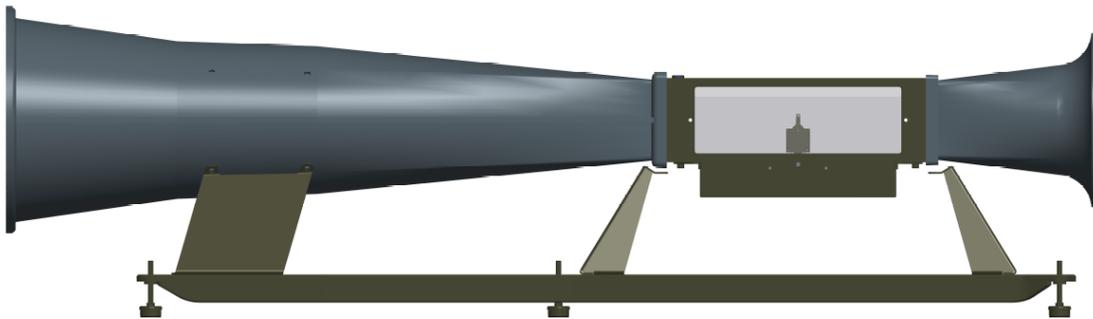




**INTERACTIVE  
INSTRUMENTS**



# Jet Stream 500

## Control Program Manual

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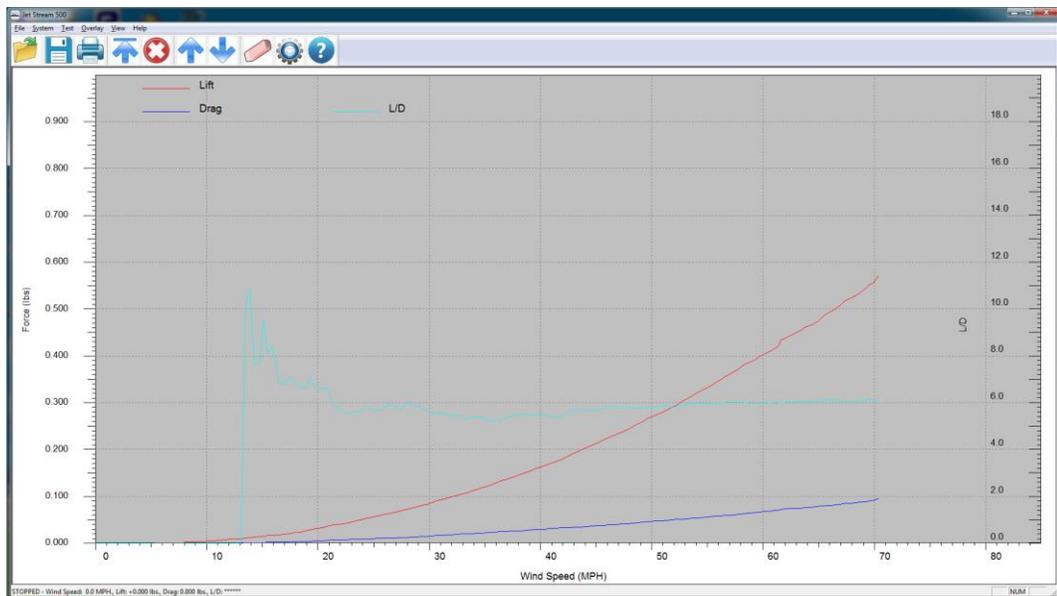
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**Welcome**

The Jet Stream Control Program is an easy to use interactive interface to the Jet Stream 500 wind tunnel which allows full functional control of the wind tunnel. The software is an easy to use Windows program with built-in help that will allow you to quickly master the features of the Jet Stream 500 (see **Figure #1** below). The lift and drag forces are displayed graphically in real time with respect to the wind velocity. Lift over Drag (L/D) and the cross-sectional drag coefficient (Cd) can be displayed graphically to show the relative performance of aircraft wings, automobiles, rockets etc. at various wind speeds. Once a test is complete, the graphical data can be printed or stored to disk for further studies. The air density calculator is useful to demonstrate the impact of altitude, air temperature, barometric pressure and humidity has on airfoils and cars as well.

