

RACEBASE PRO

WEATHER, ET/TS, TUNE UP, & TEST/TUNE PROGRAM USE

IMPORTANT INFORMATION

This instruction is intended to explain the functions of the **Weather, ET/TS, Tune Up, and Test/Tune** program windows within the RaceBase Pro software. These programs can be used for manual data entry anytime. The software also provides automatic database information transfer for the **ET/TS, Tune Up, and Test/Tune** program windows when the database contains entries in the **Tracks, Events, Cars, and New Run** fields. See RaceBase Pro **Help** for instructions on how to add this data. **Predictions are calculated for the Car selected on the tool bar pull down (down arrow right of Car:).** Any number of cars may be tracked by changing the tool bar Car selection and opening another **ET/TS, Tune Up, or Test/Tune** window. The **ET/TS** programs for **Density Alt** and **Throttle Stop** require that a **Setup** function be done for each Car selected.

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PROGRAM DESCRIPTION AND OPERATION

Weather Calculator

PROGRAM OVERVIEW - This program computes the quality of the air in which you are racing. It is based on the air temperature in degrees Fahrenheit, the relative humidity in percent, and the absolute barometric pressure in inches of mercury, or pressure altitude in feet (depending on whether you are using a barometer or an altimeter). Subtle changes in any of these variables can have an impact on the performance of your car. This one program will provide you with: the HP Correction Factor, Density Altitude feet, Air Density percent, water Vapor Pressure In Hg, Dry Barometer pressure In Hg, Dew Point temperature degrees F, and Wet Bulb Temperature degrees F.

GOOD AIR and BAD AIR - Atmospheric conditions that make the air better for racing purposes are: lower temperature, lower humidity, and higher pressure. Conditions that make the air worse for racing purposes are: higher temperature, higher humidity, and lower pressure. Computech incorporates these weather variables in three different equations: Correction Factor, Density Altitude, and Air Density. The result of each of these formulas has an important function. The Correction Factor is utilized in the Standard Dial In, the Throttle Stop, the Test/Tune, and the Estimated Performance programs. The Density Altitude is used in the Density Altitude Dial In program, and finally the Air Density is used in the Tune Up programs.

Lower Correction Factor numbers, lower Density Altitude numbers and higher Air Density numbers all mean better air quality for racing purposes. The variables that cause the Correction Factor numbers and the Density Altitude numbers to decrease (smaller numerically) as well as the Air Density numbers to increase (larger numerically) are: a lower temperature, a lower relative humidity, a higher barometric pressure (as measured with a barometer), or a lower pressure altitude (as measured with an altimeter). Typically the Correction Factor will be between .98 (better) and 1.15 (worse); the Density Altitude will be between -300 ft (better) and 8,000 ft (worse); the Air Density will be between 85% (worse) and 103% (better).

You will see changes in these numbers when racing at one track on one weekend and traveling to different track on another weekend. You will also encounter changes at the same track between spring and summer weather conditions or between summer and fall weather conditions. The typical change in these values from the heat of the day to cool of the night would not be large. However, the program will compensate for changes in all of these variables, no matter how small, each time you run the program.

Remember, as the Correction Factor and the Density Altitude increase (larger numerically), performance will decrease resulting in slower elapsed times. As the Correction Factor and Density Altitude decrease (smaller numerically), performance will increase causing faster elapsed times. The lower the Air Density (smaller numerically) the leaner your jetting needs to be. And the higher the Air Density (larger numerically) the richer your jetting needs to be.

The water Vapor Pressure number that the computer gives you is already taken into account in the Correction Factor, the Density Altitude and the Air Density numbers. The water Vapor Pressure number tells you the portion of the available air pressure (measured in inches of mercury) that is actually water vapor which displaces the oxygen in the air. And as a result, is not available for combustion.

The Dry Barometer pressure is the actual air pressure available after the water Vapor Pressure has been removed.

The Dew Point temperature is calculated so that you can be aware of the point at which the water vapor in the air will turn to liquid water and form dew. This can cause inconsistent traction and, in certain circumstances, effect engine performance. The warmer the air the more water vapor it can hold. For example: We have an air sample with a given amount of water vapor. As the temperature lowers and reaches the dew point, the air sample can no longer hold the water vapor suspended, so it condenses and turns to liquid water. If you are using methanol fuel, our research has made us aware of the fact that when the ambient temperature falls to within 5 to 10 degrees of the dew point temperature there will be an unexpected slight fall off in performance due primarily to fuel degradation in the intake manifold that is caused by water

contamination. By keeping accurate records as to when the performance actually falls off in relation the outside temperature versus dew point temperature, you should be able to estimate when you need to compensate for this fall off in performance and change your dial in.

