

If you have any questions about the use of the TRAX I, please call the following number:

215-491-4899

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

You may also contact us by fax at:

215-491-4889

or via e-mail at:

sales@jamartech.com

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Quick Setup Guide for the TRAX I

1. Turn the TRAX I 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 8 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. Note: 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, Per Veh (Per Vehicle) and Binned (Class/Speed/Gap).

Basic: the most complex of the studies, it time stamps every axle hit. Use this only if you are interested in the raw data of a traffic study.
Volume Only: the simplest of the studies, it creates a study based on one count for every two axle hits.
Per Veh (Per Vehicle): one step below Basic, it allows extensive manipulation of the data but does not time stamp every axle hit.
Binned (Class/Speed/Gap): this study can provide Class, Speed and Gap binned files. You can choose to do one, two, or all three of these studies at the same time in any combination.
9. After selecting your type of study, you will be prompted to select a tube layout. Refer to the descriptions on the TRAX I 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!

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Chapter 1

Introduction to the TRAX I

What is the TRAX I?

The TRAX I 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 can collect data in four modes: basic (raw) data, volume only data, per vehicle data and binned class, speed and/or gap 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 I can store up to 32 different studies. It stores the type of study done, the date and time, a site code and the data for the study. At any convenient time, you can transfer the data to your computer or a data module through the RS-232 serial port and process the data. Reports for volume, class, speed and gap can be generated using JAMAR's data analysis software.



How is the TRAX I powered?

The TRAX I is powered by a rechargeable lead gel battery. Depending upon use, batteries may last for several months before they need to be recharged. The TRAX I 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. Refer to Chapter 6 *Battery Care* for more information on battery maintenance. The TRAX I can also be purchased with a solar panel option.

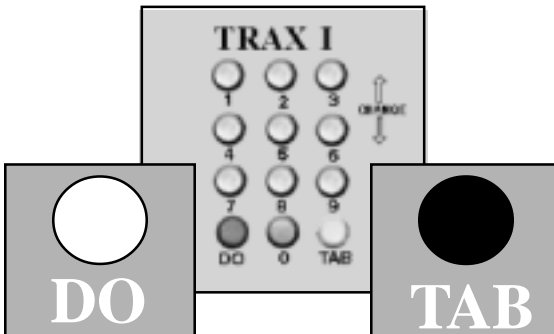
POWER ON, DO and TAB Functions



OFF/ON

An OFF/ON switch on top of the front panel is used to power the unit. 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.



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Chapter 2

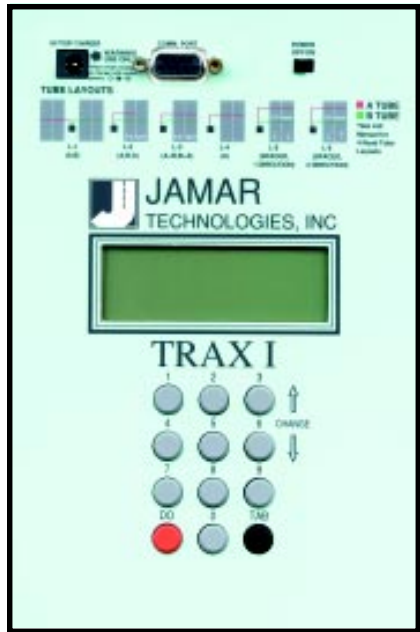
Operation of the TRAX I

Start-up Screens

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

NOTE: The display of the TRAX I 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 gray keys on the keypad.

After you power on the TRAX I the sign-on screen is displayed. This shows the version number of the firmware in the TRAX I in the lower right-hand corner.



The second screen, as shown below, displays the tube spacing that is set in the TRAX I, the amount of memory the counter contains, 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.

Tube spacing: 8.0 ft
1024K Mem: 99% Avail
Counts: 02 bat: 6.4v
TD 10:25:12 02/13/98

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

Main Menu

COUNT UTILITIES STAT
******* MAIN MENU *******
Press DO to Count.
TAB changes option

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

COUNT Program a new count. When Count is selected you can choose from BASIC, VOLUME ONLY, PER VEH(icle) or BINNED. 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. Refer to the Appendix for more information on how vehicles are classified.

UTILITIES Perform miscellaneous operations that include the option to download to a MODULE, CLEAR the counter, program the DEFAULT settings, set the TIME/DATE and perform diagnostic TESTS on the TRAX I.

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. 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

The UTILITIES Menu contains an assortment of operations that are necessary and/or helpful to the operation of the TRAX I. 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 above is displayed.