**Windows Control Program Screen**



**Figure #1**

## Requirements

Be sure your PC is 100% Microsoft Windows compatible and has at least:

- Windows 7, 8, 10 or newer (32 or 64 bit)
- CD ROM Drive (for installation).
- 1 USB Port (for communications)
- Color or B/W graphical printer (optional)

## Getting Started

### Installation

#### **IMPORTANT!**

**Do not connect the Jet Stream 500 controller to the computer until the after the Windows software is installed. Connecting the computer to the controller without the proper USB driver may require the removal of the USB driver to properly install the correct USB driver.**

#### **Connecting the Jet Stream 500 to the computer**

- Insert the Jet Stream 500 installation CD and follow the setup instructions. To install the Windows software and USB driver.
- Locate the USB cable supplied with this software package. Plug USB cable into the side of the control box, and into a USB port on the computer.
- **BE SURE THE JET STREAM 500 USB DRIVER IS INSTALLED BEFORE CONNECTING THE CONTROLLER.**
- Check that both the computer and the Jet Stream 500 are plugged into the same wall outlet so they share the same power ground.
- Power up the Jet Stream 500 using the power switch located in the rear of the control box next to the power cord. Wait until the USB driver is recognized on the computer and properly installed before starting the Jet Stream 500 Windows program.

### Configuring the Software

After the program and USB driver are installed, run the program by clicking on the icon. If the computer display prompts with: **Jet Stream 500 not found!**, the software did not recognize the Jet Stream 500 connected to the computer's USB port. Be sure to check the following:

- Is the USB cable securely connected to the control panel and the computers USB port?
- Check to see that the computer and Jet Stream 500 are powered from the same wall outlet.
- Verify the Jet Stream 500 is powered up and ready (data cable is securely connected between the control panel and test bed). If not, power up the wind tunnel controller before starting the Windows program.

You can still operate the Windows software without the Jet Stream 500 attached so you can read previous results and compare them.

You may adjust the program window for any size, the graph will automatically adjust to fill the window.

The software is now fully configured and ready to run.

If the software recognizes the Wind tunnel the computer will display a window as shown in figure 3.

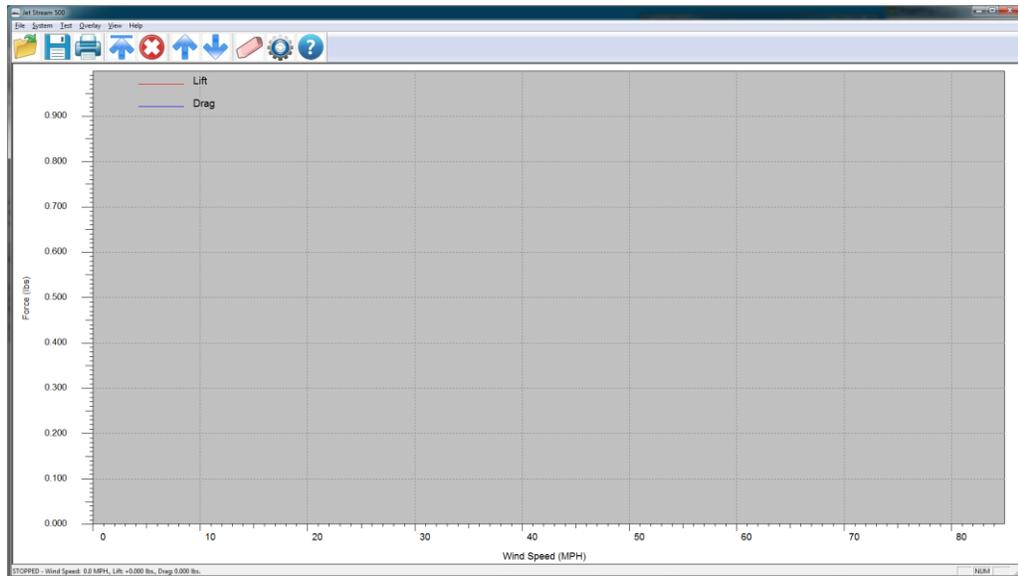


Figure 3

You may adjust the program window for any size. The graph will automatically adjust to fill the window. The software is now fully configured and ready to run.

