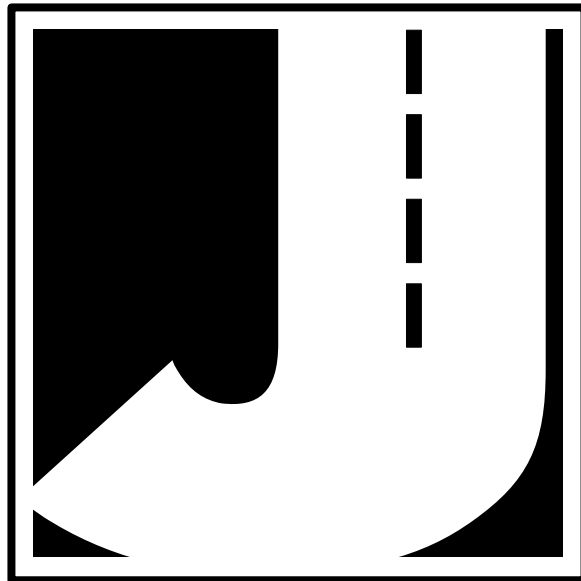


# PC-TRAVEL<sup>for</sup> Windows<sup>®</sup>

*Travel Time and Delay Analysis Software*



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**877-603-5844**

**Monday – Friday 8:00 AM to 4:30 PM Eastern time**

You may also contact us by fax at:

**1-215-491-4889**

or via e-mail at:

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For more information on our products, the latest news in product development, and to download software updates, visit our web site at:

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For information on all known issues with PC-Travel for Windows, go to:

**[www.jamartech.com/PCT4Wsupport.htm](http://www.jamartech.com/PCT4Wsupport.htm)**

Address any correspondence to:

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# Table of Contents

<b>Technical Support .....</b>	<b>iii</b>
<b>Chapter 1 — Introduction and Definitions .....</b>	<b>1.1</b>
Computer Requirements .....	1.2
Software Updates .....	1.2
Definitions .....	1.3
<b>Chapter 2 — How to Install &amp; Run PC-Travel for Windows .....</b>	<b>2.1</b>
Installation Procedures .....	2.2
How to Run PC-Travel for Windows .....	2.5
<b>Tutorial 1 — Introduction to PC-Travel for Windows .....</b>	<b>T1.1</b>
Startup Options .....	T1.4
Select Study .....	T1.5
Study Summary .....	T1.6
Run Details .....	T1.7
Node Distances .....	T1.9
Study Statistics .....	T1.11
Study Plots .....	T1.13
Reports .....	T1.14
Report Options .....	T1.15
<b>Tutorial 2 — How to do a Fixed-Route Travel Time Study .....</b>	<b>T2.1</b>
Define the Route .....	T2.2
Prepare the Field Worksheet .....	T2.2
Connect the TDC-8 to the Test Vehicle .....	T2.3
Calibrate the TDC-8 .....	T2.4
Prepare the TDC-8 .....	T2.5
Start a Run .....	T2.5
Stop the Run .....	T2.6
Make More Runs .....	T2.6
<b>Tutorial 3 — How to Process Run Data From a TDC-8 .....</b>	<b>T3.1</b>
Enter Base Name in Template .....	T3.4
Select Runs then Click Rename .....	T3.4
How to Select a Run to Edit .....	T3.6
<b>Tutorial 4 — How to Create a New Study .....</b>	<b>T4.1</b>
<b>Tutorial 5 — How to Edit Node Distances in Individual Runs .....</b>	<b>T5.1</b>
Situation 1: Normal scenario where you enter the node names for runs you just downloaded .....	T5.3
Situation 2: Your run has a missing or extra node and you want to fix it .....	T5.4
Situation 3: All of the runs were started and/or ended at different places (which is ok) .....	T5.6

<b>Tutorial 6 — How to Find Node Distances in Your Study .....</b>	<b>T7.1</b>
Use Node Data From Runs .....	T6.2
<b>Tutorial 7 — How to Edit Sensor Data .....</b>	<b>T6.1</b>
De-Spike Data .....	T7.3
Smooth Data .....	T7.4
Edit Data .....	T7.5
How Does Data Get Spikes? .....	T7.6
How can you avoid noisy sensor problems? .....	T7.6
<b>Tutorial 8 — How to Export Study and Run Statistics to a Spreadsheet .....</b>	<b>T8.1</b>
Export Path .....	T8.3
Export File Base Name .....	T8.3
Select Items to Include in Export .....	T8.3
Study & Run Stats: Excel Format .....	T8.5
Study & Run Stats: Tab Delimited Format .....	T8.6
<b>Tutorial 9 — How to Convert PC-Travel for DOS Studies .....</b>	<b>T9.1</b>
<b>Appendix .....</b>	<b>A.1</b>
Appendix 1 — Descriptions of the Preferences Options .....	A.2
Appendix 2 — How Distances are Measured .....	A.10
Appendix 3 — Utilities .....	A.12
Appendix 4 — Notes on Fuel and Emissions .....	A.18
Appendix 5 — Field Worksheet.....	A.20

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# Chapter 1

## Introduction and Installation

## Introduction & Definitions

Welcome to PC-Travel for Windows, a JAMAR Technologies software program designed to process travel time and delay data. Travel time and delay analysis is a complicated subject and we have not tried to oversimplify it at the expense of the experienced user who wants to get as much from the analysis as possible; yet we have tried to make the software easy to use, even for the occasional user.

This Reference Manual is for PC-Travel for Windows version 1, which among other things assumes that all travel time data is collected using a JAMAR TDC-8 count board connected to a transmission sensor installed in a test vehicle. Other data collection options may be added at a later date.

This guide currently is divided into three parts:

The first part covers some of the basics of doing travel time studies and the definition of terms used in collecting the data and running the software. This part also shows you how to install and run the software on your computer.

The second part is a series of tutorials that provide step-by-step instructions on how to use the software. The first tutorial is a general introduction to the software. Subsequent tutorials go into more detail about specific parts of the program.

The third and last part is a series of appendices that have reference-type information that you may find useful if you are interested in the technical aspects of the software.

### Computer Requirements

- Windows 95, 98, NT, 2000 or ME.
- 64 Megabytes of RAM (although it probably will run in less).
- 10 Megabytes of free space on your hard disk.
- CD-ROM (to install the software only)
- Screen resolution of 800 x 600 or better.

This last requirement is the only non-standard one. Some users may still be using older computers limited to 640 x 480 pixels. If you find the software screens don't fit on the monitor, this may be the case for your computer. You should be able to change the screen resolution to 800 x 600. Worst case would be to add a new video card to your computer for \$50 or so (if you are running Windows at 640 x 480 this is a great investment).

### Software Updates

Updated versions of JAMAR software are released periodically and are posted on the JAMAR web site. Licensed owners of PC-Travel for Windows can download updates to the program to make sure they always have the latest version of the software on their computer. To download the latest version of PC-Travel for Windows, go to **[www.jamartech.com](http://www.jamartech.com)** and then select Downloads from the list of options.



## Definitions

Before any discussion of travel time data collection and analysis can begin, you must have a careful understanding of the terms we use and how we use them. This section defines the words used in the program that mean something more specific than the word itself might imply.

### Run

*A single collection of travel time data.*

For example, when data is collected along an arterial, the user drives to the beginning of the arterial under study, starts data collection, proceeds along the arterial to the end of the study area, and then stops data collection. He has just completed one run. If he turns around and collects data in the other direction, it is another run. All runs are stored as separate entities in the program.

### Study

*A collection of runs.*

When the user collects data, he is making data runs, and when he gets back to the office, he collects those runs into studies. The difference is important because runs can be collected into different studies. For example, a user may make a number of runs at an arterial during one or two days. Back in the office he may create a study with just the morning runs. He may also create a study with all of the runs, which of course use some of the morning runs.

There is one critical rule for studies:

*All of the runs in a study must start at the same place, end at the same place, and follow the same route.*

Only runs in the same direction can be part of the same study. Since you usually collect runs in two directions (up and back), you typically will create at least two studies for each data collection session.

### Study Group

*A folder where related runs and studies are stored.*

This term is specific to the program. Since studies must be created from runs that start in the same place, end in the same place, and go in the same direction, it makes sense to store all runs that fit that criteria in one place on your computer, along with any studies that are created from those runs.

You typically create Study Groups when you first read the run data collected in the field using a TDC-8 count board. Since you usually collect at least two sets of runs, one in one direction and another in the opposite direction, you usually will create two Study Groups when you read the data from the TDC-8.

### Fixed-Route

*Data collection along a pre-determined route.*

Version 1 of PC-Travel for Windows only supports Fixed-Route studies. Another type of study, called Chase Car studies, may be supported in the future, based on user interest.

When you do Fixed-route studies, you collect run data along the same route several times. One run is rarely sufficient to find the travel time characteristics of a route. You may be lucky and never hit a red light during your run, or you may be unlucky and hit several. If you collect several runs, the averages of the individual run data will be a better representative of the true traffic characteristics of the route.

Fixed-route studies usually have segments defined at the time the runs are made. The route is divided into geographic segments, using easily determined landmarks to separate the segments. For arterials, the segment boundaries may be signalized intersections. For freeways, the boundaries may be interchanges. You are free to define the segments any way you want.

## Node

***The boundary between two segments of a run.***

Every run has a *starting node*, which is where you start collecting data on a fixed-route study, an *ending node*, which is where you stop collecting data, and several *segment nodes* in between. The user records the location of the nodes by pressing buttons on the TDC-8 as the user passes the nodes during a run.

## Primary Run

***A run where the user collected segment node data.***

Most users, when doing a run, will collect segment node data by pressing the New Link button on the TDC-8 as they pass by the pre-determined nodes in the route. There is a fairly high error associated with this process (more about this later) so the distances measured for a single run are not very accurate. The program uses the average of the node distances from each of the Primary runs in a study to find more accurate distances between nodes.

## Secondary Run

***A run where the user did not collect segment node data.***

***or***

***A primary run in which the user decides not to use the segment node data to find the node distances for the study.***

You do not have to collect segment node data while doing a run. You may have done several runs in that direction and know you have sufficient data to find accurate node distances, or you may have made several mistakes marking the node on a particular run (which is annoyingly easy to do), or you simply don't need node by node statistics for this route. You can define a run as Secondary in the software and any node distance data in the run will be ignored in the analysis.

## Before and After

***A way to categorize a group of runs so that two different groups of runs can be compared.***

The terms Before and After are used liberally in the program and these mean only that the data is summarized into two separate groups so the statistics of each group can be compared. If all of one set of runs are made under the same conditions, they may all be defined as *before* runs. Later, identical runs made under different conditions (after an arterial has been re-timed, for example) may be defined as *after* runs. The program lets you define runs as either before or after and then automatically calculates statistics for the before runs as a group, the after runs as a group, and changes in the various statistics from before to after.

## Normal Speed

***Ideal speed at which the traffic should travel on an arterial.***

The Normal Speed is used in two places in the program. It is used to find Total Delay statistics for runs and studies (*see Total Delay, below*). It also is plotted on the Time/Space Diagrams to show perfect progression. You set the Normal Speed on the Study Summary screen. As with most ideals, real traffic rarely measures up to the ideal, but it is useful as a guide.

<b>Travel Time</b>	<p><i>The elapsed time to travel between two points, in seconds.</i></p> <p>This is probably the most fundamental of the reported statistics. It is measured directly by the TDC-8 in the field. All run travel times are measured and reported to the nearest second. Study travel times, which are averages of the run travel times, are reported in tenths of second (technically speaking, the tenths of second are not significant in studies with less than about 5 runs, but that is rarely of concern in the vast majority of practical traffic evaluation situations).</p>
<b>Number of Stops</b>	<p><i>A stop is defined as a one-second interval where the speed is less than X MPH for one second when the speed was greater than X MPH in the previous second.</i></p> <p>X is normally 5 MPH but can be set to any speed you want. This speed is called the Stop Speed and is set on the Study Summary screen. Each time the vehicle slows down and crosses the Stop Speed boundary, a stop is counted. The vehicle must speed up faster than the threshold before another stop can be counted.</p>
<b>Average Speed</b>	<p><i>The total distance covered divided by the elapsed time.</i></p> <p>The program calculates the average speed for each section (<i>node to node distance</i>) and also separately calculates a total average speed for the entire route.</p>
<b>Total Delay</b>	<p><i>Difference between actual travel time and ideal travel time.</i></p> <p>Actual travel time is calculated from the data. The ideal travel time is based on the Normal Speed setting on the Study Summary screen.</p>
<b>Time &lt;= X MPH</b>	<p><i>Total time the vehicle spent at or below the given speed.</i></p> <p>The program gives you three speed categories, which you can set for different purposes. You can measure stopped delay (time vehicle is stopped) by setting Category 1 to 0 MPH. You can measure queue delay by setting Category 2 to 7 MPH. The third category might be set to 30 MPH to show how much time vehicles spent in car following mode rather than free flow (assuming free flow speed is 40 or 45 MPH). Many other uses for these three categories are possible, limited only by your imagination.</p>

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# Chapter 2

## How to Install & Run PC-Travel for Windows

## How to Install & Run PC-Travel for Windows

### Installation Procedure

The install program should load and run when you insert the CD into your CD-ROM drive. If your system is set up with the “Auto Run CD” feature turned off, you need to run the Setup.exe program that is on the CD. Click on the **Start** button on your Windows desktop. Select **Run** from the list of options and type the command line **X:\setup.exe**, where X is the letter of your CD-ROM drive. Press **Ok** and the installation will begin.

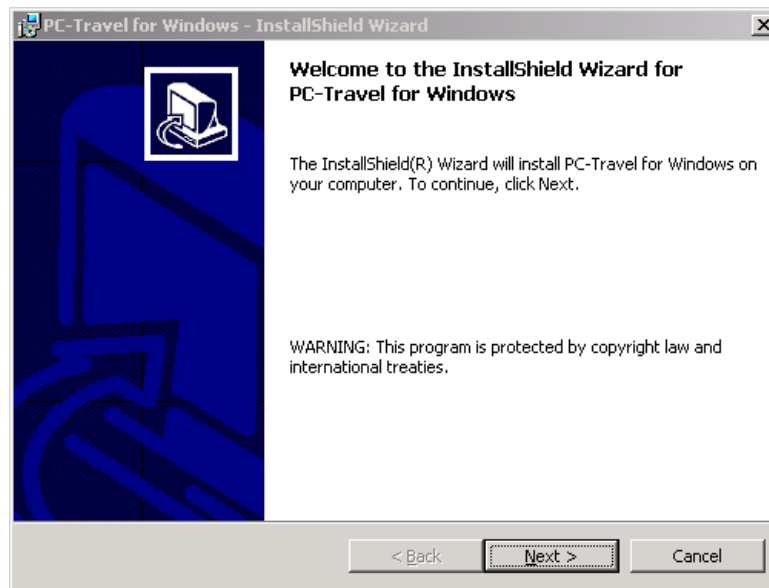
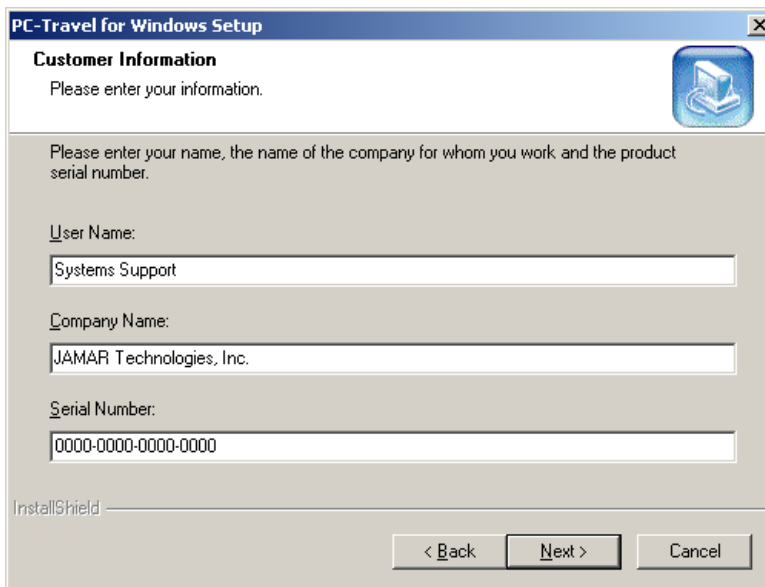


Figure 2.1 — Welcome Screen

The Welcome screen reminds you to be sure all other programs are closed before proceeding with the installation. During the installation, files used by the program will be copied to your computer, including some Windows system files. If other programs are open and using some of the files that need to be installed, an error can occur. Make sure you close any programs that obviously are running (especially virus checkers) before you install this or any Windows-based software.

The next screen contains the license information for the program. Please read this information. You must accept the provisions of the license in order to proceed and use the program. The program's license allows you to install the program on multiple computers provided they are in the same location and being used by employees of the entity that purchased the license. This is a very liberal license — many program licenses do not allow you to install the program on more than one computer. We ask that you respect the licensing policy and not abuse the use of this program. If you agree to the license, click Yes to continue.



**PC-Travel for Windows Setup**

**Customer Information**  
Please enter your information.

Please enter your name, the name of the company for whom you work and the product serial number.

User Name:  
Systems Support

Company Name:  
JAMAR Technologies, Inc.

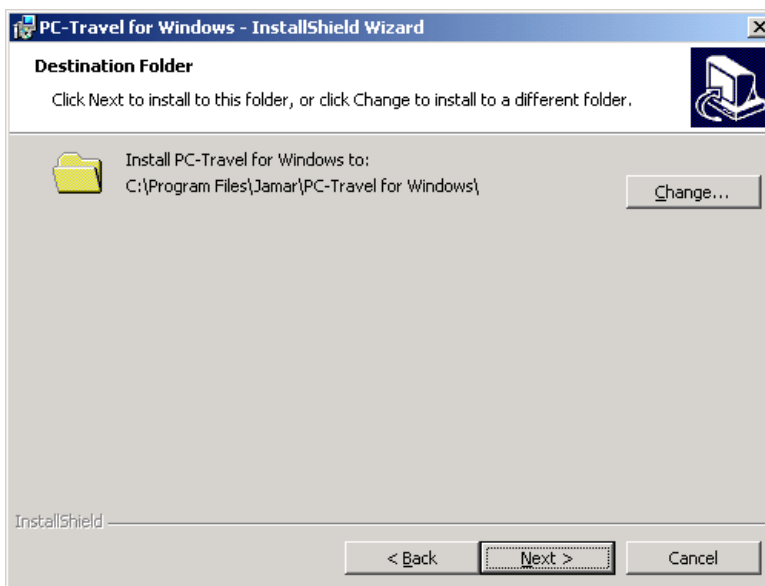
Serial Number:  
0000-0000-0000-0000

InstallShield

< Back   Next >   Cancel

**Figure 2.2 — Customer Information**

The next screen asks for the User Name, Company Name and Serial Number. The serial number can be found on the back of your CD case. When entering the numbers be sure to include the dashes. If the serial number is entered incorrectly, you will not be allowed to proceed with the installation. Once the information has been entered, click the Next button to continue.



**PC-Travel for Windows - InstallShield Wizard**

**Destination Folder**  
Click Next to install to this folder, or click Change to install to a different folder.

Install PC-Travel for Windows to:  
C:\Program Files\Jamar\PC-Travel for Windows\

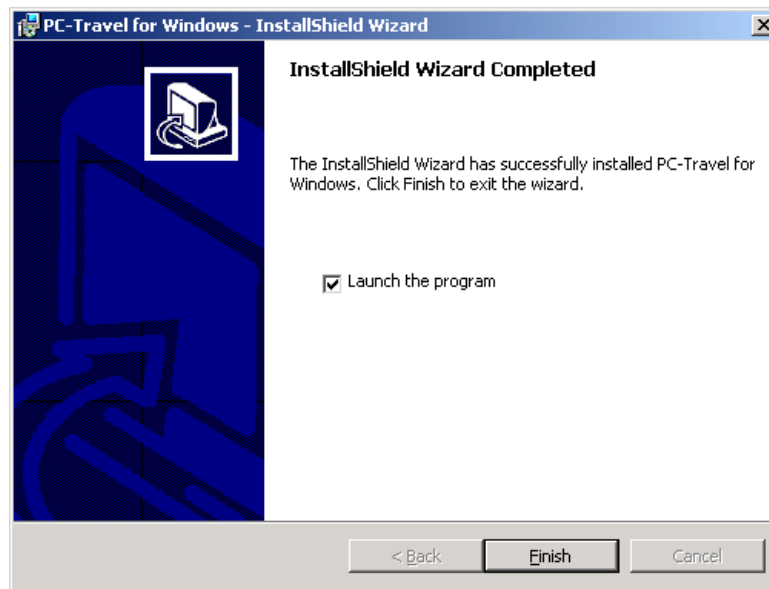
Change...

InstallShield

< Back   Next >   Cancel

**Figure 2.3 — Program Destination**

The Choose Destination Location screen is used to select the folder where PC-Travel for Windows will be installed. The default folder is C:\Program Files\JAMAR\PC-Travel for Windows, but you can change this if you like. Click the Browse button and navigate to the folder you want. Once the directory listed is correct, click Next to continue.



**Figure 2.4 — Installation Finished**

Once the installation program has enough information, the files will be copied from the CD to your computer. You'll then see a screen that tells you the installation has completed. You may be asked if you want to re-start your computer now. If you get this message, you should re-start your computer before you try to run the program. This will allow any of the System files that were copied during the installation to be loaded properly.



## How to Run PC-Travel for Windows

Like most Windows programs, there are several ways you can run the software. Here are two:

1) Open an Explorer window (right click on My Computer and select Explore) and find the PC-Travel for Windows.exe file, which probably is in the *C:\Program Files\JAMAR\PC-Travel for Windows* folder. You will see a screen that looks something like figure 2.5 shown below. Double click on the file **PC-Travel for Windows.exe** and the program will run.

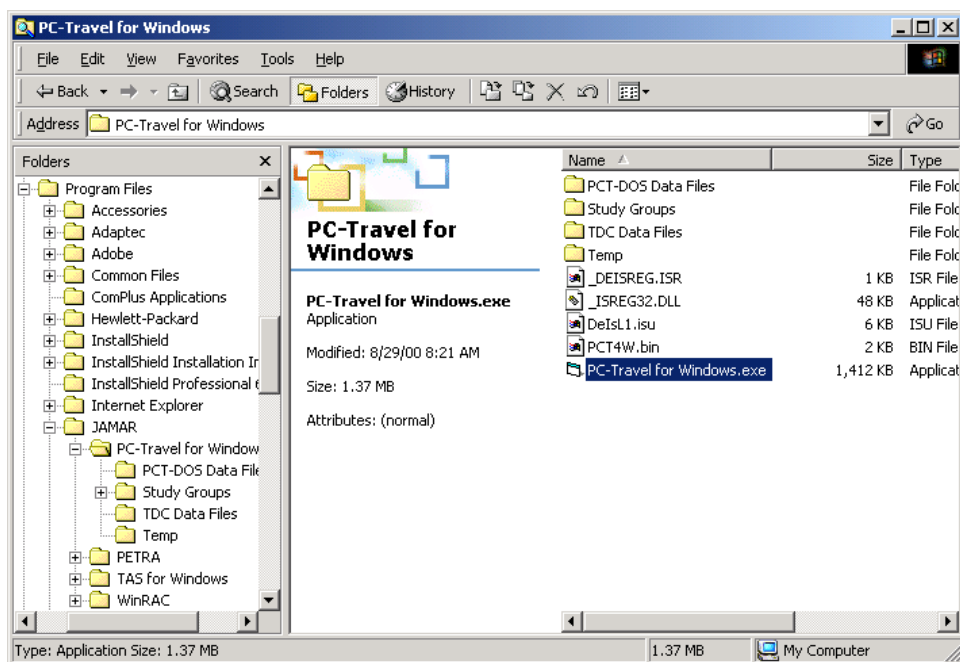


Figure 2.5 — Explorer View

2) Select **Start, Programs**, and then **JAMAR** from the list of programs. There could be a long list, and they may not be in alphabetical order (don't you love Windows?). You will see a display similar to the one shown here. Select **PC-Travel for Windows** then click on the second **PC-Travel for Windows**. This will run the software.

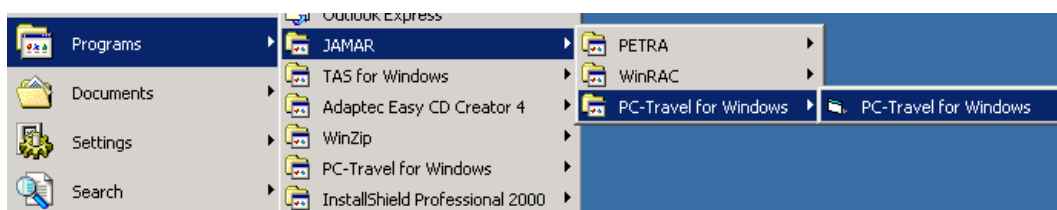


Figure 2.6 — Starting PC Travel

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# Tutorial 1

## Introduction to PC-Travel for Windows

## Introduction to PC-Travel for Windows

This tutorial will guide you through the basics of the software. To simplify things we will retrieve an existing study that was installed when the rest of the program was installed.

*Note: The first time anyone runs PC-Travel for Windows after installing it, the software loads the Preferences screens so that the various settings can be checked and edited. From then on, the program starts with the Startup Options screen. This tutorial will start with the Preferences screen, assuming that you just installed the program. You may skip this section if it doesn't apply to you.*

Run the program (see the end of the Installation notes for two ways to start the software). The first screen you will see is a little message box that tells you that since this is the first time you have run the program, you need to check the settings. Click **Ok**.

You will then see the Preferences screen:

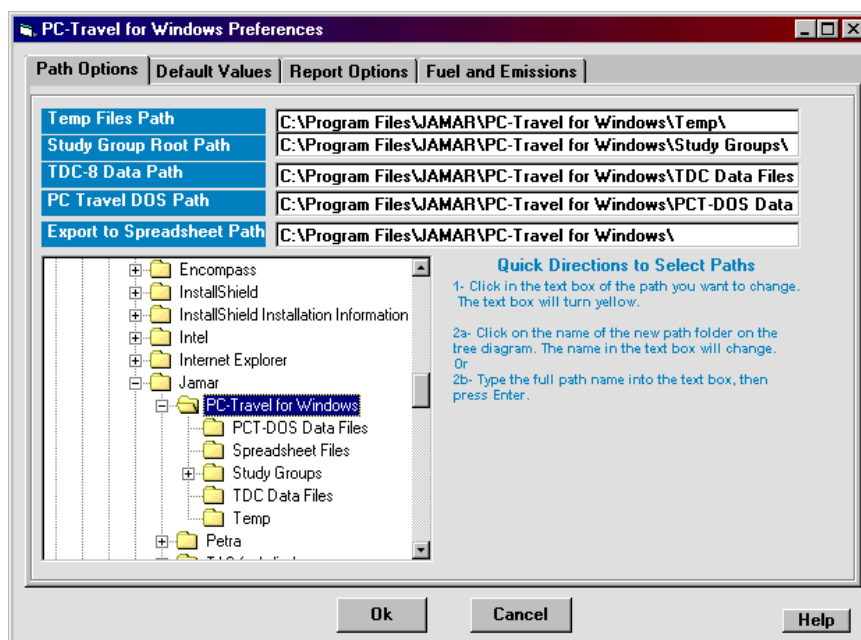


Figure T1.1 — Path Options

The Preferences screen has four sub-screens, selected by clicking on the tabs at the top of the window: **Path Options**, **Default Values**, **Report Options**, and **Fuel and Emissions**. The first tab, Path Options, is shown first.

If you selected the default installation directory, then you will see the same paths shown in the screen shot above. The program uses five basic directories:

### 1 – Temp

This directory holds the run files that you read from the TDC-8. These files are normally renamed and moved to a different directory, as you'll see when we get to the Read section.

### 2 – Study Group Root

This is the base directory where all of the travel time run and study data is stored. A **Study Group** is a

*collection of related runs and studies that are stored together.* For the computer savvy, each Study Group is a directory under the Study Group Root directory.

### 3 – TDC-8 Data Path

This is the directory where the data from the TDC-8 is stored before it is processed into runs.