WEATHER INSTRUMENTS - To utilize the Weather Calculator program you must have a thermometer calibrated in degrees Fahrenheit, a hygrometer (percent relative humidity gauge) and a barometer calibrated in inches of mercury to absolute pressure, or an altimeter calibrated in feet with a barometric pressure standard of 29.92 inches of mercury. These instruments should be of a good quality to provide for best accuracy. **Important: Do not use broadcast barometric pressure data that is corrected to sea level.**

The thermometer and the hygrometer should be exposed to the air in a shaded area with free air movement around them. It is very important that they be in the shade and are getting a sample of air similar to that which the engine will receive on the run. This means that the sample should be taken over asphalt or concrete and at approximately the same height as your engine's air inlet. The barometer or altimeter can be kept and used in your trailer or your tow vehicle. Before reading the barometer or the altimeter you should lightly tap the glass dial to settle the needle and help it overcome any internal friction in its movement. **Important: Do not expose any of the instruments to extreme temperatures or direct sunlight.**

PROGRAM OPERATION - To start the *Weather Calculator*, open the RaceBase Pro program and click on the tool bar **Weather** icon. *Note: The Live Weather button is to be used with the Computech Weather Pro software and the RaceAir Remote sensing system for continuous automatic Weather updates.* Click on the **Manual Weather** button to activate the **Weather Calculator** window. Notice that the window has an upper **Input** group and a lower **Calculations** group. Using the information from the weather instruments, type the **Temperature** in the top **Input** box and press the keyboard **Tab** key. Type the **Humidity** and press **Tab**. Depending on what kind of pressure sensor you have, enter the **Barometric Pressure** or the **Pressure Altitude** in the indicated box and press **Tab** again. The weather related **Calculations** will appear in the lower half of the window.

For example: If the **Temperature** is 87 F. The **Humidity** is 54 %. And the **Barometric Pressure** is 30.25 In Hg. The **Pressure Altitude** box will show -303 ft. The **Calculations** group will show; **Corr. Factor:** 1.0384, **Density Alt:** 2147 Ft, **Air Density:** 93.90 %, **Vapor Pressure:** 0.698 In Hg, **Dry Barometer:** 29.55 In Hg, **Dew Point:** 68 F, and the **Wet Bulb Temp:** 73.5 F.

Keep the **Weather Calculator** window open. While the **Weather Calculator** window is open or minimized the calculated values will automatically be inserted into the correct boxes in the **ET/TS** and **Tune UP** windows. The automatically transferred values may be manually changed at any time while working in those windows.

Standard Dial In (ET Prediction)

PROGRAM OVERVIEW - This program has been designed to assist class and bracket racers to predict elapsed time for the next run based on changes in atmospheric conditions as calculated by the **Weather** program **Corr Factor** function. The program works for all length tracks and is compatible for use with either gasoline or methanol fuel. The **Dial In** is predicted from one previous reference run (no database of runs is used or required) and you get to decide the run on which to base your prediction. Your reference run should be your most recent good full run when the car performed as expected. Runs that incurred tire spin, unusual 60 ft. times, or unusual wind conditions should not be utilized for your reference run. You should change the run you use as your reference run as the race day goes on because it is important to use your most recent good full run for reference purposes as this will most likely represent current traction and atmospheric conditions.

This program works best when the engine's air to fuel mixture ratio is slightly on the rich side so that the vehicle's performance will change appropriately with the weather changes. This may require periodic jet changes during the course of the race season, but the benefits gained in consistency and predictability are well worth the effort. As a rule of thumb, if the vehicle runs quicker than the computer is predicting when the Correction Factor is improving (Correction Factor number is getting smaller) then the air to fuel mixture ratio is probably too rich and should be leaned slightly. Conversely, if the vehicle will not run as quick as the computer is predicting when the Air Correction Factor is improving then the air to fuel mixture is probably too lean and should be richened slightly. Efforts spent on getting your air to fuel mixture correct will be well worth the rewards in increased predictability.

PROGRAM OPERATION – On the RaceBase Pro data spreadsheet, click on the record for the run which is to be designated the reference run. The reference run will then be highlighted blue. Click on tool bar **Weather** icon and enter the current weather observations in the **Input** group. Click on the **ET/TS** icon. And then click the **Standard** box on the **Prediction** window. Make sure the **Old Correction** and the **Old ET** numbers match the desired reference run numbers. Make sure the **Weather Calculator** window **Corr Factor** number has transferred to the **Prediction** window **New Correction** box. The automatically transferred number in any white box can be manually changed at any time. Click the appropriate **Fuel Type** button, **Gas** or **Methanol**, and click the **Calculate Dial In** button. The predicted **Dial In** is shown in the yellow box. Notice that the predicted **Dial In** is given in thousands of a second. When the predicted **Dial In** is x.xx0 through x.xx3 you may want to dial down to the next lower number to avoid breaking out.

For example: Using a reference run with an **Old Correction** of 1.0503, an **Old ET** of 8.826 seconds, and if the **Temperature** is 87 F, the **Humidity** is 54 %, the **Barometric Pressure** is 30.25 In Hg. the **Corr. Factor** box will show 1.0384. Clicking the **Fuel Type Gas** button and then the **Calculate Dial In** button will show a predicted **Dial In** of 8.793 seconds. The Correction Factor is lower (better air) so the car will go a little quicker.

Density Altitude Dial In (ET Prediction)

PROGRAM OVERVIEW - This program has been designed to assist class and bracket racers to predict elapsed time for the next run based on changes in the **Weather Calculator Density Alt**. This program requires that the **ET/TS, Density Alt, Setup** function be run for each vehicle so that the program can calculate an elapsed time versus density altitude ratio. See the paragraph titled DA DIAL IN SETUP below. The **Density Altitude Dial In** is predicted from three previous runs that are selected in the **Density Altitude Dial In Setup** window and a recent reference run. You get to decide which reference run to use for your prediction. The program displays the ratio being used for density altitude versus elapsed time below the **Calculate Dial In** button.