## Working with the Control Program

### A quick tour of the screen

Looking at the Jet Stream 500 Control Program window you will see the real time display graph area in gray. The Y (vertical) axis represents the lift and drag force and the X (horizontal) axis represents wind speed. If the Cd (coefficient of drag) or the L/D (lift/drag) axis are enabled, the scale will be to the right side of the graph. The graph will display both positive or negative lift and drag forces on the wing, car or rocket with respect to the measured wind speed.

**Note:** Lift, drag, Cd and L/D graphs will be represented with different colors to distinguish between them.

At the top of the display is the menu and toolbar. The menu and toolbar are used to configure and run wind tunnel. Just below the graph is a status line. The status line displays the current wind speed, lift, drag, L/D and Cd (if enabled). During a test, these values represent the current status of the object attached to the test bed. This line is also used to display a quick one line help message for the menu and toolbar items.

## Toolbar Items

The Jet Stream 500 tool bar is used for quick access to the most frequently used features. The toolbar is made up of three groups of buttons. The first group recalls or saves the graphical information to disk. The second group controls the operation of the wind tunnel. The third group is for miscellaneous system features such as printing and displaying the on line help.



Figure 4

The toolbar can be disabled to increase the size of the graphical viewing area which may be useful to increase the graphing area for low-resolution video modes. To enable and disable the toolbar, toggle the toolbar option in the View menu selection.

The toolbar buttons are defined below.

### Open

Open an existing Jet Stream 500 file (*filename.JET*) and restore the graphical data. Opening the file also restores the comment text, Cd area and English/Metric units status. See **Open** menu item below.

### Save

Store the test results along with the comment text, Cd area and English./Metric units status. See **Save As** menu item below.

### Print Graph

Displays the Print dialog. See **Print** menu item below.

### Set Wind Speed

Ramps the wind speed to the desired value. See **Set Wind Speed** menu item below.

### Stop

Stop the wind tunnel fan. See **Stop Wind** menu item below.

### Increase Speed

Increases the current wind speed by 5 MPH or 5 KPH. See **Increment Wind Speed** menu item below.

### Decrease Speed

Decreases the current wind speed by 5 MPH or 5 KPH. See **Decrease Wind Speed** menu item below.

### Clear Graph

Clear the graph results for another test. See **Clear Graph** menu item below.

### Configure Axis

Displays the Test Configure dialog. See **Configure** menu item below.

### Help

Displays the on line help.

## Menu Items

The Jet Stream 500 Menu organizes the functions into 6 groups.



### Files

Open a Jet file, Save test results, Print or Exit the program. Once a test is complete, the test results can be saved for future reference. The data can be loaded in the same directory as the Jet Stream 500 Control Program or under a different subdirectory. See **Files Menu** below.

### System

Configure the system communications port and axis scales. The serial communications port is typically configured once but if the Challenge must be moved to a different port, use this menu item to change the port number. The lift, drag, Cd and L/D axis scales can be altered to make full use of the screen resolution. See **System Menu** below.

### Test

Configures a test and selects an operation for the Jet Stream 500. Once a test begins, the control panel attached to the wind tunnel has no control over it other than halting the remote access. Controlling the Jet stream 500 is accomplished by using the computer. As the computer instructs the wind tunnel to change wind speed, the Control panel gathers data from the test bed and the Windows program reads the data using the serial port. The Windows program then displays the results it graphically. See **Test Menu** below.

### Overlay

Data from a previous test can overlay another test result so that visual comparisons can be made. The overlay data color will be different than new data to allow for easy visual comparison between two curves. To clear an overlay, select Clear from the Overlay Menu. See **Overlay Menu** below.