### 4 – PC-Travel DOS Path

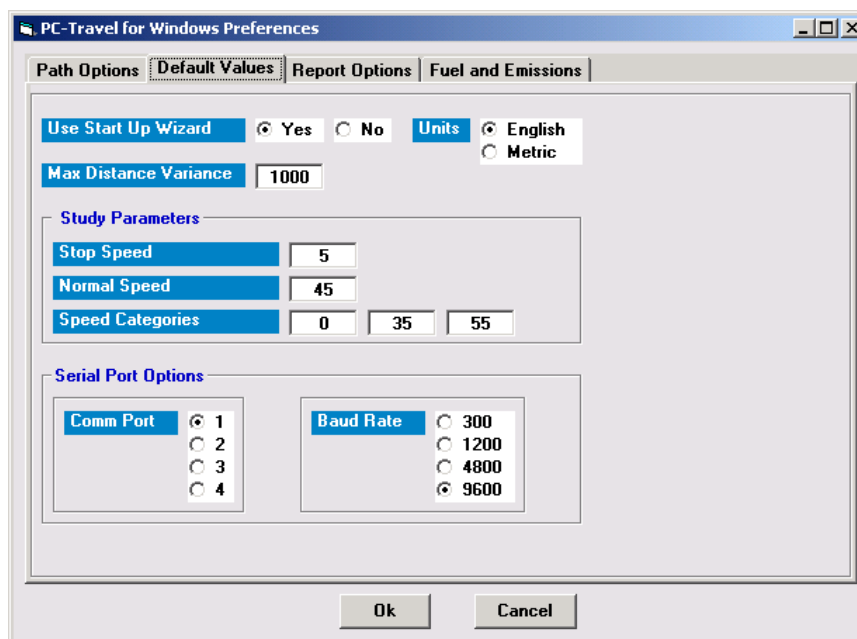
This is the directory where you have your old PC-Travel for DOS data files. The program can convert these files into new runs and studies. The installation program creates a directory under the PC-Travel for Windows directory and installs one set of old files that you can use to see how the Convert operation works.

### 5 – Export to Spreadsheet Path

This is the directory where files will be created if you use the Export to Spreadsheet function. Refer to *Tutorial 8 — How to Export Study & Run Statistics to a Spreadsheet* for more information.

If you want to change the paths, then follow the Quick Directions on the screen. You probably won't need to change them, however.

Click on the second tab labeled **Default Values**.



**T1.2 — Default Values**

The items on the screen are parameters that are used in the software. These values are the default values that are used when a study is first created; however, you can change many of them on the Study Summary screen if needed, and the changes will be stored with the other study data. Normally, you will set these values once and then not worry about them again.

Some of the parameters have an obvious meaning. Some don't. Don't worry what the various parameters mean for now. They will make more sense later after you have seen some more of the program. Just accept the default values for now.

You can check the settings in the other two tabs. They are fairly obvious from the descriptions, but again, don't worry if it isn't obvious what a particular setting is for.

You can play with the various options on the Report Option tab when you get to the Report section of the tutorial. Don't change any of the numbers in the Fuel and Emissions tab unless you are an expert in the models used.

Press **Ok** to close the Preferences screen and go to the Startup Screen.

## Startup Options

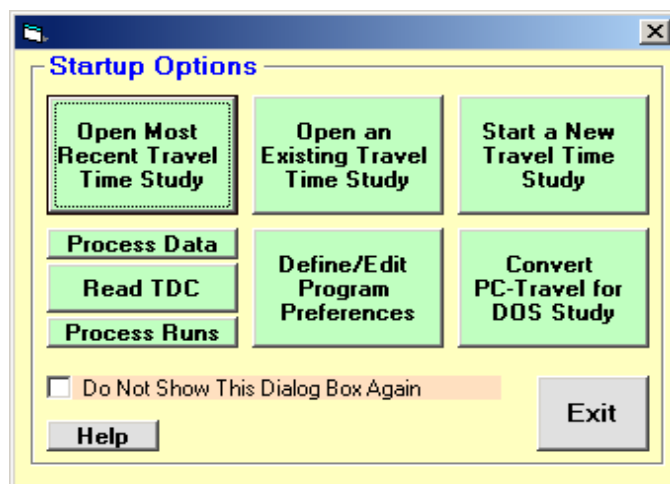


Figure T1.3 — Startup Options

This is the screen you will normally see when you first run the software. It helps to remind you what your options are when you first start the program. If you don't like this type of screen, you can turn it off so you won't see it in the future.

The options listed are fairly self-explanatory. However, they all will be discussed in more detail as we go along.

Click on the **Open an Existing Travel Time Study** button so we can start exploring PC-Travel for Windows.

## Select Study

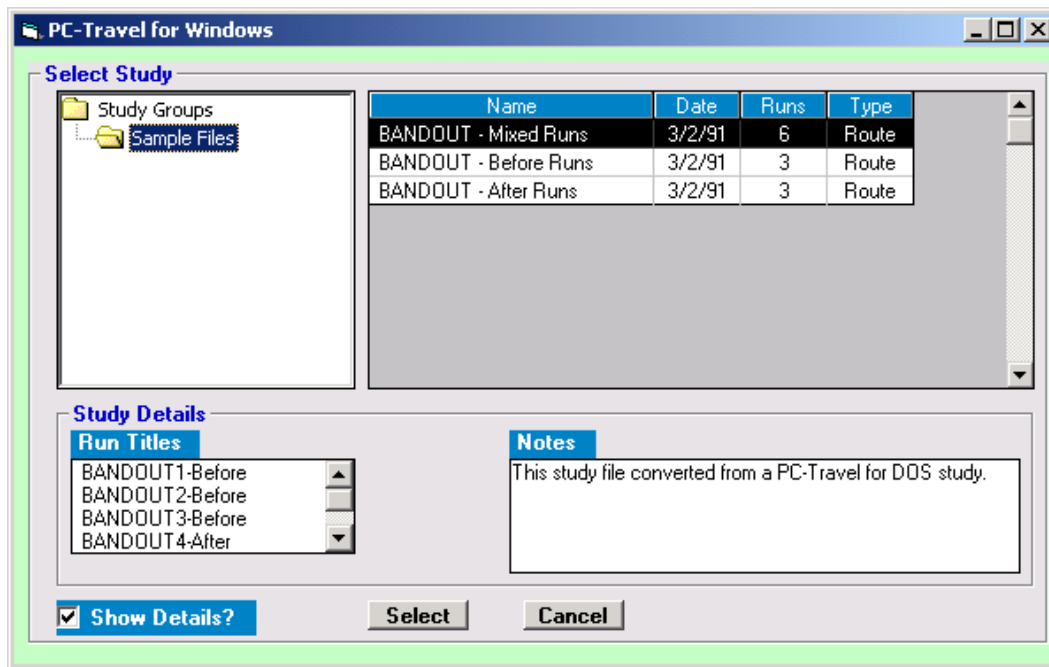


Figure T1.4 — Select Study

This is the screen you use to select a study that is stored on your computer. The upper left corner has a window that shows the directories (*or folders, if you prefer*) in the common tree format used in Windows. The Study Group folder is currently selected. Click on the **Samples** folder just below the **Study Group** folder. This is the state shown in figure T1.4 above.

The window to the right of the tree shows a list of the studies in that folder, with a little bit of information about the studies. In this case, there are three studies. The first study, **BANDOUT - Mixed Runs**, is highlighted.

The **Study Details** window shows some more information about the highlighted study. The titles of the runs that make up that study are shown, as well as any notes you entered when you saved the study.

We want to open the first study, which is highlighted, so click on **Select**.

## Study Summary



Figure T1.5 — Study Details

This is the core screen for the program; most of the operations involved in the software start and end here. There are several sections to this screen. At the top are the standard *pull down menus* that are part of every Windows program. Below that are a series of icons that make up the *toolbar*. These icons duplicate the most common options that are available in the menus.

The majority of the screen shows the details for the current study:

- The current **Study Group**. It is shown just below the toolbar. (*Sample Files, in this case*).
- The **Name** of the study. To change the name you type in a new name and then hit the **Save** icon on the toolbar, or select **File:Save Now** from the drop down menus.
- **Notes** for this study. Just type anything you want.
- Study **Type**, either Fixed Route or Chase Car. (*Chase Car studies aren't supported yet.*)
- List of **Runs Used in This Study**. You can **Add Runs** or **Remove Runs** using the appropriate buttons. You can also **Show Details** of any run (*we'll do that in a minute*). All three buttons operate the same way; select the run then click the appropriate button.
- **Speed Categories #1, 2 & 3, Normal Speed, and Stop Speed**. These are all parameters that are used in the study statistics. If you have used PC-Travel for DOS these should be familiar. If not, then you'll see how they are used when you see the Study Statistics screens.
- **Node Distances**. This will be explained in depth in a little bit.

First, click the **Show Details** button. This will allow you to see all of the information about the run that is highlighted.



## Run Details

Study Group: C:\Program Files\JAMAR\PC-Travel for Windows\Study Groups\Sample Files'

Name: BANDOUT -

Type: ☒ Fixed Route ☐ Chase Car

Runs Used in This Study:

Run Title
BANDOUT1-Before
BANDOUT2-Before
BANDOUT3-Before
BANDOUT4-After
BANDOUT5-After
BANDOUT6-After

Show Details

Speed Categories [1]: # 1 0

Normal Speed: 35

Run Details:

Name: BANDOUT1-Before

Date: 03/02/91 Sat Time: 14:55

Run Type: Primary

Before or After?: Before

Calibration Constant: 1882

Notes: This run file created from PC-Travel for DOS study.

Run Summary:

Course Length	9960
Run Duration	230
Number of Nodes	6

Node Names and Distances:

1	[Start]	0
2	Mainland	800
3	Guilbeau	2448
4	Bresnahan/Mistic	5045
5	Braun	7568
6		9960

Copy Reverse Delete Insert

Trim Start Trim End

Save Cancel Edit Stats Plot

Figure T1.6 — Run Details

The Run Details screen shows just about everything we know about this particular run, and most of it can be edited. In general, any fields with a white background are edit fields, and can be changed. Fields with a gray background are calculated from other things, and can't be edited directly.

Most of the fields are self-explanatory; each run has a *Name*, *Date*, and *Time*. A run can be either *Primary* or *Secondary* (see page 1.4), and *Before* or *After* (page 1.5). The *Calibration Constant* normally should not be edited; it is the factor that converts the pulse data collected in the TDC-8 to distances. You can also enter any *Notes* you want about this run. You might, for example, mention that it was raining during this run, or that there was a large truck in front of you during the run which might affect the data.

If the run is a Primary run you can edit the *Node Names and Distances*. The Node Names have a white background, which means you can edit the names simply by typing over the existing name. The distances are derived from the data collected in the field; these aren't as easy to edit so they have a gray background.

You can *Copy* names and distances from other runs. You can *Reverse* the list of names (*usually after copying from another run that went in the other direction*). And you can even *Insert* and *Delete* actual node data points in the data to fix a run. (*Inserting and Deleting data points is beyond the scope of this introductory tutorial and will be covered in another tutorial.*)

The name of the run is shown in the upper left corner text box. You can change the name and then click **Save** to create a new run. The run file is stored in the current Study Group.

You can see more information about the run, if needed.

Click **Stats**

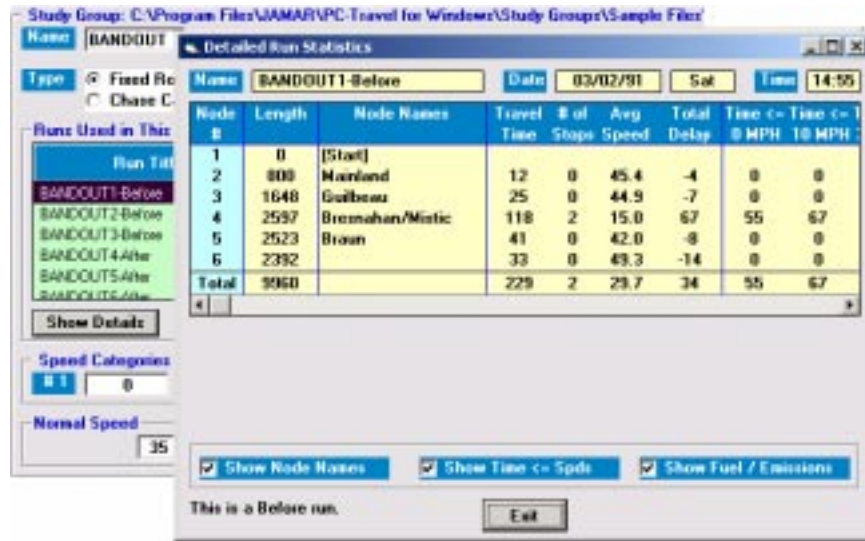


Figure T1.7— Detailed Run Statistics

This screen shows calculations of the standard statistics used in the program, for this run only. You can think of this as the results of a study with a single run. You can't edit anything on this screen. You can play with the check boxes and see what they do. If you are not familiar with all of the terms shown in the statistics, don't worry about it now. They will be explained later.

Click **Exit** to go back to the Run Details screen and then click on **Plot**.

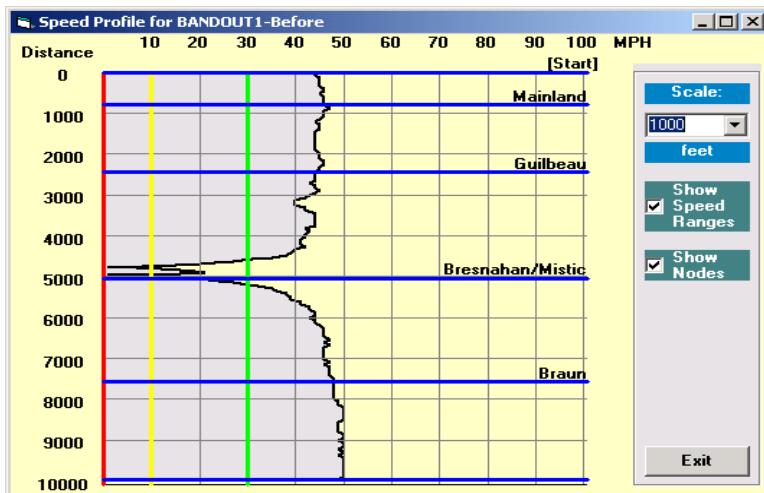


Figure T1.8— Speed Profile

You'll see the screen shown here. This is a plot of the Speed vs Distance for the data in the run. You can change the scale, and choose to show the nodes in the data, and to show the three speed category limits (the red line is Speed 1, Yellow is Speed 2, and Green is Speed 3).

In this run, the car went through a couple of intersections without any delays, then had to slow down to a stop (*probably a red light*), and then accelerated back to about 50 mph for the duration of the run.

When you are done playing with the plot, click on **Exit** to return to the Run Details, then click **Cancel** to go back to the Study Summary screen.

## Node Distances

At this point, you should be back at the Study Summary screen. Notice that the **View** button in the Node Distances frame is red. This is telling you that you need to check the Node Distances because something *may* be wrong. Click on **View**.

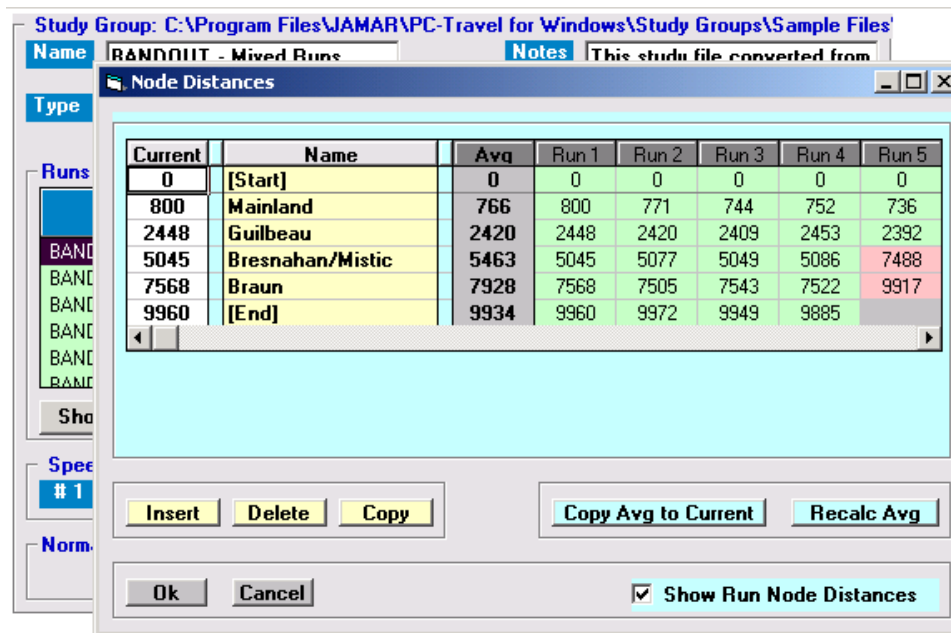


Figure T1.9 — Node Distances

Every study, like the runs that it is made from, starts at one well-defined point and ends at another, and usually has nodes in between. These nodes are usually cross streets, but can be anything that is easy to see while you are driving. The program needs to know the names of each of the nodes and the distance that each node is from the starting point. Various statistics are calculated, displayed, and printed in the reports not just on the entire route, but on a node to node basis as well.

The Node Distances screen shown above shows the **Names** of the nodes and the **Current** distances assigned to each node. *Ultimately, the only thing that matters is that the Current column has the best possible distances.* The distances default to the values of the first Primary run, which often is close enough to use. However, these rarely are the *best possible* distances. There are several ways to get these better distances. They will all be explained very carefully in another tutorial, but for now you will just get a quick summary.

As you saw in the Run Detail screen, each Primary run has node names and distances that you entered when you entered the data for that run. The program uses the averages of the node distances in all of the Primary runs to calculate the best possible node distances for the study.

The Node Distance screen shows the node distances for each of the Primary runs in the study. This is shown in the upper right section of the screen. The **Avg** column is the average of all of the run distances in that row. In this case, there are six runs (*only five are visible without scrolling*).

Notice that most of the numbers have a green background, and two have red backgrounds.

The software knows that each number should be close in value to the other numbers in the same row, since they represent the attempt of the data collector to mark the same node. The software compares each number to the value in the Avg column. If the two numbers are close (*within 500 feet by default, but you can change this in the Preferences screen*) then it shows a green background. If it isn't close, then it shows a red background.

Look at the two red values. It is pretty clear what happened here. The data collector missed the node at Bresnahan/Mistic in Run 5. This makes the other two distances out of place.

You can fix this easily. Just follow along:

- 1- Click on the number 9917. A solid border appears around the cell.
- 2- Point the cursor at the bottom of the cell, right on the line. The cursor will change from a cross to an arrow.
- 3- Press and hold the left mouse button and drag the cell down one cell.
- 4- Let go of the mouse button.
- 5- The 9917 cell is now one row lower.
- 6- Repeat steps 1-4 with the number 7488.

We now have the distances in the proper rows.

Click on **Recalc Avg**. The values in the Avg column change, and now all of the numbers have green backgrounds.

Click on **Copy Avg to Current**. The values in the **Current** column now match the **Avg** column. These values are now the best we can get from our data, and are probably more accurate than just choosing the distances in any one run.

When you are happy with the values in the Current column, click **Ok**. If you get the distances all messed up, just hit **Cancel** to go back to Study Summary without making any changes.

The new distance values are not a permanent part of the study yet. If you want to save the new values with the study, then click on the **Save** icon. The new distances, plus any other changes to the study you have made, are saved.

This whole procedure may seem a little cumbersome, but if you don't want to fiddle with the node distances you don't have to. You can accept the initial values shown in the **Current** column, which are based on the first run, or you can simply type in the values you want in the **Current** column. Only the distances in the **Current** column are editable.

You should be back at the Study Summary screen now.

## Study Statistics

Click on the icon labeled **Stats** in the toolbar at the top of the Study Summary screen.

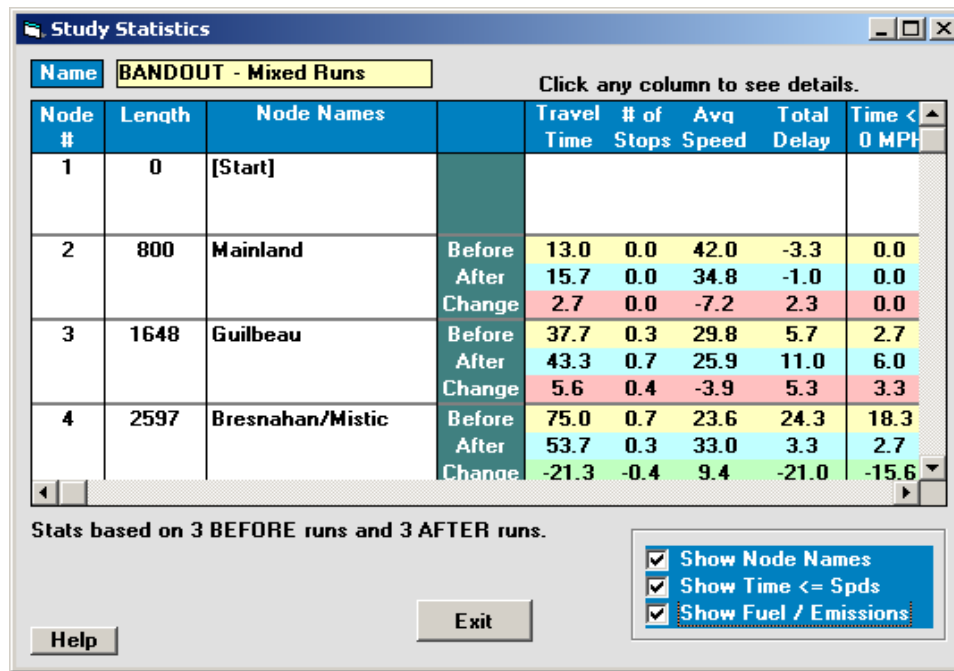


Figure T1.10 — Study Statistics

This screen lets you see a summary of the statistics for your study. All of the stats shown are averages of the data contained in the runs. Runs labeled as Before Runs are treated separately from After Runs.

A separate row labeled Change shows the difference between the Before and After values for each node. The background colors in the Change cells are coded to show if the change is good or bad. Since you want lower Travel Times (*I assume*), a negative change in Travel Time is good, so it is green. A lower Average Speed is bad, so a negative change in Average Speed is red, and so on.

Since there is too much information to show everything on one screen, you need to scroll around to see all of the stats. The three checkboxes let you choose what groups of data to show. You can play with them for a minute to see what they do.

If you scroll down to the bottom of the list, after the last node, you will find a set of total statistics for the entire route.

If your study doesn't have both Before and After runs then the screen looks a little different. There is only one line per node, and obviously, no Change row.

If you want to see where these numbers came from, you can see the Study Details screen for each statistic. For example, to see the details for Travel Time, click the mouse on any cell in the Travel Time column. You will see a screen like figure T1.11 below.

Node #	Length	Node Names	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
1	0	[Start]	[Before]	[Before]	[Before]	[After]	[After]	[After]
2	800	Mainland	12	15	12	20	12	15
3	1648	Guilbeau	25	40	48	27	42	61
4	2597	Bresnahan/Mistic	118	51	56	43	61	57
5	2523	Braun	41	55	42	50	39	48
6	2392	[End]	33	39	36	38	34	35
Total	9960		229	200	194	178	188	210

Figure T1.11 — Travel Time by Section

The travel times of each run, for each node, is shown. The Before runs are shown with a yellow background, the After runs with a blue background.

The data on the Study Stats screen (*the previous screen*) are averages of these values. For example the Travel Times for the Before runs from the start to Mainland are 12, 15, and 12 seconds. If you check the Study Stats screen you will see that the average shown is 13.

You can check the other stats in the same way. Click anywhere in the column of the stat you want to see to bring up a similar screen.

You can also get to these screens from the **View** menu on the Study Summary screen.

Normally, you probably would never check these screens. However you may see a statistic on the Study Stats screen (*or a report*) that seems odd. You can check to see where the data came from by examining the Study Details screens. You may find a run with bad data, or one where the node distances were incorrect.

Click **Exit** to return to the *Study Details* screen, then click **Exit** again to return to the *Study Summary* screen.

## Study Plots

Click the toolbar icon labeled **SpdPlt**.

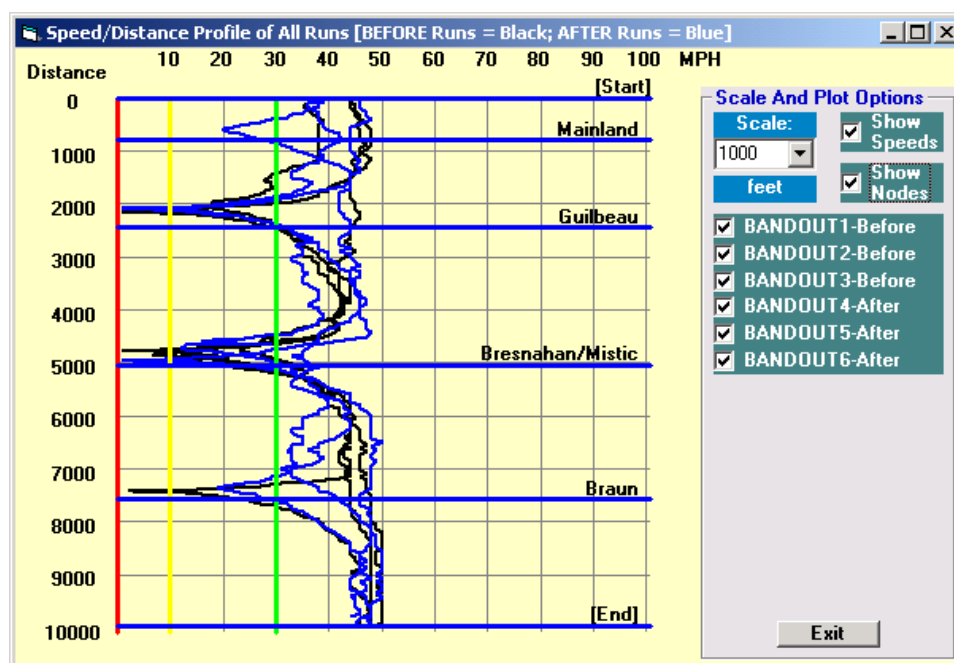


Figure T1.12 — Speed Plot

This screen shows Speed Profile plots of all of the runs in the study. You can select which runs to show, the scale for the graph, and whether to show the node distances and names and/or the speed categories. This will give you a quick look at the data before you print it. You might find a problem with one of the runs when you see them all plotted on the same graph. Click **Exit** to return to the Study Summary screen.

Click the toolbar icon labeled **TSDiag**. This screen shows a Time/Space Trajectory plot of each of the runs

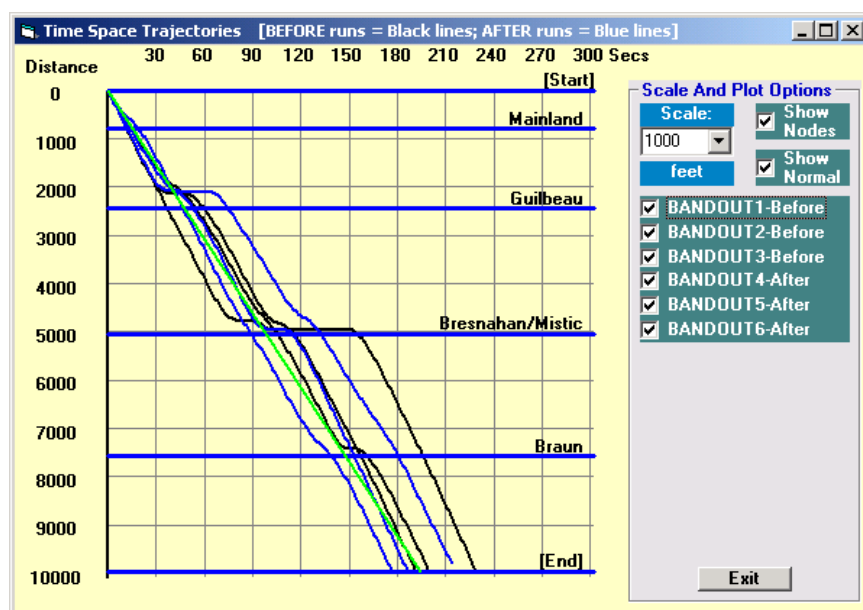


Figure T1.13 — Time Space Trajectory Plot

in the study. As in the Speed Profile plot, you can control various aspects of the plot. The straight green line shows the Normal Speed as set on the Study Summary screen. This plot is another way of seeing the data for all of the runs at one time. Click **Exit** to return to the Study Summary screen.

By now you should have a pretty good idea if your study is set up properly and has good analysis results. It is time to print the reports.

## Reports

The end results of almost all Travel Time studies are the reports, and special attention has been given to the design of the reports in this program.

