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If you have any questions about the TRAX I Plus that you cannot find answers for in this manual, there are several ways to get additional information.

On the Hardware Support section of our web site at:

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

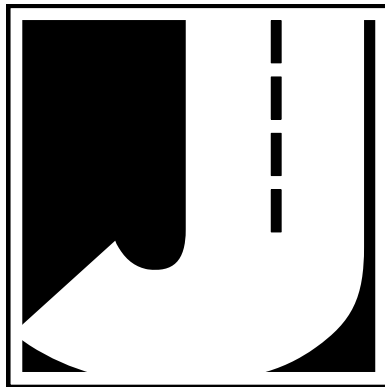
Contact us by e-mail at:

**[sales@jamartech.com](mailto:sales@jamartech.com)**

Contact us by phone at:

**215-361-2244**

**Monday - Friday 8:00 AM to 5:00 PM Eastern time**



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## Quick Setup Guide for the TRAX I Plus

1. Turn the TRAX I Plus ON.
2. From the Main Menu, **TAB** to “STAT” and hold down the **DO** key. Check the battery voltage (bat:X.Xv). For longer studies (week or more) the voltage should be at least 6.4. It can be less for shorter counts, but should not be below 6.1. Release the **DO** key when finished checking.
3. **TAB** to “Utilities” and press the **DO** key once. **TAB** to “Defaults” and press the **DO** key once.
4. With “INT” flashing, press the **DO** key once. **TAB** to select the interval length desired and press the **DO** key when your selection is flashing.
5. **TAB** to “Space” and press the **DO** key once. Enter the spacing of your tubes for the study. This is only required for class, speed or gap types of studies. All of these studies require 2 ft. *This setting does not affect volume studies - if you are doing a volume count, you do not need to set the spacing.* Hit the **DO** key when your selection is correct.
6. Hit the **DO** key twice with “Exit” flashing to return to the main menu. The default settings will remain stored in the counter for all future counts. You will not need to set them again unless you are going to do a different type of study.
7. From the Main Menu, press the **DO** key when “Count” is flashing.
8. Select the type of study you wish to do by using the **TAB** key and hitting **DO** when your selection is flashing. The options are: Basic, Volume Only and Bin.
  - Basic:* time-stamped raw data. This study gives you the greatest flexibility and can be used to get volume, class, speed or gap information.
  - Volume Only:* axle or divide-by-two vehicle counting. This study should be used if you are only interested in vehicle volumes. For Volume-Axle, each axle is counted. For Volume-Vehicle, every two axles is counted as one (divide-by-two technique)
  - Bin:* class, speed and/or gap data sorted into bins by the TRAX.
9. After selecting your type of study, you will be prompted to select a tube layout. Refer to the descriptions on the TRAX I Plus or to Chapter 4 for the appropriate selection. **TAB** to your selection and press the **DO** key to select it.
10. You will then be prompted to select a site code. Press **DO** with “Yes” flashing to enter one or press **DO** with “None” flashing to not use a site code.
11. Press **DO** with “Start” flashing to begin your study!

## Chapter 1

# Introduction to the TRAX I Plus

## **What is the TRAX I Plus?**

The TRAX I Plus Counter/Classifier is an automatic traffic recorder designed and built by JAMAR Technologies, Inc. It is designed for ease of use, but contains many options and features that are needed for comprehensive traffic data analysis.

The TRAX I Plus can collect data in three modes: basic (time-stamped) data, volume only data or binned data. These various modes allow you to go from a simple one lane volume count to a multi-lane, individual axle time-stamped raw data collection with the same piece of equipment.

The TRAX Flex HS can store up to 150 different studies. It stores the type of study done, the date and time, a site code & GPS coordinates (if entered) and the data for the study. At any convenient time, you can transfer the data to your computer or PDA using the RS-232 serial port and process the data. Once the data is in the TRAXPro software, reports for volume, class, speed and gap can be generated.

## **Before You Do a Count**

Before you attempt to collect important data with the TRAX I Plus we strongly recommend that you familiarize yourself with both the operation of the TRAX and how to properly install your road tubes. Few things are more frustrating than trying to resolve problems when working on a tight deadline or with critical data.

Whenever possible, we recommend that you perform a test count if you are new to the TRAX I Plus or are planning to collect data that you have not in the past. This will help you become comfortable with the operation of the equipment and how the data is collected, which should make things easier when you have to do a real count.

The next section provides a tutorial that walks you through the basics of setting up the TRAX and starting a count.



## **Learning about the TRAX I Plus**

The remainder of this chapter provides a tutorial that will walk you through the basics of setting up the TRAX and starting a new study. Once you have completed this tutorial, you should have a good working knowledge of how the TRAX I Plus operates.

At its heart, the TRAX is a very simple unit to set up and use. This tutorial will not attempt to cover every feature and option of the TRAX, just those that are most commonly used. If you would like more information on a specific feature that is not covered in this tutorial, refer to chapter 2, which provides details on all the features and options of the TRAX.

### **Turning the TRAX On and Off**

To start, we'll familiarize ourselves with the basic features of the TRAX. Open the lid of your TRAX and you will see the faceplate, which contains a display for showing information and keys for entering data.



The first thing we want to do is turn the unit on. This is done by moving the black POWER switch to the ON position. Do this now.

Two start up screens will appear on the display, then it will finally show the Main Menu. Before we start to learn about this screen, let's learn how to turn the unit off.

Note that you can turn the TRAX off at any time, regardless of which screen you are on, by simply moving the Power switch to the OFF position.

Now that we're familiar with how to turn the TRAX off and on, let's restart it and start looking at some of the features.

## Menu Navigation

There are two keys on the keypad of the TRAX that are used to navigate through the various screens and select options. The black TAB key is used for navigation, while the red DO key is used to select an option. In general, you press the TAB key until the option you want is flashing, and then press the DO key to select the option. If you move the highlight too far and overshoot the desired option, just keep pressing the TAB key until it is re-selected. Let's see how this works.



Press to move highlight



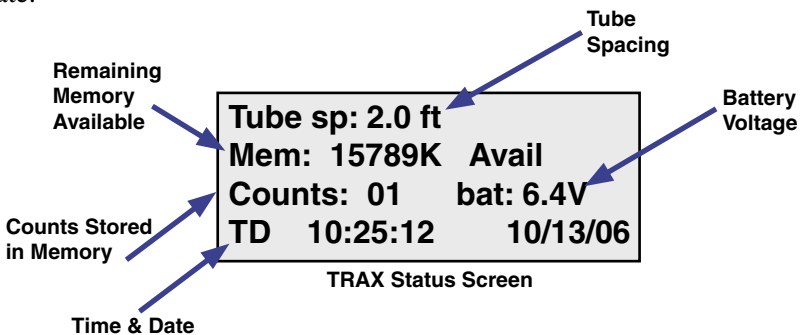
Press to select option

The Main Menu shows several options on the top line – Count, Utilities and Stat. Notice that *Count* is flashing. This means that it is the currently active option. Now, press the TAB key once and notice that *Utilities* is now flashing. Press it again and *Stat* is flashing. Press TAB again, and the display goes back to *Count* flashing. The TAB key is used to scroll through the various options shown on the display.

Now, press TAB until *Stat* starts flashing again. With *Stat* flashing, press the DO key and hold it down.

## Status Screen

What you're looking at now is the Status screen for the unit. It displays some of the main settings of the TRAX, including the currently programmed tube spacing, the amount of available memory, the number of counts currently stored in memory, the battery voltage and the time & date.



It's a good idea to get in the habit of checking this screen whenever you are going to start a new count. You can then be sure that your tube spacing

is set correctly for the count, that your battery voltage is strong enough to complete the count and that the correct date and time are set in the TRAX.

Release the DO key and the display will go back to showing the Main Menu. We'll now take a look at how we can change some of the settings we just saw on the Status screen.

On the Main Menu, press the TAB key until *Utilities* is flashing, then press the DO key.

### Utilities Menu

The Utilities menu contains an assortment of features that are necessary and/or helpful to the operation of the TRAX. The options that can be selected are: Mod, Clr, Default, T/Date, Sys and Test.

```
MOD CLR DEFAULT
T/DATE SYS TEST EXIT
```

Utilities Menu

As you move the highlight on these options, the bottom two lines of the display will update to show what the currently highlight option is used for.

Let's first take a look at what's available in the Default menu. Highlight this option, then press the DO key.

There are several options in the Default menu that can be used to change settings in the TRAX. The one we are interested in right now is the *Space* setting, so highlight this option, then press DO.

### Setting the Tube Spacing

When collecting data that will be processed for speed or classification, you have to use a tube layout with at least two road tubes set at a fixed distance apart. It is by knowing what this fixed distance is that speed and classification can be determined.

```
TUBE SPACING
      2.0 ft
DO:enter      TAB:clear
```

Tube Spacing Screen

The powerful data processors of the TRAX I Plus allow it to accurately record data with the tubes spaced at 2 feet (2.0) apart when using the Basic data mode. This is the spacing we recommend for the unit when using Basic mode. However, if you are more comfortable with Binned mode, or just like using the older traffic counter standard of 8 feet (which was used for many years before the TRAX Plus came along) you are free to select this as well. *Note that a minimum of 8 foot spacing is recommended when using Binned mode.*

Set the Tube Spacing to the value you will be using by pressing the numbers on the keypad. To enter 2 feet, press 0, 2, 0. To enter 8 feet, press 0,8,0. Once the correct number is entered, press DO.

The other settings in the Defaults menu are ones that you probably won't ever need to change from their factory settings, so we won't go into them in this tutorial. Chapter 2 provides details on every setting in the TRAX, if you do ever need to change any of these values.

With Exit flashing, press the DO key and return to the Utilities menu.

## **Clearing the Data Memory**

The second option listed in the Utilities menu is CLR, which stands for Clear. This option is used to clear the data memory of the TRAX.

When you do a count with the TRAX, that count stays in the memory of the TRAX until you clear the memory using this option. That's an important fact to remember, so we'll repeat it - when you do a count with the TRAX, that count stays in the memory of the TRAX until you clear the memory using this option.

Let's take a closer look at this process. Highlight *CLR*, then press the DO key.

If you are worried about losing your data by following the previous instruction, don't be. When you select the *CLR* option, the TRAX does not immediately clear the memory. Instead, it brings up the first of two confirmation screens that you must go through before the memory is actually cleared. This is designed to prevent you from accidentally clearing the memory. To clear the memory, you must confirm that that is what you want to do on both confirmation screens.

How often you should clear the memory is a matter of personal preference. We recommend that you clear the memory after you have downloaded your data to the computer and checked to make sure it looks okay. However, some people like to leave the counts in the TRAX's memory for a while as a sort of a backup of the data. It's up to you to decide which you prefer.

Since we don't want to actually clear the memory at this point, press DO with *Exit* flashing to return to the Utilities menu.

### **Frequently Asked Questions Regarding Data Memory**

There are a few common questions people ask related to the memory of the TRAX:

**Q:** If I download the data from the TRAX to the computer, does that remove the data from the TRAX?

**A:** No. You can download the same data as many times as you like and it doesn't affect what's stored in the TRAX.

**Q:** If I start a new count in the TRAX, does that wipe out any old counts?

**A:** No. The TRAX can store up to 150 different counts in its memory.

**Q:** If I have several counts stored in the memory of the TRAX, can I delete just one specific one?

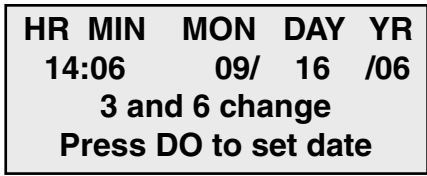
**A:** No. Clearing the memory deletes the entire memory. You cannot clear individual counts from the memory.

### **Setting the Time and Date**

The fourth option listed in the Utilities menu is T/DATE, which stands for Time & Date. This option is used to enter the correct time and date in the TRAX.

The TRAX contains a real-time clock, which means it is always keeping track of the time, whether the TRAX is turned on or off. When you do a count, the data is stored based on the time and date that is set in the TRAX, so it's important that the time and date are set correctly. If they are not, the data you produce will be inaccurate.

Highlight *T/Date*, then press the DO key. To change a value in this screen, you press the TAB key to highlight the field you want to change. You then press the Change keys (numbers 3 and 6) to either scroll up or down through the values.



**Time & Date Screen**

Let's give this a try. With HR flashing, press the 3 key several times and notice that the hour value increases up. Now, press the 6 key several times and notice that the value decreases.

Use the 3 or 6 key to reset the time to the correct hour. Note that the time style used is the military format, meaning 2:00 PM equals 14:00, so be sure you're selecting the correct hour. If you set the TRAX to 2:00, it's set to 2:00 AM.

Check the remaining time and date values to make sure they are correct for your location. Make any changes that are necessary, then press the DO key to store the values and return to the Utilities menu.

The fifth option on the Utilities menu, Sys, lets you change some system settings for the TRAX. In most cases, you probably won't need to change any of these. However, if you're using the TRAX outside the US, you can use this menu to set the TRAX to Metric mode.