**MOD CLEAR DEFAULTS
TIME/DATE TESTS EXIT
Data Module commands
Press DO key**

MOD

The Mod, or Module, option allows you to use a JAMAR data module with the TRAX I. You can check the status of a module, erase a module, or download data into a module by using the module's built-in cable to connect to the COM port on the TRAX I. The module has a memory capacity of four MB, and 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 WRITE ERASE
EXIT
Status: Data Module
Press DO Key**

STATUS

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

WRITE

This option allows you to download data from your TRAX I into the data module. You are asked to verify this selection several times to make sure this is what you want to do.

ERASE

This option 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

Clears the memory of all data. You are given two chances to change your mind before data is removed from the nonvolatile memory. **NOTE: Once the clearing memory process has started, you must allow the counter to finish before turning it off. Turning the counter off be-**

fore the clearing process is finished will result in a file error in the counter.

DEFAULTS

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

INT SPACE DATE UNITS DT DTX DBV VEH EXIT Select time interval for Binned Data
--

INTERVAL 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.

SPACE 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: The spacing does not affect volume studies and does not need to be changed for volume only studies. We recommend leaving the spacing set at 8 ft.**

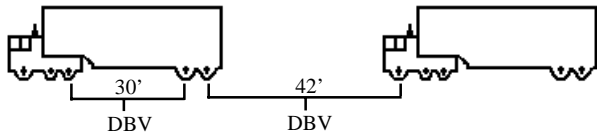
DATE USA (month/day/year) or World (day/month/year) formats.

UNITS Select either English or Metric units.

DT/DTX Dead time or D-Bounce for air switches. Use the TAB button to select DT and press DO. Use the keypad to enter in the DT and press DO when completed. Typically, 25 ms is the normal setting. The DTX setting should only be used for very low speed counting. Refer to Chapter 7 for more information.

DBV

Allows you to set the 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 will use this number to determine if the distance between 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 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 the axles spaced at 30 feet could be from the same vehicle, but the axles spaced at 42 feet must be from separate vehicles.



VEH

The TRAX I has the ability to upload user-defined tables for class, speed or gap data collection from JAMAR's data analysis software. The VEH option is used to restore the factory default tables. The default tables are 15-70 mph by 5 mph for speed, FHWA scheme F for class, and 2 to 26+ by 2 seconds for gap.

TIME/DATE

TAB to TIME/DATE and push 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. Enter the correct number of minutes. TAB to month and enter the number for the current month. TAB to day and enter the day of the month. Finally, TAB to year and enter the year. When completed, press the DO button. **NOTE:** The real time clock in the TRAX I uses a 24-hour military format; i.e. 5:00 P.M. is 17:00.

TESTS

MEMORY Press DO while Memory is flashing and the TRAX I automatically starts testing the memory. The test does not affect any data that is stored in the unit.

MEMORY	DISPLAY
KEYS	S.PORT
EXIT	
Test internal data storage memory	

DISPLAY To test the DISPLAY, press DO after the various screens that are displayed.

KEYS Press any of the keys and the TRAX I will display the key you pressed. Press DO to exit.

SER. PORT Plug a test connector into your serial port. The connector must short the 2 & 3 pins. **NOTE: This test will fail if a test connector is not used properly.**

Highlight EXIT and press DO to leave the DEFAULTS Menu. With EXIT highlighted once again, press DO to exit the UTILITIES Menu and return to the MAIN Menu.

Count Menu

When you select COUNT from the Main Menu, the screen shown above is displayed. The options on this sub-menu are:

**BASIC VOLUME ONLY
PER VEH BINNED EXIT
Basic Data
Press DO to accept**

Basic

The most complex of the studies, Basic (Raw) data collection involves time stamping every axle hit. Use this only if you are interested in the raw data of a traffic study. Selecting this type of count will take you into the tube layout selection menu, described on the following 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. 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 following page .

**VOL-VEH VOL-AXLE
EXIT
Binned Veh. Counts
Press DO to select**

Per Veh

Short for Per Vehicle, this study is one step below Basic. It allows extensive manipulation of the data but does not time stamp every axle hit. Selecting this type of study will take you into the tube layout selection menu, described on the following page.

Binned

This study can provide Class, Speed and Gap binned files. You can choose to collect only one type of data, or two or three

**CONT CHANGE EXIT
OPT= CLASS SPEED GAP
Press DO to continue
with options shown.**

types at one time, in any combination. Unlike the other three studies, selecting this option does not immediately take you to the tube layout selection menu. Instead you are taken to the screen shown above.

Use this screen to select the types of data you want to collect. The default setting is for Class, Speed and Gap. To change this setting, press the TAB key until Change is flashing and press DO. You will then be taken to the screen shown to the right.