Your reference run should be your most recent good, full run when the car performed as expected. Runs that incurred tire spin, unusual 60 ft. times, or unusual wind conditions should not be utilized for your reference runs. You should change the run you use as your reference run as the race day goes on because it is important to use your most recent good full run for reference purposes as this will most likely represent current traction and atmospheric conditions. Since this program utilizes runs in memory from your actual vehicle, it is compatible

with whatever fuel you are using.

This program works best when the engine's air to fuel mixture ratio is slightly on the rich side so that the vehicle's performance will change appropriately with the weather changes. This may require periodic jet changes during the course of the race season, but the benefits gained in consistency and predictability are well worth the effort. As a rule of thumb, if the vehicle runs quicker than the computer is predicting when the **Density Alt** is improving (number is getting lower) then the air to fuel mixture ratio is probably too rich and should be leaned slightly. Conversely, if the vehicle will not run as quick as the program is predicting when the **Density Alt** is improving then the air to fuel mixture is probably too lean and should be richened slightly. Efforts spent on getting your air to fuel mixture correct will be well worth their rewards in increased predictability.

DA DIAL IN SETUP - Prior to using the **Density Altitude Dial In** program you must first run the **Density Altitude Dial In Setup** function. The **Density Altitude Dial In** is predicted from three previous runs that are selected in the **Density Altitude Dial In Setup** window. The runs you select in the **Density Altitude Dial In Setup** should all be good, full hard runs with at least 100 feet of difference in density altitude between any two runs. This will allow the program to calculate the amount of elapsed time change your vehicle experiences in comparison to the respective change in the density altitude.

These three baseline runs should be made on the same day, preferably in the same lane so that the traction conditions will be similar. It is likely that you will have to make five or six runs to get three good runs for use in this **Setup** function. Enter the baseline runs in the RaceBase Pro database. Make sure you include the weather conditions for each run. When comparing all of your runs make certain that the 60 foot times are within a hundredth of a second of each other. Also, make certain that as the **Density Alt** gets higher, the vehicle elapsed time slows down. Conversely, as the **Density Alt** gets lower the vehicle elapsed time should get quicker.

To run the **Density Altitude Dial In Setup** function, click on the **ET/TS** icon to open the **Prediction** window. Click the **Density Alt** button then the **Setup** button. The **Density Altitude Setup** window has a top and a bottom section. The bottom section shows the database **Available Runs**. Click on a qualified **Available Runs** entry to select for transfer to the top **Saved Setup Runs** section. A selected run will be highlighted blue. Click the **Save Highlighted Run As Setup Run** button. The selected run will transfer to the top **Saved Setup Runs** section. Repeat this process until three runs are in the top section. A **Saved Setup Runs** entry may be deleted at anytime by highlighting the run and clicking the **Delete Highlighted Setup Run** button. Three runs must appear in the top **Saved Setup Runs** section in order to use the **Density Altitude Dial In** program. You may go back to verify or change your inputs in this **Setup** function at any time.

This **Setup** function may be run as often as you desire or whenever the accuracy of the program is not up to par. If you are using the **Density Altitude Dial In** program to perform predictions for multiple vehicles, the entire **Setup** function must be repeated for each vehicle. See RaceBase Pro **Help** for instructions on how to add other **Car** data.

Important: Whenever changes are made that effect vehicle performance, including jet changes, this program should be run again to maintain accuracy. Remember, the Density Altitude Dial In program accuracy can only be as good as the information you put into the Setup function.

PROGRAM OPERATION – On the RaceBase Pro data spreadsheet, click on the recorded entry for the run which is to be designated the reference run. The reference run will then be highlighted blue. Click on tool bar **Weather** icon and enter the current weather observations in the **Input** group. Click on the **ET/TS** icon. And then click the **Density Alt** box on the **Prediction** window. Make sure the **Last Run DA** and the **Last Run ET** numbers match the desired reference run numbers. Make sure the **Weather Calculator** window **Density Alt** number has transferred to the **Prediction** window **New DA** box. The automatically transferred number in any white box can be manually changed at any time. Click the **Calculate Dial In** button. The predicted **Dial In** is shown in the yellow box. Notice that the predicted **Dial In** is given in

thousands of a second. When the predicted **Dial In** is x.xx0 through x.xx3 you may want to dial down to the next lower number to avoid breaking out.

For example: Using a reference run with a **Last Run DA** of 1,925 feet, a **Last Run ET** of 8.953 seconds, and if the **Temperature** is 87 F, the **Humidity** is 54 %, the **Barometric Pressure** is 30.25 In Hg. the **New DA** box will show 2,147 feet. Click the **Calculate Dial In** button to show a predicted **Dial In** of 8.968 seconds. The **Density Alt** is higher (worst air) so the car will go a little slower.