The sixth option on the Utilities menu, Test, allows you to run several diagnostic tests on the TRAX in case you ever encounter a problem with it use.

Now that we've taken a look at how to program some of the setting of the TRAX, let see how to actually start a count. Highlight Exit on the Utilities menu, the press DO to return to the Main Menu.

## Starting a New Count

With *Count* highlighted on the Main Menu, press the DO key.

You have three options for the type of data you want to collect – **Basic**, **Volume Only** or **Bin**.

<b>BASIC</b>	<b>VOLUME ONLY</b>
<b>BIN</b>	<b>TUBES</b>
	<b>EXIT</b>
<b>Basic Data</b>	
<b>Press DO to select</b>	

Count Menu with *Basic* highlighted

What do we mean when we say ‘Basic,’ ‘Volume Only’ and ‘Bin’ data?

Basic data means that the data you are collecting in the field with the TRAX is in its most basic format – a time-stamp recording for every single axle that goes over the road tubes you have put down. (Some people refer to this type of data as Raw data or Time-stamped data – we call it Basic data. They all essentially mean the same thing.) Depending on the tube layout you select (we’ll cover this shortly) Basic data can be processed to provide data for volume, speed, classification & gap, all from the same original file.

With Volume Only data, as the name implies, you can only get volume information. This format also does not time-stamp every axle, but rather sorts and stores the volume data into specific interval times.

Bin data, like Volume Only, does not time-stamp every axle, but rather sorts and stores class, speed and/or gap data into specific categories, or bins.

**In general, we recommend that you use the Basic format whenever you can.** There are several reasons for this, the most important of which is that if something goes wrong with one of your counts, *it is much easier to determine why (and potentially fix the problem without having to re-do the count) if the data is collected in the Basic format.*

There is a fourth option listed on this menu, *Tubes*, that can be used to view the strength of the pulses that are coming in on the road tubes. This is a very handy feature that can help reduce the need for recounts caused by tube failures. (For more details, refer to Chapter 2.)

With *Basic* highlighted on the screen, press the DO key.

## Selecting a Layout

The next screen you see is used to select the type of layout you will be using to collect your data.

<b>L1</b>	<b>L2</b>	<b>L3</b>	<b>L4</b>	<b>L5</b>
<b>L6</b>	<b>L7</b>	<b>L8</b>	<b>L9</b>	<b>L10</b>
<b>L1: Two Channel Vol. A,B</b>				

Layout Menu with L1 highlighted

The TRAX contains 15 pre-programmed layouts, labelled L1 through L15. These all represent different ways of placing road tubes on the road to collect data.

Since there are many different layout possibilities, they can't all be shown on the display at one time. The first screen, shown above, shows the layouts L1 through L10. Let's take a look at how we can see the rest of the layouts.

Press the TAB key and the highlight will move from L1 to L2. Also notice that the bottom two lines of the display changes to provide a description of whichever layout you have highlighted.

Press TAB until L5 is flashing, then press it once more. Notice that the display has changed so that the first row of layouts, L1 through L5, has moved off the screen and the third row, L11 through L15, has now appeared. This is how you move through the available layouts. Now, keep pressing TAB until you are back at L1.

Which layout you select largely depends on the type of data you need. Some layouts can only provide volume and gap data (L1, L2, L3, L4, L7, L8, L9, L13, L14) while others will provide speed and class in addition to volume and gap (L5, L6, L10, L11, L12). For full descriptions of the different tube layouts, refer to chapter 5.

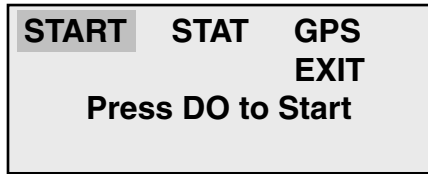
If you need to produce reports for speed or classification data, the most commonly used layout is L6. This is designed for standard two-lane roads with traffic traveling in opposite directions. Another commonly used layout is L5, which is designed for one-lane of traffic (or possibly two if each lane is going in the same direction). The data for either of these layouts can be collected with two road tubes. (Note that any layouts that provide speed & class data also automatically provide volume data.)



For this tutorial, we'll select the L6 layout, so press the TAB key until L6 is flashing, then press DO.

The next screen gives you the option to enter a Site Code for your count. This feature allows you to enter information specific to where the study was done, such as street names, location codes, etc. If you do a lot of counts at different locations, using Site Codes can help you keep track of them all. We won't use one for this tutorial, so press TAB to highlight *NO*, then press DO.

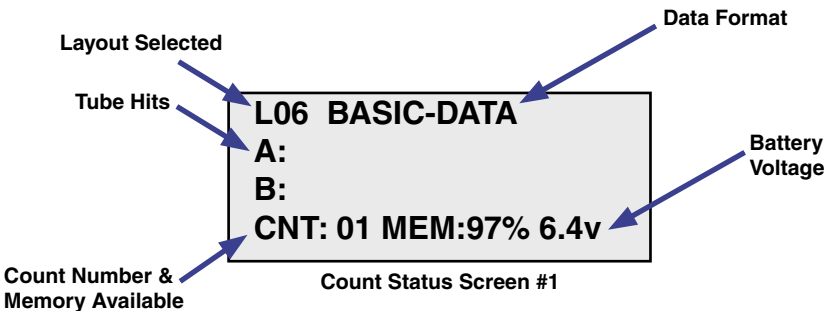
We're now ready to start our count. Before we do so, notice the two other options listed on this screen. The *STAT* option lets you review how you have set up the count. The *GPS* option lets you upload GPS coordinates into the TRAX if you have a GPS receiver.



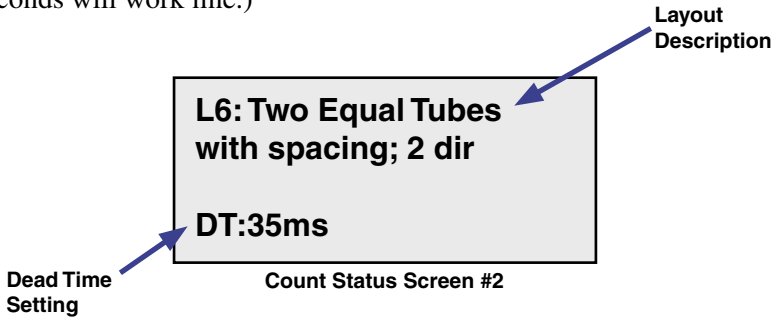
Count Start Menu with *Start* highlighted

Now, to start our count, press DO with *Start* flashing. The TRAX immediately goes into data recording mode and the count has begun.

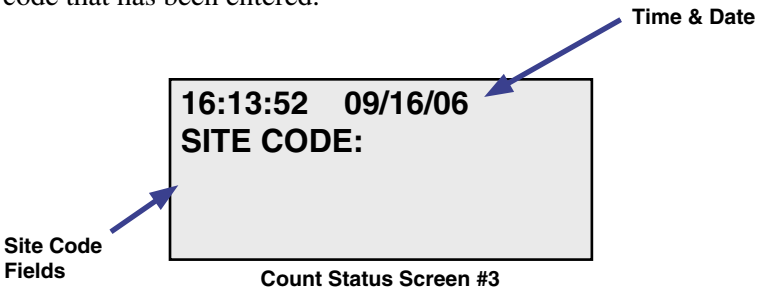
Once the count has begun, the first of four status screens is displayed. The top line of this screen tells us what layout we have selected and the data format we are using. The middle two lines will show the hits that are being received on the road tubes. Whenever a vehicle's axle hits one of the road tubes, you should see an asterisk appear on that tube's row. The bottom line shows what number count this is in the TRAX's memory, the percentage of memory available, and the battery voltage.



Press the TAB key and the second status screen will appear. This screen provides a more detailed description of the layout we are using, along with the default dead time value (DT) set in the TRAX. (Dead Time is explained in detail in chapter 2 – in most cases a value from 25 - 40 milliseconds will work fine.)



Press the TAB key again and the third status screen will appear. This screen shows the time and date that are set in the TRAX, along with any site code that has been entered.



Now press TAB again, and the display will go back to showing the first of the status screens.

If we were doing a real count, at this point we'd close the lid of the TRAX and lock it up. The TRAX will then continue to do its job of collecting data until we tell it to stop.

It's a good idea to periodically check the status of your count, if possible, when you are doing one for an extended period of time. If you are doing a count for a week or more, you may want to stop by and check the status screens once or twice during the count, just to make sure everything is still recording correctly.

## **Ending the Count**

When you want to end a count, simply turn the TRAX off by moving the POWER switch to the OFF position. This shuts the TRAX down and stores the count file in memory. Go ahead and do that now to end the count we started. Once the unit is turned off, turn it back on again.

## **Downloading Your Data**

Once you have collected data and stored it in memory, the next step is to download it. The data can be downloaded through the Serial Port of the TRAX.

To download your data, first plug a the JAMAR download cable into the serial port of the TRAX, then into a serial port on your computer. (Refer to Chapter 3 if you do not have a serial port, or there is a conflict with the port.)

On the TRAX itself, check to see if the Main Menu is visible. Your data can be downloaded if this screen is visible.

Once your TRAX is properly connected, start the TRAXPro software and click on the *Download a TRAX counter* icon. The *Read TRAX Counter* screen will then appear.

The baud rate setting determines how fast the data will be transferred into the program. Note that the TRAX will automatically sense whatever baud rate you select in the software. The higher the baud rate, the faster your data will be downloaded. Most computers can be set for the highest setting, 115200, so select this. Once this is set, select the comm port that you are using on the computer. TRAXPro will only list the comm ports that are available on your computer, making the selection easier.

After making any needed adjustments, click on the *Begin* button in TRAXPro and the program will attempt to connect to the TRAX. The traffic signal icons at the bottom of the TRAXPro screen provide the status of the download.

If the connection is made, you will see a blue progress bar moving across the TRAXPro screen as the data is transferred. While the data is being downloaded, the display on the TRAX will show:

**TRANSFER IN PROGRESS**  
**COUNT:01**  
**BLOCK:000001**  
**Sending Data...**

**Download in Progress**

When all of the data in the TRAX has been downloaded, you will either see a screen for assigning a name to your file or, if there is more than one count, a list of counts to choose from.

Once the data has been transferred to the computer, the TRAX display will return to the screen it was on before the download began.

Downloaded counts will remain in the memory of the TRAX until they are cleared, using the method we covered earlier in this tutorial.

## **Congratulations**

Now that you have completed this tutorial, you should have a good working knowledge of how the TRAX operates. The next chapter covers all the options and features of the TRAX in detail, both those we touched on in this tutorial and additional ones.

We commend you on your choice of the TRAX I Plus for your data collection needs. A lot of thought and care has gone into the design of this unit, and it should provide you with years of reliable service.

**Chapter 2**

**Operational  
Features  
of the  
TRAX I Plus**

## How is the TRAX I Plus Powered?

The TRAX I Plus is powered by a rechargeable lead gel battery. The solar panel also provides power when in the field, which extends the time before the battery needs to be recharged. Depending upon use, batteries may last for several months before they need to be recharged manually.

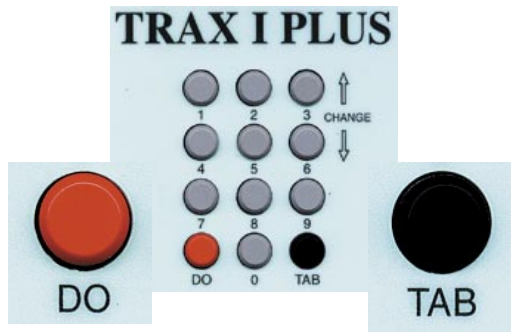
The TRAX I Plus displays the battery voltage when it is first turned on. This allows you to determine if there is enough battery power to complete a study. Generally, battery voltage should register at 6.3 VDC or higher for a full charge.

*Keeping your battery properly charged is very important.* The rechargeable battery will begin to decay and become less effective if it is allowed to fall below 5.9 volts. To avoid having to replace your battery prematurely, keep it consistently charged. A well-maintained battery will last for years without having to be replaced. Refer to Chapter 6 *Battery Care* for more information on battery maintenance.

## POWER ON, DO and TAB Functions

An OFF/ON switch on top of the front panel is used to turn the unit on or off. A four line by 20-character display helps you select the proper entries. All options are clearly displayed, with the currently selected option flashing. The bottom two lines of the display are used to explain the option that is highlighted.