CONT CLASS SPEED GAP
OPT= CLASS SPEED GAP
Press DO to continue
with options shown.

On the screen shown, all three study types - class, speed and gap - are currently selected. To de-select a study type, 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, press the TAB key until the selection you want is flashing. Then hit the DO key. You will see the study you chose returned to the Options on the second line.

When you have configured the options for the types of data that you want to collect, press the TAB key until CONT is flashing. Then press the DO key and you will be taken into 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. The meaning of each of the selections is displayed on the 3rd line, when the individual option is flashing. Refer to Chapter 4 *Road Tube Layouts* for a more detailed description of the individual layouts. Listed below are the types of layouts that are available to be selected with the different types of data collection modes:

L1 L2 L3 L4 L7 L8 L9
Two Channel A, B Vol
Press DO to select

VOLUME ONLY L1 L2 L3 L4 L7 L8 L9

CLS/SPEED/GAP L5 L6 L10 L11 L12

After you have selected the tube layout for your study, you will be taken to the Site Code Menu.

Site Code

The data in the TRAX I 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 may then enter a numerical code up to 12 characters using the numbered keys on the TRAX I. If you do not wish to use a Site Code, TAB until NONE is flashing and press DO. **NOTE: Pressing DO while EXIT is flashing will exit you out of the count setup and back to the Main Menu.**

YES	NONE	EXIT
Enter num. Site Code		
Press DO to accept		

After you have entered your Site Code, you will be taken 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, program start and stop times for the count, or set the TRAX I into test mode.

START STAT SET TIMES
TEST EXIT
Press DO to select

Stat

When you select STAT from the Count Start-up menu, you will see a screen similar to the one shown here. Use the TAB key to scroll through screens which give you information such as the current count number, percentage of memory available, battery voltage, study type selected, current date and time, start/stop times and site ID. After you have tabbed through the available screens, you will be returned to the Count Start-up Menu.

BASIC Startup Status
Use TAB to advance
display screens
CNT:02 MEM: 95% 6.4v

Set Times

*******IMPORTANT*******

Although the ability to set start and stop times is provided as a convenience for some users, we recommend using the continuous mode of collection whenever possible. It is easy to edit out extra data in the software when collecting in the continuous mode. Nothing can be done, however, if no data is collected because the incorrect start/stop times were programmed.

After you have selected SET TIMES from the Count Start-Up Menu, you will see the screen shown here. This is the screen that you will use to select your start and stop times. Press the TAB key until the letters above the number you want to change are flashing. Then use the Change Keys (3 & 6) on the keyboard to program the number you want. When this number is set, press the TAB key and the next set of letters will be flashing. Use this procedure to set your start time and date.

hh mm MM DD YY
Strt: 07 :00 01 /25 /98
Stop: 08 :00 01 /31 /98
Use TAB& ;DO=accept

When the correct time and date are set, press the DO key and you will see the screen shown to the right. Follow the same instructions used in setting the start time to set the stop time.

Strt: 07 :00 01 /25 /98
Stop: 08 :00 01 /31 /98
hh mm MM DD YY
Use TAB&↑↓DO=accept

When the correct date and time are entered, press the DO key and you will be taken to the screen shown to the right. Press DO while START is flashing and the TRAX I is programmed to begin and end recording at the times you set.

START STAT EXIT
Press DO to Start
Start Time Enabled

IMPORTANT: After pressing DO to Start the count, you will see one of the status screens. Vehicles will be shown on this screen as they pass over the tubes. However, this data is not being recorded in the memory of the TRAX I. If you TAB through the status screens, you will see in one of the screens the word “Wait” in the upper right hand corner. This is telling you that the TRAX I is waiting until it reaches the start time to begin storing data. When the data is actually being stored, the word “Wait” will change to “Run”.

Test

When you select TEST from the start-up menu you will see the screen shown below here. Selecting start will take you to the status screens for the type of study you have programmed. You will be able to observe how the TRAX I is collecting data with the setup you have programmed.

START STAT EXIT
Press DO to Start
TEST MODE ENABLED

*******IMPORTANT*******
Although you will see the data for each vehicle displayed in the TRAX I, when you are in the TEST mode no data is being stored in permanent memory. To end the Test mode, you must turn the TRAX I off.

Start

When you select Start from the Count Start-up menu, the TRAX I 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 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), the type of study being done (Basic) and that the TRAX I is recording data (RUN). The

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

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).

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 tells you what the tube

```
L6: 2 Equal Tubes
with spacing; 2 dir
SP:8.0 ft
DT:25ms
```

spacing is set for in the TRAX I (SP: 8.0 ft.). The fourth line tells you what the dead time (or D-bounce) is set for (DT:25ms).