Throttle Stop Timer (TS Prediction)

PROGRAM OVERVIEW - This program has been designed to assist super class racers to predict the throttle stop timer settings for the next run based on changes in the **Weather** program **Corr Factor** function. This program requires that the **ET/TS, Throttle Stop, Setup** function be run for each vehicle so that the program can calculate an elapsed time versus throttle stop timer setting ratio. See the paragraph titled TS SETUP below. The program works for all length tracks and is compatible for use with either gasoline or methanol fuel. Gasoline and methanol respond differently to changes in atmospheric conditions, so you must select the **Fuel Type** that you are using when you run the **Throttle Stop** program. The **Setup** function must be redone if you change fuels. The program displays the ratio being used for ET versus timer setting below the **Calculate Timer** button. Timer settings are then predicted from the two runs that are selected in the **Throttle Stop Setup** function and one current reference run. You get to decide which reference run to use for your prediction.

Your reference run should be your most recent good, full run when the car performed as expected. Runs that incurred tire spin, unusual 60 ft. times, or unusual wind conditions should not be utilized for your reference run. You should change the run you use as your reference run as the race day goes on because it is important to use your most recent good, full run for reference purposes as this will most likely represent current traction and atmospheric conditions.

This program works best when the engine's air to fuel mixture ratio is slightly on the rich side so that the vehicle performance will change appropriately with the weather changes. This may require periodic jet changes during the course of the race season, but the benefits gained in

consistency and predictability are well worth the effort. As a rule of thumb, if the vehicle runs quicker than the program is predicting when the **Corr Factor** is improving (number is getting smaller) then the air to fuel mixture ratio is probably too rich and should be leaned slightly. Conversely, if the vehicle will not run as quick as the program is predicting when the **Corr Factor** is improving then the air to fuel mixture is probably too lean and should be richened slightly. Efforts spent on getting your air to fuel mixture correct will be well worth their rewards in increased predictability.

TS SETUP – Before you can run the **ET/TS Throttle Stop** program you must first provide information on how your vehicle works with your throttle stop. Most current throttle stop timers on the market utilize two timers in the same unit. The first timer typically will allow the throttle to remain wide open for some period of time and the second timer will then close the throttle for a period of time. This program assumes that once you have found a setting that is appropriate for the first timer, you will leave it set there. If at any time you change the time on the first timer, you will have to repeat this **Setup** procedure. The program also assumes that the more time you put into the second timer, the slower the car will run (higher elapsed time).

To allow the program to calculate the relationship between timer settings and elapsed times, you will need to provide the **Corr Factor**, elapsed time, and throttle stop timer duration information from two runs. One of these runs should be made with a throttle stop timer setting that will allow the vehicle to run approximately one tenth of a second faster than your target index. The other run should be made with a throttle stop timer setting that will allow the vehicle to run approximately one tenth of a second slower than your target index. For example, if your target index is 8.90 seconds, then you should attempt to make one run with an elapsed time of approximately 8.80 seconds and a second run with an elapsed time of approximately 9.0 seconds. These runs should be made on the same day, preferably in the same lane and within an hour or so of each other so that the traction and weather conditions are similar. It is likely that you will have to make five or six runs to get two good ones for use in this **Setup** function.

Enter the baseline runs in the RaceBase Pro database; click on the tool bar **New Run** icon then click **Run Setup** in the **New Run** window. Under **Throttle Stop**, enter the first timer setting in the **1** box and the second timer setting in the **2** box. Make sure you include the weather conditions for each run.

To run the **Throttle Stop Setup** function, click on the **ET/TS** icon to open the **Prediction** window. Click the **Throttle Stop** button then the **Setup** button. The **Throttle Stop Setup** window has a top and a bottom section. The bottom section shows the database **Available Runs**. Click on a qualified (faster) **Available Runs** entry to select for transfer to the top **Saved Setup Runs** section. A selected run will be highlighted blue. Click the **Save Highlighted Run As Setup Run** button. The selected run will transfer to the top **Saved Setup Runs** section. Repeat this process for the second (slower) run. A **Saved Setup Runs** entry may be deleted at anytime by highlighting the run and clicking the **Delete Highlighted Setup Run** button. Two runs must appear in the top **Saved Setup Runs** section in order to use the **Throttle Stop** program. You may go back to verify or change your inputs in this **Setup** function at any time.

This **Setup** procedure may be run as often as you desire or whenever the accuracy is not up to par. If you are using the **Throttle Stop** program to perform predictions for multiple vehicles, the entire **Setup** function must be repeated for each vehicle. See RaceBase Pro **Help** for instructions on how to add other **Car** data.

Important: Whenever you change the setting on the first timer or change anything in your combination that affects the performance of the vehicle, you must repeat this procedure.

PROGRAM OPERATION - On the RaceBase Pro data spreadsheet, click on the record for the run which is to be designated the reference run. The reference run will then be highlighted blue. Click on tool bar **Weather** icon and enter the current weather observations in the **Input** group. Click on the **ET/TS** icon. And then click the **Throttle Stop** box on the **Prediction** window. Make sure the **Old Timer**, **Old Corr**, and the **Old ET** numbers match the desired reference run numbers. Make sure the **Weather Calculator** window **Corr Factor** number has transferred to

the **Prediction** window **New Corr** box. The automatically transferred number in any white box can be manually changed at any time. Click on the **Desired ET** white box and enter the target ET. Select the appropriate **Fuel Type** by using the roll down arrow. Finally, click the **Calculate Timer** button. The predicted **New Timer** setting is shown in the yellow box. Most throttle stop timers do not allow you to set the time to a thousandth of a second so you will have to round off the timer setting as necessary.