### View

The status bar and tool bar are enabled by default. They can be disabled to gain more viewing area. See **View Menu** below.

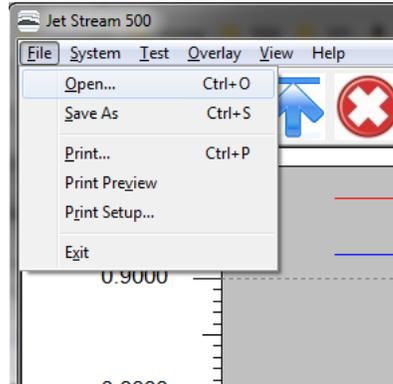
### Help

On Line Help.

Each menu group contains sub-menu items as shown below.

**Note:** Some of the menu items have a letter or control key next to them. This is an accelerator key that can be typed at any time to select the function. For example to go to a wind speed, type the letter W and the "Wind Speed" dialog will appear.

## Files



### Open (Ctrl+O)

Load a pre-saved Jet stream 500 file (*filename.JET*) from disk or network. Once a file is saved to a disk, the file can be loaded back into the Jet Stream 500 Control Program to view the information, overlay with another test and/or reprint the results.

### Save As (Ctrl+S)

Save the current results to disk. Once a model has been evaluated, the data can be saved to disk or onto a network for future evaluation. If the file already exists, a dialog will appear asking if it should be overwritten. Press **Save** to save the file or **Cancel** to exit the dialog. The data is stored in ASCII format so the results can be read into a spreadsheet program (eg. Excel) for further analysis and graphing.

### Print (Ctrl+P)

Displays the default printer dialog box for your printer. Press **OK** to begin printing.

### Print Preview

Displays on the screen the way the graph will look after it is printed. If the print does not look acceptable, you can alter the graph or printer options before the graph is printed.

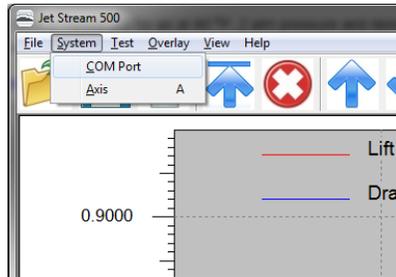
### Print Setup

Displays the printer setup dialog. Use this dialog to select a printer (if more than one are available) and configure the print options before printing. Since the graphs are better suited for landscape mode (horizontal) be sure the printer is set to landscape mode before printing. This can be done in the printer properties dialog for the selected printer. If you have a color printer, the graph will print the graph data in color.

### Exit

Exit the Jet Stream 500 control program.

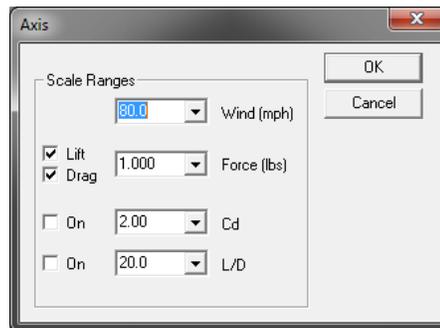
## System



### COM Port

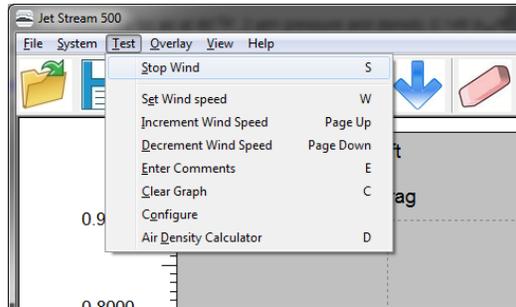
Change the computer's USB COM port for the Jet Stream 500. Typically the program will automatically identify the proper USB port but at times it may be necessary to set the port manually. Before making the changes to the port, be sure you know which COM port the wind tunnel is plugged into. The port number will be saved in the Windows directory under the file "JET.INI".