The top line of this screen gives the date and time as they are set in the TRAX I. The next two lines are used to tell you if start/stop times have been programmed. If

```
TD 07:13:12 02/13/98
NO START/STOP TIMES

SITE ID:      12345
```

they have been programmed, you will see the times and dates listed. The last line is used to tell you what site code has been programmed for the study.

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>B:0006  
B>A:0008  
TD 07:19:50 02/13/98
```

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.

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:000008
```

The top line of this screen tells you the layout that has been selected (L4), the type of study being done (VOLUME) and that the TRAX I is running, or recording data (RUN). The next two lines represent the channels 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 (CNT:02), the percentage of memory available (MEM:99%) and the battery voltage (6.4v).

```
L04-VOLUME RUN  
A:*****  
B:*****  
CNT:02 MEM: 99% 6.4v
```

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

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

The top line of this screen gives the date and time as they are set in the TRAX I. The next two lines are used to tell you if start/stop times have been programmed. If they have been programmed, you will see the times and dates listed. The last line is used to tell you what site code has been programmed for the study.

```
TD 07:19:50  02/13/98
NO START/STOP TIMES
SITE ID:      12345
```

Per Veh Status Screens

The first line of this screen tells you which channel of data you are seeing (CHNL 0), the number of axles that have been recorded for the most recent vehicle (AX:2)

```
CHNL 0 AX: 2  #V:0010
CLS: 02 33 MPH  A>C
GAP: 21    14.2
```

and how many vehicles have been recorded (#V:0010). The second line tells you what class the last vehicle was (CLS:02) the speed of the vehicle (33 MPH) and how the vehicle struck the tubes (A>C). The third line tells you the gap between vehicles (GAP:21) and the length between the last two axles (14.2). **NOTE:** If you are collecting data with a four road tube layout (L10 - L12) pressing the TAB key will switch you to the data for your second channel. This will be reflected by the channel number changing (CHNL 1).

The top line of this screen gives you the date and time as they are programmed in the TRAX I. The second line tells you the type of data that is being collected.

```
TD 07:30:17  02/13/98
OPT= CLASS SPEED GAP
```

These options are fixed when in the Per Vehicle mode.

The top line of this screen tells you the layout that has been selected (L11), the type of study being done (Per-Vehicle) and that the TRAX I is running, or re-

```
L11 PER-VEHICLE RUN
A:****      C:****
B:**        D:**
CNT: 02 MEM:99% 6.4v
```

ording data (RUN). The next two lines represent the tubes that data is being recorded on (A, B, C & D). 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 (CNT:02), the percentage of memory available (MEM:99%) and the battery voltage.

The top two lines of this screen tell you the layout selected (L11) and how the tubes should be arranged for this study. The third line tells you the distance between vehicles that has been programmed into the TRAX I (DBV: 36.0) and the spacing of the tubes that has been programmed (8.0 ft). The fourth line tells you the dead time, or D-Bounce, that has been programmed (DT: 25ms).

L11: 2 (1/2 & full) Tube Sets; A>C B>D DBV: 36.0 SP: 8.0 ft DT: 25ms

The top line of this screen gives the date and time as they are set in the TRAX I. The next two lines are used to tell you if start/stop times have been programmed. If they have been programmed, you will see the times and dates listed. The last line is used to tell you what site code has been programmed for the study.

TD 07:13:12 02/13/98 NO START/STOP TIMES SITE ID: 12345
--

Binned Status Screens

The first line of this screen tells you which channel of data you are seeing (CHNL 0), the number of axles that have been recorded for the most recent vehicle (AX:2) and how many vehicles have been recorded (#V:0010). The second line tells you what class the last vehicle was (CLS:02) the speed of the vehicle (33 MPH) and how the vehicle struck the tubes (A>C). The third line tells you the gap between vehicles (GAP:21) and the length between axles (14.2).

CHNL 0 AX: 2 #V:0010 CLS: 02 33 MPH A>C GAP: 21 14.2
--

NOTE: If you are collecting data with a four road tube layout (L10 - L12) pressing the TAB key will switch you to the data for your second channel. This will be reflected by the channel number changing to 1 (CHNL 1).