For example: Using a reference run with an **Old Timer** setting of 1.42 seconds, an **Old Corr** of 1.0476, an **Old ET** of 8.953 seconds, and if the **Temperature** is 87 F, the **Humidity** is 54 %, the **Barometric Pressure** is 30.25 In Hg, the **New Corr** will show 1.0384. Click on the **Desired ET** box and enter 8.90 seconds. Select the **Fuel Type** as **Gas**. Click the **Calculate Timer** button to show a predicted **New Timer** setting of 1.337 seconds.

Run Completer (ET Prediction)

PROGRAM OVERVIEW - This program will predict what the elapsed time and mph would have been on a run that was aborted prior to the finish line. In break-out classes it is a common practice to lift off of the throttle or to brake the vehicle prior to the finish line in an effort to take only enough win light to get there first and to avoid the possibility of breaking out. To utilize this program you will need the 1000 foot elapsed time, the 1/4 mile elapsed time, and the 1/4 mile MPH from a previous full run. You also need the 1000 foot elapsed time from the aborted run. The program will also work for 1/8 mile racing if you substitute the 330 foot elapsed time for the 1000 foot elapsed time, the 1/8 mile elapsed time for the 1/4 mile elapsed time, and the 1/8 mile mph for the 1/4 mile MPH.

PROGRAM OPERATION - On the RaceBase Pro data spreadsheet, click on the record for the run which is to be used as the previous full reference run. The reference run will then be highlighted blue. Click on the **ET/TS** icon. And then click the **Run Comp** box on the **Prediction** window. Make sure the **Old Interim ET**, the **Old Full ET**, the **Old Full MPH** numbers match the desired reference run numbers. The automatically transferred number in any white box can be manually changed at any time. Click on the **New Interim ET** white box and enter the aborted run 1000 foot ET. Finally, click the **Calculate** button. The **Estimated ET** and **Estimated MPH** is shown in the yellow box.

For example: Using a reference run with an **Old Interim ET** of 7.463 seconds, an **Old Full ET** of 8.916 seconds, an **Old Full MPH** of 154.26, and a **New Interim ET** of 7.421 seconds the new **Estimated ET** is 8.866 seconds and the new **Estimated MPH** is 155.13.

Tune Up Basics

In order for any of the jetting programs to be utilized you must establish a baseline tune up which includes a baseline **Air Density** (see the **Weather Calculator** for details) and baseline jet to work from. Once you have a baseline tune up established for a particular engine combination, the jet change programs will help you decide when it is time to change your carburetor jets or your fuel injection bypass jet (pill). The lower the **Air Density**, the leaner the jetting needs to be, and the higher the **Air Density**, the richer the jetting needs to be.

BASELINE TUNE UP - To establish a baseline tune up, go to the track with the car in a known state of tune. Make a full hard run and record the jet size (or sizes) used, the **Air Density**, the elapsed time, and the MPH.

CAUTION: Monitor the engine exhaust gas temperature, oxygen sensor readings, air/fuel ratio indication, etc., and, most importantly, take spark plug readings during this entire process to make certain that the air/fuel mixture ratio does not become too lean. Severe engine damage can be caused by excessively lean mixtures.

Now, lean the jet (or jets) down one size, make another full hard run and repeat the process of recording the jet (or jets) size, **Air Density**, elapsed time, and MPH. Inspect the spark plugs, exhaust ports, etc. carefully for signs of detonation or other indications that the air/fuel mixture ratio may be too lean. Assuming there are no signs of being too lean and the car picked up MPH on the last run, repeat the entire procedure again with the jet (or jets) one size leaner. Continue this testing until the MPH slows down or the engine shows signs of the air/fuel mixture ratio being too lean. At that point richen the jet (or jets) one size if you are tuning for peak performance or two sizes if you are tuning for ET classes (bracket racing). The jet (or jets) and the **Air Density** that you have at that time will become your baseline tune up. After you have established your baseline tune up, make some additional runs to verify the repeatability of the elapsed time and the MPH. Record your baseline tune up information for future reference. Future jetting changes can be calculated from this baseline.

CHANGING JETS - Use the **Holley Jet**, **Precision Jet**, or **Fuel Injection** program windows whenever there is a significant change in weather conditions or when you go to a different track to ensure that your jetting is correct. Remember, your car will run more consistently and be more predictable when properly jetted. If you don't make any changes in your combination, such as ignition timing, valve lash, camshaft, carburetor, headers, fuel pump, fuel lines, fuel, etc., you should be able to use your baseline tune up for a long time. It is, however, recommended that you rerun your baseline tune up testing two or three times during the course of the season to verify proper jetting.

Important: Anytime you suspect your tune up is slightly rich or slightly lean you can utilize the *Tune Adjust %* box in any of the jetting programs to make adjustments to the tune up by changing fuel flow one or two percent at a time (i.e. +2 for richer, -2 for leaner).