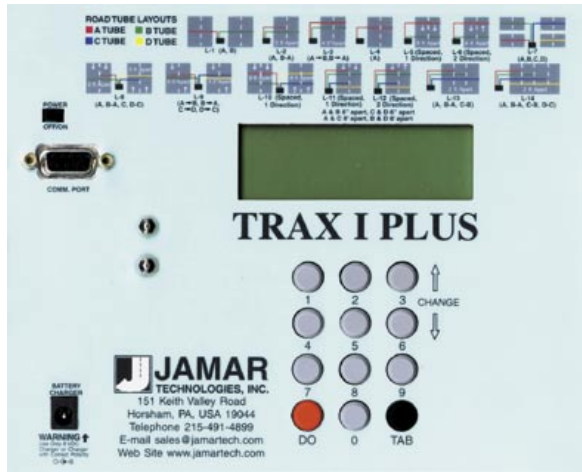
Two buttons are all that are used to move from menu to menu, and to select from the various options shown on the display. One key (TAB) is used to move the highlight to the option you want, and another is used to implement it (the DO key). In general, you press the TAB key until the option you want is flashing, and then press the DO key. If you move the highlight too far and overshoot the desired option, just keep pressing the TAB key until it is re-selected.



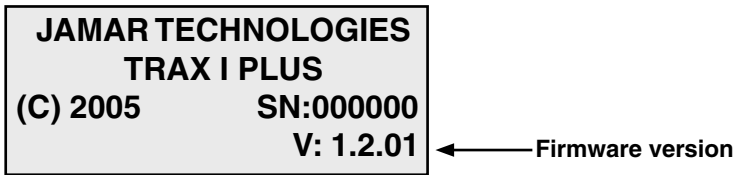
## Start-up Screens

A four-line, 20-character LCD display, located in the middle of the TRAX I Plus' front panel, is used to display current options and status.

**Important Note:** The display of the TRAX I Plus has a power-saving feature that turns off the screen if the unit has not been disturbed for several minutes. To bring the display back up, simply hit any of the key on the keypad.



After you power on the TRAX I Plus the sign-on screen is displayed. This shows the version numbers of the firmware in the TRAX I Plus on the bottom line. The firmware is the internal program that the TRAX uses to operate. If you ever encounter a problem with your unit and request support for it, you may be asked for this version number.

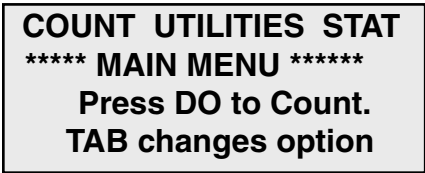


The second screen, as shown below, displays the tube spacing that is set in the TRAX I Plus, the amount of memory remaining for new studies, the number of counts stored in memory, the status of the battery and the time and date that is set in your TRAX I Plus.



After a few seconds, the screen clears and the Main Menu is displayed.

# Main Menu



The Main Menu is the starting point for all of the options in the TRAX I Plus. The options on this screen are:

**COUNT** Program a new count. When Count is selected you can choose from BASIC, VOLUME ONLY or BIN. Depending on the mode of data collection you have selected, you can produce reports in the software for volume, class, speed, gap, length and following distance.

**UTILITIES** Perform miscellaneous operations that include the option to download to a module, clear the counter, program the default settings, set the time & date, restore default tables and perform diagnostic tests on the TRAX I Plus.

**STAT** Select to display available memory, counts stored, battery power, and time/date. This is the same screen as the second one shown after turning on the TRAX I Plus. TAB until STAT is flashing then hold the DO key down to review the information on this screen. Approximately five seconds after releasing the DO key, the screen will return to the Main Menu.



## Utilities Menu **Main Menu > Utilities**

The Utilities Menu contains an assortment of operations that are necessary and/or helpful to the operation of the TRAX I Plus. Press the TAB key until Utilities is flashing, then press the DO key to enter this menu. When you have selected UTILITIES from the Main Menu the screen shown here is displayed.

```
MODULE CLR DEFAULTS
T/DATE SYS TEST EXIT
Data Module commands
Press DO key
```

## Module **Main Menu > Utilities > Module**

The Module option allows you to use a JAMAR data module with the TRAX I Plus. You can check the status of a module, erase a module, or download data into a module by connecting to the COM port on the TRAX I Plus using the module cable.

```
STATUS WRITE ERASE
EXIT
Status: Data Module
Press DO Key
```

The module can hold multiple files from several different counters. With this feature you can download all of your data in the field and only have to transport the module back to your office for downloading into the software.

### Status **Main Menu > Utilities > Module > Status**

This selection allows you to check whether there is data currently stored in the module.

### Write **Main Menu > Utilities > Module > Write**

This selection allows you to download data from your TRAX I Plus into the data module. You can choose to download all studies, or just new studies created since you last downloaded. You are asked to verify this selection several times to make sure this is what you want to do.

### Erase **Main Menu > Utilities > Module > Erase**

This selection allows you to clear any data stored in the module. You are asked to verify this selection several times to make sure this is what you want to do. Once the data has been erased it cannot be restored.

## Clear (Clr)

Main Menu > Utilities > Clr

The Clear option allows you to clear the memory of all data. You are given two chances to change your mind before data is removed from the nonvolatile memory.

## Defaults

Main Menu > Utilities > Defaults

**Note:** The nonvolatile memory in the TRAX I Plus will retain the default settings you program. These settings will be used for future traffic studies without having to re-enter the DEFAULTS menu.

### Interval (Int)

Main Menu > Utilities > Defaults > Int

The Interval selection applies to data collected in Volume Only or Bin mode.

It allows you to internally store data in 5, 10, 15, 30, or 60 minute intervals.

Use the TAB button to

select INT and press DO. Use TAB to highlight the number of minutes in which you would like the data stored. With the number flashing, press DO.

INT	SPACE	DT	DTX	DBV
				EXIT
<b>Select time interval for Binned Data</b>				

### Space

Main Menu > Utilities > Defaults > Space

The Space selection applies to data collected in Basic or Bin mode. It allows you to set the proper spacing for the tube layout you will be using. Use the TAB button to select SPACE and press DO. Use the keypad to enter your correct tube spacing. When finished, press DO. **Note:** We recommend a minimum of a two foot spacing when collecting basic data for class, speed or gap analysis or a minimum of an eight foot spacing when using Binned mode.

### DT

Main Menu > Utilities > Defaults > DT

DT stands for Dead Time (also known as D-Bounce) which is the amount of time the air switch in the TRAX I Plus will wait after it has recorded a pulse before it will accept another one.

Use the TAB button to select DT and press DO. Use the keypad to enter in the DT and press DO when completed. Thirty-five ms is the normal setting.

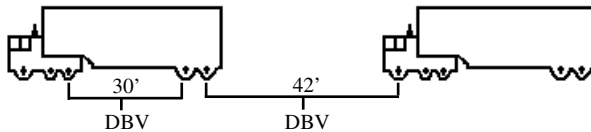
However, if you need to use a longer time, the DT selection allow you to set the dead time up to 990 ms. This setting is generally only used for very low speed counting. Refer to the appendix for more information.

## **DBV**

**Main Menu > Utilities > Defaults > DBV**

This selection allows you to set the default Distance Between Vehicles. Enter, in feet, the longest distance between consecutive axles of the largest vehicle you would expect to see at the study site. The TRAX I Plus will use this number to determine if two axles could be from the same vehicle or if the distance is great enough that the axles must be from separate vehicles.

Example: setting the DBV for 36 ft. tells the TRAX I Plus that any axles spaced at over 36 ft. apart must be from separate vehicles. In the example from the following diagram, a DBV setting of 40 feet would tell the TRAX I Plus the axles spaced at 30 feet could be from the same vehicle, but the axles spaced at 42 feet must be from separate vehicles.



## **Time/Date**

**Main Menu > Utilities > T/Date**

This option allows you to program the date and time to be used in your TRAX I Plus. To use this option, press TAB until T/DATE is flashing and then press DO. Set the current time and date for your location starting with the hour. Use the Change buttons (3 and 6) to correct the settings as required. Use the TAB key to move from the hour setting to the minutes, then enter the correct number of minutes.

The same process can then be repeated to set the month, day and year. When completed, press the DO button. **NOTE:** The real time clock in the TRAX I Plus uses a 24-hour military format; i.e. 5:00 P.M. is 17:00.

<b>HR</b>	<b>MIN</b>	<b>MON</b>	<b>DAY</b>	<b>YR</b>
14:06		04/	13	/06
<b>Press</b>		<b>to change.</b>		
<b>Press DO to set date.</b>				

## System (Sys)

**Main Menu > Utilities > Sys**

This option allows you to program some of the system settings of the TRAX I Plus. Like the Default settings, the System settings will be retained in the unit's non-volatile memory until changed.

<b>VEH</b>	<b>DATE</b>	<b>UNITS</b>	<b>PERM</b>
<b>FULLMEM</b>	<b>SPLIT</b>	<b>EXIT</b>	
<b>Restore Default</b>			
<b>Vehicle Table</b>			

### Veh

**Main Menu > Utilities > Sys > Veh**

This selection allows you to restore the factory default tables for data collection. This selection will restore the defaults tables of 15-70 mph by 5 mph for speed, FHWA scheme F for class, and 2 to 26+ by 2 seconds for gap.

### Date

**Main Menu > Utilities > Sys > Date**

This selection allows you to determine the format of the date used in the unit. The options are USA (month/day/year) or World (day/month/year).

### Units

**Main Menu > Utilities > Sys > Units**

This selection allows you to determine the format of the units used in the TRAX I Plus. The options are English or Metric.

### Perm

**Main Menu > Utilities > Sys > Perm**

This selection allows you to determine whether the TRAX should be configured for mobile use, or for permanent location use. This setting affects how the unit can be downloaded.

When set for Mobile the TRAX will disable the serial port when it goes into power saving mode (the display turns off), which saves power. To be able to download you must then wake up the unit by pressing any of the keys. When set for Permanent, the serial port is never disabled so data can be downloaded remotely. We recommend that you leave the setting for Mobile unless you are using the TRAX at a permanent location and retrieving data remotely.

### Fullmem

**Main Menu > Utilities > Sys > Fullmem**

This selection allows you to determine how the TRAX should respond if the memory is filled. The options are to Stop recording data or to Overwrite the beginning of the memory. In most cases you will never come close to filling the entire memory of the unit. The TRAX I Plus' 16 MB of internal memory will record over 3 million vehicles before the memory is filled.

### Split

**Main Menu > Utilities > Sys > Split**

This selection allows you to determine whether data should be recorded in continuous mode or if a new file should be started at midnight every day. The Never option tells the unit to never split the study while the Daily option tells it to split the study on a day by day basis. The Daily option is normally only used if the TRAX is set up at a permanent location, or if data is being retrieved while the unit is still recording data.

## TEST

**Main Menu > Utilities > Test**

This option allows you to perform diagnostic tests on various features of the TRAX I Plus to be sure they are operating correctly.

<p><b>MEMORY DISPLAY KEYS</b> <b>S.PORT TUBES EXIT</b> <b>Test internal data</b> <b>storage memory</b></p>
--

### Memory

**Main Menu > Utilities > Test > Memory**

The Memory test will check all memory locations in the unit's 8 MB memory. To perform the test, press DO while Memory is flashing and the TRAX I Plus automatically starts testing the memory. The test does not affect any data that is stored in the unit.

### Display

**Main Menu > Utilities > Test > Display**

The Display test allows you to view all segments of the liquid crystal display to be sure the display has not been damaged. To test the display, press DO after each of the screens that are shown.

### Keys

**Main Menu > Utilities > Test > Keys**

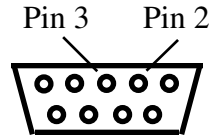
The Keys test allows you to check the functionality of each of the buttons on the keyboard. When in this test mode a simulation of the 12 keys is shown on the left side of the display. As you press a

key an 'X' should briefly appear at the correct location in the simulation. Pressing the DO key will exit you from the test.

**S. Port**

**Main Menu > Utilities > Test > S. Port**

The Serial Port test allows you be sure that the port used for retrieving data from the TRAX is working correctly. To perform the test correctly the 2 & 3 pins of the port must be looped together. A straightened paper clip can be used to perform this test by carefully inserting one end into the 2 pin and the other end into the 3 pin.



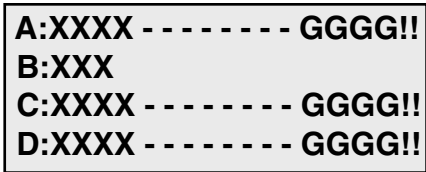
**NOTE: This test will fail if a test connector is not used properly. The cable used for downloading data cannot be used as a test connector.**

**Tubes**

**Main Menu > Utilities > Test > Tubes**

The Tubes test allows you to check the quality of the air pluses that are being received by the TRAX from the road tubes. This test should be performed once the TRAX is in the field and connected to the road tubes to be used for the study. The test lets you to identify potential problems with the tubes, enabling you to take corrective action.

When a pulse is received while in test mode, the strength of the pulse is shown for about a second on the display of the TRAX. Pulse levels are broken down into 4 categories: 'X' for Poor, '-' for Fair, 'G' for Good and '!' for Excellent. In the example shown here, the pulse strength is excellent for the A, C and D tubes. However, the pulse strength for the B tube is poor, indicating that the tube should be checked, and possibly replaced.



Press the DO or TAB key to exit the tube test screen.

## Count Menu

When you select Count from the Main Menu, you are given the option of the type of data you would like to collect, or to test the tubes.