Click the toolbar icon labeled **Print**, or select **Print** from the **File** menu.

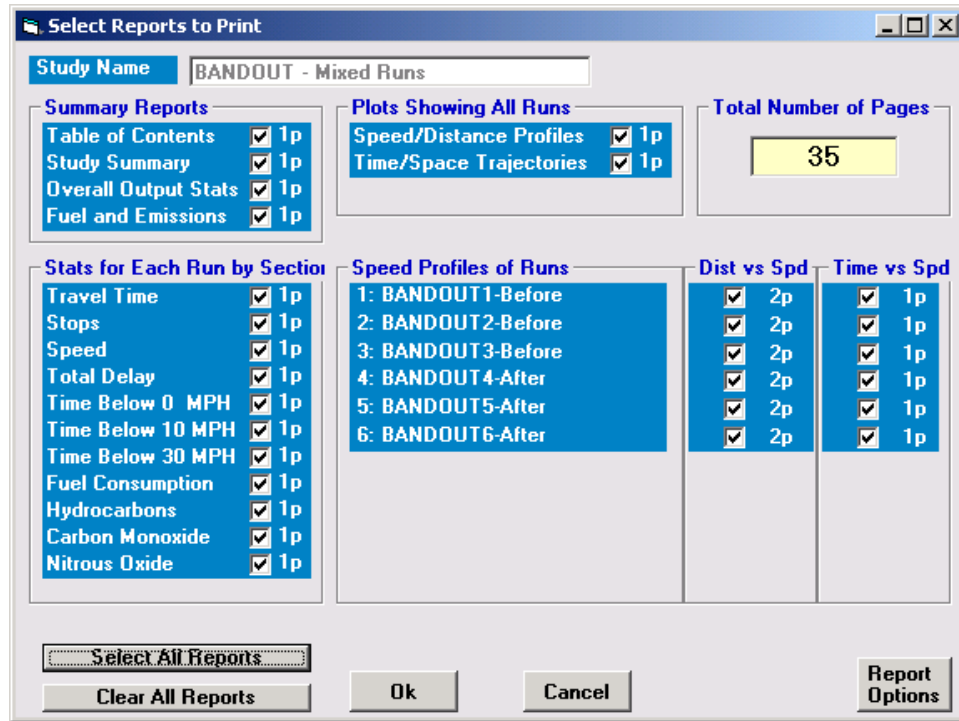


Figure T1.14 — Select Reports to Print

The screen you see is a list of all of the reports you can print with the current study. There are 17 standard reports that are always available, and then there are two types of plots that you can print for each run in the study. The screen shows the name of each run with check boxes for each of the two types of run plots you can print.

The idea is simple, just *click the reports you want to print*. All reports with a check in the checkbox next to the report will be included in the report.

There are two buttons in the lower left corner. One **Selects All** of the reports and the other **Clears All** of the reports. Their meaning should be obvious.

In the upper right hand corner is a little window that shows the total number of pages for the reports you have selected. The number changes automatically as you select or de-select different reports.

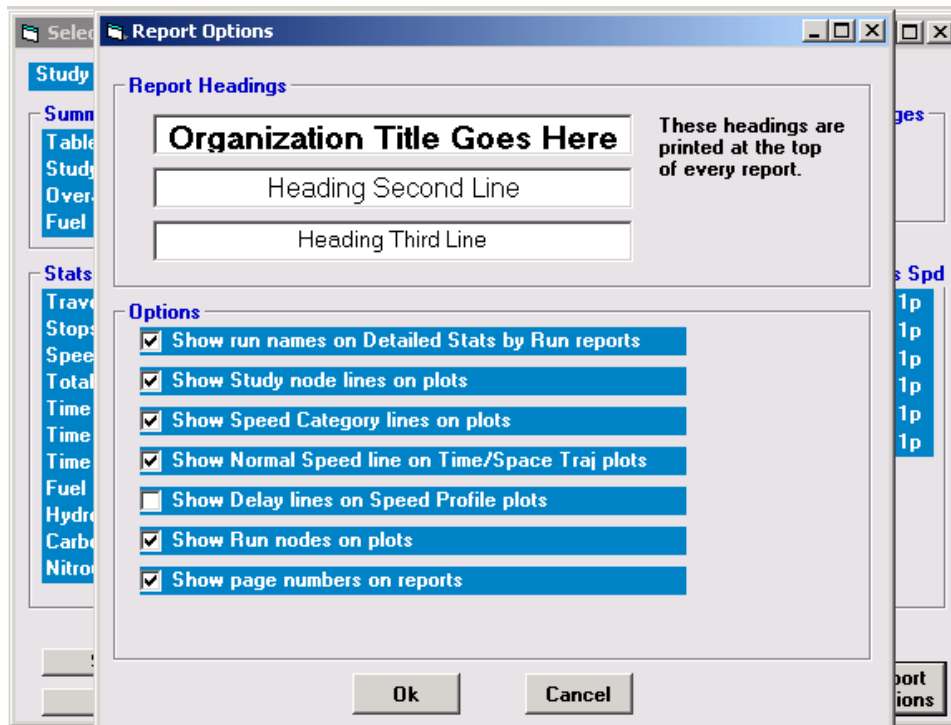
Most of the reports are only one page. They are shown with a small **1p** next to the check box. The **Speed Profiles of Runs** plots are often more than one page. The number of pages in each of these reports is also shown next to the checkbox.

Once you have selected the reports you want to print, click **Ok**. If you change your mind and decide not to print any reports at this time, click **Cancel**.



## Report Options

You can select different options before you print the reports. To select the options you want, click the button labeled **Report Options**.



**Figure T1.15 — Report Options**

The top section shows the three titles that are printed on the top of every report. Normally you would fill this out once and never edit it again. However, some users like to change the titles often, especially consultants who will put the name of the customer, rather than their own name, on each report. It's up to you.

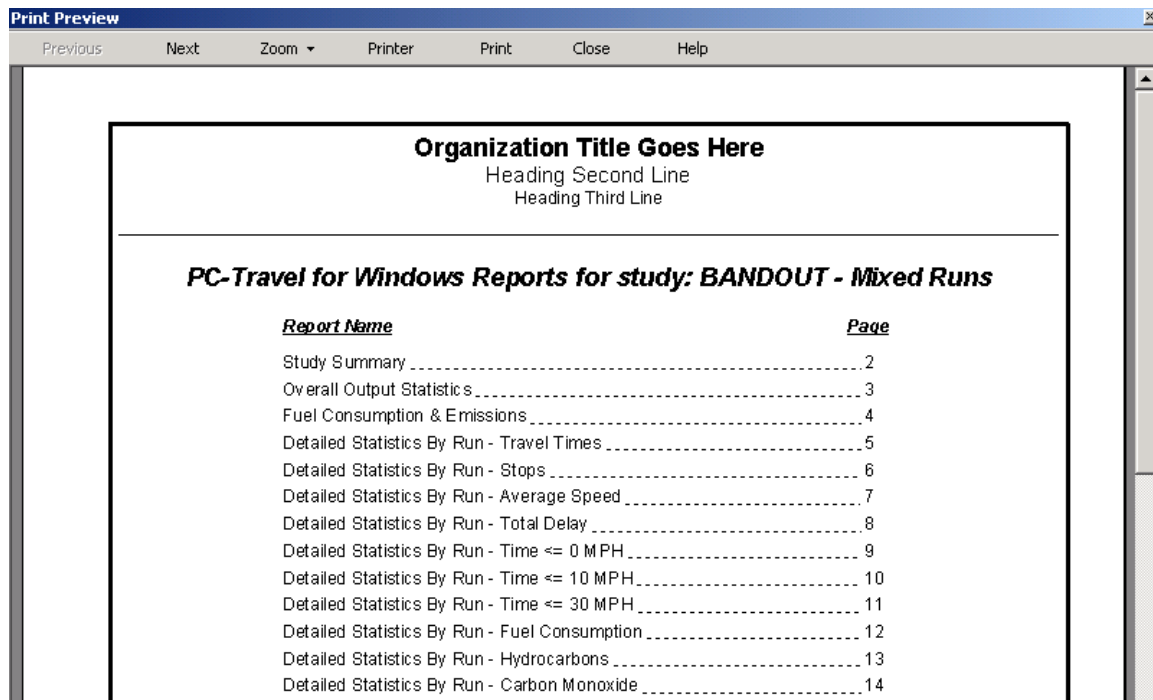
The top line usually is the name of your organization. It is printed in larger type, in bold, and centered on the top of every report. The next two lines are smaller, but still centered under the top title. You don't have to use all three lines, you can leave the second or third lines blank if you want.

The bottom section shows other options you can set before you print the reports. Your choices for these options may vary from study to study, although you may just set all of the options on and forget about it. The options may not make much sense right now. That's not important for now. Just accept the defaults.

All of the settings on this screen are duplicated in the Report Option tab on the Preferences screen. *See Appendix 1 for a complete description of each of these options.* That is where you would set the default value for each title and option. You use the screen shown here only to change any of the default values. If you know that you don't need to change any of the default values (*which is the usual case*) then you don't need to go to this screen at all.

Click **Ok** when all of the options are set the way you want them. This will bring you back to the **Select Reports to Print** screen.

Once you have selected the reports you want to print, and have selected the options for the reports, you are ready to preview the reports. Click **Ok**.



**Figure T1.16 — Report Preview**

Above is an example of the screen you might see. In this case I selected all of the reports on the previous screen. This is the Table of Contents page that lists all of the reports and the page number for each report.

At the top of the screen are the navigation buttons to control the preview of the reports, select the printer, print the reports, and exit the preview.

Click the **Next** and **Previous** buttons to move from page to page to see what each of the reports look like.

Click the **Zoom** button to select different views. Select the Thumbnail view (*my favorite*) from the drop down list, then double click on any of the reports to quickly go to that page.

Click the **Printer** button to display the standard Windows printer select dialog box. If you have multiple printers available to you, you can choose the printer here.

Click the **Print** button to print the reports.

Click the **Close** button to return to the Study Summary screen.

Feel free to play with all of the options available on these screens. You also might try changing some of the Report Options to see the effect on the reports. Remember, you don't have to print out the actual reports to see the different options, you can just preview the report pages on the screen.

## Summary

If you made it all of the way through this tutorial, congratulations.

In this tutorial we retrieved an existing study, displayed the run details of the runs in the study, edited the node distances of the runs to find the best possible node distances for the study, displayed the study details in both tabular and graphical form, and finally previewed and then printed a complete set of reports for the study.

Hopefully you now have a pretty good idea of how the core features of the software work.

Several areas of the software were not discussed at all, and a few others were just briefly discussed. Other Tutorials and Appendices in this Reference Manual explain these areas in more detail.

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# Tutorial 2

## How to do a Fixed-Route Travel Time Study

## How to Do a Fixed Route Travel Time Study

This tutorial is a step-by-step guide to use a TDC-8 counter to do a fixed route travel time study on an arterial street. It assumes you have the following:

- 1 – Transmission sensor installed in your test vehicle.
- 2 – JAMAR TDC-8 counter.
- 3 – New Link pushbutton switch connected to the TDC-8.
- 4 – TDC-8 Sensor Interface Cable.

(Note 3 & 4 are included in the TDC-8 Travel Time Kit)

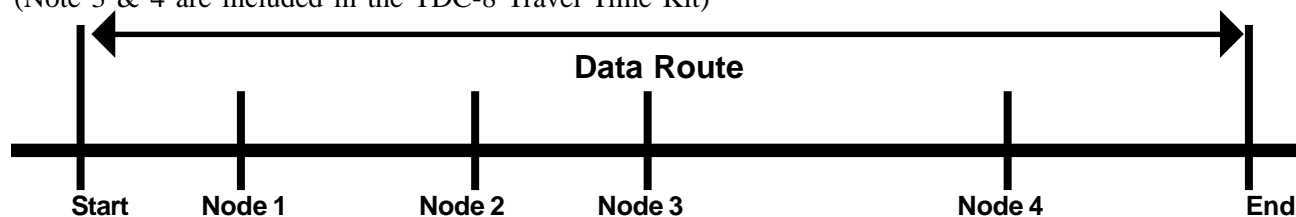


Figure T2.1 — Data Route

### Step 1 — Define the Route

This step may seem obvious, but it is easy to forget some important points. You need to define a starting point, an ending point, and the intermediate nodes. Normally the starting, ending, and intermediate nodes are intersections, but they can be other landmarks such as bridge abutments, mile post markers, or other fixed landmarks. Pick points that can be easily identified now and when future *after* runs may be collected. The drawing above shows a simplified diagram of a typical study route. There is a starting node, which could be an intersection, four nodes, which could be signalized intersections, and an ending node.

Make a rough sketch of the route, clearly showing the starting and ending points and list the intermediate nodes you want to use (*see step 2*). You don't have to make every intersection a node. It is important to understand the type of information you want the data to give you before you define the route and nodes. Don't use more nodes than you really need; it just needlessly complicates the analysis.

PC-Travel Field Worksheet			
Location: Handout		Date: 5/11/2000	
Site Code: 12345678		Site Count: 882	
<b>Nodes</b>			
Node	Event	Time	Count
1	4. Main St	16	
2	2. Green St	17	
3	3. Brown St	18	
4	1. Brown St	19	
5	5. Tiger St	20	
6		21	
7		22	
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	
<b>Run</b>			
Run	Start Time	Comments	End Time
1	14:55	ok	15:03
2	15:15	red light at brown	15:22
3	15:30	ok	15:40
4	15:52	slow truck cannot backup	16:12
5	16:20	ok	16:28
6	16:30	ok	16:38
7	16:40	ok	16:48
8	16:50	ok	16:58
9	17:00	ok	17:08
10	17:10	ok	17:18
11	17:20	ok	17:28
12	17:30	ok	17:38
13	17:40	ok	17:48
14	17:50	ok	17:58
15	18:00	ok	18:08

Figure T2.2 — Field Worksheet

### Step 2 — Prepare the Field Worksheet

You should always keep field notes when you do travel time studies. The field notes help you keep track of the runs when you get back to the office. The Appendix has a master copy of a sample field worksheet to help you store all of the information about the runs you make. You should make copies of this form, or use it as a guide to develop your own field sheet. Also included is a sample of a worksheet that has been filled out (*shown here in reduced form*) to give you an idea of how the form is used.

Before you start the data collection, fill in the general information about the session at the top of the sheet. List the starting point, ending point, and any intermediate nodes.

### Step 3 — Connect the TDC-8 to the Test Vehicle



Figure T2.3 — TDC-8

actually connected to the Bank 2 switch in the counter. The labels for the two jacks are reversed on the side of the TDC-8.

This tutorial assumes you have installed and tested a transmission sensor in the test car. Refer to the instructions that came with the sensor to install it in the test vehicle.

Connect the transmission sensor to the TDC-8 using the Sensor Interface Cable. The five pin DIN connector goes to the transmission sensor cable. The other end plugs into the serial connector jack on the TDC-8. Make sure you tighten the lock-down screws on this connector to assure a good connection.

Also connect the pushbutton switch to the TDC-8. You don't have to use the pushbutton switch; you can use the BANK 2 button on the TDC-8. However, if you are doing a study by yourself, the pushbutton switch is much easier and safer to use.

**Note:** Plug the pushbutton switch into the jack labeled Bank 1 on the side of the TDC-8. This is

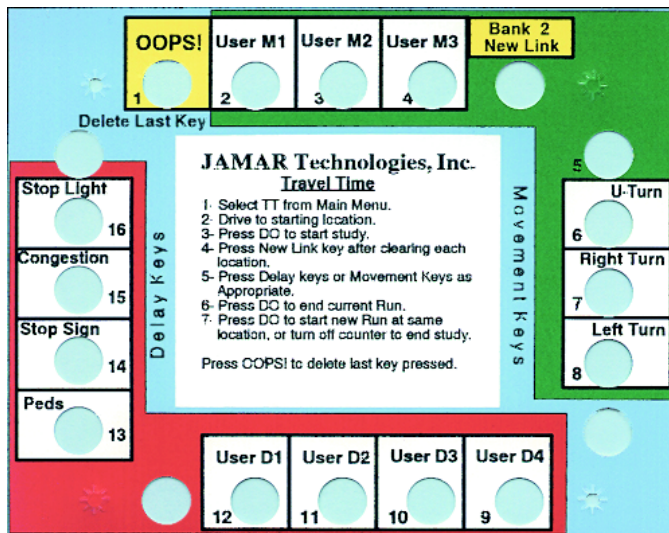


Figure T2.4 — TDC-8 Travel Time Template

The diagram to the left shows the Travel Time overlay that comes with the TDC-8. It has a set of brief directions printed on the middle of the overlay to help you remember how to do a Travel Time study. It also defines the buttons that you can use when you do a study.

Actually, you only need to use two buttons to do a typical study; the DO button to start and stop runs, and the BANK 2 button (*via the pushbutton switch*) to define node distances.

However, PC-Travel for Windows lets you use other buttons to define other events that you can monitor when you do a study. These other events can be sources of delay during a run, such as a signal, stop sign, congestion, etc. You

can also assign your own (*for example, a construction zone delay could be assigned to button 12*). These delay buttons are grouped on the left side of the overlay and have a red background. You can also use the buttons to define *movements* made by the vehicle during a run, in case the route isn't along a single arterial. These movement options are shown in green on the overlay.

If you use the delay buttons, you can have the software show where the delays occurred on several of the plots supported in the program. If you want to use the delay buttons, you should have another person in the car collecting the data while you drive; it isn't safe to try to collect delay data while you drive.

## Step 4 — Calibrate the TDC-8

If you have already calibrated your test car (*possibly with a JAMAR Distance Measuring Instrument*), you can skip this step, unless you have made a change in your vehicle which affects the calibration, such as getting new tires or changing their inflation pressure. The TDC-8 will

**TRAVEL CALIBRATE** **EXIT**  
 Edit or Measure the  
 Calibration Constant

**EDIT MEASURE** **EXIT**  
 Measure a new  
 Calibration Constant

Enter calibration  
 distance (ft): **2000**  
**BANK1-TAB = cancel**  
**DO = done**

Drive to beginning  
 of calibration run..  
 Press DO to start...

Counting pulses:  
**0473**  
 Press DO at end of  
 calibration distance

Calibration Constant  
**0882**  
 Press DO to return  
 to Travel Time menu

remember the last calibration constant used. If you have several test vehicles you can enter the calibration constant using the edit feature of the TDC-8's calibration routine. If you use multiple vehicles, you will help yourself by posting the calibration constant in the vehicle.

**The calibration constant used should be between 0500 and 1200. If not, you must adjust the jumper block in the transmission sensor.**

Calibration requires a little advanced preparation. Find a location in your area where a straight and flat section of sparsely traveled road can be used. Have a section of the road surveyed so that the distance between two fixed landmarks is accurately measured. The distance should be between 1000-3000 feet, though lengths up to 9999 feet can be used.

Drive to the first marker and stop (*that's why a sparsely traveled road is desirable*) so that the test car is immediately adjacent to the marker. Invoke the TDC-8's calibration procedure by selecting a new TT count and then tabbing to the CALIBRATE option and pressing the DO button. Select MEASURE and then press the DO button. Next, enter the calibration distance, which is the distance resulting from your survey. Remember, the "10" button on the TDC-8 gives you a zero. If you haven't already, drive to the start of the calibration distance. You should always come to a complete stop for several seconds before starting the calibration run. This stop will ensure that no distance error results from the reaction time of pressing the button.

Once in position, press the DO button again, then drive to the end of the calibration course. The TDC-8 will show you how many pulses are being received from the transmission sensor as you traverse the calibration distance. Drive to the second landmark and again come to a complete stop immediately adjacent to the marker. Then press the

DO button again, and the calibration constant will be displayed. The constant is the same value used in PC-Travel for Windows, and you should write it down on your field notes.

**IMPORTANT:** The calibration constant used should be between 0500 and 1200. If your calibration constant is outside this range, you will need to adjust the jumper block in the transmission sensor then re-calibrate. Refer to the documentation that came with the sensor for information on how to do this. *If you use a calibration constant outside the 0500 to 1200 range you may not receive accurate data.*

That's all there is to calibration. The TDC-8 will store the constant until you change it.



**TRAVEL CALIBRATE  
EXIT**  
**Start a new Travel  
Time study**

**Site Code: 12345678**  
**Enter up to 8 digits**  
**Press DO to accept**  
**BANK1-TAB to cancel**

**Travel Time Study**  
**Count:001 Run:001**  
**Press DO to Start...**  
**07:12:43 Speed=27**

**Travel Time Study**  
**Run:01 Link:01**  
**Dist=0843 Speed=27**  
**07:12:52 L Key = 12**

## Step 5 — Prepare the TDC-8

Go through the preparation of the TDC-8 for a travel time (TT) study: From the Main Menu, select COUNT, then NEW, then TT. That will bring you to the point shown in the first screen shown here. Select TRAVEL and press DO. Enter a numeric site code (*there isn't much reason to go through the hassle of entering an alpha-numeric site code; pick a numeric one and write it in your field notes in case you need it later*), and press DO (*the second screen*) and proceed until the TDC-8 says to press DO to start the study (*the third screen*).

The screen now shows the Count number, Run number, time, and speed if the car is moving.

Note: Step 5 can be done in the office or, more commonly, in a parking lot near the start of the route.

## Step 6 — Start a Run

Drive to the starting point so that when you pass the starting point you are traveling at the proper speed with the rest of the traffic. Press the DO button as accurately as you can as you pass the starting point; this begins data collection.

The display shows the run number, link number (*how many times you have pressed the New Link button this run*), time, distance traveled so far this run, speed, as well as the last delay button pushed (*the L Key = value*). As you proceed along the route, press the New Link button as you pass each new section.

**Note: Check the speed reading on the TDC-8 and make sure it is close to the speed on the speedometer. If they are not reasonably close (within a few MPHs), it may indicate a problem with the sensor or an incorrect Calibration Constant. Don't collect data if the speed isn't right; the data almost certainly won't be correct.**

**Note: If you have chosen intersections as your nodes, wait until you exit the intersection to press the New Link button. This will ensure that any delay associated with stops at the intersection will be reported in the correct section.**

If you forget to press the New Link button at a location, continue the run to its stopping point as normal. You can add a node to the run later when you process the data. Make a note on the field sheet at the end of the run about the missing data.

If you hit the New Link button or a delay button by mistake, continue the run. You can edit the run data in the office if needed. Make a note on the field sheet at the end of the run about the extra data.

If you have an additional person in the car to push buttons, they may press the delay buttons as appropriate during the run. You can use the Travel Time overlay that came with the TDC-8 to describe the delays you encounter during the run, or you can assign your own definitions to the buttons; the software lets you define the delay buttons any way you want.

## Step 7 — Stop the Run

Press the DO button on the TDC-8 when you have reached the end of the route. If the end is the last intersection, remember to press the button as you *depart* the intersection. This ends the run and the TDC-8 stops collecting data until you press the DO button again, signifying the start of a new run.

You may turn around and collect data in the other direction. In this case you press the DO key when you go by the first intersection (*the END node of the previous run*), press the New Link button as you go through each of the nodes, and press the DO button to end the run when you get to the last node (*the START node of the previous run*).

It is important to understand that the various runs in the two different directions are not going to be combined in any way in the software. Travel times and other statistics have no meaning unless they represent travel along the same route, *in the same direction*. However, it is usually useful to collect data in both directions, and if you use the same nodes for both directions, you will not have to enter the names of the nodes twice later in the office. The software lets you enter the node names once, and then copy and reverse the order for the runs in the other direction. For this reason, we always suggest that you collect data in both directions, and use the same nodes for both directions.

**Note:** Remember that you press the DO button to start and stop a run. You press the New Link button for nodes in between.

## Step 8 — Make More Runs

Repeat Steps 6 & 7 until you have completed the session, then just turn the TDC-8 off. There is considerable debate on how many runs you should do to have statistically significant data, but the general consensus is that at least 3-5 runs in each direction are necessary, with the more runs the better.

# Tutorial 3

## How to Process Run Data from a TDC-8

## How to Process Run Data in a TDC-8

This tutorial is about how you get the data collected in the TDC-8 into edited runs.

Since you probably don't have a TDC-8 with travel time data in it lying around, we'll fake it a bit for this tutorial.

Select **Convert TDC-8 Travel Time Data** from the **File** menu in the *Study Summary* screen. The *Select TDC Data* screen is displayed, as shown in figure T3.1 below.

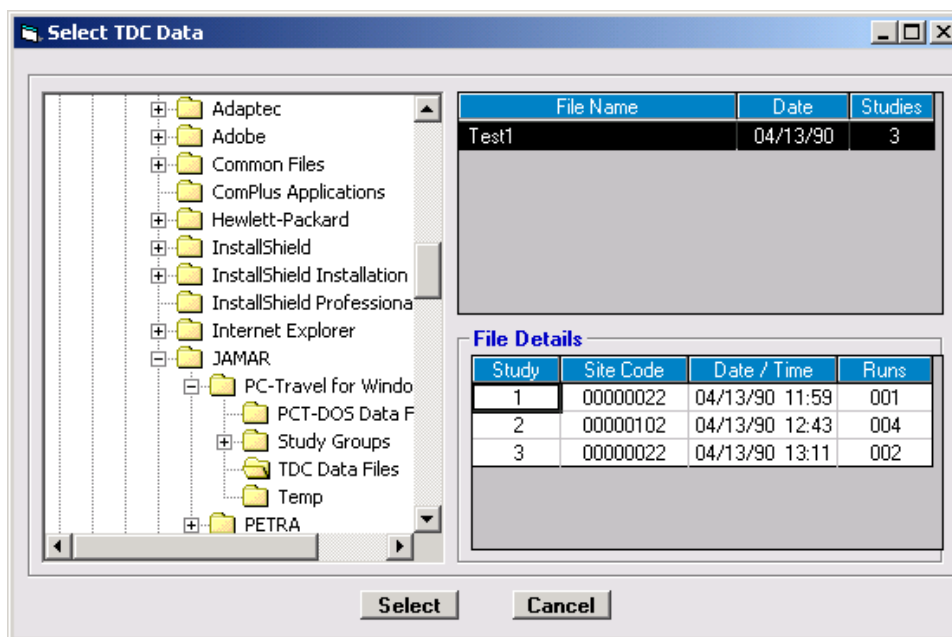


Figure T3.1 — Select TDC Data

This screen shows any files with a .tdc extension, which are text-like files you get if you store the data downloaded from a TDC-8 count board. The install routine created a folder called *TDC Data Files* and copied a file called Test1.tdc to that folder.

The left side of the screen shows the familiar tree layout of your computer, with the *TDC Data Files* folder selected. The upper right window shows that there is only one file in it now, called *Test1*. The file was created on 4/13/90 and has 3 studies in it.

The *File Details* window shows more info about the three studies, such as the Site Code, Date and Time, and the number of Runs in each study. The file details help you pick the correct File Name to process. Since there is only one file, that decision is easy.

Click **Select** to select the Test1 file.

The next screen you see is the same screen you would have seen if you had read the TDC-8 counter with this data in it. There is another screen that helps you connect the TDC-8 properly and dump it, but that screen is pretty simple (*and almost identical to the screen in PETRA if you happen to have that software*) so it isn't shown in this tutorial.

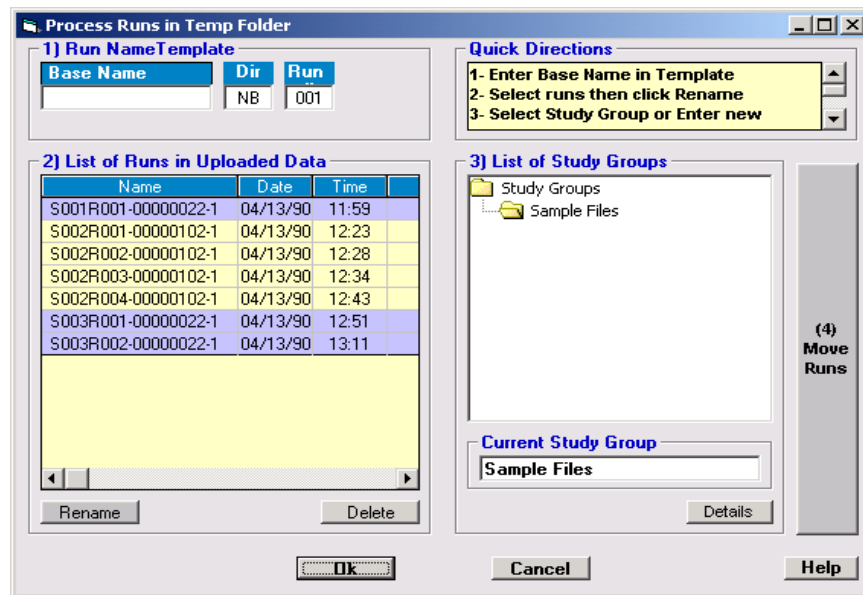


Figure T3.2 — Process Runs in Temp Folder

You have collected data with the TDC-8 counter. That data has no real resemblance to the run file format the software needs. This screen attempts to solve the following problem:

*What is the simplest procedure for an experienced user to take the data from the counter and end up with proper PC-Travel for Windows runs that can be built into studies?*

When you read the data from your TDC-8, the data in the counter is read into a temporary file and automatically stored in the **TDC Data File** folder (*as specified in the Preferences screen*). At this point, you can clear the counter and go do other studies with it.