Holley Jet Change (Tune Up)

PROGRAM OPERATION - The **Holley Jet** change program is designed to work with Holley carburetor jets from #50 through #100. The program utilizes actual jet flows as opposed to drill sizes when making the computations. Utilizing modified jets will impact the accuracy of this program.

Important: Use only unmodified Holley flowed jets with this program.

Having established a baseline tune up, you can use this program to keep your Holley carburetor jetted as close to your baseline tune up as possible. Store the baseline tune up for the car; click the tool bar **Cars** icon, enter the vehicle data. Click the **Carb, Carburetor** button and the **Fuel, Gas** button.

Important: The *Holley Jet Change* program will not make accurate predictions for methanol or nitromethane fuels. The *Precision Jet* program can be used for carburetors with a single orifice main metering system using fuels other than gasoline.

Click the **Base Setup** button and then the **Holley Jet** button. Enter the **Base ADR** and **Base Jet #** in the appropriate boxes. Click **Save and Close** to record your baseline tune up.

To use the **Holley Jet** Change program open the **Weather** window; click on the **Manual Weather** box and enter the current weather observations in the **Input** group. Click the tool bar **Tune Up** icon then click the **Holley Jet** box on the **Tune Up** window.

Make sure the **Base ADR** and the **Base Jet #** values match the baseline tune up values. Make sure the **Weather Calculator** window **Air Density** number has transferred to the **Holley Jet**

Change window **New ADR** box. The automatically transferred number in any white box can be manually changed at any time. Enter a 0 in the **Tune Adjust %** box to maintain the same air/fuel ratio as the baseline tune up. Click the **Calculate** button. The predicted new Holley jet # is shown in the **New Jet** yellow box.

For example: For a baseline tune up of 99.21 **Base ADR**, with an 88 **Base Jet #**, a **Temperature** of 87 F, a **Humidity** of 54 %, a **Barometric Pressure** of 30.25 In Hg, and a **Tune Adjust %** of 0, the calculated **New Jet** is 86.3. Obviously, Holley does not make a #86.3 jet, so you will need to decide whether to put in a #86 or a #87. When in doubt - always go richer. If you use different size primary and secondary jets, or if you stagger jet sizes, you will need to run the program for each different size jet you are using to properly adjust the jetting.

CAUTION: Monitor the engine exhaust gas temperature, oxygen sensor readings, air/fuel ratio indication, etc., and, most importantly, take spark plug readings during this process to make certain that the air/fuel mixture ratio does not become too lean. Severe engine damage can be caused by excessively lean mixtures.

Precision Jet Change (Tune Up)

PROGRAM OPERATION - The Precision Jet Change program is designed to work with precision drilled/reamed and flowed jets. Hand drilled jets are not accurate enough for highly precise fuel metering.

Important: Using modified jets will impact the accuracy of this program. The Precision Jet program can be used for any carburetor with a single orifice main metering system (i.e. one main jet per venturi or barrel). Methanol carbs that use multiple main metering orifices for the same barrel cannot be tuned using this method.

Having established a baseline tune up, you can use this program to keep your carburetor jetted as close to your baseline tune up as possible.

Store the baseline tune up for the car; click the tool bar **Cars** icon, enter the vehicle data. Click the **Carb, Carburetor** button and the appropriate **Fuel** button (**Gas** or **Methanol**). Click the **Base Setup** button and then the **Precision Jet** button. Enter the **Base ADR** and **Base Jet Diameter** in the appropriate boxes. Be sure to use a decimal point to correctly define the jet diameter (i.e. 0.095). **The program will correctly predict jet diameters using inches or millimeters units.** Click **Save and Close** to record your baseline tune up.

To use the **Precision Jet Change** program, open the **Weather** window; click on the **Manual Weather** box and enter the current weather observations in the **Input** group. Click the tool bar **Tune Up** icon then click the **Precision Jet** box on the **Tune Up** window. Make sure the **Base ADR** and the **Base Jet Diameter** values match the baseline tune up values. Make sure the **Weather Calculator** window **Air Density** number has transferred to the **Precision Jet Change** window **New ADR** box. The automatically transferred number in any white box can be manually changed at any time. Enter a 0 in the **Tune Adjust %** box to maintain the same air/fuel ratio as the baseline tune up. Click the **Calculate** button. The predicted **New Jet Diameter** is shown in the yellow box.

For example: For a baseline tune up of 99.21 **Base ADR**, with a 0.095 **Base Jet Diameter**, a **Temperature** of 87 F, a **Humidity** of 54 %, a **Barometric Pressure** of 30.25 In Hg, and a **Tune Adjust %** of 0, the calculated **New Jet Diameter** is 0.092.

You may not have the jet diameter that the program calls for. When in doubt - always go richer. If you use different size primary and secondary jets, or if you stagger jet sizes, you will need to run the program for each different size jet you are using to properly adjust the jetting.

CAUTION: Monitor the engine exhaust gas temperature, oxygen sensor readings, air/fuel ratio indication, etc., and, most importantly, take spark plug readings during this process to make certain that the air/fuel mixture ratio does not become too lean. Severe engine damage can be caused by excessively lean mixtures.