**BASIC    VOLUME ONLY**  
**BIN   TUBES   EXIT**  
**Basic Data**  
**Press DO to accept**

### Tubes

Selecting this option will take you to the road tube test screen, which is described on page 2-10.

### Basic

Basic (raw) data collection involves time stamping every axle hit. This mode should be used if you want to analyze your data for volume, class, speed or gap information. Selecting this type of count will take you into the tube layout selection menu, described on the next page.

### Volume Only

If you select Volume Only you will be taken to the screen shown here, where you can choose a study using either the divide-by-two technique or a straight axle count.

**VOL-VEH    VOL-AXLE**  
**EXIT**  
**Volume by Vehicle**  
**Press DO to select**

Select VOL-VEH for a divide-by two study, where every two hits is counted as one. Select VOL-AXLE for an axle count, where every hit is counted as one. After you select the type of study you want, you will be taken to the tube layout selection menu, described on the next page.

### Bin

If you select Bin you will be taken to the screen shown here, where you can choose which bin data you want to record.

**CONT    CHANGE    EXIT**  
**OPT= Class Speed Gap**  
**Press DO to continue with**  
**options shown.**

You can choose to collect one type, two types or three types of data in any combination. The default setting is for Class, Speed and Gap. If you want to change this, press TAB until Change is flashing, then press DO. You will then see the screen shown on the next page.

On this screen all three study types are currently selected. To de-select a study, press the TAB key until the study you want to remove is flashing, then press the DO key. You will see that the study you chose has been removed from the Options listed on the second line. To re-select a study that has been removed, highlighted it on the top line, press DO and it will be returned to the Options line.

**CONT Class Speed Gap  
OPT= Class Speed Gap  
Press DO to continue with  
options shown.**

When you have configured the options for the types of data you want, press TAB until CONT is flashing, then press DO and you will be taken to the tube layout selection menu, described below

### **Tube Layout Selection**

A screen similar to the one shown here is displayed when in the Tube Layout Selection Menu.

**L1 L2 L3 L4 L5  
L6 L7 L8 L9 L10  
L1: Two Channel Vol.  
A,B**

The TAB key is used to move through the layouts. A description of the currently flashing layout is displayed on the bottom two lines. Refer to Chapter 5 *Road Tube Layouts* for a more detailed description of the individual layouts.

Listed below are the types of layouts that can be used depending on the data collection mode selected.

#### **Volume Only**

- 1 or 2 Road Tubes L1, L2, L3, L4
- 3 or 4 Road Tubes L7, L8, L9, L13, L14

#### **Bin**

- 1 or 2 Road Tubes L5, L6
- 3 or 4 Road Tubes L10, L11, L12

#### **Basic**

- 1 or 2 Road Tubes L1, L2, L3, L4, L5, L6
- 3 or 4 Road Tubes L7, L8, L9, L10, L11, L12, L13, L14

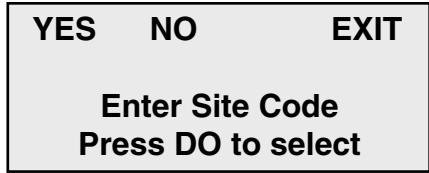
*Note that only the L5, L6, L10, L11 and L12 layouts can produce data that can be analyzed for speed, class or gap information.*



Press DO when the layout you want to use is flashing. You will then be taken to the Site Code menu.

## Site Code

The data in the TRAX I Plus includes the date and time that the study was done, but no direct information on where the study was done. Correct use of the Site Code is a way for you to guarantee that the data you collected at a particular site was indeed collected there.



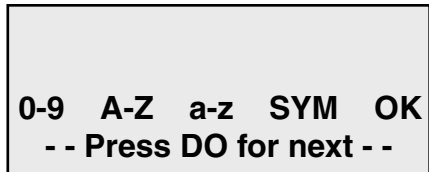
To enter a Site Code, press DO while YES is flashing. You then have the option of using either a numeric (numbers only) site code or an alpha-numeric (numbers, letters and symbols) site code.

### Numeric Site Code

Numeric site codes can be one or two lines, with up to 20 characters on each line. Enter the value for the first line of the site code using the numbered key on the TRAX. Once done, press DO to move to the second line. Once the second line has been entered press DO and the code is stored. You are then returned to the Site Code selection screen, with the code you entered shown. Select OK to proceed to the Count Start-Up menu.

### Alpha-numeric Site Code

Alpha-numeric site codes can be one or two lines, with up to 20 characters on each line. The alpha-numeric code can use numbers, lower case letters, upper case letters and/or symbols.



When you first enter the Alpha-numeric site code screen the first field is flashing, along with the OK selection. To enter a value, press the TAB key until the field for numbers, upper case letters, lower case letters, or symbols is flashing. Use the Change keys (3 and 6)

to scroll through the values for the option you've selected. Once the character you want is entered, press DO and the highlight will move to the next field.

Once the code you want has been entered, TAB to OK and press DO. You are then returned to the Site Code selection screen, with the code you entered shown. Select OK to proceed to the Count Start-Up menu.

## Count Start-up Menu

The Count Start-Up menu allows you to immediately begin a count, check the status of the setup, or load GPS coordinates into the TRAX.

**START    STAT    GPS  
                         EXIT**  
**Press DO to Start**

### Stat

When you select STAT from the Count Start-up menu, you are shown some summary information on the configuration of the TRAX.

**L5: Two Equal Tubes  
with spacing; 1 dir**  
**DT: 35 ms**

The first screen shows the tube layout selection and the Dead Time setting. Press the TAB key to see the current date and time as well as the Site Code. After you have tabbed through the available screens, you will be returned to the Count Start-up Menu.

### GPS

This selection allows you to download latitude and longitude from a hand-held GPS unit into the TRAX. The TRAX I Plus supports the NMEA protocol, which is a standard for the transmission of GPS data available in most GPS units.

To load GPS information into the TRAX, connect the GPS unit to the TRAX using the JAMAR GPS cable (also used with the data module) to link

**Receiving GPS Data**  
**LAT:**  
**LON:**  
**Press DO to Accept**

each unit's RS-232 serial port. Some GPS units may require you

send the data, other may automatically do so. In either case, if the information is properly sent you will see the latitude and longitude information appear on the TRAX's display. Press DO to return to the Count Start-up Menu.

## **Start**

When you select Start from the Count Start-up menu, the TRAX I Plus will begin recording data. You will be shown a screen that displays the data as it is being collected. There are several screens available for viewing while the TRAX I Plus is collecting data. Press the TAB key to page through the available status screens. The following are examples of the types of screens that are available for review depending on the study you have programmed.

### **Basic Data Status Screens**

The top line of this screen gives the layout that has been selected (L6) and the type of study being done (Basic). The next two lines represent the tubes that data is being recorded on (A, B). As the tires from an axle strike the tubes, an asterisk is recorded in the appropriate channel. The bottom line tells you what number count this study is (CNT:02), the percentage of memory available (MEM:95%) and the battery voltage (6.4v).

```
L06 BASIC-DATA
A: *****
B: *****
CNT: 02 MEM:95% 6.4v
```

The top two lines of this screen tell you the layout selected and the how the tubes should be arranged for this study. The fourth line tells you what the dead time (or D-bounce) is set for (DT:25ms).

```
L6: Two Equal Tubes
with spacing; 2 dir
DT:25ms
```

The top line of this screen gives the date and time as they are set in the TRAX I Plus. The next three lines provide information on the site code that has been programmed for the study.

```
07:13:12 04/13/06
SITE CODE:
3469788
```

### **Volume Only Status Screens**

The top line of this screen tells you the way in which the data is being collected (CHNL CNTS, or Channel Counts) and the current interval number (Int:0001).

```
CHNL CNTS Int:0001  
A:0006  
B-A:0008  
TD 07:19:50 04/13/06
```

The next two lines give you the total per channel for the current interval. The last line gives you the time and date as they are programmed in the TRAX I Plus.

This screen provides the total accumulated volume for each channel for the entire study. This can be used to get a total count without having to download the counter to a computer.

```
TOTAL COUNTS  
A:000006  
B-A:000008
```

The top line of this screen tells you the layout that has been selected (L2) and the type of study being done (VOL-VEH). The next two lines represent the channels

```
L02-VOL-VEH  
A:*****  
B:*****  
CNT:02 MEM: 99% 6.4v
```

that data is being recorded on (A and B). As the tires from an axle strike the tubes, an asterisk is recorded in the appropriate channel. The bottom line tells you what number count this study is in the TRAX I Plus (CNT:02), the percentage of memory available (MEM: 99%) and the battery voltage (6.4v).

The top two lines of this screen tell you the layout selected and how the tubes should be arranged for this study. The fourth line tells you what the dead time (or

```
L3: Two Tubes Vol  
A, B-A  
DT:25ms Intv: 15 min.
```

D-bounce) is set for in the TRAX I Plus (DT:25ms) and what length of interval is being used for the study (Intv:15min).

The top line of this screen gives the date and time as they are set in the TRAX I Plus. The next three lines provide information on the site code that has been programmed for the study.

```
07:13:12  04/13/06
SITE CODE:
3469788
```

### **Bin Status Screens**

The top line of this screen show which channel of data you are seeing (CH0), the number of axles in the last vehicle (AX:2) and the total volume for the study (#V:

```
CH0 AX:2  #V: 000056
CLS: 02  35 MPH  A>B
GAP: 05      8.7
```

000056). The second line shows the class of the last vehicle (CLS: 02), the speed of the vehicle (35 MPH) and how the vehicle struck the tubes (A>B). If you are using a four tube layout, pressing the TAB key will show you the second channel, reflected by the channel number changing to 1. (CH1).

The top line of this screen shows the types of data that are being collected. The second line lists the total volume for the current interval. The last line shows the number of the current interval.

```
OPT=Class Speed Gap
#V0000000
```

```
Interval:000010
```

The top line of this screen gives the layout that has been selected (L5) and the type of study being done (Binned). The next two lines represent the tubes

```
L05 BINNED-DATA
```

```
A: *****
```

```
B: *****
```

```
CNT: 02 MEM:95% 6.4v
```

that data is being recorded on (A, B). As the tires from an axle strike the tubes, an asterisk is recorded in the appropriate channel. The bottom line tells you what number count this study is (CNT: 02), the percentage of memory available (MEM:95%) and the battery voltage (6.4v).

The top two lines of this screen tell you the layout selected and the how the tubes should be arranged for this study. The third line shows the current distance between vehicle (DBV:40.0) and tube spacing (SP:8.0 ft) that are set in the defaults. The fourth line shows the current dead time (DT:35ms) and interval length (Intv:15 min) that are set in the defaults.

**L5: Two Equal Tubes  
with spacing; 1 dir  
DBV:40.0 SP:8.0 ft  
DT:35ms Intv: 15 min.**

The top line of this screen gives the date and time as they are set in the TRAX I Plus. The next three lines provide information on the site code that has been programmed for the study.

**07:13:12 04/13/06  
SITE CODE:  
3469788**

## Ending a Count

**To end a count, turn the TRAX I Plus off.** The count will be stored in the TRAX I Plus's internal memory. Additional studies can then be conducted with the unit. The TRAX I Plus can hold up to 150 different studies in its memory.

There are also several other options that can be accessed by hitting the DO key while a study is in progress.

**EXIT    MODULE    NEW**

The Module option allows you to access a data module while the study is in progress. Refer to page 2-5 for a more detailed description of the module options.

The New option will end the current study and immediately begin a new study with the same default settings.

The Exit option will return you to the Count Status screens.

## Chapter 3

# Downloading the TRAX I Plus

## Downloading a TRAX I Plus

The TRAX I Plus is designed to be downloaded to a computer or data module using its communications (serial) port. To properly download the unit you will need JAMAR's data analysis software, an available serial port on your computer, and a JAMAR universal download cable. The download cable uses a specific pin configuration.

To prepare to download your data, connect the universal cable to a serial port on your computer. Some serial ports have 25 pins and some have 9. Generally, COM 1 is a 9 pin, COM 2 is a 25 or 9 pin. The ports may be labeled on the computer itself with COM 1 listed as 1 or A and COM 2 listed as 2 or B. The following tips should help you to avoid problems when download through a computer's serial port.