The program then processes the data in the temp file into individual runs and stores them in the **Temp** folder, (*again as specified in the Preferences screen*). Each run is given a unique name using the following naming logic: SxxxRyyy-CCCCCCCC-N, where xxx is the study number, yyy is the run number, CC... is the site code from the data, and N is a number that is used to break ties in case two runs have the same other specs.

The program then displays the screen shown above. The large window on the left side of the screen shows the runs from the counter named using the convention just described. The background color alternates to separate runs from different studies.

You can see in this example that the first study just has one run, the second has four, and the third has two. Let's pretend the field notes show that the first run was just for practice. The next four runs were good runs. Runs 1 & 3 were northbound, 2 & 4 southbound. The last two runs were done at a different location, first westbound, then eastbound.

This is the starting point. The ending point will be when all of the temporary runs have been renamed and moved into a new or old Study Group. This is a four step process. While it isn't necessary to do the operations strictly in the order shown, it is probably a good idea to do it that way for a while until you feel comfortable with the process.

## 1 — Enter Base Name in Template

The **Base Name** is just a name that helps you identify a run as belonging to a group of similarly named runs. From the field notes (*continuing the example from the last page*), we know the first five runs were done on Fowler Ave., so we'll name all of these runs with a Base Name of Fowler Ave. Enter Fowler Ave. in the **Base Name** text box. Leave the Dir set to NB (*northbound*) and the Run # to 001.

## 2 — Select Runs then Click Rename

Study 1, Run 1 was just for practice, according to our notes. Runs 1 and 3 of Study 2 are northbound runs. We want to select them. Click on S002R001... and S002R003... then click on **Rename**. The names change to match the new name convention.

## 3 — Select Study Group

We want to move these two runs into a Study Group, but there isn't a Study Group we want to use. We need to create a new Study Group for these runs (*and later for any studies built from them*). In the **Current Study Group** text box, type Fowler Ave NB then press **Enter**. This creates a new Study Group, which is shown in the **List of Study Groups**. Click on the new Study Group to select it (*you can see it is selected because the folder is "open"*).

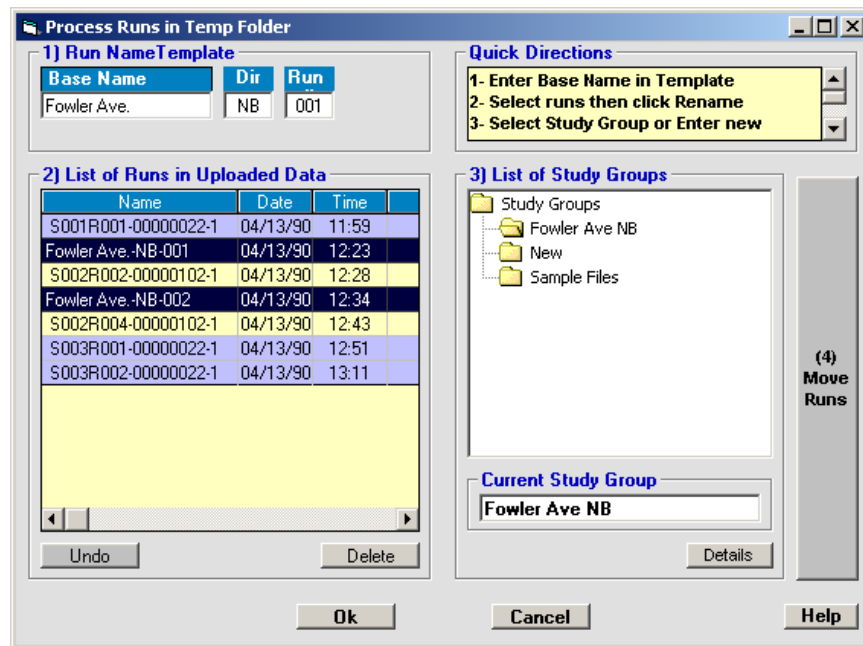


Figure T3.3 — Select Study Group

Your screen should now look like the one shown above. The runs with the new names are selected and the destination Study Group is shown in the **Current Study Group** text box.

## 4 — Click Move Runs

You are ready to move the runs to the new Study Group. Click the button on the far right labeled **(4) Move Runs**. The two runs disappear from the **List of Runs**, showing that they have been moved.

That takes care of the northbound runs. Now you have to do the same thing for the southbound runs. Since we already went through it once, I'll just outline the procedure.

- 1 – Edit the **Dir** field in the **Run Name Template** to SB, for southbound.
- 2 – Select the two runs from the list (S002R002... & S002R004).
- 3 – Click **Rename**.
- 4 – Create a new Study Group called Fowler Ave SB.
- 5 – Select the new Study Group.
- 6 – Click **Move Runs** to move the runs.

This will reduce the List of Runs to three.

You can repeat the procedure for the two runs in Study 3, if you want. Since our hypothetical notes say they were done at a different location, you should create a new Study Group for them. Just make up any name. Put both of the runs in the new Study Group.

This leaves the single run. Since our notes say this was a practice run, then it isn't needed. Click on **Delete** to delete the run. The **List of Runs** is now empty. This is where you want to end up, with all of the runs from the counter renamed and moved to study groups.

Click on the **Ok** button to close the **Process Run** screen and return to the main screen.

*Note: The procedure outlined up to this point may seem confusing at first glance. Once you get the hang of it though, you will be able to process run files very quickly.*

At this point you have all of the runs from the counter renamed and moved to new study groups. The run data is not complete, however. The runs only contain the information that was available in the TDC counter, which includes the name, the date and time of the run, and the actual pulse data collected in the field. There still are other pieces of data that are required before a run can be used in a study. You need to add the node names, assuming you collected node data during the runs, and you also can add notes to the run details to help you explain the data when you do analyze the data as part of a study.

**There are two different procedures you can follow to finish editing the run data details:**

**1 – Create a new study, and then edit the run details for the runs in that study.** This is the most common procedure, since most users immediately create studies and print out the analysis reports after reading the data from the counter. This process is described in *Tutorial 4 — How to Create a New Study* and then *Tutorial 5 — How to Edit Nodes in Individual Runs*.

**2 – Edit all of the runs you just read from the counter before you create any studies.** This is a good option if you plan to create the studies at a later date. You probably have the information you need to edit the runs at hand, since you brought the field sheets with you when you read the counter. You can edit the runs as needed, get them in really good shape, and then when you want to create the studies you won't have to worry about the runs at all. Some users prefer this method even if they plan to create the studies and print the analysis reports in the same session.

The next part of this tutorial shows you how to easily select a run to edit even if that run isn't part of a study as yet.

## How to Select a Run to Edit

Assume that you have read a counter and processed the runs as described in this tutorial. You now have several runs in one or more study groups. The runs are not complete yet; they still need some information added to them (*primarily the node names, but other stuff as well*).



Figure T3.4 — Edit Run Icon

From the Main Menu, click on the **Edit Run** icon in the toolbar, as shown in the figure here. This will bring up the **Select One Run** screen as shown below.

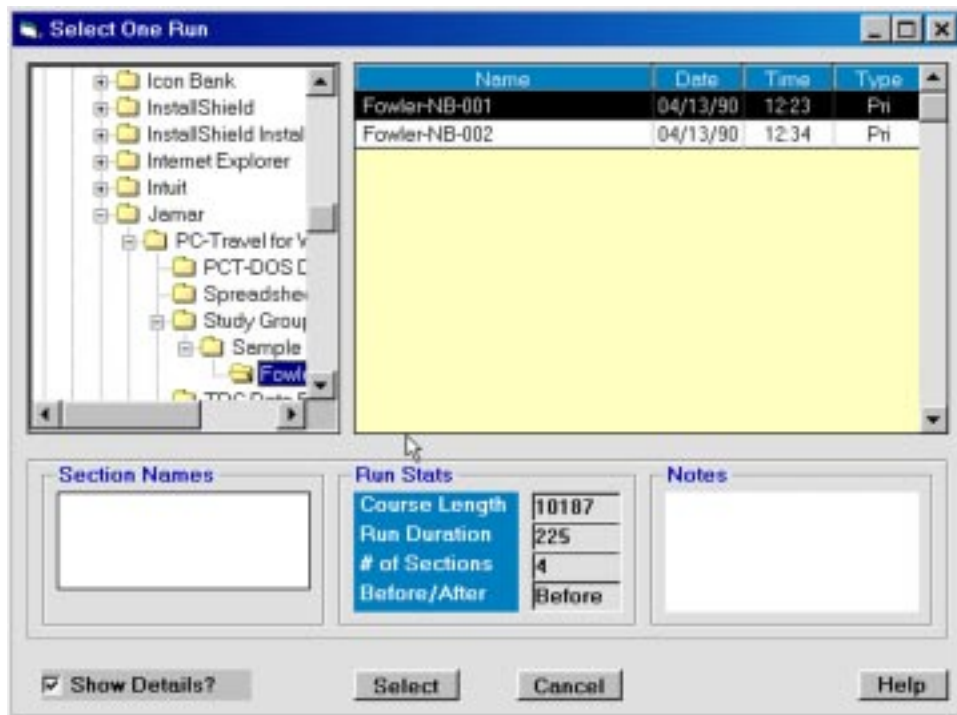


Figure T3.5 — Select One Run

There are three primary parts to this screen. The upper left window shows the familiar tree diagram of your Study Groups with the current Study group highlighted. The upper right window shows the runs that are in the highlighted Study Group. The name, date, time, and type of run are shown for each run. The bottom window shows additional information about the run that is highlighted in the upper right window.

The highlighted Study Group probably isn't the correct Study Group; you probably want to navigate to one of the new Study Groups you created when you processed the runs in your counter. If you followed the tutorial then you should have a folder under the Samples folder called Fowler NB. Click on that folder and you should see the screen shown in Figure T3.5.

There are the two runs you created earlier. The first run, **Fowler - NB - 001** is highlighted. There are no Node Names or Notes, so those sections are blank in the lower window. This is the run you want to edit, so click on the **Select** button at the bottom of the screen.

This brings up the Run Details screen shown in Figure T3.6.



The screenshot shows the 'Run Details' window with the following fields and sections:

- Name:** Fowler NB\Fowler-NB-001
- Date:** 04/13/90, **Fri**, **Time:** 12:23
- Run Type:** Primary (dropdown), **Before or After?:** Before (dropdown), **Calibration Constant:** 2680
- Node Names and Distances:**

1		0
2		651
3		9841
4		10187
- Run Summary:**

Course Length	10187
Run Duration	225
Number of Nodes	4
- Buttons:** Copy, Reverse, Delete, Insert, Trim Start, Trim End, Help, Save, Cancel, Edit, Stats, Plot.

Figure T3.6 — Run Details Screen

Tutorial 5 explains in great length how you can edit the Node Names on this screen, so that information won't be repeated here. Once you are through editing the run, you click on the **Save** button. This will bring you back to the *Select One Run* screen shown in Figure T3.5, where you can select another run to edit.

You can systematically edit each of the runs in the Study Group, and then go to another Study Group (*Fowler SB in this case*) and edit each of the runs in that Study Group. When you are done you will have all of the runs completely edited and ready to be added to studies.

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# Tutorial 4

## How to Create a New Study

## How to Create a New Study

This tutorial shows you how to create a new study from runs you have previously collected and stored on your computer.

In this case, we will create a study using three Before runs from the sample data that is installed with PC-Travel for Windows.

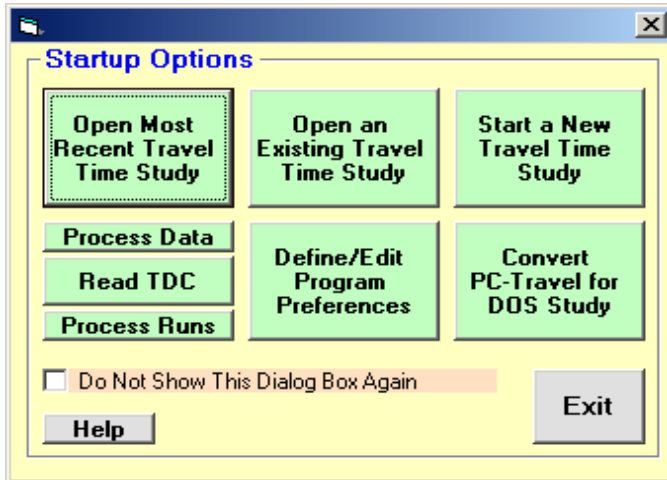


Figure T4.1 — Startup Options

Run PC-Travel for Windows. You will see the Startup Options, as shown here.

Click on the top, right button which is labeled **Start a New Travel Time Study**.

*Note: If you are already in the program, you can select **File: New** from the main menu, or click on the first toolbar, labeled **NEW**, at the top of the screen.*

You will see the screen shown in the figure below. This is a blank Study Details screen. At the bottom of the screen are the default values for the Speed Categories, Normal Speed, and Stop Speed. Everything else is blank.

Run Title	Start Date	Start Time	Length (ft)	Before After	Run Type

Speed Categories (MPH): #1: 0, #2: 35, #3: 55

Node Distances: View

Normal Speed: 45 MPH

Stop Speed: 5 MPH

Help

Figure T4.2 — New Study

Click on the **Add Run(s)** button in the center of the screen. This will bring up the *Select Runs* screen, which is similar to the screen shown in the figure T4.3 below. The left side of the screen shows the familiar tree of folders, with the Study Groups folder highlighted (*or whatever you have set as the Study Group Root Folder in the Preferences*).

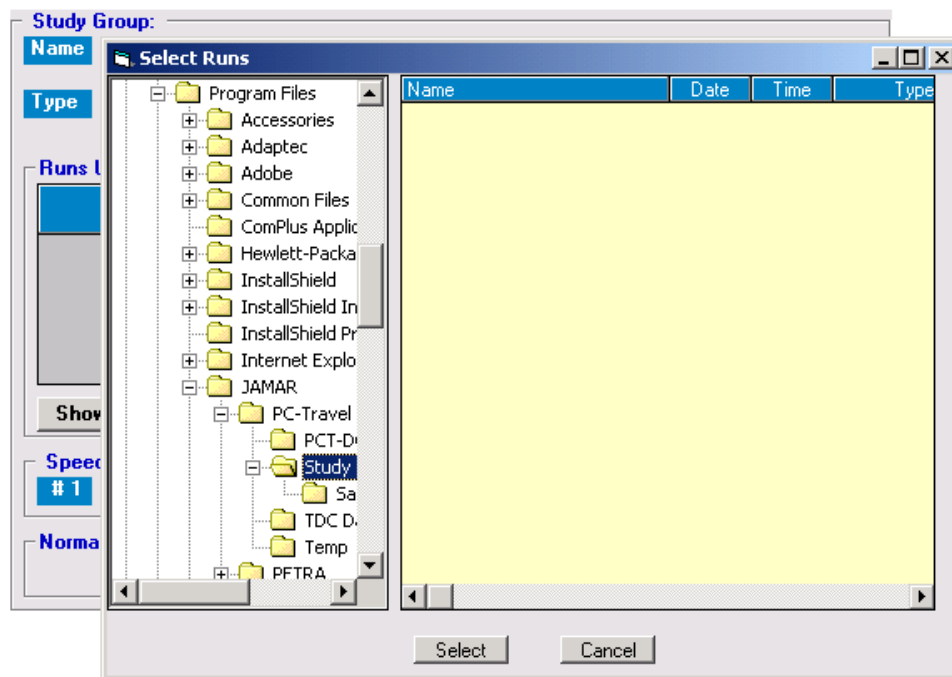


Figure T4.3 — Add Runs

Click on the study group named **Sample Files** in the tree, which is where the runs we want are located. The window to the right shows the six runs that are in that study group.

We want this study to be just the Before runs from that group. We previously had cleverly named the runs with Before and After suffixes, so it is easy to find the Before runs. Click on each of the three Before runs in the list. The runs you select are highlighted as you click them. Your screen should now look like this.

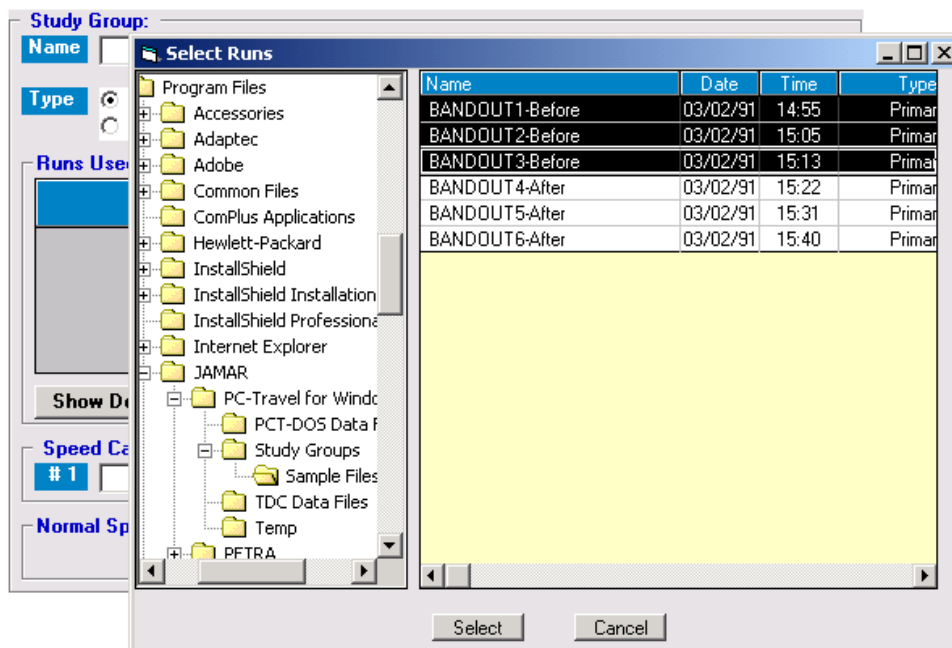


Figure T4.4 — Select Runs

These are all of the runs we want for this particular study, so click on the **Select** button. The **Select Runs** screen disappears, and the **Study Summary** screen now shows the three runs we just selected. Your screen should look like this:

Figure T4.5 — Runs Added

The top of the screen, right above the Name label and text box, shows the Study Group as Sample Files, which is where the runs are located. The assumption always is that the study will be stored in the same study group as the runs.

You can view the **Run Details** of each or any of the runs by highlighting the run and clicking on the **Run Details** button. If these runs came from data just read from a TDC-8, then you would need to edit each of the runs and give them new names, check the node names and distances, etc. (See Note below).

Notice that the **View** button in the lower right corner is red. This indicates that you should check the study node distances to make sure the current distances are ok.

Click on the **View** button now. Notice that all of the distances have green backgrounds. That means that for each node, all of the run distances for that node are close to the same distance. In this case, you don't need to do anything with these distances. The distances in the Current column are fine as well. So just click the **OK** button to go back to the **Study Details** screen. If these runs came from data just read from a TDC-8, then there is a good chance that some of the node distances would be incorrect and you would need to edit the distances.

Current	Name	Avg	Run 1	Run 2	Run 3
0	[Start]	0	0	0	0
771	Mainland	771	800	771	744
2425	Guilbeau	2425	2448	2420	2409
5057	Bresnahan/Mistic	5057	5045	5077	5049
7538	Braun	7538	7568	7505	7543
9960		9960	9960	9972	9949

Figure T4.6 — Run Distances

*Note: See Tutorial 1 pages T1.7 to T1.10 for a brief overview of how you can edit the runs in the Run Details screen and then how you can manipulate the node distances on this screen.*

The last few things you need to do are to add any notes, give the study a name, and then save it.

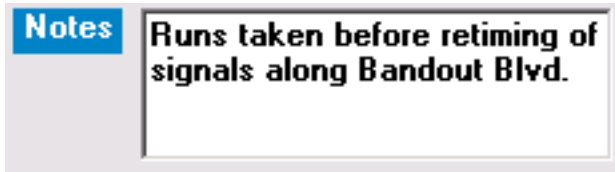


Figure T4.7 — Notes

Type any notes in the *Notes* window. Remember that whatever you type will be saved with the study and printed at the bottom of the Study Summary report. Ask yourself, “What would I want to remember about this study in 6 months that isn’t obvious from the data?”.

The study is just about ready to save. Check everything on the Study Summary screen. Make sure the *Speed Categories*, *Normal Speed*, and *Stop Speed* are what you want for this study. You can change any of these parameters simply by editing the text boxes.



Figure T4.8 — Name Closeup

Finally, click in the far left corner of the *Name* text box at the top of the screen, and type in the name you want to give to this study. Make the name as descriptive as necessary so that you can tell what the study is about from the name alone. In this case, the name is simply the main

road, Bandout Blvd., and the fact that these are the Before runs. The name will often, but not always, be an elaboration of the names of the runs in the study.

When you have entered the name in the text box, click on the **Save** icon on the toolbar, or select **File:Save Study Now** from the main menu.

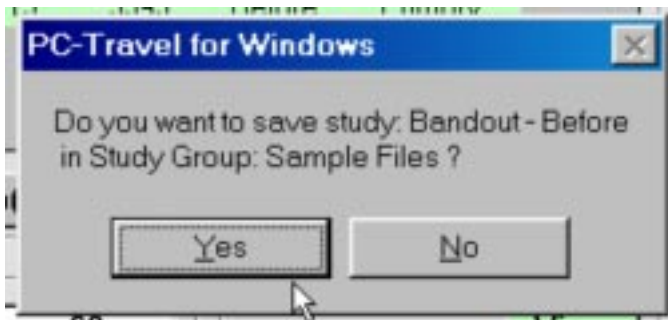


Figure T4.9 — Save Confirmation

A confirmation window pops up asking if you want to save this study. It shows the name of the study and the study group. Click on **Yes** to save the study. If you realize the name or the study group is wrong then click on **No**.

The study is now saved on your computer in the study group shown at the top of the screen. You can now view the data or print reports.

## Summary

This tutorial gave you a quick introduction to the process of creating new studies. You saw how to Add existing runs to a blank study, edit the basic parameters for the study, and name and save the study.

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# Tutorial 5

## How to Edit Node Distances in Individual Runs

## How to Edit Nodes in Individual Runs

Travel-time studies would be pretty simple to do and analyze if it weren't for the nodes; you could simply time how long it took you to drive from the start to the end of the route and that would be your travel time. But that doesn't give you enough information. You need to know the statistics on a node to node basis. That is how you find the intersections that are causing the biggest delays. But dealing with the node information is annoying at best. Not only do you have to be very diligent when you collect the data so that you press the New Link button accurately at each node, but you also have to type in the names of all of the nodes into the software so that the reports will make sense. This tutorial shows you how to use some of the advanced features in PC-Travel for Windows to edit the node distance names and distances in your runs, to make it as easy as possible.

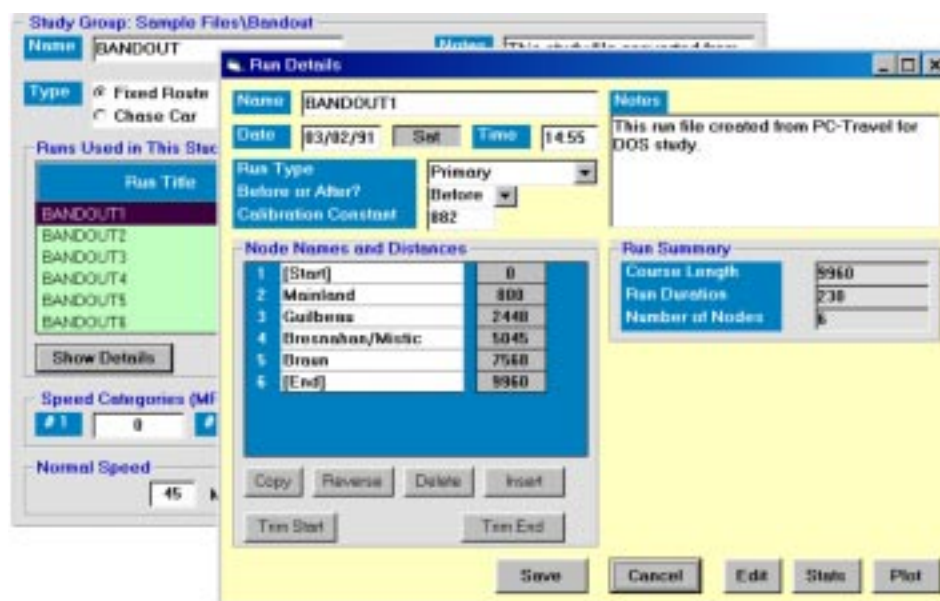


Figure T5.1 — Run Details

This is the **Run Details** screen. It shows just about everything we know about a particular run, including the node names and distances if this run is a Primary run (*remember, a Primary run is a run where you collected node distance information in the field and want to use it to find the node distances for the study*). Most of this screen has been discussed before, in *Tutorial 1 - Introduction to PC-Travel for Windows* (see page T1.7).

This tutorial will deal with the information shown in the lower left part of the screen, the window labeled **Node Names and Distances**. This is where you enter the names of the nodes, either by typing in the names (*but just once*) or copying the names from other runs (*the preferred method*). You also can insert and delete nodes in the data, and trim the start or end of the run to make the nodes line up. These options will be explained in detail in a little while.

**For this tutorial, just read the text. It isn't necessary to follow along on your computer. These operations permanently alter the runs, and that might confuse you if you then try to use the same runs in another tutorial.**

In order for a study to analyze correctly, all of the runs in the study must start in the same place, end at the same place, and go in the same direction. This sounds simple, and usually is, but occasionally a mistake is made during a run and a node is missed, or an extra node is added, or the run is started at the wrong place. You could just ignore this run, but as you'll see, you may also be able to fix it.

The *Node Names and Distances* window in figure T5.1 has two sections:

The top shows the node names and distances. The Node Names section have a white background, which means you can edit the names simply by typing over the existing names. The distances have a gray background. Those values are calculated from the pulse data collected by the TDC-8, and can't simply be edited by typing over them (*although, as you'll see, there is a way to edit them*).

The bottom section has six buttons. This tutorial basically will explain how to use these six buttons.

There are three situations we will examine, each requires the use of one or more of these buttons:

- Situation 1: Normal scenario where you enter the node names for runs you just downloaded from a TDC-8.
- Situation 2: Your run has a missing or extra node and you want to fix it.
- Situation 3: All of the runs were started and/or ended at different places (*which is ok*).

## Situation 1: Normal scenario where you enter the node names for runs you just downloaded

There really are two parts to this situation. The first is processing the first run, where you have to type in the node names for the first (*and last*) time. The second is for other runs on the same route (*even those going in the opposite direction*). We'll call these two parts 1a and 1b, respectively.

### 1a – First Run

The normal sequence with PC-Travel for Windows is the following:

- You do a study in the field and collect data in your TDC-8.
- You read the TDC-8 and create two study groups, each containing runs for one direction.
- You create a new study and add the runs from one direction.
- You enter the Run Details information for each run and re-save the run.

Node Names and Distances		
1		0
2		800
3		2448
4		5045
5		7568
6		9960

Figure T5.2 — Nodes Without Names

It is during this last item that you enter the node names. This screen shot shows what the screen looks like before you type in the node names. The distances are already there because they come directly from the data. Since this is the first run you are processing for this route, you need to type the names of the nodes. The first line, with a distance of 0 is where you started the run. The last line, with a distance of 9960, is where you ended the run. This is all standard and easy to do. Just click in the text box where you want to edit the name, and type in the name or edit the existing name.

Node Names and Distances		
1	[Start]	0
2	Mainland	800
3	Guilbeau	2448
4	Bresnahan/Mistic	5045
5	Braun	7568
6	[End]	9960

Figure T5.3 — Nodes With Names

You will end up with something similar to this. Once all of the names are entered, and you have edited the other information on the *Run Details* screen, click on **Ok** to save the run information. You now have one run with all of the node names entered; you won't have to type the names in again.