Fuel Injection Jet Change (Tune Up)

PROGRAM OVERVIEW - This program is designed to work with mechanical fuel injection systems utilizing precision drilled/reamed and flowed bypass jets (pills). The use of jets other than this type will affect the accuracy of the program. Having established a baseline tune up, you can use this program to keep your fuel injection system jetted as close to your baseline tune up as possible.

FI SETUP - The FI program needs to know the total fuel nozzle area that you had for the baseline tune up in order to make accurate predictions for main bypass jet changes. After entering information for **Events** and **Cars**, click **New Run**. See RaceBase Pro Help for information on these screens. In the **New Run** window, click the **Fuel Setup** tab. When Fuel Injection has been selected in the **Cars** window, a listing of typical nozzle locations will appear. Click on a **Nozzle Selector** location button. Enter all the nozzle orifice sizes used at that location; click on a nozzle location box, enter the nozzle size and hit the keyboard **Tab** key. Be sure to use a decimal point to correctly define the jet diameter (i.e. 0.050). When you have entered all the nozzles at that location, the total nozzle area for that location will appear in the **Area** box. Write this number down. Repeat the nozzle entry process for each nozzle location. When all the nozzle sizes have been entered, add up the nozzle **Area** numbers noted for each location.

Important: The program does not calculate the total engine nozzle area for all nozzle locations. However, using this method the nozzle sizes and locations are recorded in the RaceBase Pro database for future reference. Anytime a nozzle is changed, the area must be retotaled.

Store the baseline tune up for the car; click the tool bar **Cars** icon, enter the vehicle data. Click the **Fuel Injection** button and the appropriate **Fuel** button (**Gas**, **Methanol**, or **Nitro**). Click the **Base Setup** button and then the **Fuel Injection** button. Enter the baseline **Nozzle Area**, **Base ADR**, **Base Bypass Pill** diameter, and the supercharger/turbocharger **Base Boost** psi in the appropriate boxes. Be sure to use a decimal point to correctly define the jet diameter (i.e. 0.050). Click **Save and Close** to record your baseline tune up.

PROGRAM OPERATION - To use the **Fuel Injection Jet Change** program, open the **Weather** window; click on the **Manual Weather** box and enter the current weather observations in the **Input** group. Click the tool bar **Tune Up** icon then click the **Fuel Injection** box on the **Tune Up** window. Make sure the baseline **Nozzle Area**, **Base Bypass Pill**, **Base ADR**, and **Base Boost** numbers match the baseline tune up values. Make sure the **Weather Calculator** window **Air Density** number has transferred to the **Fuel Injection Jet Change** window **New ADR** box. The automatically transferred number in any white box can be manually changed at any time. Enter the **New Boost** psi manifold pressure you expect (normally, this will be the baseline boost unless the blower or turbo setup is changed) and press the keyboard **Tab** key. Enter a 0 in the **Tune Adjust %** box to maintain the same air/fuel ratio as the baseline tune up. Click the **Calculate** button. The predicted **New Bypass Pill** jet diameter is shown in the yellow box.

For example: For a baseline tune up of 0.015786 **Nozzle Area**, 0.070 **Base Bypass Pill**, 99.21 **Base ADR**, 15 psi **Base Boost**, a **Temperature** of 87 F, a **Humidity** of 54 %, a **Barometric Pressure** of 30.25 In Hg, a **New Boost** of 15 psi, and a **Tune Adjust %** of 0, the calculated **New Bypass Pill** diameter is 0.079.

You may not have the jet diameter that the program calls for. When in doubt - always go richer (smaller diameter bypass jet).

CAUTION: Monitor the engine exhaust gas temperature, oxygen sensor readings, air/fuel ratio indication, etc., and, most importantly, take spark plug readings during this process to make certain that the air/fuel mixture ratio does not become too lean. Severe engine damage can be caused by excessively lean mixtures.

Calculate Nozzle Area (for Fuel Injection Program)

PROGRAM OVERVIEW – The **Calc Area** program will quickly calculate the square area of round orifices such as jets, pills and nozzles. Varied quantities and diameters are easily handled. An equivalent diameter for the total square area is also provided. The calculated values are not stored in the RaceBace Pro database. Write down any calculated values you want to save. See the paragraph titled FI SETUP in the Fuel Injection Jet Change (Tune Up) section for instructions on how to store fuel injection program nozzle areas.

PROGRAM OPERATION – On the tool bar, click **Tune Up** then, on the **Tune Up** window, click **Calc Area**. Use the nozzle location roll down below the **Calculate Nozzle Area** heading to select what nozzles are being calculated. Enter a nozzle or jet diameter in a box and hit the keyboard **Tab** key. Be sure to use a decimal point to correctly define the jet diameter (i.e. 0.050). The yellow **Area** box will show the total area for all the orifices shown. The yellow **Equivalent Diameter** box will show a single orifice diameter that is equal to all the orifices in the boxes.

Standard Day Correction (Test/Tune)

PROGRAM OVERVIEW – The **Std Day** program corrects the elapsed time and MPH for any run to Standard Day conditions. A Standard Day is one with a 1.0000 **Corr Factor** based on a 60 degree F temperature, 0 % relative humidity, and a 29.92 In Hg barometric pressure at sea level. This allows you to compare runs, even those made on different days, as if the weather conditions were all the same. You are then able to see if changes made in your tune up and/or chassis set up actually changed the performance. Often times changes in performance are mistakenly attributed to changes in the tune up or chassis set up of the vehicle when, in fact, changes in the weather may have been responsible for the change in performance.