- 1) You must correctly identify what port you are plugging the cable into. The 25 and 9 pin connectors used for serial ports are also used for serial or parallel printers, mice, plotters, video cards and other devices. Just because your cable fits into a connector on your PC does not mean it is a serial port. Consult your computer instruction manual if you have any questions on which ports are serial ports on your computer.
- 2) Many computers have more than one serial port. You will need to know which serial port you are plugging the universal cable into. Serial ports are designated as COMx where x is a number from 1 to 16. You will need to know this number to download the unit.
- 3) Some devices that are plugged into a computer's serial port will not allow the TRAX I Plus to download its data properly. These are devices that require a program (called a **device driver**) to be running in the computer at all times. These device drivers are very self-centered, and think that all the data coming into the serial port is for them. Digital cameras, mice, digitizer boards, PDAs and light pens are all devices that require these device drivers to be running. If you have to unplug a device from the serial port to plug your TRAX I Plus in, or if you are using a switch box, be sure that the device does not have a driver running in memory.
- 4) If you have a conflict with another device on a serial port, or if your computer does not have a serial port, you can use a USB port by using a **USB to Serial Converter**. These devices allow serial peripherals, like JAMAR equipment, to interface with a USB port. There are several of

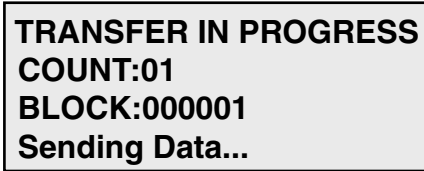


these devices available on-line and at computer stores. Go to the hardware support section of our web site ([www.jamartech.com](http://www.jamartech.com)) for a link to one of these devices that we have tested and found to work well.

Once the universal cable is plugged into the computer, plug the other end into the TRAX I Plus. The TRAX will download all completed studies. If you have a count in progress that you would like to download you must end the count. Refer to page 2-18 for information on ending a count.

At this point, refer to your software manual for information on how to setup the software for downloading. Note that the TRAX I Plus will automatically sense whatever baud rate you select in the software. The higher the baud rate, the faster your data will be dumped.

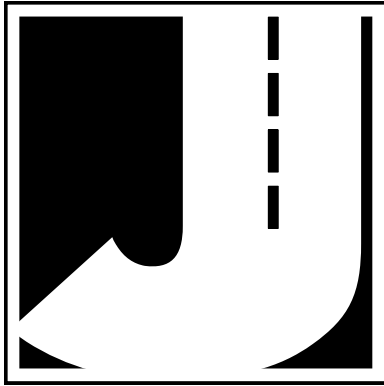
While the data is being downloaded, the display on the TRAX I Plus will show:

A rectangular display box with a black border and a light gray background. The text inside is black and reads: "TRANSFER IN PROGRESS", "COUNT:01", "BLOCK:000001", and "Sending Data...".

**TRANSFER IN PROGRESS**  
**COUNT:01**  
**BLOCK:000001**  
**Sending Data...**

The computer will show the data being received in blocks. Each block represents 4096 bytes of data. Once the data has been transferred to the computer, the TRAX display will return to the screen it was on before the download began.

Downloaded counts will remain in the memory of the TRAX until they are cleared. Refer to Chapter 2 for information on how to clear the memory. **Do not clear the memory of the TRAX until you are certain that the data has been successfully downloaded to you computer.**



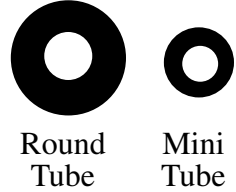
## Chapter 4

# Road Tube Installation

## Using Road Tube

Road tubes come in several different varieties. The following installation instructions cover standard round tube (.25 inside diameter by .60 outside diameter), and mini-tube (.187 ID by .365 OD). These directions will assist you in placing your road tubes correctly on the road surface with confidence and a minimum of effort.

### Actual Size



**Road tubes should be replaced on a fairly consistent basis.** Older tube will eventually develop splits that can allow water to enter. When an air pulse is received, this water can be forced back into the unit's air switch, potentially causing serious damage. Do not risk expensive repair bills by trying to squeezing a few extra studies out of old tube. One rule of thumb is to replace tubes after 30 days of use.

## Installing Road Tubes

Proper road tube installation is very important for collecting accurate data with your TRAX. The road tube and the TRAX's air switches comprise the sensing device for the unit. As with all receivers, the sensor has to be functioning properly to record reliable information. With this in mind, examine your installations carefully and be absolutely certain that your unit is recording data as programmed.

A slideshow demonstration of the proper techniques for installing road tubes can be viewed on the JAMAR web site at:

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

We recommend viewing this demonstration if you are new to the process of installing road tubes, or would like additional tips on installation.

## Step 1 – Select an Installation Location

The first step in the installation process is to select the location where the road tubes will be installed. The tubes should be placed exactly perpendicular to the flow of traffic and should be installed on a straight stretch of road so that vehicles are not hitting the tubes on an angle.

For the best results, do not install the tubes in a location where traffic will be queueing up and stopping on the tubes, or in a location where vehicle will be turning over the tubes or otherwise striking them on an angle.

## Step 2 - Select Layout

Once you have selected your location, the next step is to decide what layout to use. Which layout you select largely depends on the type of data you want to collect.

The L1, L2, L3, L4, L7, L8, L9, L13, and L14 layouts allow you to record data for volume information, while the L5, L6, L10, L11 and L12 layouts allow you to record data for speed, class and gap in addition to volume. Chapter 5, *Road Tube Layouts*, contains more detailed information on each individual layout.

## Step 3 - Prepare the Road Tube Lengths

Proper tube length is a crucial aspect of accurate data collection. The following guidelines should be followed for all studies regardless of simplicity. The lengths listed for each study below have shown to provide the best results based on extensive testing.

### **L1, L3, L4, L5, L6, L7, L9, L10 (Long tube setups)**

To encompass all types of vehicles and speeds, a tube length of sixty (60) feet is recommended for standard round tube, and fifty (50) feet for mini tube. These lengths should satisfy all requirements for normal street, road, highway and interstate traffic patterns.

### **L2, L8, L11, L12, L13, L14 (Short tube, long tube)**

To ensure the pulses from the road tubes arrive at the counter in the proper order, the tube length must be the same from the edge of the road to the TRAX. This will ensure that the pulse from the short tube arrives before the pulse from the long tube.

**Example:** You are using mini tube to install an L11 layout across two lanes of traffic and each lane is twelve feet wide. In order to ensure that the distance the air pulse has to travel from the edge of the road to the counter is the same for all tubes, you should use 38 feet for the short tubes (A & C) and 50 feet for the long tubes (B & D). The short tubes will be installed over only one lane (12 feet), leaving 26 feet of tube back to the TRAX. The long tubes will be installed over two lanes (24 feet), but since they are 50 feet long, you will still have 26 feet back to the TRAX. For round tube, the lengths would be 48 feet for the short tubes and 60 feet for the long tubes. **It is very important that the air pulses travel the same distance when two or more tubes are used to record data.**

To accommodate the required length of tube, brass splices may be used to fit two tubes together. The splices are approximately three (3) inches long, hollow and do not restrict the flow of air. Do not use the splices on the roadway itself, only on the section of tube after the clamp nearest the TRAX.

## **Step 4 - Prepare the Installation Equipment**

Once you have decided on your layout and prepared your tubes, you're just about ready to begin the installation. However, first be sure you have all the equipment you'll need to do the installation quickly and efficiently. The equipment you'll typically need, depending on the type of road tube you are using, includes the road tubes themselves, a hammer and PK nails, mastic tape in 6 inch strips, webbing or another type of clamp, a utility knife, a tape measure, and end plugs.

## **Step 5 - Install the Road Tubes**

Road tubes should be installed exactly perpendicular to the traffic flow.

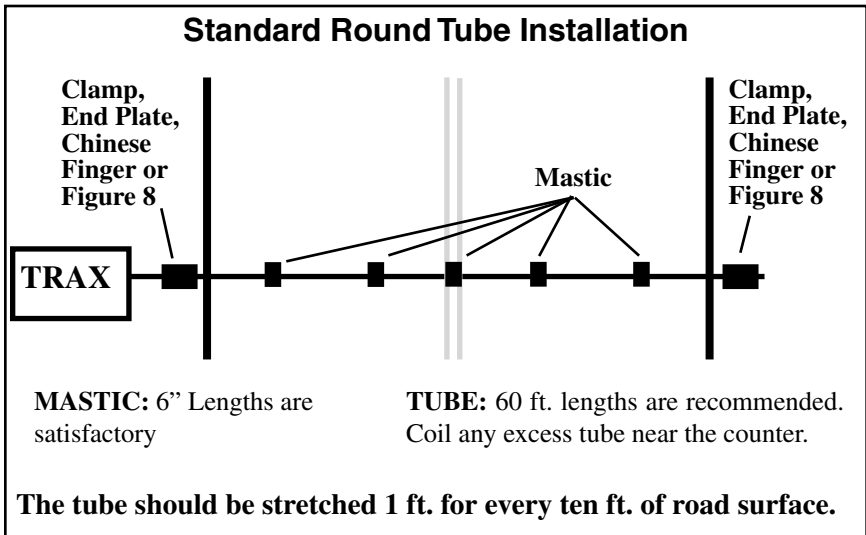
When using two or more tubes that must be set at specific distances from each other, always use a tape measure or ruler to measure from the center of each tube to determine the proper spacing. In short tube, long tube setups, the short tube should be installed to the zone line (center of the highway). Observe traffic to be sure that vehicles in the outer lane are not coming in contact with the short tube.

The following sections detail the specific installation procedures for both standard round tube and for mini tube.

### Standard Round Tube (.25 ID x .60 OD)

Round tube should be stretched one foot for every ten feet of roadway when being installed. Each tube should be secured at each end of the roadway by using a galvanized C-Clamp, Chinese Finger, Figure 8 Grip or an End Plate. Whichever is used, ensure the proper nail size is used. Use the longer nail size (2.5 inch or longer) in hotter temperatures to compensate for softer road surfaces. In cold weather applications, the asphalt becomes harder, making it more difficult to drive in the nails. In this situation, smaller nails (1.5 inch) can be used.

Next, secure the tube on the traveled portion of the road surface by using mastic. As a minimum, one piece of mastic should be placed on the zone line (middle of the road) and two pieces of mastic should be placed in each lane. Additional mastic should be used as deemed necessary to prevent the tube from moving when stuck by a vehicle. Refer to the diagram below for more details.



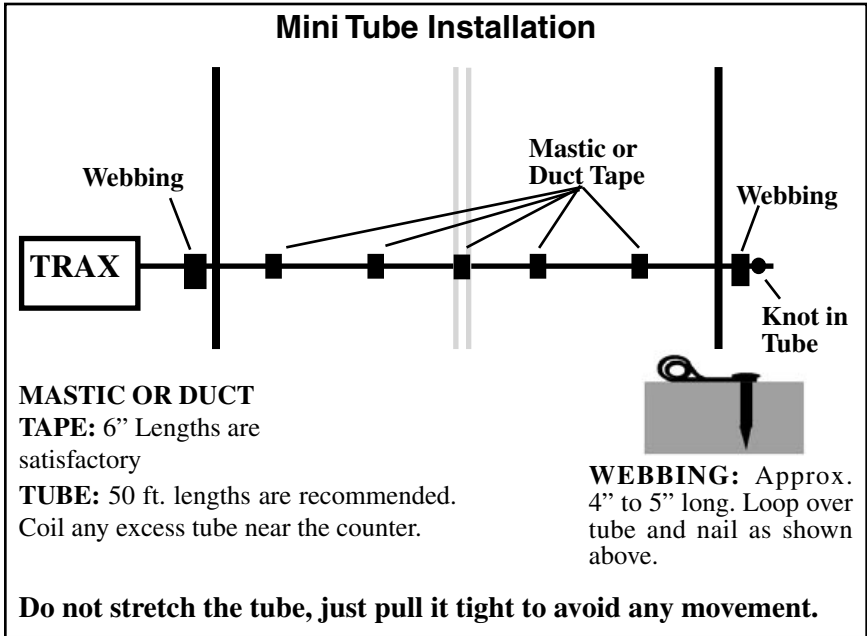
### Mini-Road Tube (.20 ID x .375 OD)

Since mini tube is smaller and lighter than standard round tube, less hardware is required to install the tubes. Also, mini tube should **not** be stretched when installed, just placed on the road.

Webbing can be used to secure the tube at each end of the roadway. You may tie a knot at the far end of the tube instead of using an end plug or PK

nail. Since the mini tube is light and low profile, you may use duct tape or two-inch mastic to secure the tube to the roadway. Generally, three pieces of tape/mastic are sufficient. To reduce wear and/or breakage of the tape, do not install the tape in the path of the vehicle tires.

When installing a short tube, long tube configuration (L2, L8, L11, L12) you may install both tubes completely across the road and tie a knot midway of the half tube. This eliminates nailing the half tube on the center line which can create a safety problem for installation personnel.



## **Step 6 - Check for Accuracy**

Once your tubes are installed and you are collecting data, observe the traffic as it is being recorded to be sure everything is working correctly. If possible, check the tubes periodically during the study to ensure they have not been damaged and data is being recorded as programmed.

Upon completion of your data collection, remove the tubes, clamps, nails and anything else that may be of danger to the motorists. The mastic may be hard to remove in some instances, especially in hotter weather. In those cases, it may be left on the highway and eventually it will blend into the asphalt from the flow of traffic.



**Chapter 5**

**Road Tube  
Layouts**

## **Road Tube Layouts for the TRAX I Plus**

The TRAX I Plus is equipped with fourteen pre-programmed tube layouts for recording traffic data. These are designated as L1 through L14 and represent the most common types of layouts used to record traffic data.