## 1b – Subsequent Runs



Figure T5.4 — Copy Node Names

copied to the appropriate fields. Then you can save the run.

You can follow a similar sequence when you create the second study with the runs going in the opposite direction, with a couple of minor additions. The first run of this new study will not have any node names yet. Instead of typing them in like you did the first time, you can copy the node names from a run from the first study group. You may need to navigate to another study group to find the run you want before you select the run. Once you are back in the Run Details screen, you will have the node names on the screen but they will be in the wrong order. Click on the **Reverse** button to flip the names from top to bottom. Save the run, and then you can follow the sequence in 1b described above for the rest of the runs in that study using this first run as the source for the node names.

Using the procedures described in 1a and 1b above, you can add node names to all of your runs, and you just have to type in the names once for each route.

## Situation 2: Your run has a missing or extra node and you want to fix it

Sometimes, however, you may find that there are problems following the procedures outlined above because one or more of the runs don't have the proper number of nodes. It is easy to miss a node while collecting the data; you are busy driving and you may not hit the pushbutton properly so the node isn't entered. Or you may accidentally press the pushbutton when you shouldn't, which adds a node that doesn't belong there.

You have three options when you discover a run has the wrong number of nodes:

- 1 – Make the run a Secondary run, which effectively ignores the node information in the run.
- 2 – Adjust the run node distances on the Node Distances screen before finding the averages.
- 3 – Fix the node information in the run.

The first choice is actually the easiest and usually the best solution. *The node distance information in any one run is only used to help find the average node distances for the study (which is done in the Node Distances screen accessed from the Study Summary).* All statistics found in the software use the study node distances. So, if you have a study with several runs, and one of the runs has bad node information, then the simplest solution is to change the run type to Secondary (on the Run Details screen, see Fig T5.1). This tells the software to skip that run when it shows the node distances in the Node Distance screen, and the bad node information will not affect your data in any way.

The second choice works if you are missing one or two nodes in a run. With this option, you use the tools available in the *Node Distances* screen to adjust the node distances shown for the runs so that the nodes in the bad run line up with the equivalent nodes in other runs. This is explained in detail in *Tutorial 6: How to Find Node Distances in Your Study*. This is also a perfectly good option.

The third choice is for when it isn't practical to use the first two choices. If your study only has 2 or 3 runs, then skipping one or two of them would make the averages of the node distances less accurate than you might like. If your run has extra nodes, then it isn't easy to use option 2. Or, you may just decide that you want the runs to be as accurate as possible. For these cases, you can almost always fix the bad runs so that the node information is accurate.

### How to Delete A Node

Node Names and Distances	
1	0
2	800
3	1004
4	2448
5	5045
6	7568
7	9960

Copy Reverse Delete Insert

Trim Start Trim End

**Figure T5.5 — Delete a Node**

edited the data point that had the node information at 1004 feet and removed the node marker. When you save the run, you make the change permanent.

Assume that in one of your runs you accidentally hit the New Link button, which added an extra node to the data. When you go to the Run Details screen you see that instead of the expected six nodes, there is a seventh. A little comparison to the other runs makes it clear that the problem is the third node, at 1004 feet. That node shouldn't be there. There aren't any node names yet, since you want to have the proper number of nodes before you copy the names from another run.

Click on the text box in the third node line. Then click on the **Delete** button. The third line (*along with the distance*) disappears and there now are six nodes, which is correct. You can now copy the names from another run and proceed as normal. The software

### How to Insert a Node

Node Names and Distances	
1	0
2	800
3	5045
4	7568
5	9960

Copy Reverse Delete Insert

Trim Start Trim End

**Figure T5.6 — Insert a Node**

Assume that in one of your runs you missed a node. When you go to the Run Details screen you see that instead of the expected six nodes, there are only five. A little comparison to the other runs makes it clear that the problem is that the third node is missing; the other runs have a node around 2040 feet and this run doesn't. We can fix that.

Click on the text box on the third node line, then click on the **Insert** button. A new line, along with a blank distance, is inserted in the third node position.

We know the missing node is about 2040 feet from the start. Click on the blank white text box in the distance column and enter 2040.

Node Names and Distances	
1	0
2	800
3	2040
4	5045
5	7568
6	9960

Copy Reverse Delete Insert

Trim Start Trim End

**Figure T5.7 — Add Node Distance**

You now have the proper number of nodes for this run, so you can copy the node names from another run and proceed as normal. When you save the run, you make the change permanent.

If you immediately go back to the Run Details screen you may see something that seems odd. The distance that you typed in, 2040, has changed to 2051. This is normal. In fact it is unavoidable.

Node Names and Distances		
1	[Start]	0
2	Mainland	800
3	Guilbeau	2051
4	Bresnahan/Mistic	5045
5	Braun	7568
6	[End]	9960

Figure T5.8 — Node Added

Remember that node markers are embedded in the pulse data, and that the pulse data is stored every second. The software can only find distances on a second by second basis. When you inserted a node and typed in the distance, the software searched for the data point that contained the distance you entered. It then added a node marker to that data point. Later, when the software scanned the pulse data to find the node distances, it found the new marker, but used the only distance it knew, the distance traveled up to that

point, as the node distance. This probably doesn't exactly match what you entered. But it is as close as the system allows, and normally is more than accurate enough. (*For a more complete discussion of how distances are measured, see Appendix 2.*)

### Situation 3: All of the runs were started and/or ended at different places (which is ok)

The first two situations discussed dealt with handling mistakes that were made while collecting travel time data, specifically missing nodes or adding nodes. The third situation deals with editing runs that are done using a data collection procedure that is fairly common, but could cause problems if not handled properly.

**One of the primary requirements for a successful travel time study is that all of the runs must start at the same place.** All distances in PC-Travel for Windows are calculated from the start of the run. If the starting point of each of the runs in a study varies, then the study statistics won't make any sense.

You start a run by pressing the DO button on the TDC-8. Most users set up their route and add a node (*usually an intersection*) before and after the main route. They start each run at the start node and end each run at the last node. Since each run starts at the same place, everything is fine.

To start the run at the first node, you really have to be driving at the proper speed some distance in advance of the first node when you start the run. It is a little easier to press the New Link button, which is in your hand and doesn't require you to take your eyes off the road, than the DO button on the counter. For this reason, some users, especially those who have used PC-Travel for DOS, like to start the run without the requirement that the driver press the DO button exactly at the right place. The idea is that the driver starts the run anywhere in advance of the first node of interest, then accurately marks the nodes using the New Link button, and then ends the run anywhere after the final node of interest.

In PC-Travel for DOS, the software had a feature called **Ignore First Link** and **Ignore Last Link**. If the **Ignore First Link** was chosen, the analysis software didn't start the run where the user pressed the DO button, but rather with the first node. Similar logic was used for **Ignore Last Link**. This feature was used by only a small percentage of users, but caused a lot of confusion. It was left out of PC-Travel for Windows.

However, the idea of starting and ending the runs somewhat randomly has some merit, if only from a safety point of view, so we wanted to support those users who wanted to collect data that way.

If you start a series of runs at different places, but always have the first link at the same place, then essentially you want the software to ignore the data from the start of the run to the first node. Instead of ignoring it, we let you delete it. This is where the **Trim Start** and **Trim End** buttons are used.

## How to Trim Runs

**Node Names and Distances**

1		0
2		800
3		2051
4		5045
5		7568
6		9960

Copy Reverse Delete Insert

Trim Start Trim End

**Figure T5.8 — Trimming Runs**

**Node Names and Distances**

1		0
2		1251
3		4245
4		6768

**Figure T5.9 — Trimmed Runs**

Assume you have collected data as discussed above, so that the first node distance varies from run to run in this study. Also, the last node distance isn't important either because it varies from run to run. This is shown in the first screen shown here.

Click on **Trim Start**. The first node line is erased and the distances adjusted so that the first node starts at zero. The software deletes all of the data points from the start of the run up to the data point with the first node marker.

Click on **Trim End**. The last node is erased. The software deletes all of the data points from the end of the run back to the data point with the last node marker.

You need to do this for each of the runs in the study. All of the runs now start and end at the same place.

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# Tutorial 6

## How to Find Node Distances in Your Study

## How to Find Node Distances in Your Study

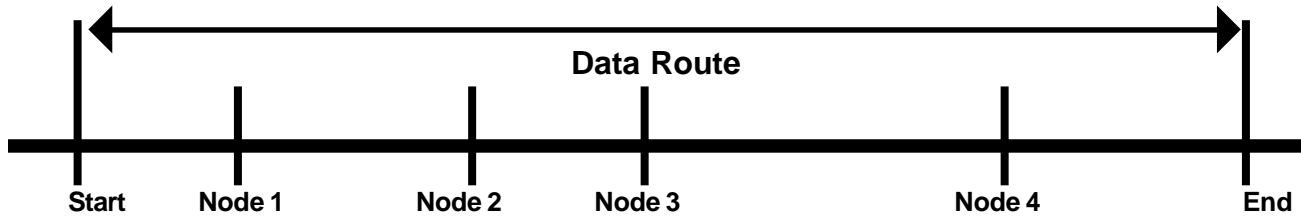


Figure T6.1 - Typical Route with Nodes

Nodes are an important concept in PC-Travel for Windows. Every study, like the runs that it is made from, starts at one well-defined point and ends at another, and usually has nodes in between (*see Figure T6.1*). These nodes are usually cross streets, but can be anything that is easy to see while you are driving.

The program needs to know the names of each of the nodes and the distance that each node is from the starting point. Various statistics are calculated, displayed, and printed in the reports not just on the entire route, but on a node to node basis as well.

Since node names and distances are so central to the operation of the software, it is important that you understand how you find the most accurate distances for your studies (*the names don't cause much confusion*). That is the purpose of this tutorial. You will learn how to find the best possible node distances for your study. Before you get to the software, however, you need to understand some of the concepts involved.

There are basically two methods you can use to find the node distances:

- 1 – Collect node distance information while you do the travel time runs by pressing the **New Link** button as you pass each node point during a run.
- 2 – Measure the node distances accurately in some way independent of the travel time data collection, and then manually input the distances into the software.

Since the first option is by far the most common method used, it will be discussed first.

### Use Node Data From Runs

You may ask, “What’s the problem? I drive the route and press the **New Link** button at each node. The software should be able to calculate the node distances from the run data.” Basically, this is true. But there are two problems. One is the fact that the node distances found from the data stored in the TDC-8 are not very accurate. *Appendix 2 — How Distances are Measured* explains this in detail. The second is that the nodes are recorded by people, who don’t always press the **New Link** button at the proper place (*and sometimes forget to press the button at all*). The result is that the node distances for any one run are often inaccurate.

Since a typical travel time study requires multiple runs, you have multiple opportunities to measure the same node distances. Assume you did five runs in a row. You pressed the **New Link** button at each node during each run. There is some error in each node distance caused by the inherent error in the way the distances are stored in the TDC-8, plus the error associated with you trying to push the button at exactly the same place each run. Each node distance may have some error inherent in the measurement, but the *average* of the five node distances is probably pretty accurate, or at least more accurate than any one run you might pick.

The idea of averaging the node distances from all of the runs is the basis for the *Node Distances* screen used in PC-Travel for Windows. The more runs there are that have node distance information, the more accurate the averages will be. This leads to two of the fundamental rules for collecting good travel data:

**1 – Press the New Link button at each node on every run you do.** This is fairly easy to do. You are out there anyway, so you might as well collect the node information for each run.

**2 – It is better to not hit the New Link button at all for a node, then to hit it several seconds late.**

Sometimes it is impossible to press the button just when you want to, especially if you are doing the study by yourself; the traffic may keep you busy as you pass the node. Just skip the one node. You'll probably have several measurements for that node by the end of the day. However, if you know you mis-timed a node, make a note on your field sheet at the end of the run so that you can deal with it later back in the office.

When you read and process the data in the TDC-8, you create runs from the data and store them in a Study Group. You edit the parameters of each run in the Run Details screen (See page T1.7). If you designate the run as a Primary run (*which only means that you collected node information in the field and you want the software to use it*) then the run has node names and distances for you to enter or edit. The names are entered manually or copied from other runs. The distances are found from the pulse data collected in the TDC-8. Occasionally you need to fix bad node information in the run. **Tutorial 5 — How to Edit Nodes in Individual Runs** explains how to do this. When you save the run details, the node information is ready to be used in a study.

Once the runs are created and edited as needed, you create a study using some or all of those runs. Before the software can find the statistics for the study, which include statistics on a node-to-node basis, it has to find the node distances that will be used in that study. That is done, with your help, on the *Node Distances* screen.

First, you need to run the software and open a study so you have data to use.

1 – Run PC-Travel for Windows and from the **Startup Options** screen, select *Open Existing Study*.

2 – If necessary, navigate to the **Sample Files** study group.

3 – Click on *Bandout-Mixed Runs* from the list and then click on **Select**. You'll see the *Study Details* screen as shown below in Figure T6.2.

Study Group: C:\Program Files\JAMAR\PC-Travel for Windows\Study Groups\Sample Files\

Name: BANDOUT - Mixed Runs

Notes: This study file converted from a PC-Travel for DOS study.

Type: ☒ Fixed Route ☐ Chase Car

Runs Used in This Study

Run Title	Start Date	Start Time	Length (ft)	Before After	Run Type
BANDOUT1-Before	03/02/91	14:55	9960	Before	Primary
BANDOUT2-Before	03/02/91	15:05	9972	Before	Primary
BANDOUT3-Before	03/02/91	15:13	9949	Before	Primary
BANDOUT4-After	03/02/91	15:22	9885	After	Primary
BANDOUT5-After	03/02/91	15:31	9917	After	Primary
BANDOUT6-After	03/02/91	15:40	9905	After	Primary

Show Details Add Run(s) Remove Run

Speed Categories (MPH)

# 1 0 # 2 10 # 3 30

Node Distances View

Normal Speed 35 MPH Stop Speed 5 MPH

Figure T6.2 — Study Summary Screen

4 – Click on the **View** button in the *Node Distances* window. This will bring up the Node Distances screen.

Current	Name	Avg	Run 1	Run 2	Run 3	Run 4	Run 5
0	[Start]	0	0	0	0	0	0
800	Mainland	766	800	771	744	752	736
2448	Guilbeau	2354	2051	2420	2409	2453	2392
5045	Bresnahan/Mistic	5463	5045	5077	5049	5086	7488
7568	Braun	7928	7568	7505	7543	7522	9917
9960	[End]	9934	9960	9972	9949	9885	

Buttons: Copy, Copy Avg to Current, Recalc Avg, Ok, Cancel, Help, ☒ Show Run Node Distances

Figure T6.3 — Node Distances Screen

The *Node Distances* screen shown above shows the **Names** of the nodes and the **Current** distances assigned to each node for this study on the left side of the screen. *Ultimately, the only thing that matters is that the Current column has the best possible distances.* The names and distances default to the values of the first Primary run. The distances are often close enough to use. However, these rarely are the *best possible* distances. There are several ways to get these better distances.

The right hand side of the Node Distance screen shows the node distances for each of the Primary runs in the study. The **Avg** column is the average of all of the run distances in that row. In this case, there are six runs (*only five are visible without scrolling*).

Notice that most of the numbers have a green background, and two have red backgrounds. Each number should be close in value to the other numbers in the same row, since they represent the attempt of the data collector to mark the same node. The software compares each distance to the value in the Avg column. If the two distances are close (*within 500 feet by default, but you can change this in the Preferences screen, see Appendix 1*) then it shows a green background. If it isn't close, then it shows a red background.

Look at the two red values in Run 5. It is pretty clear what happened here. The data collector missed the node at Bresnahan/Mistic. This makes the other two distances below that node out of place. The 7408 that is now in the Bresnahan/Mistic space should be in the Braun row, and the 9917 should be in the [End] row.

***Note:** When this run was first created, the missing node could have been inserted in the Run Details screen; then this screen would have all green entries. Alternatively, you could go back to the Run Details screen for run 5 and set the type to Secondary. Then the run wouldn't show up on this screen at all. You usually have several different options available to you to deal with bad or missing nodes. The best option is the one that gives the software the most node distance data points to average, since that will give the most accurate results. Therefore, as the best option we always recommend fixing the runs by inserting or deleting nodes as needed. As the next best option, adjust the node distances on this screen as shown in this tutorial. Finally, if all else fails, make the run a Secondary run. This is the least desirable since it eliminates all of the node distances for that run from the averaging operation, not just the one or two bad ones.*

Assume that you don't want to fix the run, but you want the distances that are out of place to be put where they belong. You can do this easily. Just follow along:

Avg	Run 1	Run 2	Run 3	Run 4	Run 5
0	0	0	0	0	0
766	800	771	744	752	736
2354	2051	2420	2409	2453	2392
5463	5045	5077	5049	5086	7488
7928	7568	7505	7543	7522	9917
9934	9960	9972	9949	9885	

1 – Click on the number 9917. A solid border appears around the cell.

2 – Point the cursor at the bottom of the cell, right on the line. The cursor will change from a cross to an arrow.

3 – Press and hold the left mouse button and drag the cell down one cell and let go of the mouse button.

4 – The 9917 cell is now one row lower.

5 – Repeat steps 1-4 with the number 7488.

Avg	Run 1	Run 2	Run 3	Run 4	Run 5
0	0	0	0	0	0
766	800	771	744	752	736
2354	2051	2420	2409	2453	2392
5463	5045	5077	5049	5086	7488
7928	7568	7505	7543	7522	
9934	9960	9972	9949	9885	9917

Avg	Run 1	Run 2	Run 3	Run 4	Run 5
0	0	0	0	0	0
766	800	771	744	752	736
2354	2051	2420	2409	2453	2392
5059	5045	5077	5049	5086	
7523	7568	7505	7543	7522	7488
9931	9960	9972	9949	9885	9917

We now have the distances in the proper rows. There is a blank entry, but that is ok. The software will ignore it.

Click on **Recalc Avg**. The values in the **Avg** column change, and now all of the numbers have a green background.

**Figure T6.4 —  
Select and Move Node Distances**

Click on the **Copy Avg to Current** button. The values in the **Current** column now match the **Avg** column. These values are now the best we can get from our data, and are probably more accurate than just choosing the distances in any one run.

When you are happy with the values in the **Current** column, click **Ok**. If you get the distances all messed up, just hit **Cancel** to go back to the **Study Summary** screen without making any changes.

The new distance values in the **Current** column are not a permanent part of the study yet. If you want to save the new values with the study, then click on the **Save** icon in the **Study Summary** screen. The new distances, plus any other changes to the study you have made, are saved.

This whole procedure may seem a little cumbersome, but if you don't want to fiddle with the node distances you usually don't have to. If you prepare the runs properly you will see only green values when you first see this screen. If there are some red values, you still have several options. You can go back and fix the runs that are causing the problems, which is probably the best option. You can make one or more of the runs Secondary runs so that they don't show up on this screen. Or you can use the procedure described here to move the distances around so that the distances are in the correct rows.

You can't solve all bad node problems by moving node distances around. If you have a run with an extra node, then you really need to fix it by deleting the node in the **Run Details** screen. Also, if there are the proper number of nodes, but the distance is way off because the driver hit the button very late, then you also need to fix that in the **Run Details** screen. However, the most common problem is a missing node, which is easy to adjust for on this screen.

Please realize that you are not permanently altering the node data in the runs in any way. All you are doing is temporarily moving the node distances to different rows *on this screen* so that you can find the best possible average distance for that node. The only way to permanently fix node problems is in the **Run Details** screen.

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# Tutorial 7

## How to Edit Sensor Data

## How to Edit Sensor Data

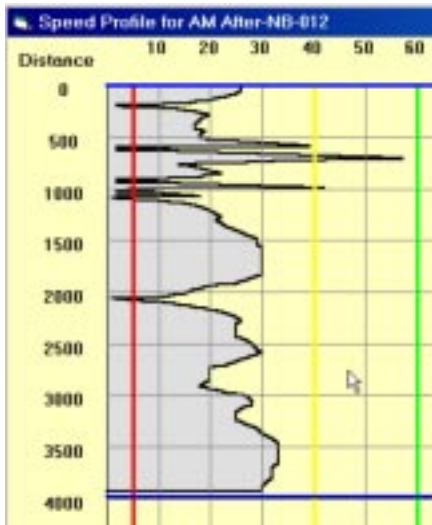


Figure T7.1 —  
Problem Sensor Data

There may be times when your data needs editing. Usually there is an apparent problem with one of the graphs. Instead of the nice smooth variations in speeds that you normally see, you see uneven jumps, as shown in this screen shot of a Speed Profile for a run (*which you can see by clicking on the **PLOT** button on the **Run Details** screen*). This is real data sent to us by a user. It is pretty clear that something weird is happening in the 500-1000 foot range. The rest of the graph looks fairly typical. There is a normal looking slow to a stop, probably at a stop light, at the 2000 foot mark. The rest of the graph looks ok. Still, that funny looking data is likely to cause the statistics to be off.

This tutorial will show you how you can edit the sensor data in your runs to eliminate some problems you might find. This is a read-along tutorial, you don't have to follow-along on your computer.

Let's take a closer look at the sensor data that makes up this run.

In the **Run Details** screen, instead of the **PLOT** button, you click on the **EDIT** button.

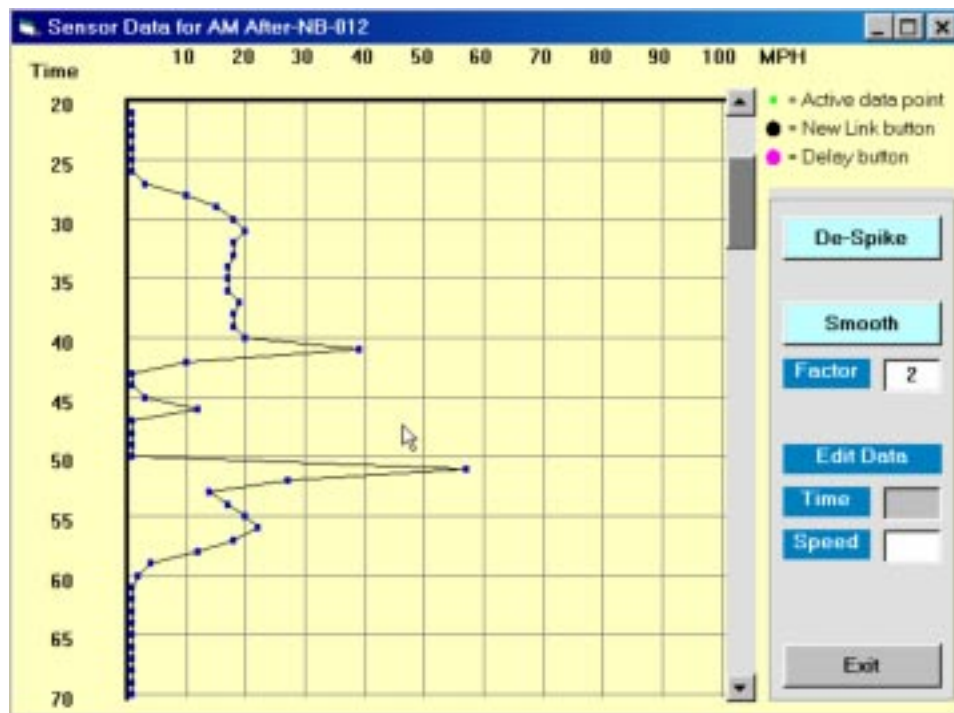


Figure T7.2 — Edit Sensor Screen



This is the Edit Sensor screen. The graph is a Speed vs Time plot of the sensor data collected in the field during one run. Each data point is one second of data. You can scroll through the data using the scroll bar. The graph shows 50 seconds of data at a time.

Here you can see that there is a sharp spike at 41 seconds, a small spike at 46 seconds, another large spike at 51 seconds, and another small spike at 56 seconds. The rest of the data on this screen looks ok. We know that cars can't go from 20 MPH to 40 MPH in one second, so there clearly is a problem here. The first impulse might be to distrust all of the data and go back and re-do the data collection. You don't necessarily have to do this, however. You might be able to edit the data so that it is usable.

*Note: When you modify the data using the options on this screen you are modifying a copy of the data stored in the run. To make the changes permanent you must click on the SAVE button on the Run Details screen, which is where you go when you exit this screen. You also might add a note to the run before you save it to explain that the data was edited.*

The Edit Sensor screen gives you three ways to modify the data:

- 1 – De-Spike
- 2 – Smooth
- 3 – Edit individual data points.

## De-Spike Data

The De-Spike option is very simple. When you click on the **De-Spike** button, the software scans through the data looking for patterns that look like spikes.

A **spike** is defined as a 3 consecutive data points, S1, S2, & S3, that have one or more of the following characteristics:

- 1 –  $S2 - S1 > 20 \text{ (MPH)}$
- 2 –  $S2 - S1 > 10 \text{ AND } S3 - S2 > 10 \text{ (MPH)}$

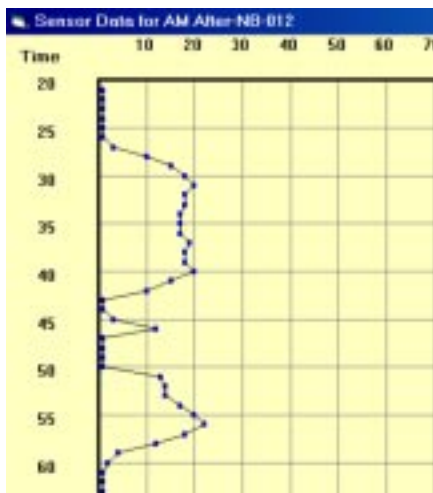


Figure T7.3 — De-Spiked Data

These definitions may change as we get more experience with real data.

The software scans through the data. When it finds a spike, it replaces the middle data point (S2) with the average of the other two points. The software then continues on until all of the data has been scanned. The graph is then updated to show any changes.

Figure T7.3 shows how the data in Figure T7.2 looks after it has been De-Spiked. Notice the spikes at 41 seconds and 51 seconds are gone. There still is a little spike at 46 that looks a little odd. This can be taken care of with either of the other two editing options, smoothing, or actual editing of the data points.

## Smooth Data

Sometimes the data looks a little *jerky*, instead of nice and smooth like it should. After all, cars make fairly smooth transitions from one speed to another, the large mass of the car makes it difficult to do anything else. If you smooth out the data a bit, it will more closely represent what the car was actually doing on the road.

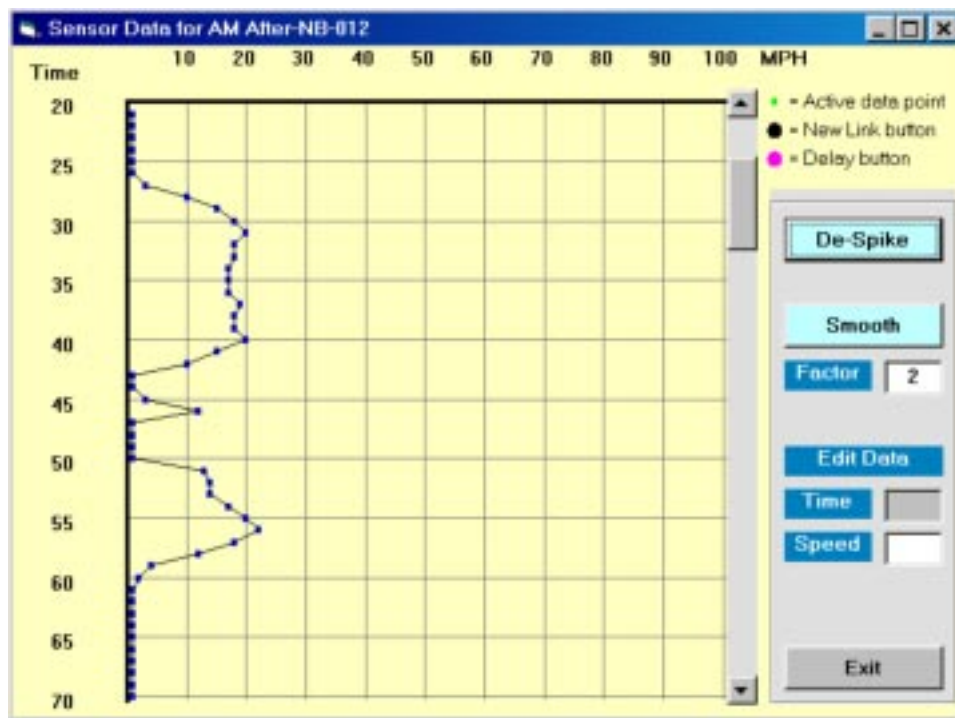


Figure T7.4 — Sensor Data Before Smoothing

### Smoothing Factor

Notice that below the **Smooth** button is a text box labeled **Factor**. This setting tells the software how much smoothing should be done. The lower the setting, the greater the smoothing effect. The default is 2, which seems to work reasonably well, but you can change it as you see fit. Values above 5 don't do much at all. A value of zero will smooth every point. The factor essentially tells the software how much of a difference there must be between consecutive data points before a point should be smoothed.