PROGRAM OPERATION - To use this program click the tool bar **Test/Tune** icon.

Important: Gasoline and methanol respond differently to changes in the atmospheric conditions. Make sure you select the proper fuel type in the *Int Time Analysis* window.

On the **Test/Tune Programs** window, click the **Int Time** box. Select the appropriate **Fuel Type** by clicking on the **Gas** or **Methanol** button. Click on the **Std Day** box. Enter the information from the run that you are trying to correct to **Std Day** performance. Click on the **Corr** white box, enter the number and press the keyboard **Tab** key. Enter the **E.T.** and press **Tab**. And enter the **MPH** value. Click the **Calculate** box to see the **Std E.T.** and the **Std MPH** in the yellow boxes.

For example: For a **Corr** of 1.0432, an **E.T.** of 8.258 seconds, a **MPH** of 160.42, and the Methanol button selected on the **Int Time** window, the **Std E.T.** is 8.19 seconds and the **Std MPH** is 161.8.

Intermediate Time Analysis (Test/Tune)

PROGRAM OVERVIEW - This program corrects all of the intermediate times for any run to Standard Day conditions. A Standard Day is one with a 1.0000 **Corr Factor** based on a 60 degree F temperature, 0 % relative humidity, and a 29.92 In Hg barometric pressure at sea level. This allows you to compare runs, even those made on different days, as if the weather conditions were all the same. You are then able to note subtle differences between runs and isolate exactly when during the run a problem may have occurred. This allows you to make appropriate chassis and/or tune up adjustments with greater confidence. You can also detect other problems that occurred on the run, such as inconsistent traction, head or tail winds, etc. Often, changes in performance are mistakenly attributed to changes in the tune up or chassis set up of the vehicle when, in fact, changes in the weather may have been responsible for the change in performance.

PROGRAM OPERATION – To use this program click the tool bar **Test/Tune** icon. Then on the **Test/Tune Programs** window, click on the **Int Time** box. Enter the information from the run that you are trying to analyze. Click on the **Corr** white box, enter the number and press the keyboard **Tab** key. Click on the appropriate **Fuel Type** button and press **Tab**. Enter the **60' E.T.**, **330' E.T.**, **660' E.T.**, **1000' E.T.**, and the **1320' E.T.** Remember to press the keyboard **Tab** key after each entry. Click the **Calculate** box

For example: For a **Corr** of 1.0262, on **Methanol**, with a **60' E.T.** of 1.236 seconds, a **330' E.T.** of 3.469 seconds, a **660' E.T.** of 5.339 seconds, a **1000' E.T.** of 6.959 seconds, and a **1320' E.T.** of 8.330 seconds, the Intermediate Times corrected to Standard Day conditions are; 1.230, 3.452, 5.312, 6.924, and 8.288.

Estimated Horsepower (Test/Tune)

PROGRAM OVERVIEW – The **Est HP** program computes the estimated engine horsepower based on 1/8 mile or 1/4 mile elapsed time and vehicle weight. There is also a **Corrected HP** box provided to correct the calculated horsepower to Standard Day conditions to compensate for atmospheric conditions.

PROGRAM OPERATION - To use this program click the tool bar **Test/Tune** icon. Then on the **Test/Tune Programs** window, click on the **Est HP** box. Enter the information from the run that you want to use to calculate HP. Click on the **Corr** white box, enter the number and press the keyboard **Tab** key. Enter the **E.T.** and press the **Tab** key. Enter the car **Weight** and press the **Tab** key. Select the **Run 1/4 Mile** or **1/8 Mile** button. Click the **Calculate** button to see the **Estimated HP** and the **Corrected HP** in the yellow boxes.

For example: For a **Corr** of 1.0567, an **E.T.** of 9.58 seconds, a car **Weight** of 2350 pounds, a **Run** of **1/4 Mile**, the **Estimated HP** is 528 and the **Corrected HP** is 557.

Estimated ET (Test/Tune)

PROGRAM OVERVIEW - This program calculates the estimated elapsed time and MPH for 1/8 and 1/4 mile drag runs. It is based on estimated horsepower and vehicle weight. The program allows you to quickly see what effect changes in the vehicle weight or available horsepower will mean to elapsed time and MPH.

PROGRAM OPERATION - To use this program click the tool bar **Test/Tune** icon. Then on the **Test/Tune Programs** window, click on the **Est E.T.** box. Enter the **Est HP** and press the keyboard **Tab** key. Enter the total vehicle **Weight**, including driver. Click the **Calculate** button to see the estimated **1/8 Mile ET**, **1/8 Mile MPH**, **1/4 Mile ET**, and **1/4 Mile MPH** performance in the yellow boxes.

For example: For an Est HP of 725 and an Est Weight of 2200 pounds, the predicted performance is 5.355 for **1/8 Mile ET**, 132.54 for **1/8 Mile MPH**, 8.430 for **1/4 Mile ET**, and 161.63 for **1/4 Mile MPH**.