The following are descriptions of each of the layouts, and the type of data that can be collected with each. Each layout is different, but there are some common principles that should be used with any layout that is chosen.

- The condition of the road tubes, the manner in which they are installed and the length of the tubes are all critical to achieving good results. Refer to Chapter 4 *Road Tube Installation* for more information on this.
- A tube length of sixty (60) feet is recommended for round tube, and a tube length of fifty (50) feet is recommended for mini tube.
- In all tube setups of more than one tube, the tube length from the end of the road to the counter must be the same for all tubes.
- In all short tube, long tube layouts, the vehicle must strike the short tube first.
- To collect class or speed data, a minimum of eight feet of tube spacing is required to achieve accurate results.
- For counts done in the Volume Only mode, the TRAX I Plus will either do a straight axle count or use the divide-by-two technique, in which every two axle hits will increment the TRAX I Plus by one.
- Data can be collected in the Basic mode with any of the tube layouts, since basic data is essentially a collection of all the sensor activations on an individual basis. However, the minimum tube spacing requirements still apply to Basic data. If a layout says volume only, that is the only information you will be able to accurately get from it. You can collect data in the Basic mode with an L1 layout, but you will only be able to get volume data, not class, speed, etc.

The diagrams for the following layouts assume a length of twelve feet per lane of traffic and are shown for round tube and mini tube.

## Layout: L1 - Volume

Layout Type: Road Tubes

Sensors Used: 2 Road Tubes

Spacing: None

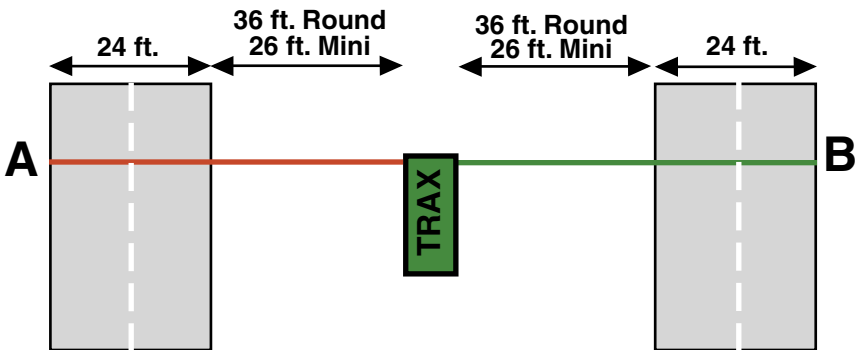
Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 2 Channels, A, B

In this layout, channel “A” and channel “B” record independently. When in Volume mode the TRAX can do either a straight axle count or use the divide-by-two technique.

EXAMPLE: The TRAX has been programmed to use the divide-by-two technique. As a passenger car passes over the “A”, the unit records one count. As a four axle truck passes over the “A” tube the unit records two counts.



## **Layout: L2**

Layout Type: Road Tubes

Sensors Used: 2 Road Tubes

Spacing: 2 Feet

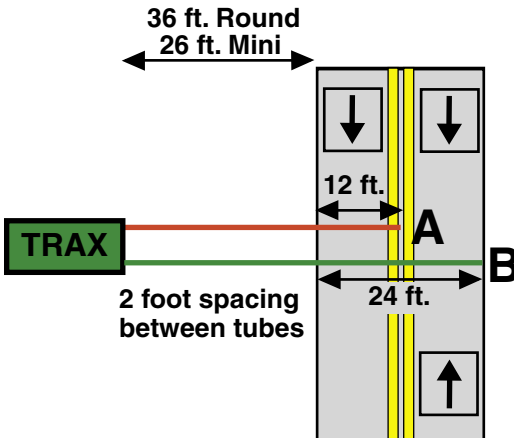
Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 2 Channels, A, B-A

In this layout, channel “A” and channel “B” record independently. The A tube is extended over one lane while the B tube is extended over two lanes. Hits on the A tube are recorded in channel 1. Hits on the B tube are recorded in channel 2, unless they were immediately preceded by a hit on the A tube, in which case the B hit is ignored. When in Volume mode the TRAX can do either a straight axle count or use the divide-by-two technique. Traffic in the outer lane can be going in either direction.

EXAMPLE: The TRAX has been programmed to use the divide-by-two technique. As a car approaches the tubes in the inner lane and both front and rear axles pass over the “A” and the “B” tube, the unit records a one in the A channel, but ignores the hit on the B channel since it occurred immediately after the A hit. As a second car approaches the tubes in the outer lane and both front and rear axles pass over the “B” tube, the unit records a one in the B channel. One vehicle has been recorded in each lane of the study.



**Layout: L3**

Layout Type: Road Tubes

Sensors Used: 2 Road Tubes

Spacing: 4 Inches

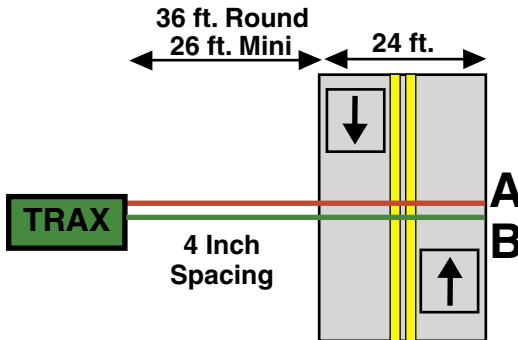
Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 2 Channels, A to B, B to A

In this layout, both tubes (A and B) are extended across the lanes to be counted. Channel A and channel B record independent of each other. When one tube is hit, the next hit is ignored. When in Volume mode the TRAX can do either a straight axle count or use the divide-by-two technique.

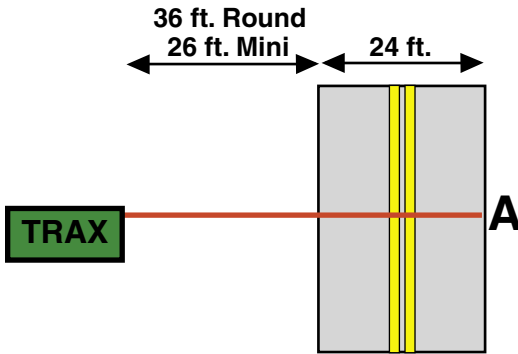
EXAMPLE: The TRAX has been programmed to use the divide-by-two technique. A car is traveling southbound, approaching the tubes. As the front and rear axles strike the A tube, a one is registered in the A channel. The front and rear axles then strike the B tube but these hits are ignored since the A tube has just been hit. Conversely, a car traveling northbound will strike the B tube first (recording it in the B channel) and then have its hits on the A tube ignored.



**Layout: L4**

- Layout Type: Road Tubes
- Sensors Used: 1 Road Tube
- Spacing: None
- Count Formats: Basic, Volume Only
- Data: Volume, Gap
- Channels: 1 Channel, A

In this layout, one tube is extended across the lanes to be counted. When in Volume mode the TRAX can do either a straight axle count or use the divide-by-two technique. This layout can be used with single direction or bidirectional traffic; however, there is no lane separation.



## Layout: L5

Layout Type: Road Tubes

Sensors Used: 2 Road Tubes

Spacing: Two Feet for Basic mode, eight feet for Binned mode

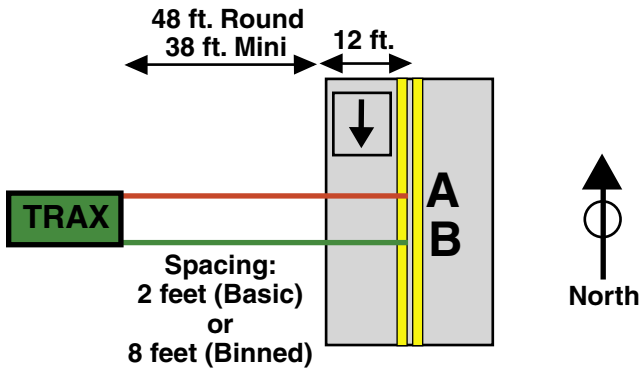
Count Formats: Basic, Binned

Data: Class, Speed, Gap, Volume

Directions: 1 Direction, A to B

In this layout, both tubes (A and B) are extended across the lane to be studied. Channel A and channel B record dependent on each other. The tubes should be spaced two feet apart and be of equal length.

EXAMPLE: A car is traveling southbound, approaching the tubes. As the vehicle passes over both the A and B tubes, the TRAX records the class, and speed (or time-stamps) of the vehicle.



## Layout: L6

Layout Type: Road Tubes

Sensors Used: 2 Road Tubes

Spacing: Two Feet for Basic mode, eight feet for Binned mode

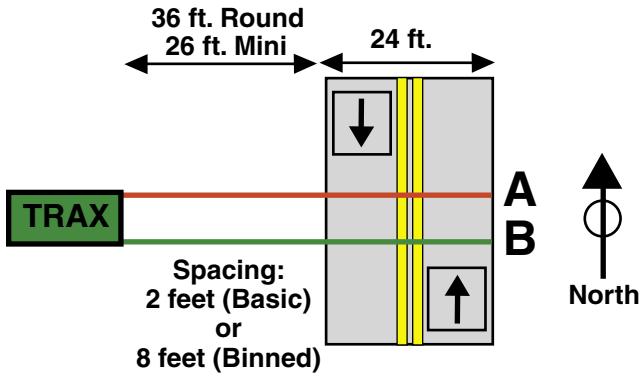
Count Formats: Basic, Binned

Data: Class, Speed, Gap, Volume

Directions: 2 Directions, A to B, B to A

In this layout, both tubes (A and B) are extended across the lanes to be studied. Channel A and channel B record dependent on each other. The tubes should be spaced two feet apart and be of equal length.

EXAMPLE: A car is traveling southbound, approaching the tubes. As the vehicle passes over both the A tube, then the B tube, the TRAX records the class, and speed (or time-stamps) of the vehicle in the first direction. A car traveling northbound, passing of the B tube then the A tube, gets recorded in the second direction.





## Layout: L7

Layout Type: Road Tubes

Sensors Used: 4 Road Tubes

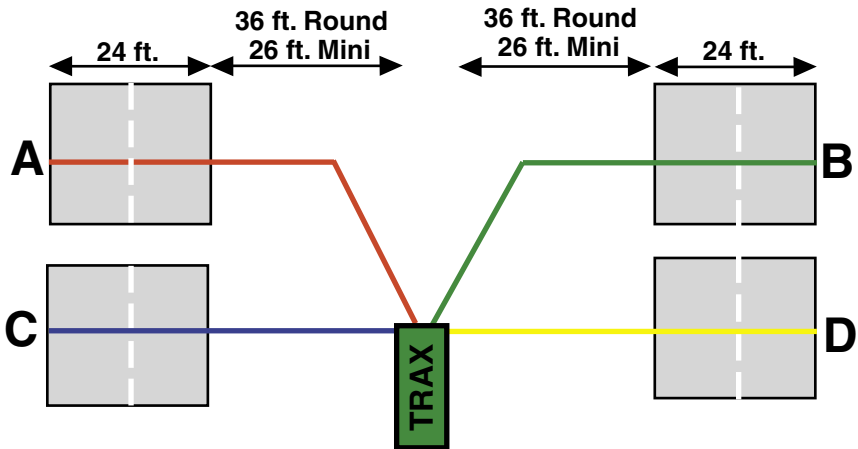
Spacing: None

Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 4 Channels, A, B, C, D

This layout is the same as the L1 layout, but with four tubes over four separate lanes rather than two tubes over two lanes. Refer to the L1 description for more information.



### Layout: L8

Layout Type: Road Tubes

Sensors Used: 4 Road Tubes

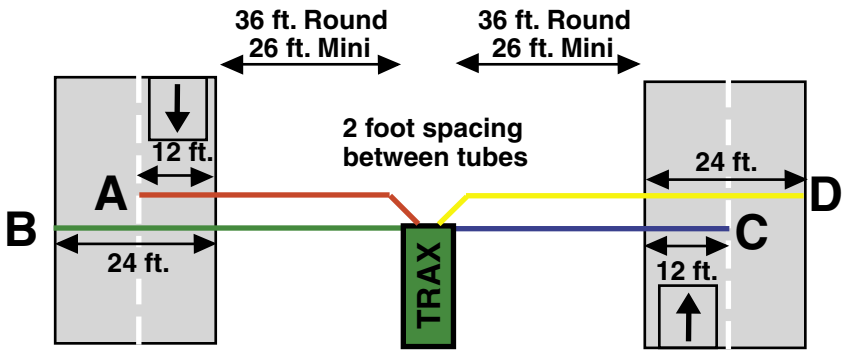
Spacing: Two Feet

Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 4 Channels, A, B-A, C, D-C

This layout is the same as the L2 layout, but with four tubes over four lanes rather than two tubes over two lanes. Refer to the L2 description for more information. The tubes should be spaced two feet apart.