### Axis (A)



Set the maximum scale value for the lift and drag, Cd and L/D K axis. Select the appropriate maximum value from each drop down menu and the Jet Stream 500 software will scale the axis appropriately. Each graph can also be enabled or disabled to view only the desired data. When a graph is enabled, the data for the curve is graphically displayed on the screen. If a curve is disabled during a test, the data is still collected so it can be re displayed at a later time. Don't worry about setting up the axis before a test because the software will automatically adjust each axis if the data exceeds the scale. Once a test is finished, the axis can be altered to fill the display window.

## Test



### Stop Wind (S)

Set the wind speed to 0 MPH. Before adjusting the angle of attack or removing a model from the test area, be sure to return the wind speed to 0 MPH.

### Set Wind Speed (W)

Enter the desired wind speed from the keyboard. The wind speed will slowly ramp up or down to the selected wind speed. The set wind speed will then be maintained. If the wind starts from rest after a previous run, a dialog will appear asking if the graph should be cleared before restarting. Answering no will keep the old graph data and overwrite it with the new data as the wind speed increases. Wind speed regulation under 5 MPH may not regulate properly due to the limited control at low speeds.

### Increment Wind Speed (Page Up)

Increment the wind speed in 5 MPH increments (or 10 KPH) levels each time. The wind speed can increment up to the maximum allowed speed. Using the Up cursor arrow will increment the wind speed in 1 mph increments

### Decrement Wind Speed (Page Down)

Decrement the wind speed in 5 MPH increments (or 10 KPH) levels each time. The wind speed can decrement down to 0 MPH. Wind speed regulation under 5 MPH may not regulate properly due to the limited control at low speeds. Using the Down cursor arrow will decrement the wind speed by 1 mph.

### Enter Comments (E)

Enter up to 5 comment lines. The comments will be placed over the graph area as a reminder of the test parameters, student name date etc. Each comment line can contain up to 50 characters each. The comment information can be stored along with the graphed results when the data is stored to disk.

**Note:** After entering the first line of comments, press the TAB key to advance to the next comment line. When done, press the return key to place the comments on the graph.

### Clear Graph (C)

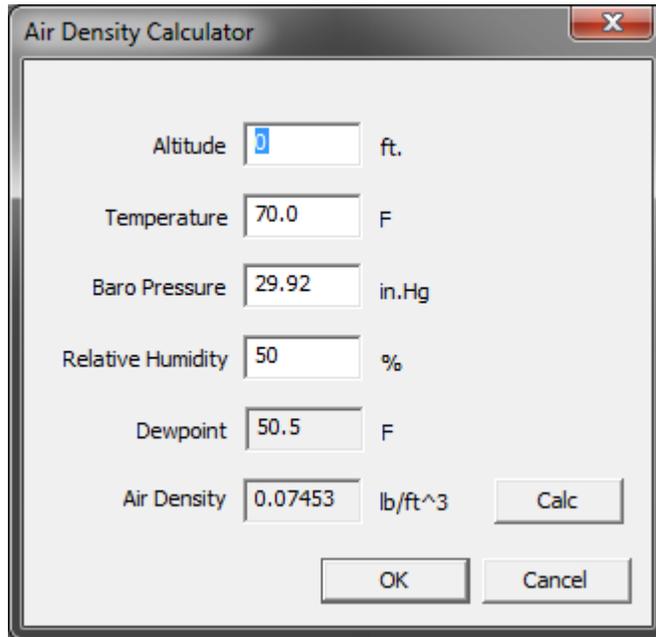
Clear the test data from the screen. This command will not clear the overlay data, use **Overlay Clear** to remove the overlay results.

### Configure

Changes the current test configuration. The display units can be changed between English (pounds, miles per hour and inches) or metric (kilograms, kilometers per hour and centimeters).

### Air Speed Density (D)

Calculates air density's and dew point based on altitude, temperature barometric pressure and relative humidity conditions. Air density impacts wind speed as well as the cross sectional drag coefficient (Cd) calculations. Adjusting these parameters to the actual conditions will adjust the air density accordingly and adjust the Jet Stream 500 wind tunnel temporarily (V6.00 and higher). Adjusting the altitude to a higher than actual elevation will decrease the air density which would reduce the fan power (V6.00 or higher) to demonstrate the impact of flying at higher altitudes.