When you click the **Smooth** button, the software scans through the data and finds the difference in speed between consecutive data points. If it is greater than the Smoothing Factor, then that point is set to the average of the two points around it. The software then continues through the data until all of the data has been scanned. The graph is then updated to show the new data values.

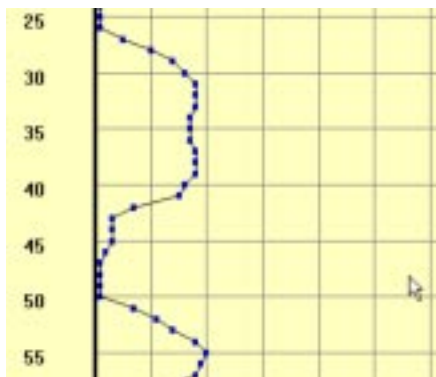


Figure T7.5 — Smoothed Data

This screen shot shows the result of smoothing the data *once*, with a setting of 2. Notice how much, well, *smoother*, the data looks. That annoying little spike at 46 seconds is also gone now.

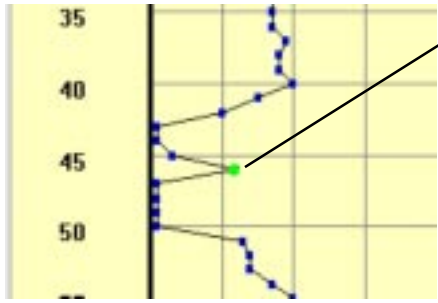
You can run the smoothing routine several times. Just click on the Smooth button again. The software will make another pass through the data and smooth points as needed.

You also can change the Smoothing Factor and continue to smooth the data. But be careful, if you do too much smoothing, the speed profile can change significantly. Like many things, a light touch is best.

## Edit Data

If you only have a few data points that don't seem right then you can directly edit those points.

### To select the data point to edit:



Click on the point you want to edit. The point turns green. Figure T7.6 shows a selected point from the same data we used in the other examples. Here, we're going to get rid of that little spike in the data at 46 seconds.

Edit Data	
Time	46
Speed	12

Notice the text box labeled **Speed** now shows the number 12, which is the speed of the point shown in green. The **Time** shows 46. The box is in gray because you can't edit that number directly.

Figure T7.6 — Selected Data Point and Values

### To edit the data:

Click on the Speed text box and type in the new speed you want. Press the Enter key when the speed is the value you want. The graph updates to show the data point at the new value.

**Or**

Click on the green point, hold the left mouse button down, and drag the point to the new speed value, then release the mouse button. The Time and Speed boxes now show the new values.



Figure T7.7 shows the graph after editing the data point at 46 seconds from 12 to 2. The graph now looks a little more realistic. The value in the **Speed** text box now shows the new value.

Edit Data	
Time	46
Speed	2

You can use this option to clean up the occasional data point that seems out of place.

Figure T7.6 — Edited Data Point and Values

## How Does Data Get Spikes?

You might reasonably ask, “How does data get spikes like these in it?”. The answer is it doesn’t, unless there is a problem with the sensor, or with the way the sensor is installed.

The transmission sensor picks up signals that are designed to go to the speedometer electronics of your car. The sensor sends those signals (*through wires*) to the sensor electronics where the signal is amplified, conditioned, and passed on to the TDC-8.

Assuming everything is working properly, if 10 pulses are detected on the speedometer cable, then 10 pulses are delivered to the TDC-8 (*it’s not quite that simple, but for the sake of this argument, pretend it is*). All the TDC-8 knows is that it is supposed to count the number of pulses, so if extra pulses are added to the 10 pulses, it has no way of knowing.

It is a sad fact of electronics life that all wires are small antennas, radiating signals and receiving signals from all of the other wires in the area. It is also a sad fact that a car is a great source of spurious electronic noise that can easily be added to the signals traveling through wires if the wires aren’t installed properly.

When you see data like the data in Figure T6.1, you can be almost certain that electrical noise from something in the car is being coupled into the signal going to the TDC-8. This causes the TDC-8 to count more pulses than it should, which makes the speed for that second too high.

If the sensor is installed properly, according to the directions included with the sensor installation kit, then you won’t see problems like this. But it is easy to make little mistakes installing the kits. Make sure all of the connections are well made. If you use terminal blocks, make sure the screws are tight on the terminal block and that the wires are crimped properly to the spade lugs. Sometimes re-routing the wires will reduce the amount of noise coupling into the cables.

## How can you avoid noisy sensor problems?

**First, make sure you install the sensor kit properly.** Follow the directions carefully.

**Second, test the sensor before you collect any critical data.** A good way to test the sensor is simply to drive around with the TDC-8 connected to the sensor. Set the TDC-8 to Travel Time mode as if you were doing a run. The display shows the current speed, among other things, as shown in the image here. The speed display usually lags a little bit when you speed up or slow down, but it should track the speedometer on the car fairly closely. You shouldn’t see wild variations in the speed; this may be an indication of a problem with the sensor.

<b>Travel Time Study</b>	
<b>Run:01</b>	<b>Link:01</b>
<b>Dist=0843</b>	<b>Speed=27</b>
<b>07:12:52</b>	<b>L Key = 12</b>

## Summary

There is a good chance that you will never need to edit your sensor data. Usually the data coming into the TDC-8 is very clean. However, it is nice to know that if you do develop a noisy sensor, or a bad connection, or whatever causes the data to have spikes or jitter, that you have a way to clean up the data so that you can use the data to produce accurate travel time studies. Don’t ignore the source of these problems even though you can clean them up in the software. Find the cause of the problem so you won’t have to use this option at all.

# Tutorial 8

## How to Export Study & Run Statistics to a Spreadsheet

## How to Export Study & Run Statistics to a Spreadsheet

PC-Travel for Windows has extensive report options but some users may want to be able to generate their own reports or use the data calculated by the software in another program. To help these users, the software

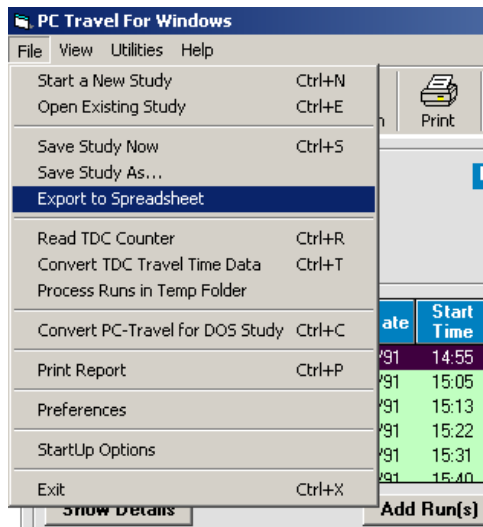


Figure T8.1 — Export Selection

has an Export to Spreadsheet option, which allows you to export the study and/or run statistics into one of two file formats: a Microsoft Excel spreadsheet file (.xls), or a generic tab delimited text file which can be used with most spreadsheet, database, or custom designed programs. This tutorial will show you how to export a study using a sample study included with the software.

1 – Run PC-Travel for Windows and select **Open Existing Study** from the Startup Option screen.

2 – Navigate to the Study Group Sample Files and select the BANDOUT study.

3 – Select **Export to Spreadsheet** from the **File** menu in the *Study Summary* screen (see Figure T8.1).

You will then see the screen shown in figure T8.2 below.

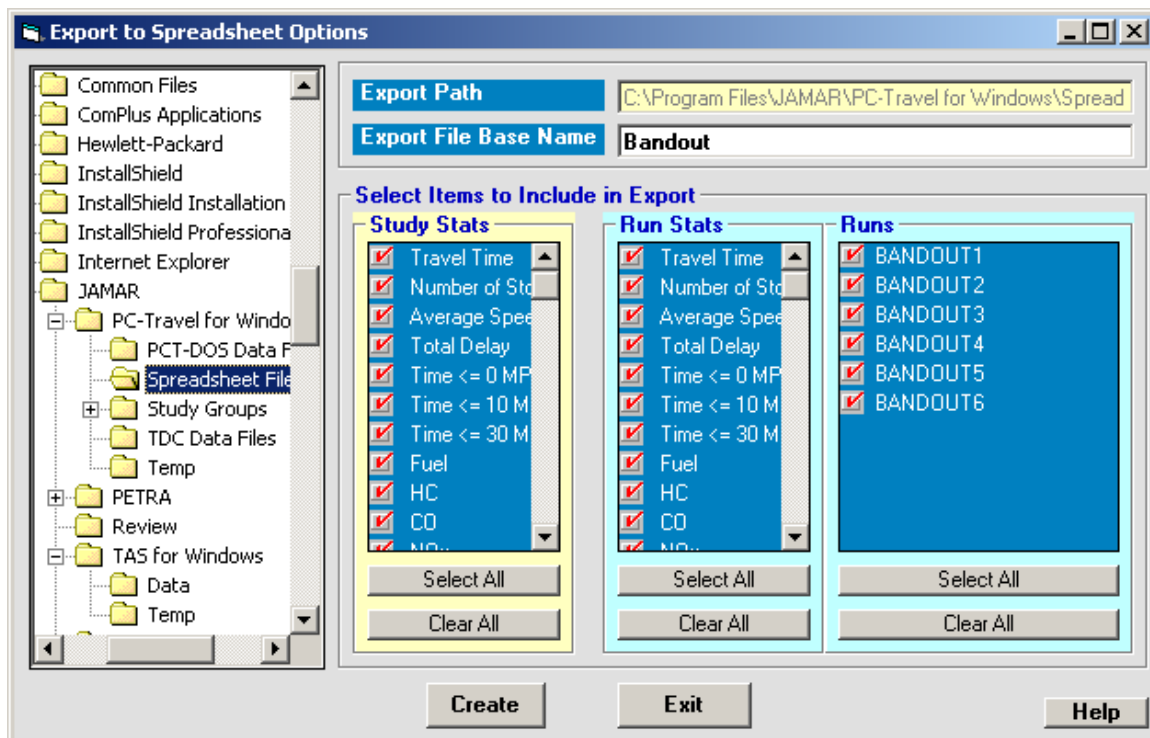


Figure T8.2 — Export to Spreadsheet Options Screen

There are several parts to this screen, and each part will be explained in the next few sections. This screen allows you to choose the destination folder for the spreadsheet files, the base name of the two spreadsheet files you can create, as well as choose which study and run statistics to export. For example, if you aren't interested in the fuel and emissions statistics then you don't have to include them in the exported data.

## Export Path

The window on the left side of the screen shows the familiar folder tree which is used in many of the screens in PC-Travel for Windows. The current export path folder is highlighted (*the folder icon is shown in an open position*). This is the folder where the exported spreadsheet files will be stored. The text box window labeled **Export Path** at the top of the screen shows the complete path to this folder. You cannot edit this text window, it simply shows you the path to the folder that is highlighted in the tree.

The default value is the value stored in the Preferences screen. If you change the export path, then the new path will become the default path the next time you run PC-Travel for Windows.

You can set the path to point to any folder on your computer. However, the folder you want must already exist; you can't create a new folder on this screen. Simply navigate to the folder you want to use on the tree and then click on the folder. The name in the Export Path text box will change to show the new path.

For this tutorial, just keep reading. Don't change the export path.

## Export File Base Name

The Export to Spreadsheet normally creates two separate files, one for the study statistics and one for the run statistics. Each file will have the same base name (*the first part of the file name*). The study statistics file will be named **<Base Name>- Study Stats**. The run statistics file will be named **<Base Name>- Run Stats**.

The default base name is the name of the study. This is shown in the text box labeled **Export File Base Name** when you first see the screen. You can edit the base name to anything you want if you don't want to use the study name. Just click in the text box and edit the name as desired. However, for this tutorial, we'll accept the default name, so just leave it alone.

## Select Items to Include in Export

We tried to give you as much flexibility as possible when exporting study and run stats. To that end you can select only those statistics you want to include with the exported data. You can select which study stats to include, you can select which run stats to include, and you can select which runs from the study to include.

The first two windows show the eleven statistics that are calculated in PC-Travel for Windows. The third window shows the list of runs that are in the current study.

Simply click on the statistic or run name to either select it or de-select it.

The **Select All** and **Clear All** buttons let you select (*with a check*) or clear (*no check*) all of the statistics or runs in that window.

**If you are following along with the tutorial:** the **Export Path** and **Export File Base Name** are set to the default values displayed when you first see this screen. Let's suppose we want all of the statistics included in the exported files. Click on the three **Select All** buttons so that there are checks next to each statistic and run name. Now click **Create**.

*Note: The software remembers which statistics you selected and will place checks on those stats the next time you display this screen. If you rarely want to include fuel or emissions stats, for example, you won't have to check or uncheck the stats each time you export data. Since the number of runs varies from study to study, the run information is not stored; the software assumes you want to include all of the runs in the run stats and sets the check marks accordingly.*

**Export to Spreadsheet**

**Study Stats To Export**

Node #	Length	Node Names	Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 10 MPH	Time <= 30 MPH	Fuel (gals)
1	0	[Start]								
2	800	Mainland	14.3	0.0	38.1	2.2	0.0	0.0	2.2	0.007
3	1648	Guilbeau	40.5	0.5	27.7	15.8	4.3	8.0	19.8	0.017
4	2597	Bresnahan/Mistic	64.2	0.5	27.6	24.5	10.5	14.3	26.5	0.046
5	2523	Braun	45.7	0.2	37.7	7.3	0.8	1.5	6.5	0.046
6	2392	[End]	36.2	0.0	45.1	-1.0	0.0	0.0	0.0	0.020
<b>Total</b>	<b>9960</b>		<b>200.8</b>	<b>1.2</b>	<b>33.8</b>	<b>48.8</b>	<b>15.7</b>	<b>23.8</b>	<b>55.0</b>	<b>0.138</b>

**Run Stats To Export**

Node #	Length	Node Names	BANDOUT1 03/02/91 14:55 [Before]	BANDOUT2 03/02/91 15:05 [Before]	BANDOUT3 03/02/91 15:13 [Before]	BANDOUT4 03/02/91 15:22 [Before]	BANDOUT5 03/02/91 15:30 [Before]
<b>Travel Time</b>							
1	0	[Start]					
2	800	Mainland	12	15	12	20	
3	1648	Guilbeau	25	40	48	27	
4	2597	Bresnahan/Mistic	118	51	56	43	
5	2523	Braun	41	55	42	50	
6	2392	[End]	22	39	36	39	

Export To Tab File      Cancel      Export to Excel File

Figure T8.3 — Export to Spreadsheet Statistics

Figure T8.3 shows the results after you clicked the **Create** button on the previous screen. The software creates two spreadsheets; the Study Stats are shown in the upper window and the Run Stats are shown in the lower window. Only the stats you selected are shown. You can scroll through the two spreadsheets to make sure you have included everything you meant to include (*and just as important, haven't included stats you didn't want*).

The **Study Stats To Export** format is essentially identical to the format you see in the other parts of the software where the study stats are shown, specifically the View Study Stats option and the Overall Study Stats report option. The nodes are listed down the screen. The various statistics go across the screen. These are the averages over all of the runs in the study. The last line shows the totals.

The **Run Stats To Export** format is a little different from other parts of the software. The top of the spreadsheet shows the name, date, time, and type (*Before or After*) for each run selected for export. Below this, each run statistic selected has a section where the nodes are listed down the screen and the stats for that node are shown going across the screen, under the appropriate run. If you selected all 11 run stats then there will be 11 sections going down the screen. Each section is labeled to show what statistic is shown.

There are three buttons at the bottom of the screen:

**Cancel**      Click this to exit this screen, either after you have exported the files you want, or if you realize you made a mistake and don't want to export files yet.

**Export to Tab File**      Click this if you want to create tab delimited text files.

**Export to Excel File**      Click this if you want to create Excel files.



**For tutorial followers: Click both of the Export... buttons.** The software creates the appropriate files and displays a message confirming the export files were created successfully. If there is a problem with the export, then an error message is displayed.

## Study & Run Stats: Excel Format

Node #	Length	Node Names	Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 10 MPH	Time <= 30 MPH	Fuel (gals)	HC (gr)	CO (gr)	NOx (gr)
1	0	[Start]											
2	800	Mainland	14.3	0.0	38.1	2.2	0.0	0.0	2.2	0.0073	0.6491	8.4385	0.3933
3	1648	Guilbeau	40.5	0.5	27.7	15.8	4.3	8.0	19.8	0.0178	1.7398	17.4961	1.1285
4	2597	Bresnahan/Mis	64.2	0.5	27.6	24.5	10.5	14.3	26.5	0.0469	3.9732	59.8937	2.6248
5	2523	Braun	45.7	0.2	37.7	7.3	0.8	1.5	6.5	0.0463	3.8942	66.6312	2.6939
6	2392	[End]	36.2	0.0	45.1	-1.0	0.0	0.0	0.0	0.0202	1.6078	23.1407	0.9634
Total	9960		200.8	1.2	33.8	48.8	15.7	23.8	55.0	0.1385	11.8640	175.6002	7.8038

Figure T8.4 Study Stats in Excel

Node #	Length	Node Names	BANDOUT1 03/02/91 14:55 [Before]	BANDOUT2 03/02/91 15:05 [Before]	BANDOUT3 03/02/91 15:13 [Before]	BANDOUT4 03/02/91 15:22 [Before]	BANDOUT5 03/02/91 15:31 [Before]	BANDOUT6 03/02/91 15:40 [Before]
<b>Travel Time</b>								
1	0	[Start]						
2	800	Mainland	12	15	12	20	12	15
3	1648	Guilbeau	25	40	48	27	42	61
4	2597	Bresnahan/Mistic	118	51	56	43	61	56
5	2523	Braun	41	55	42	50	39	47
6	2392	[End]	33	39	36	38	34	37
Total	9960		229	200	194	178	188	216
<b>Number of Stops</b>								
1	0	[Start]						
2	800	Mainland	0	0	0	0	0	0
3	1648	Guilbeau	0	0	1	0	1	1
4	2597	Bresnahan/Mistic	2	0	0	0	1	0
5	2523	Braun	0	1	0	0	0	0
6	2392	[End]	0	0	0	0	0	0
Total	9960		2	1	1	0	2	1

Figure T8.5 Run Stats in Excel

The two figures shown above display how the study and run stats that were exported in Excel format look when opened in Excel. You need to clean up the formatting of the cells a bit before they look exactly like this, but presumably you know how to do this (*probably much better than we do*). As you can see, you get a pretty faithful duplication of the spreadsheets shown on the screen.

*What you do with the data from this point on is completely up to you. We would be interested in learning what you do with this data that we don't do in the PC-Travel for Windows software. If you come up with something you wish were incorporated into the regular software, please let us know.*

## Study & Run Stats: Tab Delimited Format

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Node	Length	Node Names	Travel	# of	Avg	Total	Time <=	Time <=	Time <=	Fuel	HC	CO	NOx
2	#			Time	Stops	Speed	Delay	0 MPH	10 MPH	30 MPH	(gals)	(gr)	(gr)	(gr)
3	1	0	[Start]											
4	2	800	Mainland	14.3	0	38.1	2.2	0	0	2.2	0.0073	0.6491	8.4385	0.3933
5	3	1648	Guilbeau	40.5	0.5	27.7	15.8	4.3	8	19.8	0.0178	1.7398	17.4961	1.1285
6	4	2597	Bresnahan/Mistic	64.2	0.5	27.6	24.5	10.5	14.3	26.5	0.0469	3.9732	59.8937	2.6248
7	5	2523	Braun	45.7	0.2	37.7	7.3	0.8	1.5	6.5	0.0463	3.8942	66.6312	2.6939
8	6	2392	[End]	36.2	0	45.1	-1	0	0	0	0.0202	1.6078	23.1407	0.9634
9	Total	9960		200.8	1.2	33.8	48.8	15.7	23.8	55	0.1385	11.864	175.6	7.8038

**Figure T8.6 — Study Stats in Tab Delimited Format Opened in Excel**

	1	2	3	4	5	6	7	8	9
1	Node	Length	Node Names	BANDOUT1	BANDOUT2	BANDOUT3	BANDOUT4	BANDOUT5	BANDOUT6
2	#			03/02/1991	03/02/1991	03/02/1991	03/02/1991	03/02/1991	03/02/1991
3				14:55	15:05	15:13	15:22	15:31	15:40
4				[Before]	[Before]	[Before]	[Before]	[Before]	[Before]
5	Travel Time								
6	1	0	[Start]						
7	2	800	Mainland	12	15	12	20	12	15
8	3	1648	Guilbeau	25	40	48	27	42	61
9	4	2597	Bresnahan/Mistic	118	51	56	43	61	56
10	5	2523	Braun	41	55	42	50	39	47
11	6	2392	[End]	33	39	36	38	34	37
12									
13	Total	9960		229	200	194	178	188	216
14									
15	Number of Stops								
16	1	0	[Start]						
17	2	800	Mainland	0	0	0	0	0	0
18	3	1648	Guilbeau	0	0	1	0	1	1
19	4	2597	Bresnahan/Mistic	2	0	0	0	1	0
20	5	2523	Braun	0	1	0	0	0	0
21	6	2392	[End]	0	0	0	0	0	0
22									
23	Total	9960		2	1	1	0	2	1

**Figure T8.7 — Run Stats in Tab Delimited Format Opened in Excel**

The two figures shown above show how the study and run stats that were exported in tab delimited text file format look when opened in Excel (*I know, if you are going to use Excel you would probably use the Excel format. However, we don't have another spreadsheet program to use as an example so use your imagination*). You need to clean up the formatting of the cells a bit before they look exactly like this, but presumably you know how to do this (*probably much better than we do*).

You can also use the tab delimited text file format files in other programs, such as database programs or programs that you write yourself in C++ or Visual Basic.

*What you do with the data from this point on is completely up to you. We would be interested in learning what you do with this data that we don't do in the PC-Travel for Windows software. If you come up with something you wish were incorporated into the regular software, please let us know.*

# Tutorial 9

## How to Convert PC-Travel for DOS Studies

## How to Convert PC-Travel for DOS Studies

PC-Travel for Windows supports studies done with the original DOS version of the program. It is a pretty simple procedure to convert the old files to the new format.

There are three ways to get started:

- 1 – You can select **Convert PC-Travel for DOS Study** from the *Startup Options*.
- 2 – You can select the **Convert** icon from the toolbar in the *Study Summary* screen.
- 3 – You can select **Convert PC-Travel for DOS Study** from the **File** menu in the *Study Summary* screen.

If you do one of these, you will see the screen shown below.

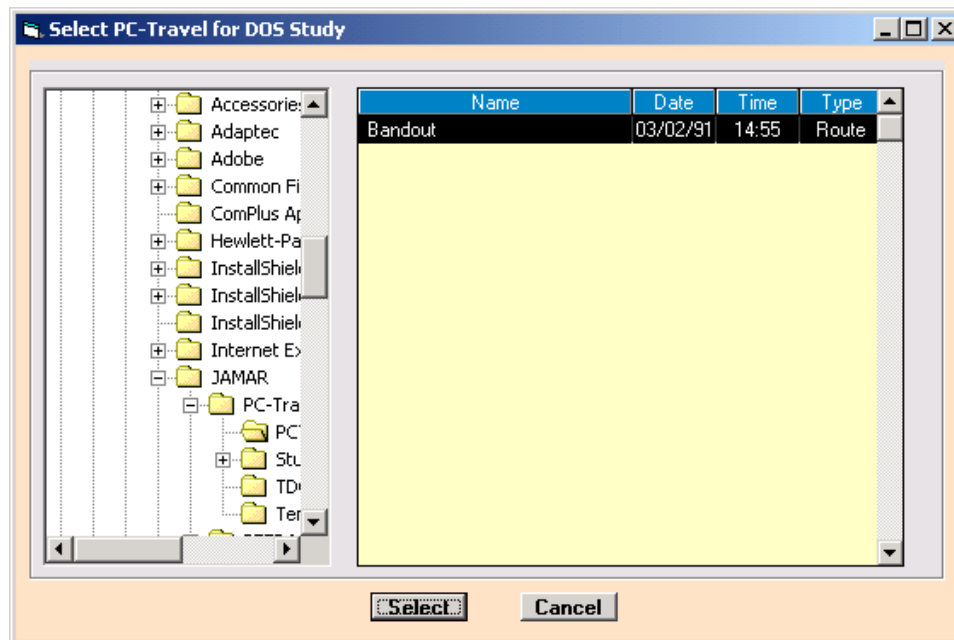


Figure T9.1 — Select PC-Travel for DOS Study

This screen is used to select the PC-Travel for DOS study you wish to convert. The install program created a folder called **PCT-DOS Data Files** and loaded a sample set of files. You can simply click on **Select** to choose this study for purposes of this tutorial, or you can navigate through the tree to find the folder on your computer with the study you want to convert.

The list to the right of the tree shows any .trv files in the selected folder, which are the primary study files used in PC-Travel for DOS.

You want to highlight a study and then click **Select**.

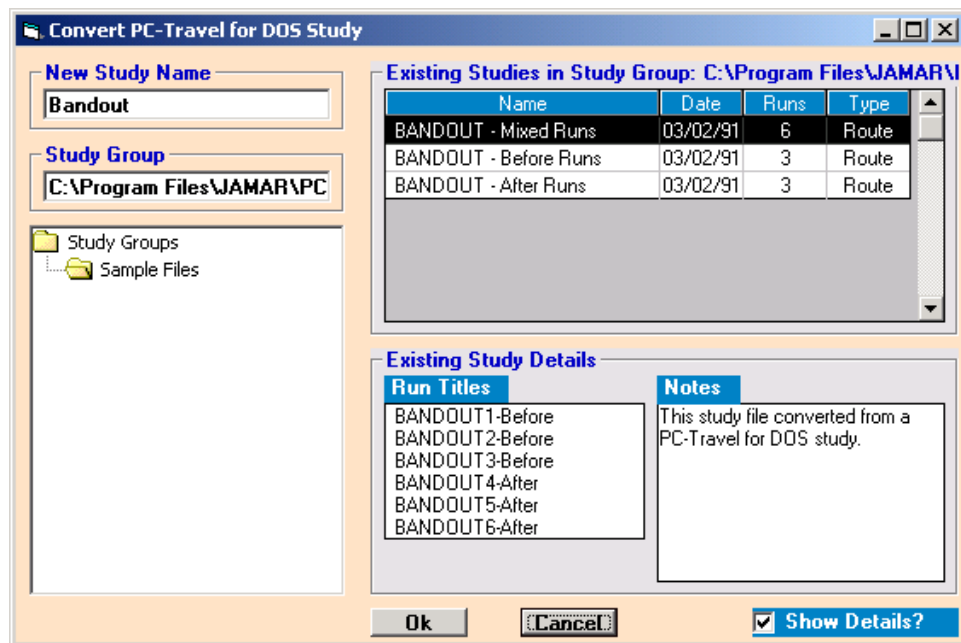


Figure T9.2 — Select Study

This screen is used to give the new study a name and also allow you to pick or create a Study Group where the study will be stored. The default name is the name of the .trv file and the default Study Group is the current Study Group. Neither of these are likely to be good choices for the new study.

You can edit the name in the New Study Name text box to be more descriptive; you aren't limited to 8 characters any more. This means you'll probably want to change the name.

You can select an existing Study Group by clicking on the name in the tree, or you can create a new Study Group by typing the new name into the Study Group text box and pressing enter.

The two other windows on the screen are there to help you pick unique names for the Study and the Study Group. The top window shows a list of all of the studies in the Study Group selected in the tree.

The Existing Study Details frame shows the Run Titles and Notes of the study highlighted in the Existing Studies in Study Group frame.

**Note: Neither of these two windows have anything to do with the new study! They are only there to help you avoid choosing a name that already exists.**

Click **Ok** after you edit the **New Study Name** and **Study Group** text box. The software then goes through a fairly complicated process to check the PC-Travel for DOS study you selected. It makes sure all of the files needed are present, creates new runs from the old run files, and finally creates a new study file from the old files.

If there is a problem with the conversion you will get an error message, otherwise you are returned to the *Study Summary* screen.