**Layout: L9**

Layout Type: Road Tubes

Sensors Used: 4 Road Tubes

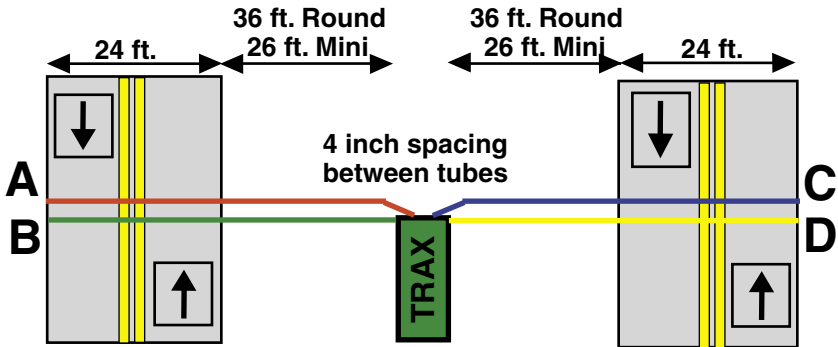
Spacing: 4 inches

Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 4 Channels, A to B, B to A, C to D, D to C

This layout is the same as the L3 layout, but with four tubes over four lanes rather than two tubes over two lanes. Refer to the L3 description for more information. The tubes should be spaced four and a half inches apart.



## Layout: L10

Layout Type: Road Tubes

Sensors Used: 4 Road Tubes

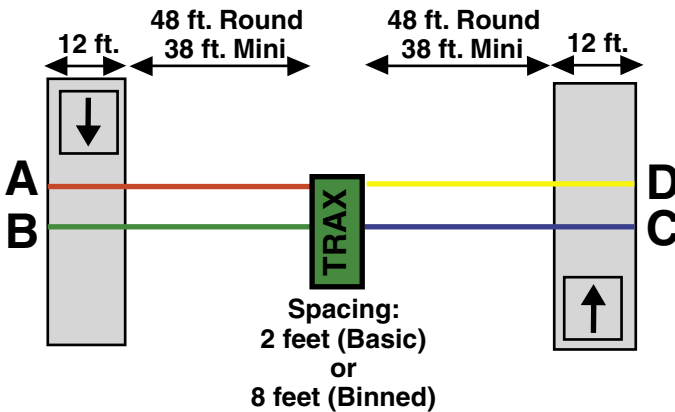
Spacing: Two Feet for Basic mode, eight feet for Binned mode

Count Formats: Basic, Binned

Data: Class, Speed, Gap, Volume

Directions: 2 Directions, A to B, C to D

This layout is the same as the L5 layout, but with four tubes over two lanes rather than two tubes over one lane. Refer to the L5 description for more information. The tubes should be spaced eight two apart and be of equal length.



## Layout: L11

Layout Type: Road Tubes

Sensors Used: 4 Road Tubes

Spacing: Two feet (basic) or eight feet (binned), A to C and B to D.

Six inches, A to B, C to D

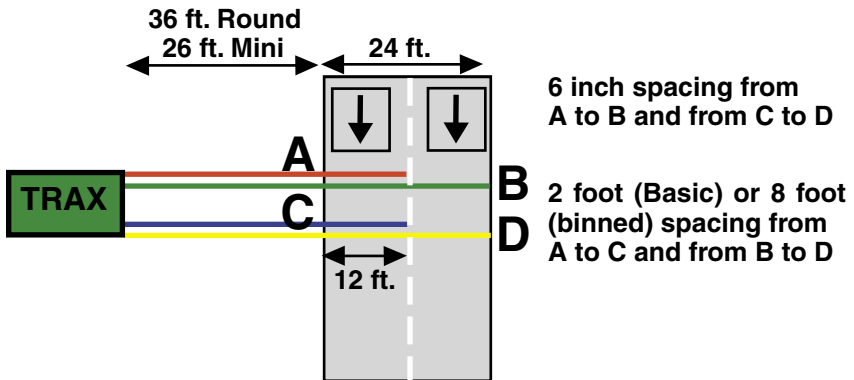
Count Formats: Basic, Binned

Data: Class, Speed, Gap, Volume

Directions: 1 Direction, A to C, B to D, With Lane Separation

This layout is the same as the L5 layout, but with the addition of two half tubes (A and C) to provide lane separation. Refer to the L5 layout for further information. This layout is for single direction traffic.

The A and C tubes should be spaced two feet apart, as should the B and D tubes. The A tube should be spaced six inches from the B tube and the C tube should be spaced six inches from the D tube. Remember, vehicles must always strike the short tube first.



## Layout: L12

Layout Type: Road Tubes

Sensors Used: 4 Road Tubes

Spacing: Two feet (basic) or eight feet (binned), A to C and B to D. Six inches, A to B, C to D

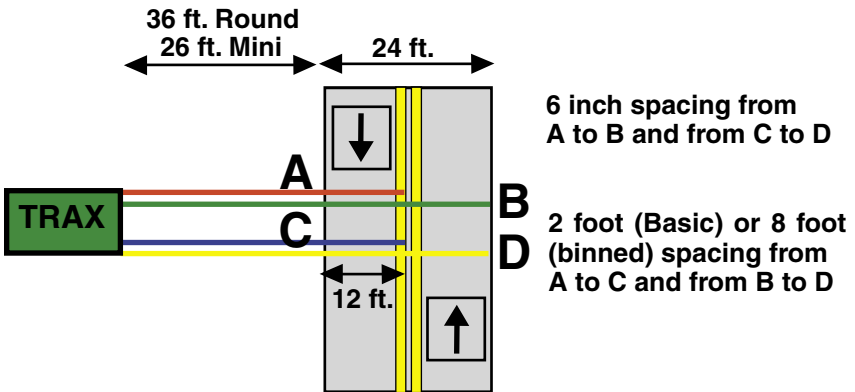
Count Formats: Basic

Data: Class, Speed, Gap, Volume

Directions: 2 Directions, A to C, D to B

This layout is the same as the L11 layout, but for bidirectional traffic. Refer to the L11 layout for further information.

The A and C tubes should be spaced two feet apart, as should the B and D tubes. The A tube should be spaced six inches from the B tube and the C tube should be spaced six inches from the D tube. Remember, vehicles must always strike the half tube first.



## Layout: L13

Layout Type: Road Tubes

Sensors Used: 3 Road Tubes

Spacing: Two Feet

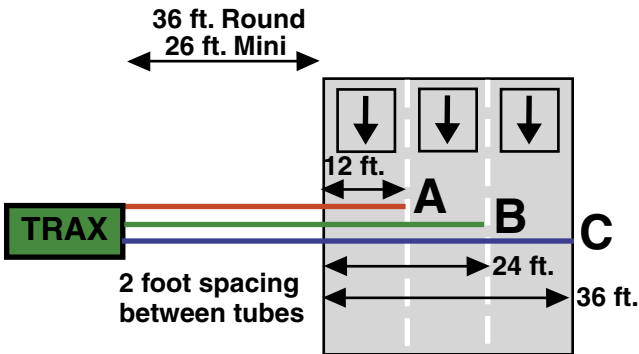
Count Formats: Basic, Volume

Data: Volume, Gap

Channels: 3 Channels, A, B-A, C-B

This layout is the same as the L2 layout, but with the addition of a tube for a third channel. Refer to the L2 layout for further information.

The tubes should be spaced two feet apart. For improved accuracy with this type of data collection, we recommend that the L7 layout be used with the Road Ramp system to isolate each lane. Visit our web site at [www.jamartech.com](http://www.jamartech.com) for more information.



## Layout: L14

Layout Type: Road Tubes

Sensors Used: 4 Road Tubes

Spacing: Two Feet

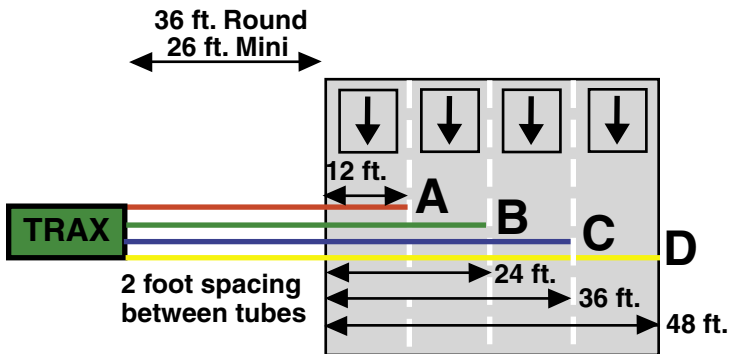
Count Formats: Basic, Volume

Data: Volume, Gap

Channels: 4 Channels, A, B-A, C-B, D-C

This layout is the same as the L2 layout, but with the addition of two tubes for two additional channels. Refer to the L2 layout for further information.

The tubes should be spaced two feet apart. For improved accuracy with this type of data collection, we recommend that the L7 layout be used with the Road Ramp system to isolate each lane. Visit our web site at [www.jamartech.com](http://www.jamartech.com) for more information.





## Chapter 6

# Battery Care

## **Maintaining Your Battery**

The following information regarding battery care is furnished to assist you in the use and maintenance of rechargeable batteries. Battery life is dependent on the user's preventative maintenance procedures. Establish regular routines for all of your batteries regardless of their usage.

**The TRAX I Plus turns itself off when the battery voltage falls to 5.9 volts.** The TRAX also will not allow a new study to be started if the voltage is 6.0 or below. This is to prevent damage from occurring to the battery if the voltage were allowed to fall too low.

Charging a battery is very important for obvious reasons. Your TRAX depends on a fully charged battery to operate efficiently and to produce reliable and correct data. Batteries should not be allowed to sit in a discharged state for any length of time. Once the battery discharges below 5.8 volts, damage to the cells has already begun. Symptoms of a damaged battery are:

1. The battery will not charge to its full capacity of 6.4 volts or higher.
2. The battery will only hold a charge for a short time under load conditions.
3. The battery will discharge faster than normal during storage under no load.

With this in mind, recharge the battery to its highest potential (normally from 6.4 volts and up) once it has fallen to 6.1 or 6.0 volts. The battery can be charged through the charge port with the TRAX Battery charger (or a similar 6VDC charger with the correct plug and polarity). The battery may also be removed for charging if desired.

### **Solar Panel Use**

If your TRAX is equipped with a solar panel, the panel can provide power to the unit when in the field and exposed to sunlight. This can extend the time between needing to recharge the battery, since the battery is not being used if the unit is able to get power from the solar panel. The solar panel draws sunlight and converts it to voltage which is regulated to as high as 7.0 volts.

If your TRAX is used frequently and exposed to sunlight often, the time span between needing to manually recharge the battery will be extended. However, if your unit is used infrequently, and not exposed to sunlight, you may need to recharge the battery more often.

Note that the Solar Panel will not generally charge the battery of the TRAX if the unit is in use. In this case, the power being supplied by the solar panel is used to directly power the TRAX itself. To charge the battery using the solar panel, the unit should be turned off and set in bright sunlight.

## Manual Battery Charging

Monitor your battery voltage by checking the Stat screen of the Main Menu. We recommend that the battery be recharged to its highest charge level (usually 6.4 volts and above) once it discharges to 6.1 or 6.0 volts. A good battery may charge as high as 7.0 volts or better. A defective battery may not charge any higher than 6.1 volts after a reasonable charge time. Charge time will vary with the level of the battery voltage. Usually, a battery of 6.0 volts can be charged to its highest potential in 12 hours or less.

To manually charge the TRAX's battery, plug the TRAX Battery Charger (shown here) into an outlet, then connect it to the Battery Charger port of the TRAX.

\*\*\*\*\*CAUTION\*\*\*\*\*

**Never plug a charger into a charge port unless you are absolutely sure of the voltage output and polarity.**



We recommend that the TRAX be turned off during the charging process. However, the charger will still charge even if the TRAX is on. While the unit is charging, the light on the TRAX Battery Charger will be amber/yellow in color. Once the charge is complete, the light will be green. If there is a problem with the charge, the light will be red.

After a battery has been charged, allow it to sit for several hours then check the voltage to determine if the battery kept its charge. Some reduction in voltage is acceptable. However, if the battery falls below 6.1 volts, recharge it for a longer period of time. If this does not improve the charge, the battery is most likely defective and should be replaced.

**Monitor your battery voltages frequently, charging when necessary, and you will extend the life of your battery.**

## **Additional Notes**

- **Do not** expose the battery to moisture or rain.
- **Do not** drop, hit or abuse the battery — it may break and expose the contents, which are highly corrosive.
- **Do not** short circuit battery terminals. Some batteries are protected with self-resetting fuses, but short circuits may still cause severe damage to the battery.
- It is normal for a battery to become warm to the touch during charging.
- It is normal for a battery to “self discharge” during prolonged storage. Always fully charge a battery prior to storage. While in storage, periodically check the batteries with a voltmeter to ensure they have not discharged below a level that may cause permanent damage.
- Always store in a cool, dry location.
- Keep batteries away from fire and do not incinerate — they may explode.
- Under no circumstances should you attempt to open the battery case.
- Always observe polarity when connecting your battery to any electronic/electrical device. If your device is not protected for improper battery hookup, you may cause severe damage to the electronic circuitry. The positive terminal may be indicated by a plus (+) sign or red mark. The negative terminal may be indicated by a minus (-) sign or black mark.
- The effectiveness of the solar panel can be reduced if it is dirty or scratched up. For best results, try to keep the panel clean.