The top line of this screen gives you the date and time as they are programmed in the TRAX I. The second line tells you the types of data that have been programmed to be collected. The third line gives you the vehicle totals for each channel for the current interval. The fourth line tells you what interval is currently being recorded.

```
TD 07:30:17 02/13/98
OPT= CLASS SPEED GAP
#V0: 02      #V1: 01
Interval: 0001
```

The top line of this screen tells you the layout that has been selected (L11), the type of study being done (Binned-Data) and that the TRAX I is running, or

recording data (RUN). The next two lines represent the tubes that data is being recorded on (A, B, C & D). 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 (CNT:02), the percentage of memory available (MEM:99%) and the battery voltage.

```
L11 BINNED-DATA  RUN
A:****          C:****
B:**           D:**
CNT: 02  MEM:99%  6.4v
```

The top two lines of this screen tell you the layout selected (L11) and how the tubes should be arranged for this study. The third line tells you the distance

between vehicles that has been programmed into the TRAX I (DBV: 36.0) and the spacing of the tubes that has been programmed (8.0 ft). The fourth line tells you the dead time, or D-Bounce, that is programmed (DT: 25ms) and the interval length that has been programmed (Intv: 15min).

```
L11: 2 (1/2 & full)
Tube Sets; A>C B>D
DBV: 36.0  SP: 8.0 ft
DT: 25ms   Intv: 15min
```

The top line of this screen gives the date and time as they are set in the TRAX I. The next two lines are used to tell you if start/stop times have been programmed. If they have been programmed, you will see the times and dates listed. The last line is used to tell you what site code has been programmed for the study.

TD 07:13:12	02/13/98
NO START/STOP TIMES	
SITE ID:	12345

Ending a Count

To end a count, turn the TRAX I off. The count will be stored in the TRAX I's internal memory. Additional studies can then be conducted with the unit. The TRAX I can hold up to 32 different studies in its memory.

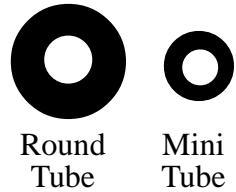
Chapter 3

Road Tube Installation

Installing Road Tube

Proper road tube installation is very important for collecting accurate data with your TRAX I. The road tube and the TRAX I'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. The following installation instructions cover round tube (.25 inside diameter (ID) by .60 outside diameter (OD)), 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



Tube Length

Tube length is **very critical** in order to record accurate vehicle data. 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 round tube, 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 (Short tube, long tube setups)

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 I. 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 I. 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 I. 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 over 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. 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 I.

Tube Placement

Tubes should be placed exactly perpendicular to the flow of traffic to prevent double counting. 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.

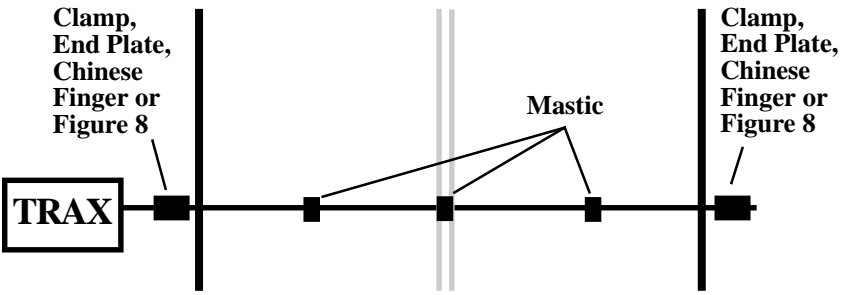
Installation

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 (normally 2 1/2 inch or longer) in hot weather due to the softness of the asphalt. In cold weather applications, the asphalt becomes harder, making it more difficult to drive in the nails. In this situation, smaller nails (1 1/2 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 the middle of each lane. Additional mastic should be used as deemed necessary to prevent the tube from moving when stuck by a vehicle.

Round Tube Installation



MASTIC: 6" Lengths are satisfactory

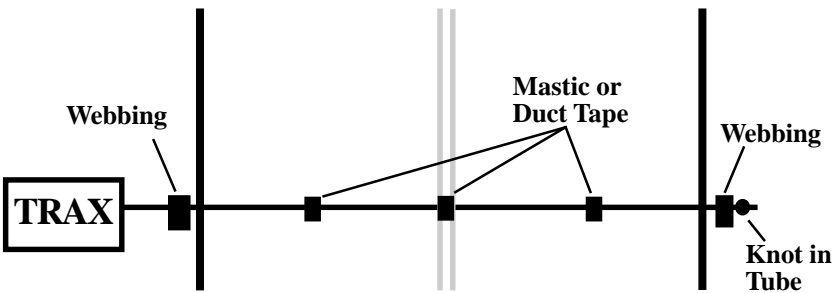
TUBE: 60 ft. lengths are recommended. Coil any excess tube near the counter.

The tube should be stretched 1 ft. for every ten ft. of road surface.

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.