The screenshot shows a dialog box titled "Air Density Calculator". It contains the following fields and values:

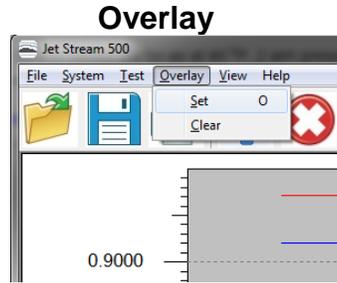
Field	Value	Unit
Altitude	0	ft.
Temperature	70.0	F
Baro Pressure	29.92	in.Hg
Relative Humidity	50	%
Dewpoint	50.5	F
Air Density	0.07453	lb/ft <sup>3</sup>

Buttons: Calc, OK, Cancel

The maximum wind speed can also be set to restrict higher speeds. Restricting the maximum wind speed helps keep the noise level to a minimum. A line can be added to the JET.INI file to place an absolute limit on the wind speed. Placing the line **ABSOLUTE MAX SPEED = 30** in the file will restrict the maximum wind speed to 30 MPH.

The cross sectional area can also be entered if the coefficient of drag (Cd) is to be calculated. Cd is a useful value that compares the measured drag on an object and compares it to the calculated drag of a flat vertical surface of the same size. The lower the Cd value, the easier the object moves through air. The higher the number, demonstrates a less efficient design. Measure the model's cross-sectional area (square inches in English units or square centimeters in metric) and enter the number in the Cd Area. As the wind speed increases, the model drag is measured and compared with the wind speed to calculate Cd. Each time a model is inserted or changed, the Cd Area should be updated so the calculated data is accurate. The Cd Area can be modified at any time and the graph will update to reflect the new value. Cd is based on the air density calculation. Modifying the air density parameters (see Air Density Calculator) will also have an impact on the Cd.

The display units and maximum wind speed are saved in a configuration file "JET.INI" located in the Windows directory so they can be restored even after the program is terminated. The display units are also saved along with the test results and restored when the results are read back from disk.



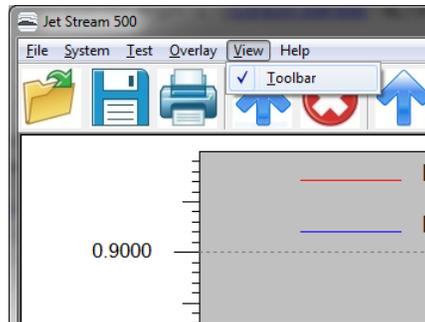
### Set (O)

Data from a previous test or disk file can overlay another test result so that visual comparisons can be made. This is useful to view variations between different test models because force vs. wind speed variations can be compared visually. To set an overlay, first display the first (overlay) data sample on the screen by performing a test or loading it from disk. Then select the Overlay Menu and select **Set** to copy the data into the overlay display. Be sure to save test data before setting it as an overlay because data sent to the overlay display can't be saved. The curve colors will change to reflect the overlay data. Next, perform another test or read the second data sample from diskette. You should be able to view the differences between the data samples by noting the variations between the two curves.

### Clear

To clear an overlay, select Clear from the Overlay Menu.

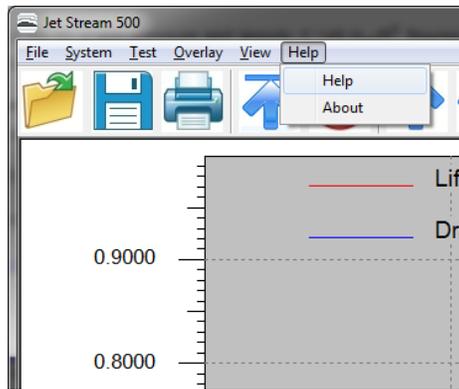
### View



### Toolbar

Enable or disable the toolbar.

## Help



### On Line Help (F1)

Displays the on line help Table of Contents.