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# Appendix

## Appendix 1 — Descriptions of the Preferences Options

PC-Travel for Windows has many options that you can set or select to help customize the software to your own personal preferences. These options are stored on your computer and loaded into the software each time you run the program. You view or change the options in the Preferences screens.

There are three ways to load the Preferences screens:

- 1 – You can select **Define/Edit Program Preferences** from the *Startup Options* screen.
- 2 – You can select the **Prefs** icon from the toolbar in the *Study Summary* screen.
- 3 – You can select **Preferences** from the **File** menu in the *Study Summary* screen.

If you do one of these, you will see the screen shown below.

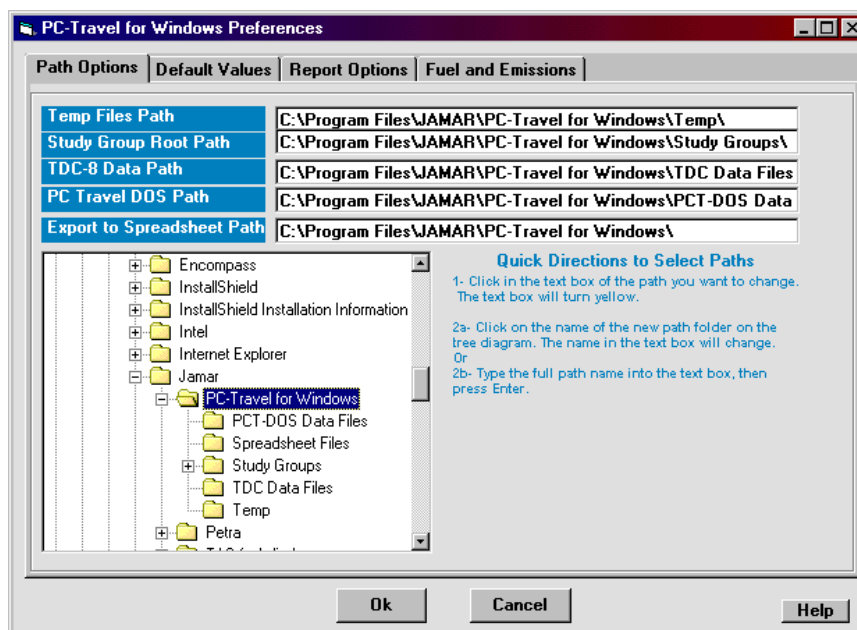


Figure A1.1 — Path Options Screen in Preferences

The figure shown here is the Path Options screen, and is the first of the four screens in the Preferences section. The various screens are selected by clicking on the tabs at the top of the screen. There are four tabs — Path Options, Default Values, Report Options, and Fuel & Emissions Options.



## Path Options

PC-Travel for Windows, like most Windows programs, stores data in files, and those files must reside somewhere on your computer in folders. Where those folders are located on your computer is called the *path*, and you can change the paths used in the program to suit your needs.

*Note: If you are not comfortable with computer terms such as file, folder, directory, subdirectory & path then this isn't the place to learn it. Either find a good book on Windows (preferably) and learn how files and folders work, or (most likely) just accept the default values the software suggests and don't worry too much about it.*

There are five different types of files that are used in PC-Travel for Windows, and each type of file is stored in a separate folder (or set of folders). The five paths are listed at the top of the screen.

Below the paths on the left side of the screen is a tree diagram showing how your folders are organized on your computer. If you are familiar with Windows then you should be familiar with the way this tree works; you can scroll around using the scroll bars and you can expand and contract the tree by clicking on the + and - signs to the left of the folders.

To the right of the tree is some text that gives quick directions on how to set the various paths. The basic idea is simple, you pick the file type for the path you want to change, and then you navigate to the folder you want to use for those files.

### Temp Files Path

When you read a TDC-8 counter, the data is first stored in the **TDC Data Path** (see below), and then each of the runs in that data is extracted and stored with a temporary name in one folder. These runs are then processed later in the Process Temporary Runs screen. The **Temp Files Path** points to this folder.

The install routine creates a folder called Temp as a subdirectory to the PC-Travel for Windows folder, and the **Temp Files Path** is initially set to this folder. You probably won't need to change this path, but you can if you find it necessary.

### Study Group Root Path

The concept of a Study Group is explained in Chapter 1, but basically a Study Group is a folder where related runs and studies are stored. The **Study Group Root Path** points to the parent directory of the many Study Group folders that you create when you do your studies. All Study Groups are subdirectories of this parent directory. Several of the screens in the software show a tree diagram similar to the one in Figure A1.1. The top of the tree is set to the Study Group Root Path folder so that all you can see are your Study Groups and not your entire computer. *(There are also trees like the one in Figure A1.1 where you need to be able to navigate throughout your entire computer. These trees don't have a root path, per se.)*

The install routine creates a folder called Study Groups as a subdirectory to the PC-Travel for Windows folder, and the **Study Group Root Path** is initially set to this folder. Unless you do many travel time studies, you probably won't need to change this path, but you can if you find it necessary.

If you do plan to do lots of studies, then you may want to create different Study Group Root folders on your computer *(such as one for each year or one for each customer if you are a consultant)*. Every study you do at a new location usually ends up with two new study groups, one for each direction of travel. It doesn't take long to have dozens of study groups, which could result in a long list of study groups in the tree listings. This is fine as far as the software is concerned, but may be a little awkward to use. We suggest you initially start with the default structure that the install routine creates and see how that works. Once you are comfortable with how the software deals with study groups, files and folders, then you can create a system to handle your studies.

### TDC Data Path

When you read a TDC counter, the data is read from the counter and stored in the folder set by the **TDC Data Path**. You can then clear the TDC counter and use it for other things, even if you don't plan to process the travel time data immediately. At any time you can choose to process the TDC data from the Startup Options screen (*select Process Runs button*) or from the Study Summary screen (*select Process Runs in Temp Folder from the File menu*). See Tutorial 3 for more details.

The install routine creates a folder called TDC Data Files as a subdirectory to the PC-Travel for Windows folder, and the **TDC Data Path** is initially set to this folder. You probably won't need to change this path, but you can if you find it necessary.

### PC-Travel DOS Path

If you have used PC-Travel for DOS (the predecessor program to PC-Travel for Windows) to create travel time studies then you can convert those studies into PC-Travel for Windows files very easily. See **Tutorial 9 — How to Convert PC-Travel for DOS Studies** for complete details.

The **PC-Travel DOS Path** points to the directory where you have your studies stored. The install routine creates a folder called PCT-DOS Data Files under the PC-Travel for Windows folder and puts a set of PC-Travel for DOS sample files in that folder.

If you have PC-Travel for DOS studies on your computer that you might want to convert (*you may do a study on the same route and want to do a before and after analysis*) then you probably would want to change the path to point to the directory where the studies are stored. If you have many different directories with study data, then you should pick a folder that is a parent to those directories so that when you go to the **Select PC-Travel for DOS Study** screen, the tree will start at the parent directory and show the directories with the studies under it.

If you don't have PC-Travel for DOS studies to convert, then ignore the setting completely.

### Export to Spreadsheet Path

A feature of the PC-Travel for Windows software is the option to export the study and run statistics calculated by the program to file formats that can be processed with other software programs. You can export to a Microsoft Excel spreadsheet file format (*.xls*) or to a generic tab delimited text file (*if you don't know what that is then you probably don't want to do it.*)

The **Export to Spreadsheet Path** points to the folder where the exported files are stored. The install routine creates a folder called Spreadsheet Files under the PC-Travel for Windows folder and the **Export to Spreadsheet Path** is initially set to this folder.

You may want to change this path if you plan to export files. You may want to have the path set to a folder that is under the software application you want to use to process the exported files. The choice is yours.

## Default Values

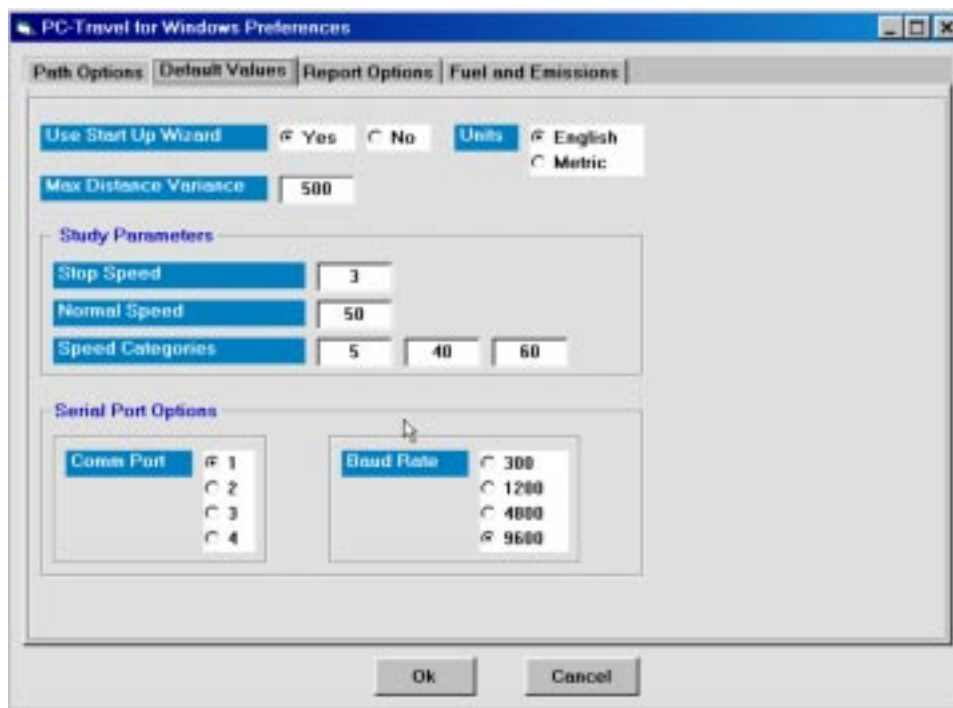


Figure A1.2 — Default Values Screen in Preferences

The figure above shows the Default Values screen, which has a hodgepodge of default options that you can set in the software. Most of these options can be adjusted in other places in the software on a study by study basis; the values on this screen are the default values that are used initially. Many of these options you will set just once and never adjust again.

## Use Startup Options Screen

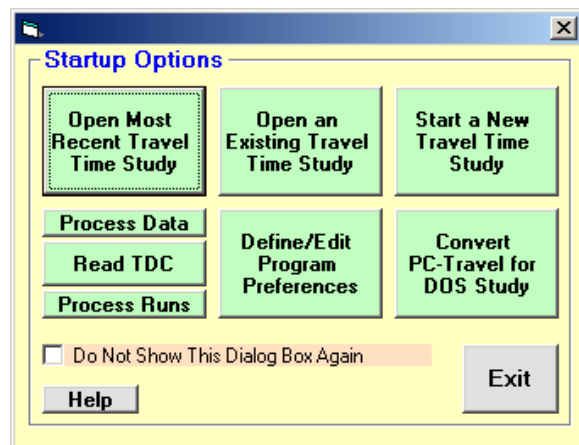


Figure A1.3 — Startup Options

English units use feet for distance and Miles Per Hour (MPH) for speed. Metric units use meters for distance and Kilometers Per Hour (KPH) for speed.

When you first start PC-Travel for Windows, you normally see the screen shown in figure A1.3, which gives you the most common options when you first start the program. Some users don't like this screen, so for them we give them a way to turn it off. Click on the **No** checkbox and you won't be bothered again.

### Units

You can choose between English and Metric units for the length and speed values shown on the screen and on the reports. The software checks this setting whenever it has to display or print a length or speed.

## Max Distance Variance

Avg	Run 1	Run 2	Run 3	Run 4	Run 5
0	0	0	0	0	0
766	800	771	744	752	736
2354	2051	2420	2409	2453	2392
5463	5045	5077	5049	5086	7488
7928	7568	7505	7543	7522	9917
9934	9960	9972	9949	9885	

**Figure A1.4 — Node Distances**

should be the same number of nodes in each run, and the distances for each node should be about the same. Since the TDC-8 doesn't measure distances precisely (*See Appendix 2 — How Distances are Measured*), the values won't be identical, even if the driver was very good at pressing the New Link button as he drove by the node point, but they will be fairly close.

The software compares each node distance to the average of all of the node distances for that row. If the distance is less than the **Max Distance Variance**, then the distance is shown in green. Otherwise, the distance is shown in red. Values in red alert you to a potential problem. See **Tutorial 6 — How to Find Node Distances in Your Study** for a complete discussion of this topic.

The default value is 500 feet, which is good if your nodes are widely spread apart, as they are in most studies. You might want to adjust this value if you like to have many nodes in your studies, and they tend to be closer together. You want the value to be high enough so that if you miss a node in the field the next node in the data (which will show up on the missing node's row) shows up with a red background. However, you don't want the value so low that you get red backgrounds on data that is ok. In general, values as low as 200 feet usually are safe.

## Study Parameters: Stop Speed, Normal Speed, and Speed Categories

These parameters are described in Chapter 1. You can set the default values that are shown on the Study Summary screen when you create a new study.

*Note: The values are unit-less. That means that if you change the Units from English to Metric, these numbers don't change. A value of 5 for Stop Speed means 5 MPH for English units and 5 KPH for Metric. This normally would never be an issue, since you likely will pick one unit or the other and not switch.*

## Serial Port Options: Comm Port and Baud Rate

You use the serial port on your computer to read the travel time data collected in the field with your TDC counter. The software needs to know the Comm Port on your computer that is connected to the TDC counter (*always using the JAMAR cable that came with the counter*). This isn't always easy to determine. If you aren't sure, try Comm 1 and try to read a TDC counter. If that doesn't work, try Comm 2.

The software also needs to know the Baud Rate that is set on the TDC counter. This setting determines the speed at which the data is transferred. The default is 9600 and really there is usually no reason to ever change this.

## Report Options

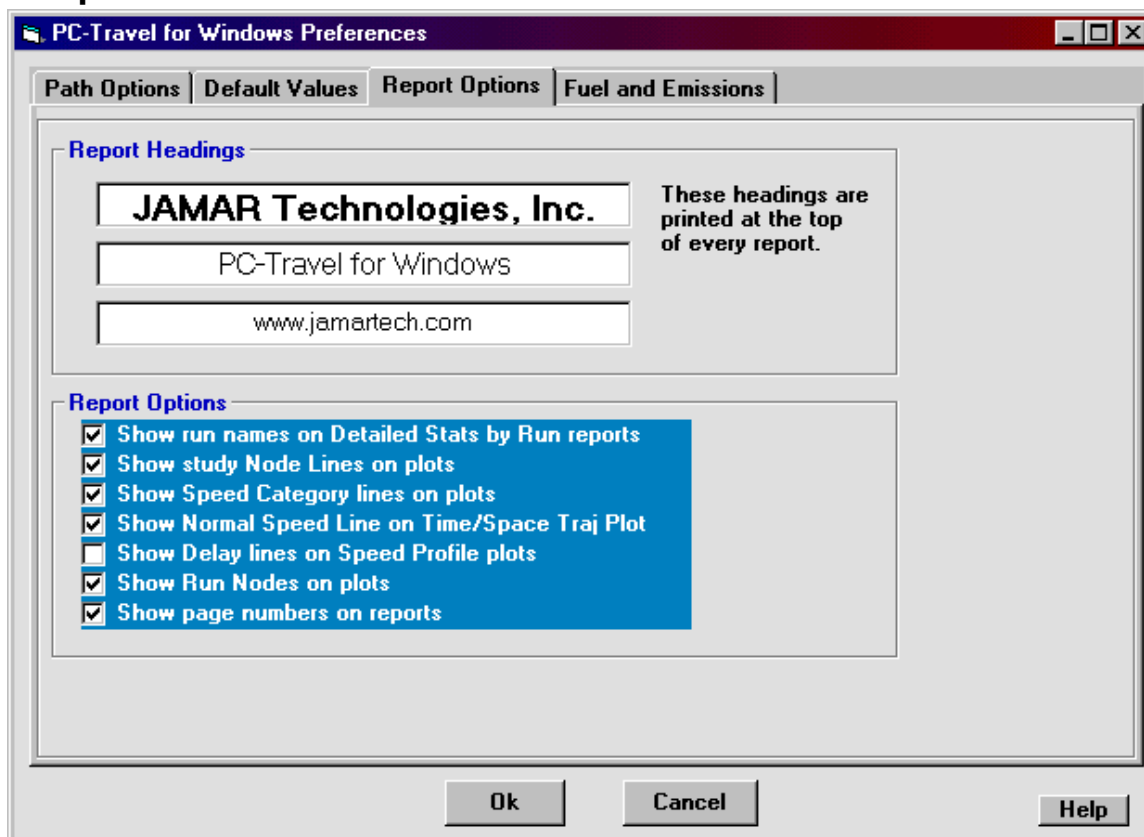


Figure A1.5 — Report Options Screen in Preferences

PC-Travel for Windows has extensive report capabilities since the end result of almost all travel time studies are printed reports showing the results. You can customize the reports to suit your needs. The values on this screen are the default values that are used whenever you go to the Select Reports to Print screen. You can change any of these values on a report-by-report basis by clicking on the Report Options button on that screen.

### Report Headings

These headings are printed at the top of every report. There are three headings, but you don't have to use all three. The top line is printed in bold in a larger font size than the other two lines. All three lines are centered on the page. Normally, you set these values once and don't worry about them again. Put the name of your organization or city or whatever on the top line and your address and/or phone number on the next two lines.

**JAMAR Technologies, Inc.**  
PC-Travel for Windows  
www.jamartech.com

Figure A1.6 — Report Headings

If you are a consultant, however, you probably would want to have your customer's name at the top of every report. In that case, you would set the headings when you print the reports, not on this screen. Some consultants use the third line to say *"Prepared by: Acme Consultants"* or something similar.

### Show Page Numbers on Reports

**JAMAR Technologies, Inc.**  
PC-Travel for Windows  
www.jamartech.com

Study Name : **Bandout**  
Study Date : **03/02/1991**  
Page No. : **2**

You can easily print reports that have thirty or forty or more pages. The software even prints a Table of Contents that reference the page numbers. So normally, you would probably want to show the page numbers on all reports. However, you may print a report for your use, and want to

Figure A1.7 — Report with Page Numbers

copy just a few of the pages to send to someone else. Sending reports that say Page 2, and then Page 9, and then Page 22 may look odd. For these occasions, it might be useful to not show the page numbers on the reports. If you do this all of the time, you may want to uncheck this option.

### Show Run Names on *Detailed Stats by Run Reports*

Travel Time (sec) by Section

	BANDOUT1	BANDOUT2	BANDOUT3	BANDOUT4	BANDOUT5	BANDOUT6
Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	
12	15	12	20	12	15	

Figure A1.8 — Run Names on Report

Run names can be fairly long, but the space available for the run names on the reports is limited. To solve this, the software prints the run names at an angle above the run columns. On most printers this looks fine, but on some older dot-matrix printers the names come up very ragged. If you have an older printer, or if you just don't like the way the run names look, then you can turn this option off and the names won't be printed.

### Show Study Node Lines on Plots & Show Speed Category Lines on Plots

Speed/Distance Profiles of All Runs

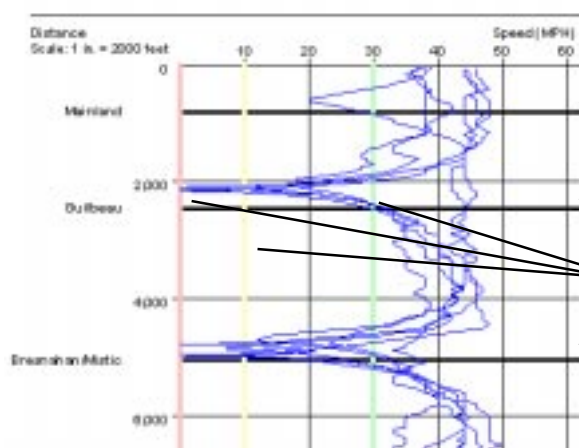


Figure A1.9 — Node Lines and Speed Category Lines on Plot

**Node Lines:** Nodes are shown on the plots as thick black lines, with the name of the node shown on the left side of the graph. You may have several nodes close to each other so that the graph looks cramped. This is unusual, but it can happen. The plot might look better without the node lines and names shown on the plot. Whatever the reason, if you don't want them on the plot, then you can turn off this option.

**Speed Categories:** You can set three speed categories and the software will find the time driving at or below these speeds for each node during a run. The speed categories are shown as three lines on the plots, a red line for Speed Category 1, a yellow line for Speed Category 2, and a green line for Speed Category 3. Whatever the reason, if you don't want them on the plot, then you can turn off this option.

### Show Normal Speed Line on *Time/Space Trajectory* Plots

Time/Space Trajectories of All Runs

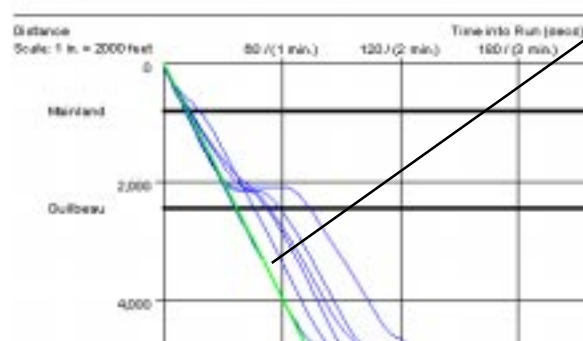


Figure A1.10 — Normal Speed Line on Time/Space Trajectory Plot

The Normal Speed is a parameter used to find Total Delay. It typically is the posted speed limit or the design speed for an arterial. The Normal Speed is shown as a thick green line on the Time/Space Trajectory plot, which is useful to show the progression of traffic through the signals on the arterial. There may be instances where the Normal Speed isn't appropriate on this plot, or the thick line might obscure the details of the smaller lines behind it (*especially on a black and white printer*). If you don't like this option, you can turn it off.

## Show Delay Lines on Speed Profile Plots & Show Run Nodes on Plots

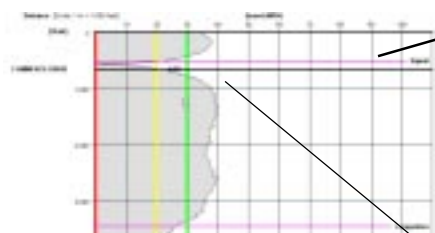


Figure A1.11 —  
Show Delay Lines on Plot

**Delay Lines:** You have the option to mark reasons for delay when you do a travel time study. You do this by pressing different buttons on the TDC-8 as you do each run. (*This is explained in Tutorial 2: How to Do a Fixed Route Travel Time Study*). You can have the graphs show where the delay buttons were pressed (*the pink line*) along with the meaning of the button (*the text at the end of the pink line*).

**Run Nodes:** The Node Lines shown on the plot are for the entire study, and usually are the average of all of the node distances for the runs in the study. You can have the graphs show where the node button was pressed for this run. The software prints a small solid circle and the text “NL” at the proper distance. This should always be right next to the node line. Sometimes the average distance used for the study appears to put the node a couple of hundred feet away from where the actual node for that run occurred, which may be on the wrong side of the intersection. Showing the Run Nodes may help explain why the delay appeared to occur after the intersection instead of before it.

## Fuel and Emissions

**PC-Travel for Windows Preferences**

Path Options | Default Values | Report Options | **Fuel and Emissions**

**Fuel Consumption Parameters** Fuel (ml/sec) =  $k1 + k2 \cdot V + k3 \cdot V \cdot V + k4 \cdot A \cdot V + k5 \cdot A \cdot A \cdot V$

k1 = 0.7 k2 = 0.00442 k3 = 0.0000022 k4 = 0.00762 k5 = 0.000886

V = velocity in KM/hr  
A = acceleration in KM/hr/sec

**Hydrocarbon (HC) Parameters** HC (grams/sec) =  $hc1 + hc2 \cdot A \cdot V + hc3 \cdot A \cdot V \cdot V$

hc1 = 0.018 hc2 = 0.0005266 hc3 = 0.0000061296

**Carbon Monoxide (CO) Parameters** CO (grams/sec) =  $co1 + co2 \cdot A \cdot V + co3 \cdot A \cdot V \cdot V$

co1 = 0.182 co2 = -0.0079776 co3 = 0.00036227

**Nitrous Dioxide (NOx) Parameters** NOx (grams/sec) =  $nox1 + noxa2 \cdot A \cdot V, A > 0$   
NOx (grams/sec) =  $nox1 + noxb2 \cdot A \cdot V, A < 0$

nox1 = 0.00386 noxa2 = 0.00081446  
nox1 = 0.00143 noxb2 = -0.000017005

V = velocity in ft/sec  
A = acceleration in ft/sec/sec

Ok Cancel

Figure A1.12 — Fuel & Emissions Screen in Preferences

PC-Travel for Windows can calculate fuel and emission statistics using fairly simple models developed over ten years ago. These models use formulas that have a variety of constants, shown in the figure above.

The default values are shown in the white text boxes. You can edit any of these values if you so desire.

Unless you understand exactly what you are doing, we suggest you leave them alone.



## Appendix 2 — How Distances are Measured

PC-Travel for Windows is a travel time and delay analysis program and is not intended to be used as a distance measuring instrument like the RAC (Road Analysis Computer) distance measuring devices that JAMAR sells. However, distance traveled is a component of travel time, and understanding the way distances are measured and calculated may help you to understand the results of your travel time analyses.

Data is collected in the TDC-8 by counting the number of pulses coming from the transmission sensor and storing the count on a second by second basis. Each pulse from the sensor represents a constant distance traveled by the vehicle. The software converts the number of pulses to distance using the Calibration Constant that you found when you calibrated your vehicle. Therefore, the TDC-8 measures the distance traveled every second, which is the speed of the vehicle. We say the data collected by the TDC-8 is the *instantaneous speed* of the vehicle on a second by second basis.

When you push one of the buttons on the TDC-8, either the New Link button or one of the delay buttons, the TDC-8 adds a marker to the data for the second in which you pushed the button. All the analysis software can tell from the data stored in the TDC-8 is that you pushed the button sometime during a particular second. Also, only one button push can be stored in any given second. If you push a button twice in the same second, the second button is stored in the next second (*you almost never do this in travel time studies*).

It is important to remember that you are using this program to measure travel times and delays, and that as long as the distance measurements are accurate enough to accurately report speed and travel time and also are accurate enough for traffic operations purposes, then everything is ok. If you really want to be able to measure distances very accurately, then you should use a true distance measuring instrument like a JAMAR RAC-200. However, that won't give you the history of speeds and stops, which is the reason for PC-Travel for Windows.

The way the data is collected has some subtle implications, especially in the way that distances are measured:

**Distance measurement is not continuous, it jumps in second by second increments.** The faster you are going the larger the jumps from second to second. If you are traveling at 60 MPH (88 ft/sec) then each data point is 88 feet from the last data point.

**Any button pushes can only be measured to the nearest second in time, and to the distance traveled in that second.** If you are traveling at 60 MPH and push the New Link button, the software only knows the distance to within 88 feet (*the distance at the beginning of the second in which the button was pushed to the distance at the end of the second*).

**The total length of the route you travel is measured accurately.** If you start a run going 30 MPH (*by pressing the DO button*) and end a run going 30 MPH (*by again pressing the DO button*) then the total error in the route distance will be 2 X 44 feet (*the error in the starting second and the error in the ending second*), plus the error in the transmission sensor (*which is about 1 foot per mile*), or less than 100 feet even if the entire route is 5 miles or more long. This is more than adequate for travel time and delay studies.

**The Node Distance errors are proportional to the speed of the vehicle when the New Link buttons are pressed.** Again, if the vehicle is going 60 MPH as it passes through several nodes, then each time you press the New Link button, the software will only be able to calculate the distance to within 88 feet, even if you precisely press the button at the same place during each run.



It is this last implication that is the most noticeable in PC-Travel for Windows. It is the reason that the **View Node Distances** screen (part of which is shown in figure A2.1) is designed the way it is. Assuming you

Avq	Run 1	Run 2	Run 3	Run 4	Run 5
0	0	0	0	0	0
766	800	771	744	752	736
2354	2051	2420	2409	2453	2392
5463	5045	5077	5049	5086	7488
7928	7568	7505	7543	7522	9917
9934	9960	9972	9949	9885	

**Figure A2.1 — Node Distances**

press the New Link button for each node on every run, you will have several measurements for each node distance, one for each run. The software finds the average of the individual node distances and makes that distance the node distance which is used in the rest of the program. The assumption is that the average of the individual node distances should be more accurate than any one set of distances from just one run. Averaging will help correct for the error associated with the way the data is stored in the TDC-8, as well as the error associated with trying to push the New Link button at exactly the same place each run while you are driving.