Mini Tube Installation



MASTIC OR DUCT TAPE: 6" Lengths are satisfactory

TUBE: 50 ft. lengths are recommended. Coil any excess tube near the counter.

WEBBING: Approx. 4" to 5" long. Loop over tube and nail as shown above.



Do not stretch the tube, just pull it tight to avoid any movement.

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.

Checking 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.

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Chapter 4

**Road Tube
Layouts**

Road Tube Layouts for the TRAX I

The TRAX I is equipped with twelve pre-programmed tube layouts for recording traffic data. These are designated as L1 through L12 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 3 *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 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 by one. In order to record volumes on a vehicle by vehicle basis without regard to their number of axles, you must be in the Binned mode with the appropriate hose configuration.
- 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.

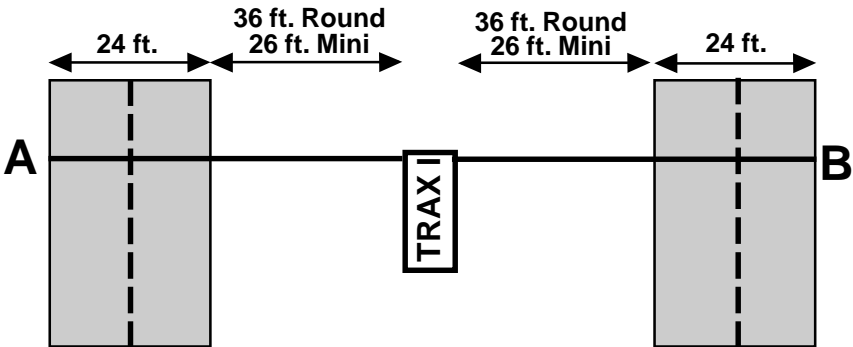
- Since Basic data collection requires the time stamping of each individual axle, it requires a great deal more memory space in the TRAX I. We strongly suggest that unless you are interested in the most basic, raw information of a study, use either the volume only, binned or per vehicle setting to record your data.
- The following examples of how the data is recorded do not apply to the Basic data mode. Basic data is a collection of sensor activations that are then later grouped into usable data by the software.

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.

L1 ó Two Channels ó A, B ó Basic, Volume

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

EXAMPLE: The TRAX I 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.

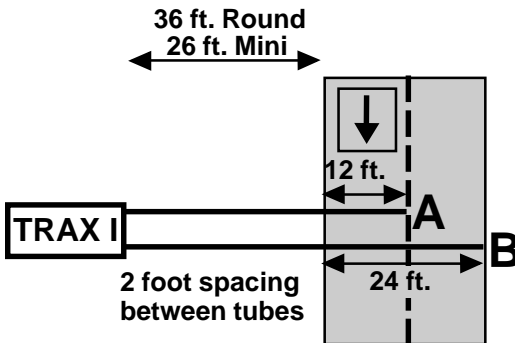


L2 ó Two Channels with Lane Separation A, B minus A ó Basic, Volume

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. At the end of each interval the A channel is subtracted from the B channel and then each channel’s total is stored in memory. When in Volume mode the TRAX I can do either a straight axle count or use the divide-by-two technique.

The tubes should be spaced two feet apart.

EXAMPLE: The TRAX I 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 each channel. 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 another one in the B channel. At the end of the interval, the total in the A channel, one, is recorded to memory. That total is then subtracted from the B subtotal of 2, for a final B total of one. One vehicle has been recorded in each lane of the study.

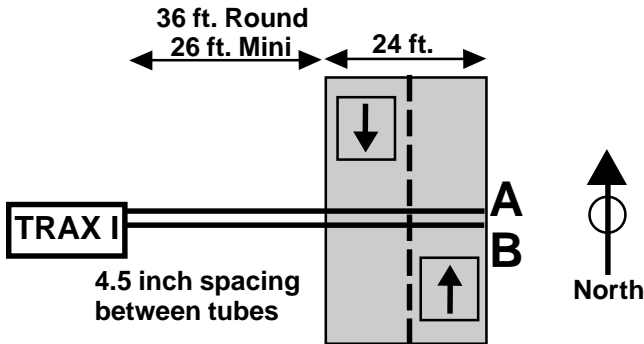


L3 ó Two Channels with Lane Separation A to B, B to A ó Basic, Volume

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 I can do either a straight axle count or use the divide-by-two technique.