## **Replacing the Battery**

The TRAX's rechargeable battery will provide years of good use if it is well maintained. (For maintenance tips, refer to the earlier part of this chapter.) However, even a well maintained battery may eventually need to be replaced. Signs that your TRAX's battery needs to be replaced include:

1. The battery will not charge to its full capacity of 6.4 volts or higher.
2. The battery only holds a charge for a short time under load conditions.
3. The battery discharges faster than normal when the TRAX is off.

If any of these conditions occur with your battery, it should be replaced. Replacement batteries can be ordered directly from JAMAR.

To replace the battery of your TRAX, open the lid of the TRAX and make sure the unit is turned off. Then, using a screwdriver, remove the four screws in the corners of the faceplate of the TRAX.

Next, carefully lift the faceplate up and move it off to the side so that the battery compartment is fully exposed.

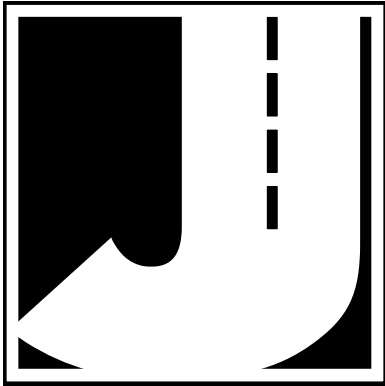
Disconnect the battery wire connections from the black and red terminals on the battery. When disconnecting, be careful not to pull directly on the wires, but rather on the connectors themselves.

Once the battery wires have been disconnected, use a screwdriver to remove the four screws from the battery bracket and lift the bracket off.

With the bracket removed, lift out the old battery and replace it with the new one. When installing the new battery, make sure the battery terminals are toward the top.

Once the new battery is in place, replace the battery bracket, then connect the battery wires of the faceplate to the terminals on the battery. Replace the faceplate and screw it back down.

After you have completed the installation of the battery, turn the Flex on to make sure it is getting power from the new battery. On the Main Menu, check the battery voltage of the new battery. If it is 6.1 or lower, be sure to fully charge it before using it to do a new study.



## Chapter 7

# Trouble shooting

## **Troubleshooting**

The following are some common questions/problems that can be encountered when using the TRAX I Plus. The possible answers that are stated with them are not necessarily the only answer, but should be checked first before contacting us. If you cannot find the answer to your problem/question, do not hesitate to contact us. Contact information is listed on the first page of this manual.

### **There is no display visible on the TRAX I Plus.**

Check that the unit is not in its power-saving mode. The display automatically goes out when the TRAX I Plus has not been disturbed for several minutes. To bring the display back up, hit any key.

### **The display on the TRAX I Plus will not come on.**

The battery voltage may have gone too low to power the display. Connect the TRAX I Plus to a battery charger and charge for 12 hours, then see if the display comes up. If the unit was in the field collecting data when this problem occurred, turn the unit off, return it to your office and charge. Even if the battery voltage was too low to power the display, it may have been high enough to continue collecting data.

### **The data is not being collected in the intervals desired.**

Check the Interval setting in the TRAX I Plus's default settings.

### **Not all layouts are available to be selected with the study requested.**

Only certain layouts can be used depending on the mode of data collection requested. Refer to Chapter 4 for more information.

### **Cannot view all of the information desired on the TRAX I Plus display after the study has begun.**

There are multiple status screens for each of the data modes. To view these screens, use the TAB key.

### **Serial Port test failed.**

Make sure that you are using a test connector with the proper pin configuration. The test will fail if a test connector is not used. The cable used for downloading cannot be used as a test connector.



**The data produced is not accurate.**

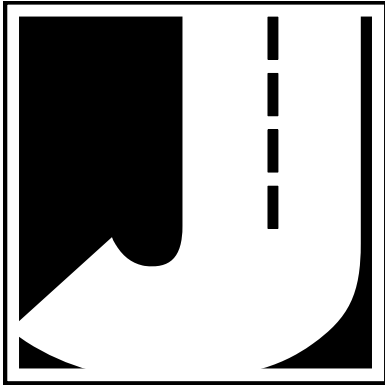
Check the tube layout used in the field and the condition of the tubes. Make sure the tubes were set with the proper length, spacing and perpendicular to the flow of traffic. One simple condition check of a tube that is laid out in the field is to go to use the Tube Test diagnostic. Refer to page 2-10 for more information on this.

**The TRAX I Plus will not download.**

Check your connection between the TRAX I Plus and the computer. Refer to Chapter 3 *Downloading the TRAX I Plus* for other items to check.

**Additional support information can also be found on our web site at [www.jamartech.com](http://www.jamartech.com).**

**If you are unable to find a solution to your problem, contact us using the information located on the first page of this manual.**



# Appendix

## **Low Speed Counting (Below 10 mph)**

The TRAX I Plus is capable of recording vehicle data as low as idle speeds and above with a high degree of accuracy. Tube length, tube placement, and the air switch D-bounce (DT) setting are important factors in achieving excellent results from this type of application. The following guidelines should be used for low speed volume installations.

### **Tube Length**

The total length should not exceed forty (40) feet. Shorter lengths may be used provided the vehicle speeds do not exceed 30 mph.

### **Tube Placement**

Tube placement should be perpendicular to the flow of traffic; however, when using a high DTX setting, a slight angle (by the tube or angled wheels of a vehicle) will not cause the counter to double count. Remember, this only applies to low speed counting - tubes should be placed correctly on the roadway regardless of low or high speed counting. As a reminder, two hits on the road tube represents one count in the volume mode. Additionally, the TRAX I Plus will record a count even if the front and rear tires on only one side of the vehicle passes over the tube, as well as if both front and rear tires do.

### **Dead Time (DT/DTX)**

The DT setting is measured in milliseconds which controls the output pulse interval from the air switch. Typically, the pulse interval is set at 20 to 40 milliseconds for normal operation. This setting will cover most speeds; however, speeds from idle to 10 mph will require the DT setting to be increased. When measuring volume in a very low speed situation, use a DTX setting of 200 to 300 milliseconds to avoid double counting.

The above rules may be varied slightly since each tube installation for low speed traffic counting is unique. The tube length and DT may be adjusted to fit your specific parameters. Once you have decided on your settings, monitor incoming data to ensure accuracy.

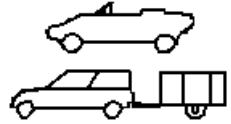
**NOTE:** Be sure to reset the DT setting once you have finished your low speed counting. Using an incorrect DT setting for average speed traffic will produce incorrect data.

## FHWA Type F Vehicle Classification Scheme

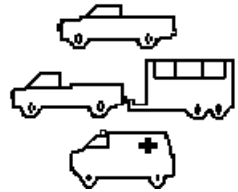
**Class 1 - Motorcycles.** This class includes all two- or three-wheeled motorized vehicles. These vehicles typically have a saddle-type of seat and are steered by handlebars rather than a steering wheel. This includes motorcycles, motor scooters, mopeds, motor-powered bicycles and three-wheel motorcycles.



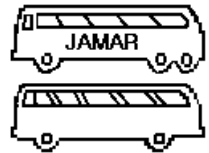
**Class 2 - Passenger cars.** This class includes all sedans, coupes and station wagons manufactured primarily for the purpose of carrying passengers, including those pulling recreational or other light trailers.



**Class 3 - Pickups, Vans and other 2-axle, 4-tire single unit vehicles.** This class includes all two-axle, four tire vehicles other than passenger cars, which includes pickups, vans, campers, small motor homes, ambulances, minibuses and carryalls. These types of vehicles which are pulling recreational or other light trailers are included.



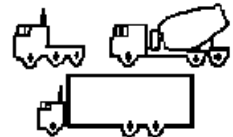
**Class 4 - Buses.** This class includes all vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This includes only traditional buses, including school and transit buses, functioning as passenger-carrying vehicles. All two-axle, four tire minibuses should be classified as Class 3. Modified buses should be considered to be trucks and classified appropriately.



**Class 5 - Two-Axle, Six-Tire Single Unit Trucks.** This class includes all vehicles on a *single frame* which have *two axles and dual rear tires*. This includes trucks, camping and recreation vehicles, motor homes, etc.



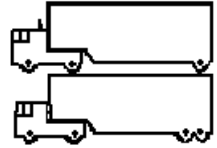
**Class 6 - Three-Axle Single Unit Trucks.** This class includes all vehicles on a *single frame* which have *three axles*. This includes trucks, camping and recreation vehicles, motor homes, etc.



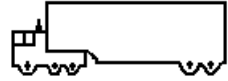
**Class 7 - Four or More Axle Single Unit Trucks.** This class includes all vehicles on a *single frame* with *four or more axles*.



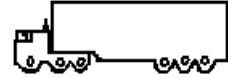
**Class 8 - Four or Less Axle Single Trailer Trucks.** This class includes all vehicles with *four or less axles* consisting of *two units*, in which the pulling unit is a tractor or single unit truck.



**Class 9 - Five-Axle Single Trailer Trucks.** This class includes all *five-axle* vehicles consisting of *two units* in which the pulling unit is a tractor or single unit truck.



**Class 10 - Six or More Axle Single Trailer Trucks.** This class includes all vehicles with *six or more axles* consisting of *two units* in which the pulling unit is a tractor or single unit truck.



**Class 11 - Five or Less Axle Multi-Trailer Trucks.**

This class includes all vehicles with *five or less axles* consisting of *three or more units* in which the pulling unit is a tractor or single unit truck.



**Class 12 - Six-Axle Multi-Trailer Trucks.** This class includes all *six-axle* vehicles consisting of *three or more units* in which the pulling unit is a tractor or single unit truck.



**Class 13 - Seven or More Axle Multi-Trailer Trucks.** This class includes all vehicles with *seven or more axles* consisting of *three or more units* in which the pulling unit is a tractor or single unit truck.



The TRAX I Plus also collects data for **Class 14 - Unclassified Vehicles.** This class includes all vehicles which the TRAX I Plus could not process into one of the existing 13 classes. This data can be retained in your reports, or it can be redistributed by the software into the existing 13 classes based on the percentages in each of those classes.

# Memory Table

The TRAX I Plus contains 16 MB (16000KB) of flash memory. Each kilobyte of memory can hold approximately 512 axle hits. Refer to the following tables for an estimate of how long you can conduct a count before filling the memory. In general, the TRAX I Plus will hold several million vehicles before the memory is filled.

Memory Left (KB)	Axles	Days of Operation			
		1000 ADT	5000 ADT	10000 ADT	20000 ADT
1	512	0.256	0.0512	0.0256	0.0128
5	2560	1.28	0.256	0.128	0.064
10	5120	2.56	0.512	0.256	0.128
100	51200	25.6	5.12	2.56	1.28
500	256000	128	25.6	12.8	6.4
1000	512000	256	51.2	25.6	12.8

ADT	Memory Usage (KB)						
	1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
1000	3.0	5.9	8.9	11.8	14.8	17.7	20.7
5000	10.8	21.5	32.3	43.1	53.8	64.6	75.4
10000	20.5	41.1	61.6	82.1	102.7	123.2	143.7
20000	40.1	80.1	120.2	160.3	200.3	240.4	280.4
50000	98.7	197.3	296.0	394.6	493.3	591.9	690.6
100000	196.3	392.6	588.9	785.3	981.6	1177.9	1374.2

# Specifications

**Size:** 11" x 7" x 4.5"

**Weight:** Approximately 8 pounds

**Power:** Rechargeable lead gel battery with solar panel

**Interface:** RS-232 serial communications port, 9 pin DBS socket

**Download Speed:** Up to 115200 bps

**Memory:** 16 MB Internal Memory

**Clock:** Always active real-time clock

**Data Collection Formats:** Volume, Binned, Time-stamped raw data

**Inputs:** Up to six road tubes

**Temperature Range:** Minus 40F (-40C) to 155F (74C)

**Date Format:** USA (MM/DD/YY) or World (DD/MM/YY)

**Recording Intervals:** 5, 10, 15, 30 or 60 min. for volume or binned data

**Units:** English (feet) or Metric (meters)

**Display:** Wide Temperature, 4-line by 20-character LCD display

**Output:** Binary file capable of being read by TRAXPro software

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We are pleased that you have chosen the JAMAR TRAX I Plus for your traffic analysis needs. We have strived to develop a unit that is easy to use and has the options that our customers require. The TRAX I Plus has undergone extensive testing to verify the accuracy of its operations, and each unit is road tested before it leaves our facility. However, just like other complex electronic devices, problems can occur. We always suggested that users verify the continuing accuracy of any device they use. Verification against manual counts, or with a JAMAR Traffic Counter Tester, should be performed on an annual basis as required by the FHWA to assure proper operations and results.

Should you detect any problems with any of our products, please notify JAMAR Technologies immediately and discontinue use of the unit until we have verified its operation.