### About Jet Stream

Displays about screen with Version Number and Copyright notice.

## Summary of the commands

### File

<b>Open</b>	Open a <b>JET</b> file on disk or network and read
<b>Save As</b>	Save test results and configuration to disk
<b>Print</b>	Print the current graphical data on the printer
<b>Print Preview</b>	Preview graphical data
<b>Print Setup</b>	Select printer and print orientation
<b>Exit</b>	Exit the program

### System

<b>Com Port</b>	Select the Jet Stream 500 test menu
<b>Axis</b>	Modify axis scales and enable/disable graphs

### Test

<b>Stop Wind (S)</b>	Stop Wind
<b>Set Wind Speed (W)</b>	Set desired wind speed
<b>Increment Wind Speed (Page Up)</b>	Increment wind speed by 5 MPH
<b>Decrement Wind Speed (Page Down)</b>	Decrement wind speed by 5 MPH
<b>Enter Comments (E)</b>	Enter comments on graph
<b>Clear Graph (C)</b>	Clear graph data
<b>Configure</b>	Configure test parameters
<b>Air Density Calculator (D)</b>	Calculate air density

### Overlay Menu

<b>Set</b>	Save current test results as overlay
<b>Clear</b>	Clear overlay data

### View

<b>Toolbar</b>	Enable or disable the tool bar
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### Help

<b>On Line Help (F1)</b>	Display on line help
<b>About Jet Stream</b>	Display software version

Other helpful keyboard and mouse commands that are not found in the Test Menu are as shown below:

#### **Keyboard Functions**

<b>Page Up</b>	Increase Wind Speed by 5 MPH (or KPH)
<b>Page Down</b>	Decrease Wind Speed by 5 MPH (or KPH)
<b>Cursor Up</b>	Increase Wind Speed by 1 MPH (or KPH)
<b>Cursor Down</b>	Decrease Wind Speed by 1 MPH (or KPH)
<b>Home</b>	Return wind speed to zero

#### **Mouse Functions**

**Double click on graph** Sets wind speed to position on the graph

## **Troubleshooting**

### **Communications Error**

- Verify the USB cable securely connected to the control panel and the computer's USB port.
- Check to see that the computer and Jet Stream 500 are powered from the same wall outlet
- Check the computers Device Manager to verify the Jet Stream 500 controller is recognized as a valid Port. If not, uninstall the USB driver and re-install the Windows program.
- Verify the Jet Stream 500 is powered up and ready (wind tunnel data cable is securely connected between the control panel and test bed). If not, power up the unit before starting the program.

### **Printer not printing graphics properly**

Check the printer configuration to be sure that the proper Windows printer driver is selected. Find the printer properties dialog box and print a test page.

### **Results appear to vary during test**

Be sure to allow time for the sensitive electronics to warm up before beginning your test. As the sensors come up to temperature, the data may vary. Also, be sure the tunnel is at room temperature (70° - 75° F) with little draft. Be sure the tunnel is on a stable, flat surface.

### **Communication Failure**

If this message is displayed, be sure that the USB cable is properly plugged in at both ends. If the message continues, un-install the Windows program and USB driver and re-install the latest version.

### **Limited Warranty**

Interactive Instruments, Inc. warrants the **Jet Stream 500 Control Program** and **USB cable** against defects in material and workmanship for a period of *one* year from receipt by the end user (*proof of purchase required*). If Interactive Instruments, Inc. receives notice of such defects during the warranty period, Interactive Instruments will either, at its option, repair or replace products which prove to be defective.

Should Interactive Instruments be unable to repair or replace the product within a reasonable amount of time, customer's alternative exclusive remedy shall be a refund of the purchased price upon return of the product.

If this product was purchased as part of a system in a coordinated shipment or as a system add-on, it is warranted against defects in material and workmanship during the same period as the system.

### **Exclusions**

***The above warranty shall not apply to defects resulting from:***  
improper or inadequate maintenance by customer; customer-supplied software or interfacing; unauthorized modification or misuse; operation outside of the environmental specifications for the product; or improper site preparation and maintenance.