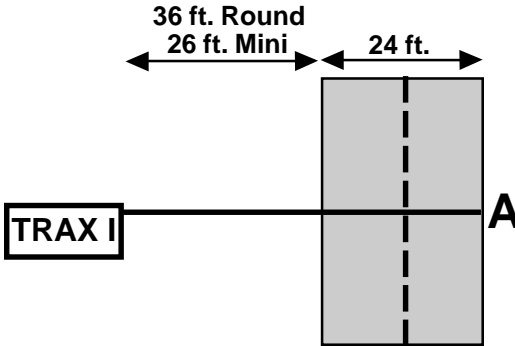
The tubes should be spaced four and a half inches apart.

EXAMPLE: The TRAX I 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.



L4 ó One Channel ó A ó Volume

In this layout, one tube is extended across the lanes to be counted. When in Volume mode the TRAX I 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.

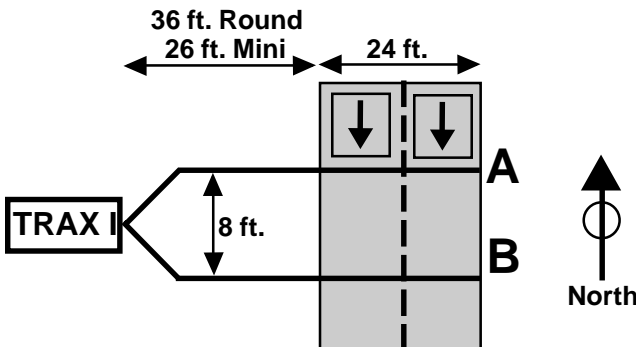


L5 ó One Direction, No Lane Separation A to B ó Basic, Per Veh, Binned (Class, Speed, Gap) ó One Direction

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 eight feet apart and be of equal length.

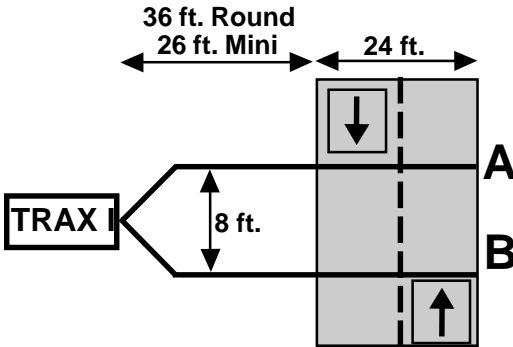
EXAMPLE: A car is traveling southbound, approaching the tubes. As the vehicle passes over both the A and B tubes, the speed and class of the vehicle are registered and a one is added to the volume data. This type of setup does not use the divide-by-two technique or axle counting in recording volume. Each individual vehicle counts as only one.



L6 ó Two Lanes, With Lane Separation A to B, B to A ó Basic, Per Veh, Binned (Class, Speed, Gap) ó Bidirectional

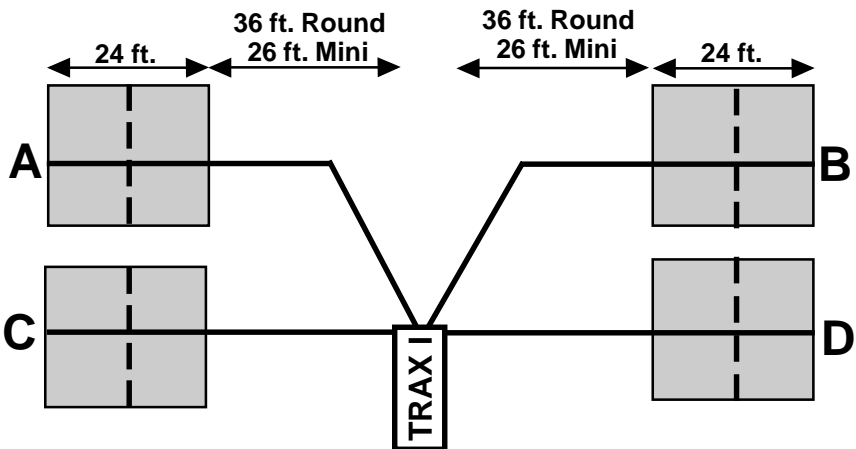
This layout is the same as the L5 layout, but provides lane separation for bidirectional traffic.

The tubes should be spaced eight feet apart and be of equal length.