Normally, the error in the node distance measurements is small enough to ignore, especially if you do collect node distance information for each run. The only time when the distances may not be completely adequate is when two nodes (*signals, typically*) are very close together on a high-speed arterial. Say, for example, that the speed on a street is 40 MPH (*about 60 ft/sec*) and two signals are only 200 feet apart. The software may inaccurately report the distance between these two signals by as much as 60 feet, though it will accurately report the travel time between them. Again, the inaccuracy will not affect operational analysis, but you may not like the look of it. In this case you can manually edit one of the distances on the Node Distances screen so that the distance between the two signals is what you and others who know the road would expect to see.

If it is important that the Node Distances are very accurate, you have at least two choices (*we don't recommend either of these since normally the distances are fine, but we like to be thorough*):

1 – **Use a true distance measuring instrument like the JAMAR RAC to measure the distances accurately.** This involves driving the route with the RAC connected to the transmission sensor either before or after you collect the travel time data. Then manually enter the distances into the **Node Distances** screen. There is no need to collect any node information during the travel time runs if you find the distances with a RAC.

2 – **Use the TDC-8 to measure the distances accurately** by driving the route and slowing the vehicle down as slow as possible (*to a stop is best*) before pressing the New Link button. Since the error in the distance measurement is proportional to the speed of the vehicle when you press the button, slowing to a low speed will make the measurement more accurate. Of course, this may not be possible or practical to do; you can't always slow down at will. However, it is an option if you don't have a RAC distance measuring instrument and want very accurate node distance information (*Hey, just go out at 4 in the morning. The traffic is light and you get too much sleep anyway*). Don't use this run in your travel time study, since it doesn't represent true driving behavior. Just use it to find the distances and then manually enter the distances into the Node Distances screen. As with the DMI option there is no need to collect any node information during the travel time runs if you find the distances with a separate run.

**Warning:** Avoid the temptation to use your GIS database (*if you have one*) to measure the distances between nodes. GIS maps don't usually accurately represent the up and down motion of the vehicle as it drives up and down little hills or grades on your route. The result is that the distances you get from your GIS measurements are usually shorter than the distances measured with the transmission sensor in your vehicle. The nodes won't be where they should be on your plots and the node-to-node statistics won't be correct.

## Appendix 3 — Utilities

This appendix describes three utilities included with PC-Travel for Windows to help you organize your data. The first lets you edit runs on your computer whether they are included in studies or not. The second lets you delete temporary runs that may accumulate in your Temp folder. The third lets you delete TDC data files that you read from your TDC hand held counters and no longer need after you have processed the data into runs.

### Select Run and Edit Run Details

When you read a TDC counter with travel time data the software creates temporary runs from the data. These temporary runs are then renamed and moved to their own Study Groups in the **Process Runs in Temp Folder** screen. The runs contain most of the information needed by the software to process the run data into study statistics, but not all. For example, the date and time of the run is already known, but the node names are not. At some point you need to edit the information in each run. There are two ways you can do this.

One way is to create a study with the new runs and then edit each run in the study to complete the information. The sequence would be as follows:

- 1 – Read the TDC and process the runs. You'll end up with the runs from the data in their own Study Groups.
- 2 – Create a new study (*Click on the icon labeled **New** on the toolbar*)
- 3 – Add the runs for that study. (*Click on Add Run(s) button and select the runs for that study*)
- 4 – Show the Run Details screen for each run in the study. (*Click on the Run Title and then click **Show Details***)
- 5 – Edit the run as needed and then save it. Do this for each run in the study.
- 6 – Process the study as usual.

This is the sequence you normally would follow if you process your runs and create and print your studies all at the same time.

Alternatively, you can edit the run information without creating any studies. Then when you create the studies you won't have to deal with the runs; you'll know they are already complete. The sequence for this method would be:

- 1 – Read the TDC and process the runs. You'll end up with the runs from the data in their own Study Groups.
  - 2 – Show the Run Details screen for each run. (*Click on the **Edit Run** toolbar and select the run*)
  - 3 – Edit the run as needed and then save it. Do this for each run you processed from the TDC data.
- At some later date:
- 4 – Create a new study. (*Click on the icon labeled **New** on the toolbar*)
  - 5 – Add the runs for that study. (*Click on Add Run(s) button and select the runs for that study*)
  - 6 – Process the study as usual.

With this sequence, you completely take care of all of the runs after you read them from the TDC before you worry about putting them into studies. This is a good sequence to follow if you don't necessarily create and print your studies immediately after you read the data from the TDC.

Which of these two sequences you use is completely up to you.

## How to Select a Run to Edit

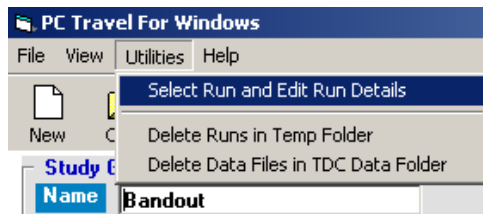


Figure A3.1 — Select Run

You can edit any run on your computer at any time. From the main screen (*it doesn't matter what study is currently visible*), click on **Select Run and Edit Run Details** from the **Utilities** menu, as shown in the figure here. This will bring up the screen shown in Figure A3.2.

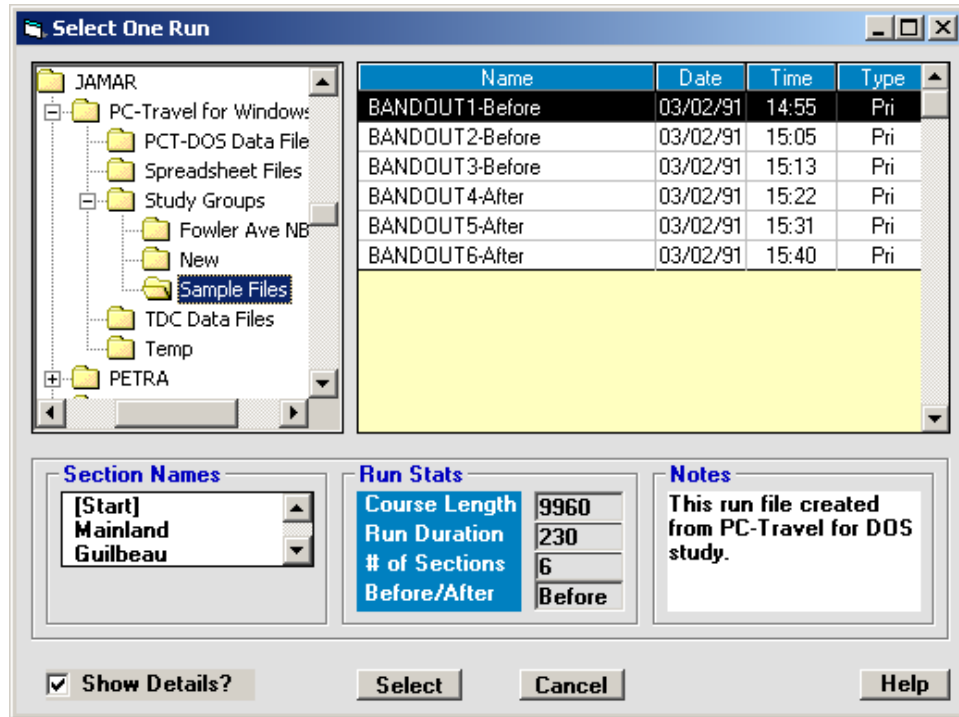


Figure A3.2 — Select One Run Screen

This screen has three main sections. The upper left shows the familiar tree structure, with the current Study Group highlighted. You can navigate to other Study Groups if necessary. The upper right shows the runs in the highlighted Study Group, along with the Date, Time, and Type of run (*Primary or Secondary*). The lower portion of the screen shows details of the run that is highlighted in the upper right window.

Navigate, if needed, to the Study Group that has the run you want to edit. Click on the run in the upper right window. Check the details and make sure it is the run you want, then click **Select**. You can click **Cancel** to exit at any time. When you click **Select**, the **Run Details** screen for that run is displayed.

The **Run Details** screen shows just about everything we know about this particular run. This screen is described on pages T1.7 and T1.8 of this manual so that information won't be repeated here.

You want to edit the information on this screen so that all of the information shown is correct. Normally, this just requires you to edit the node names (*this is described in detail in **Tutorial 5 — How to Edit Nodes in Individual Runs***) and possibly enter some notes from your field notes. You can check the data by looking at the Stats and the Plot to see if there are any obvious problems. You may occasionally need to edit the sensor data to get rid of little problems you find (*this is described in **Tutorial 7 — How to Edit Sensor Data***).

Remember to edit all of the runs you created from the TDC data. Normally, the runs are in two separate Study Groups for each route, one for each direction. Don't forget to do the runs in the second direction after you finish with the runs in the first.

## Delete Runs From Temp Folder

When you read a TDC counter with travel time data the software creates temporary runs from the data, which are stored in the Temp folder that has been set in the Preferences screen. These temporary runs are then normally renamed and moved to their own Study Groups in the **Process Runs in Temp Folder** screen, which empties the Temp folder. Occasionally, however, runs may accumulate in the Temp Folder for a variety of reasons. You may have some bad runs that you don't want to use in studies. You can delete these one at a time in the **Process Runs in Temp Folder** screen, but you may forget. Or, you may read a TDC count board twice for some reason and create duplicate runs that you have already processed. Whatever the reason, if you find your Temp folder has files you don't want then there is an easy way to get rid of them.

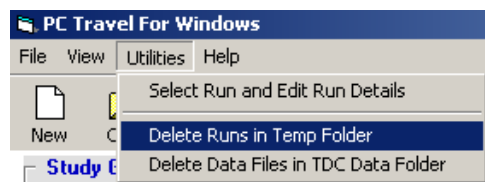


Figure A3.3 — Delete Runs in Temp

From the main screen, select **Delete Runs in Temp Folder** from the **Utilities** menu, as shown here. This will bring up the **Select Temp Runs to Delete** screen shown in Figure A3.4.

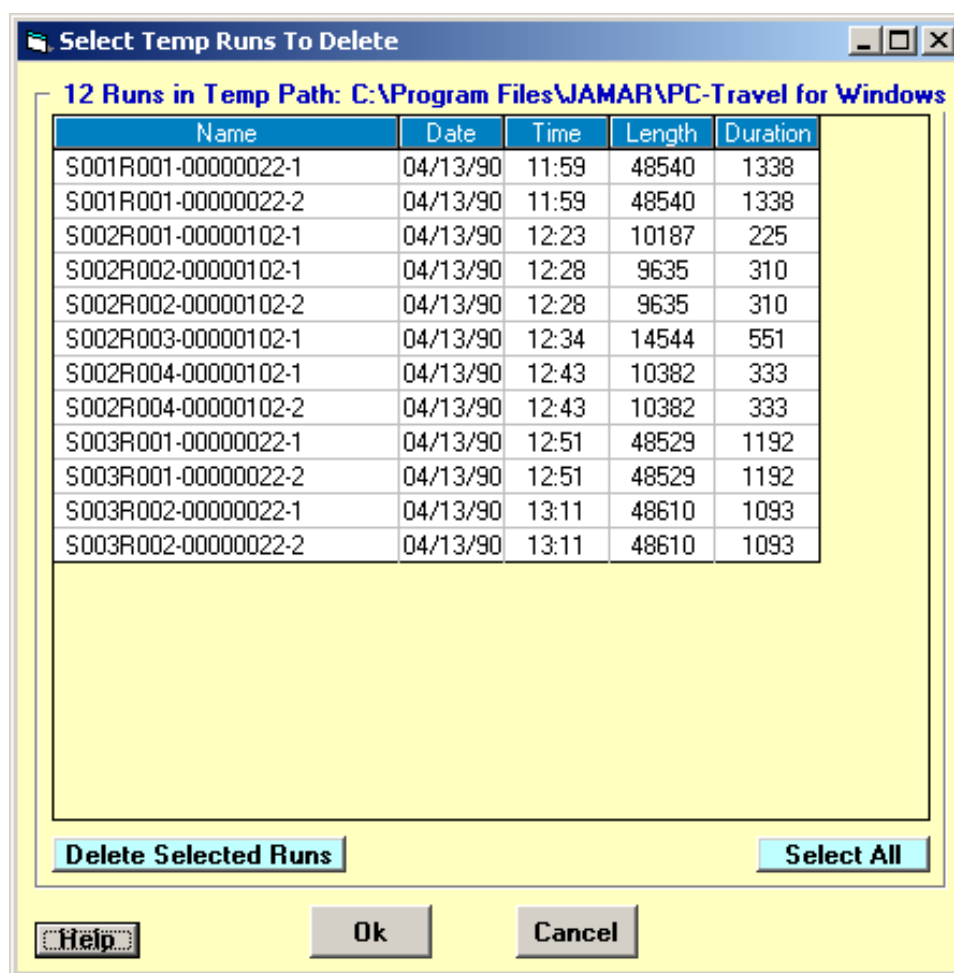


Figure A3.4 - Select Temp Runs To Delete Screen

This screen shows a list of runs in your Temp folder. The number of runs and the path to the Temp folder are shown at the top of the screen. The Name, Date, Time, Length, and Duration of each run are shown on each line in the list. If you click on a line then that line is highlighted. If you click on the line again, the highlight disappears.

Below the list are two buttons, one labeled **Delete Selected Runs**, the other **Select All**.

Click on each run you want to delete to highlight that run. If you want to select all of the runs, then click on **Select All**. You can click on any selected run to un-select it. When all of the runs you want to delete are highlighted, click on **Delete Selected Runs**. Those runs disappear from the list.

The runs aren't actually deleted from your computer yet. That doesn't happen until you click the **Ok** button. If you select one or more runs by accident and click the **Delete Selected Runs** button (*so they are no longer listed on the screen*), you can just click on **Cancel** to return to the main screen without deleting any runs. Then you can return to this screen and select the runs you meant to select the first time.

Continue to select runs to delete and click the **Delete Selected Runs** button. When all of the runs you want to delete are gone, click on the **Ok** button. The runs are permanently deleted from your computer.

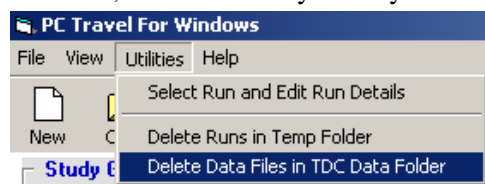
You may never need to use this utility, but it is there if you do.

## Delete TDC Data Files From TDC Folder

When you read a TDC counter the software first creates a copy of the data from your TDC counter and then stores that data in your TDC Data folder in a file. The path to this folder is set in your Preferences settings. The file is automatically given a name based on the current date and the number of times you read a TDC counter that day. For example, if you read a TDC counter on Dec 4, 2000 then the file would be given the name **!PC-Travel-12-04-00-1.tdc**. If you read another TDC counter that day, the second file would be **!PC-Travel-12-04-2.tdc** (*the ! is a convention some people use for temporary files*).

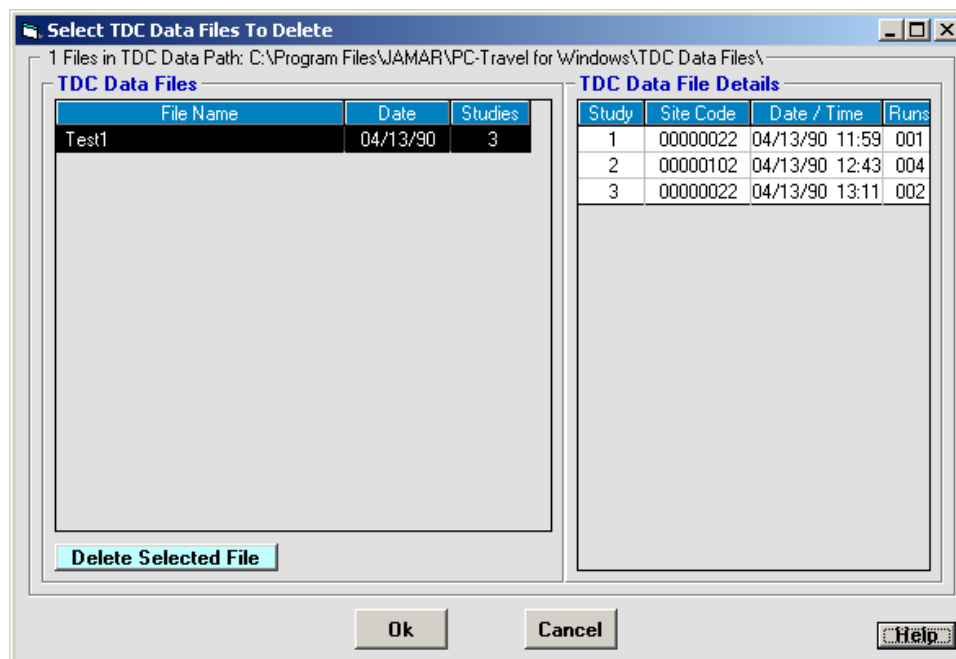
The .tdc file is immediately and automatically processed into runs which are stored in your Temp folder, without you ever interacting with them at all.

Normally, you don't ever need to think about these files. The files are not automatically deleted, however, so over time you may accumulate a number of these files on your computer. They don't do any harm, but after you have processed the data, they don't do any good either. If you want to, they are easy to delete.



**Figure A3.5 —  
Delete TDC Data Folder Files**

From the main screen, select **Delete Data Files in TDC Data Folder** from the **Utilities** menu, as shown here. This will bring up the *Select TDC Data Files to Delete* screen shown in Figure A3.6.



**Figure A3.6 - Select TDC Data Files To Delete Screen**

There are two main sections to this screen. The left side, labeled **TDC Data Files**, shows a list of the data files in the TDC Data File folder. The list shows the name of the file, the date the file was created (*not when the data was collected*), and the number of studies in the data.

The right side, labeled **TDC Data File Details**, shows details of the studies found in the highlighted data file, including the Site Code entered in the TDC counter when the study was done, the date and time of the first run in the study, and the number of runs in that study. The intent is to give you enough information about the data so that you can make an educated decision about deleting that file.

Click on a data file in the *TDC Data Files* window. Check the *TDC Data File Details* window. If you want to delete this file, click on the **Delete Selected File** button. The file disappears from the list.

The file isn't actually deleted from your computer yet. That doesn't happen until you click the **Ok** button. If you select one or more files by accident and click the **Delete Selected Files** button (*so they are no longer listed on the screen*), you can just click on **Cancel** to return to the main screen without deleting any files. Then you can return to this screen and select the data files you meant to select the first time.

Continue to select a data file to delete and click the **Delete Selected File** button. When all of the files you want to delete are gone, click on the **Ok** button. The files are permanently deleted from your computer.

### **Why Doesn't the Software Automatically Delete the TDC Data Files?**

As explained above, you normally never see the TDC data file. The software creates the file when you read the TDC counter and then immediately processes the data into temporary run files, which is where you first see the data from the TDC counter. In theory, we could delete the data file as soon as it is processed into temporary runs.

We don't do that in case there is some sort of problem with processing the runs. You may run into a problem that requires us to send you updated software. If you have the TDC data file, you don't need to have the TDC counter available. Or we may ask you to send us the TDC data file so we can see what problems you are having. This probably won't be necessary, but just in case, we don't delete the file — you do, and only when you are sure you'll never need that data again.

## Appendix 4 — Notes on Fuel and Emissions

The Fuel and Emission statistics in PC-Travel for Windows uses the same microscopic simulation models as in PC-Travel for DOS. This was done for two reasons. First, it allows continuity between the two programs. If you are comparing data from studies done with the two programs the calculations will compare easily. Second, it was easy to do since all of the information needed to do the code was available.

**PC-Travel for Windows Preferences**

Path Options | Default Values | Report Options | **Fuel and Emissions**

**Fuel Consumption Parameters** Fuel (ml/sec) =  $k1 + k2 \cdot V + k3 \cdot V \cdot V + k4 \cdot A \cdot V + k5 \cdot A \cdot A \cdot V$   
 $k1 = 0.7$   $k2 = 0.00442$   $k3 = 0.0000022$   $k4 = 0.00762$   $k5 = 0.000886$   
 V = velocity in KM/hr  
 A = acceleration in KM/hr/sec

**Hydrocarbon (HC) Parameters** HC (grams/sec) =  $hc1 + hc2 \cdot A \cdot V + hc3 \cdot A \cdot V \cdot V$   
 $hc1 = 0.018$   $hc2 = 0.0005266$   $hc3 = 0.0000061296$

**Carbon Monoxide (CO) Parameters** CO (grams/sec) =  $co1 + co2 \cdot A \cdot V + co3 \cdot A \cdot V \cdot V$   
 $co1 = 0.182$   $co2 = -0.0079776$   $co3 = 0.00036227$

**Nitrous Dioxide (NO<sub>x</sub>) Parameters** NO<sub>x</sub> (grams/sec) =  $noxa1 + noxa2 \cdot A \cdot V, A > 0$   
 NO<sub>x</sub> (grams/sec) =  $noxb1 + noxb2 \cdot A \cdot V, A < 0$   
 $noxa1 = 0.00386$   $noxa2 = 0.00081446$   $noxb1 = 0.00143$   $noxb2 = -0.000017005$   
 V = velocity in ft/sec  
 A = acceleration in ft/sec/sec

Ok Cancel

Figure A4.1 — Fuel and Emissions

This is the Preference screen showing the Fuel and Emissions constants. The values shown are the default values used in PC-Travel for DOS. You can edit them if you want to and know what you are doing. I'd leave them alone unless you are sure.

The Fuel and Emissions statistics show up in a variety of places in the program.

- 1 – **Run Stats** You can see the Fuel and Emissions calculations for any single run.
- 2 – **Study Stats** You can see the Fuel and Emissions calculations for the entire study.
- 3 – **Reports** You can print summary reports or individual run reports showing total Fuel and Emissions.



**Study Statistics**

Name: **BANDOUT - Mixed Runs** Click any column to see details.

Node #	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 10 MPH	Time <= 30 MPH	Fuel (gals)	HC (grams)	CO (grams)	NOx (grams)
2	42.0	-3.3	0.0	0.0	0.0	0.0071	0.6023	8.5685	0.3490
	34.8	-1.0	0.0	0.0	4.3	0.0075	0.6958	8.3086	0.4376
	-7.2	2.3	0.0	0.0	4.3	0.0004	0.0935	-0.2599	0.0886
3	29.8	5.7	2.7	5.0	19.0	0.0162	1.4265	14.0864	0.8575
	25.9	11.0	6.0	11.0	20.7	0.0194	2.0531	20.9057	1.3995
	-3.9	5.3	3.3	6.0	1.7	0.0032	0.6266	6.8193	0.5420
4	23.6	24.3	18.3	23.7	38.3	0.0297	2.9423	30.6384	1.7680
	33.0	3.3	2.7	5.0	14.7	0.0286	2.8242	31.8974	1.9693
	9.4	-21.0	-15.6	-18.7	-23.6	-0.0011	-0.1181	1.2590	0.2013
5	37.4	-3.0	1.7	3.0	8.3	0.0259	2.6525	32.2496	1.8658
	37.7	-3.7	0.0	0.0	4.7	0.0248	2.6371	34.0500	1.8226
	0.3	-0.7	-1.7	-3.0	-3.6	-0.0011	-0.0154	1.8004	-0.0432

Stats based on 3 BEFORE runs and 3 AFTER runs.

☒ Show Node Names  
☒ Show Time <= Spds  
☒ Show Fuel / Emissions

Help Exit

Figure A4.2 — Fuel and Emissions Stats

This screen shows what the Fuel and Emissions statistics look like on the *Study Stats* screen. Select the **Stats** icon from the toolbar to see this screen.

**Print Preview**

Organization Title Goes Here  
Heading Second Line  
Heading Third Line

Study Name: **BANDOUT - Mixed Runs**  
Study Date : 3/2/91  
Page No. : 1

**Fuel Consumption & Emissions**

Node #	Length	Node Name		Fuel (gal)	HC (grams)	CO (grams)	NOx (grams)
1	0	[Start]					
2	900	Mainland	Before	0.0071	0.6023	8.5685	0.3490
			After	0.0075	0.6958	8.3086	0.4376
			Change	0.0004	0.0935	-0.2599	0.0886
3	1549	Outlets	Before	0.0162	1.4265	14.0864	0.8575
			After	0.0194	2.0531	20.9057	1.3995
			Change	0.0032	0.6266	6.8193	0.5420
4	2507	Bismarck/Metric	Before	0.0297	2.9423	30.6384	1.7680
			After	0.0286	2.8242	31.8974	1.9693
			Change	-0.0011	-0.1181	1.2590	0.2013
5	2523	Mass	Before	0.0259	2.6525	32.2496	1.8658
			After	0.0248	2.6371	34.0500	1.8226
			Change	-0.0011	-0.0154	1.8004	-0.0432
6	2362	[End]	Before	0.0258	1.6934	22.8444	0.9437
			After	0.0196	1.5943	23.0937	0.9543
			Change	-0.0062	-0.0991	0.2543	0.0107
Total	3,960		Before	0.0666	3.2324	106.2572	5.7020
			After	0.1000	3.8046	119.2605	6.5823
			Change	0.0332	0.5722	12.9033	0.8803

Stats based on 3 BEFORE runs & 3 AFTER runs.

Figure A4.3 — Fuel and Emissions Print Preview

This screen shows the Print Preview of the *Fuel and Emissions Summary* report.

If you have ideas on other ways to present this type of data, or if you have information about these or other models you would like to see a part of the program, then please let us know.

## Appendix 5 — Field Worksheet

Fill out the top section and the Node info before you start the runs. Use one sheet for each count.


You could put a rough sketch of the route on the back of the worksheet, especially to show temporary things like work zones.

Reverse the numbering to remind you of the order of nodes in the opposite direction. The numbers match the numbers shown on the TDC-8 during the run.

Mark the End and Start Nodes to remind you to press the DO key at these nodes.

Put the direction and starting time at the beginning of each run.

Add any comments at the end of each run.

PC-Travel Field Worksheet							
Location:		Bandout		Date: 5/11/2000			
Site Code:		12345678		Cal Constant: 882			
<b>Nodes:</b>							
Start/End	Druid Hills						
1 4	Mainland	16					
2 3	Guilbeau	17					
3 2	Bresnahan/Mistic	18					
4 1	Braun	19					
<del>5</del> S	Tighe	20					
6		21					
7		22					
8		23					
9		24					
10		25					
11		26					
12		27					
13		28					
14		29					
15		30					
<b>Runs:</b>							
#	Dir	Time	Comments	#	Dir	Time	Comments
1	nb	14:55	ok	2	sb	15:03	ok
3	nb	15:15	missed link at braun	4	sb	15:22	ok
5	nb	15:33	ok	6	sb	15:41	ok
7	nb	15:52	slow truck caused backup	8	sb	16:12	ok
9	nb	16:21	ok	10	sb	16:29	late link at guilbeau?
11	nb	16:40	ok	12	sb	16:48	ok
13				14			
15				16			
17				18			
19				20			
 <b>JAMAR</b> Technologies, Inc.				<b>800-776-0940</b> www.jamartech.com			

Remember: The point of the worksheet is to record what happens during the runs so the information can be entered properly and easily into the software back in the office. Also focus on items that might effect the interpretation of the data---odd traffic patterns, weather considerations, accidents, work zones, etc. Ask yourself, "What do I want to remember about these runs 6 months from now?"

# PC-Travel Field Worksheet

Location: \_\_\_\_\_

Date: \_\_\_\_\_

Site Code: \_\_\_\_\_

Cal Constant: \_\_\_\_\_

Nodes:

Start/End

1	_____	16	_____
2	_____	17	_____
3	_____	18	_____
4	_____	19	_____
5	_____	20	_____
6	_____	21	_____
7	_____	22	_____
8	_____	23	_____
9	_____	24	_____
10	_____	25	_____
11	_____	26	_____
12	_____	27	_____
13	_____	28	_____
14	_____	29	_____
15	_____	30	_____

Runs:

#	Dir	Time	Comments	#	Dir	Time	Comments
1	_____	_____	_____	2	_____	_____	_____
3	_____	_____	_____	4	_____	_____	_____
5	_____	_____	_____	6	_____	_____	_____
7	_____	_____	_____	8	_____	_____	_____
9	_____	_____	_____	10	_____	_____	_____
11	_____	_____	_____	12	_____	_____	_____
13	_____	_____	_____	14	_____	_____	_____
15	_____	_____	_____	16	_____	_____	_____
17	_____	_____	_____	18	_____	_____	_____
19	_____	_____	_____	20	_____	_____	_____



