2.5 Make sure that clamps are in place and locked so that the designed location	e wall will not deviate from	1	

- 2.6 Slide the bottom of the mounting rod through the bottom section of the plywood removable wall []
- 2.7 Set model at desired angle of attack and vertical position by using the set screw to hold the model steady []
- 2.8 Ensure once again that model is secured in place and will not move either up and down or side to side []

3.0 Wind Tunnel Set up

- 3.1 Plug in main wind tunnel breaker box
- 3.2 Turn on main wind tunnel breaker box using lever
- 3.3 Verify wind tunnel speed control is in the zero position
- 3.4 Switch wind tunnel start switch to "on",
- 3.5 Slowly increase fan speed until digital indicator reads 48 Hz or other predetermined value
 - 3.5.1 Final Fan Speed: 2/3 of full wind tunnel capability, maybe 40 Hz

4.0 Data Recording Procedure

- 4.1 Assign someone to be a scribe and a photographer (may be the same person) []
- 4.2 Zero the transducers with the wall-mounted atmospheric barometer to check for a bias before testing is initiated daily and every hour or so during testing.

4.2.1 Record the wall-mounted barometer a	Record the wall-mounted barometer and transducer readings and time of	
reading.	[]	
Barometer Reading	Time of Reading	
Barometer Reading	Time of Reading	

Barometer Reading_____ Time of Reading_____

- 4.3 Procedures to be completed before each horizontal row of data points is collected and prior to starting the wind tunnel:
 - 4.3.1 Zero the transducers and their respective locations.
 - 4.3.1.1 Place the pitot probe in the wind tunnel at a specified location (execute step 3.0).
 - 4.3.2 Take both a side view and a top view photo of the location of the pitot probe with respect to the wind tunnel and the rocket model in order to be able to recreate that exact location. Another top view photo is taken of the rocket to archive the angle of attack.
 - 4.3.2.1 Have the scribe name the photo according to the vertical location, horizontal location, and the rocket's angle of attack.
 - 4.3.2.1.1 If the rocket is in the center of the wind tunnel the vertical location is zero. If the rocket is located above the centerline of the wind tunnel then the vertical location is the positive value of the distance from the

wind tunnel centerline to the centerline of the rocket in SI units (mm), and vice versa for negative locations.[]

- The pitot probe location is read off of the rack and 4.3.2.1.2 pinion measurements. Read the location of the pitot probe using the middle mark on the movable pinion section and line it up with the measuring device on the rack in mm. The zero on the rack measurement is the zero for the location of the pitot probe. A positive value on the rack is a positive location and a negative value is a negative pitot location. If the pitot probe is located too far into the wind tunnel for the middle pinion mark to be any use, use the end "10" mark. If the "10" mark is used, make sure to precisely measure the distance from the middle "5" mark to the "10" mark (in mm) and the measured distance between those two marks is then used to determine the location of the pitot probe in the tunnel. Also, remember that if the "10" mark is used, the pitot probe location is negative.
- 4.3.2.1.3 The vertical location of the model is measured by drawing a mark on the mounting rod and measuring the distance from the bottom of the mark to the wind tunnel ceiling for each vertical reposition. The zero location of the model is when the model is in the center of the wind tunnel (8 inches to rocket centerline). []
- 4.3.2.1.4 The rocket's angle of attack is determined by using the protractor that is glued, or taped, to the bottom of the wind tunnel and looking at the degree at which it is located. The photograph also verifies this angle. []
- 4.3.3 For angle of attack:
 - 4.3.3.1 Start with rear pitot probe outside of the model wake and record rack and pinion position on Lab VIEW front panel.
 - 4.3.3.2 Take vertical photograph of rocket to record the angle of attack and have the scribe record the angle of attack and photo filename on Lab VIEW front panel.
 - 4.3.3.3 Take data point using the Lab VIEW VI once flow is steady.
 - 4.3.3.4 Move pitot probe with rack and pinion every 0.5 inches for measurements
 - 4.3.3.4.1 If this measurement gird results are too course, execute a measurement grid with intervals of 0.25 inches.
 - 4.3.3.5 Repeat steps 3.7.2 and 3.7.3 until pitot-static probe is outside of the wake.
 - 4.3.3.6 Move the model down 0.5 inches, and repeat steps 3.7.2-3.7.4.
- 4.4 Procedures to be completed at the end of a testing day:

4.4.1 Review the testing procedures and results with the faculty and/or student advisor to verify that the data was collected correctly and to ensure that that particular testing is completed.





Schematic of Wake Survey Measurements