L7 ó Four Lanes ó A, B, C, D ó Basic, Volume

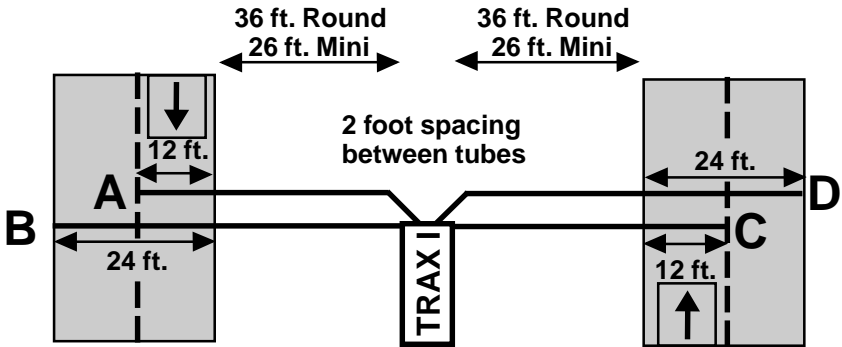
This layout is the same as the L1 layout, but with four tubes over four separate lanes rather than two tubes over two lanes. Refer to the L1 description for more information.



L8 ó Four Lanes with Lane Separation A, B minus A, C, D minus C ó Basic, Volume

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.

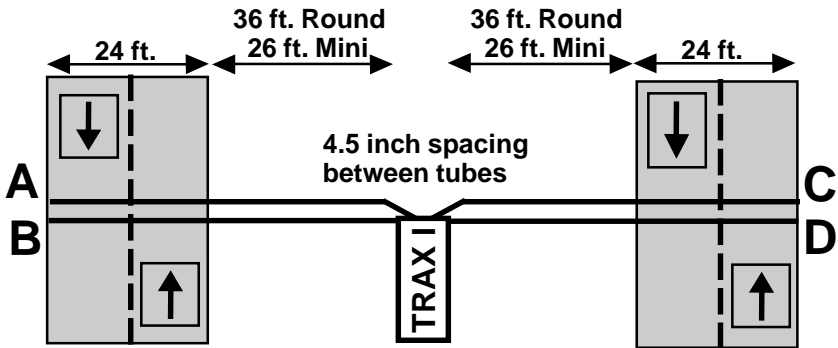
The tubes should be spaced two feet apart.



L9 ó Four Lanes with Lane Separation A to B, B to A, C to D, D to C ó Basic, Volume

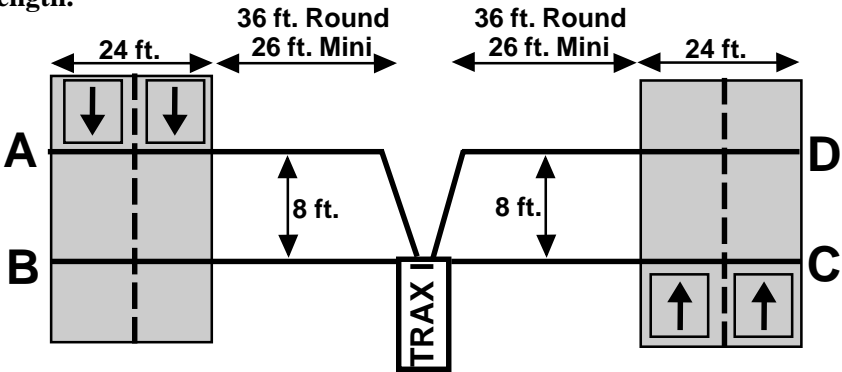
This layout is the same as the L3 layout, but with four tubes over four lanes rather than two tubes over two lanes. Refer to the L3 description for more information.

The tubes should be spaced four and a half inches apart.



L10 ó Two Directions, No Lane Separation A to B, C to D ó Basic, Per Veh, Binned (Class, Speed, Gap)

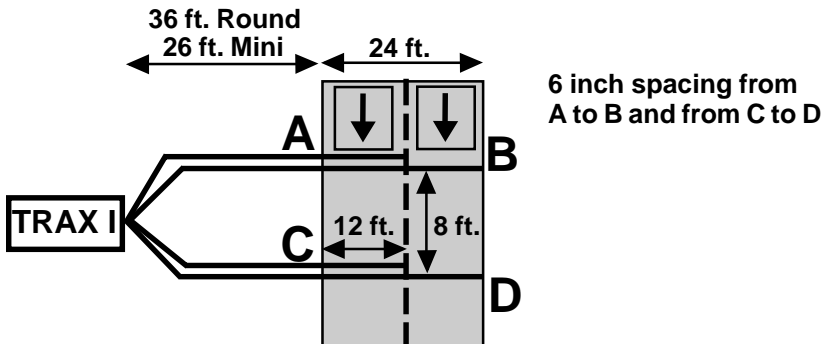
This layout is the same as the L5 layout, but with four tubes over four lanes rather than two tubes over two lanes. Refer to the L5 description for more information. The tubes should be spaced eight feet apart and be of equal length.



L11 ó Two Lanes, One Direction With Lane Separation ó A to C, B to D ó Basic, Per Veh, Binned (Class, Speed, Gap)

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.

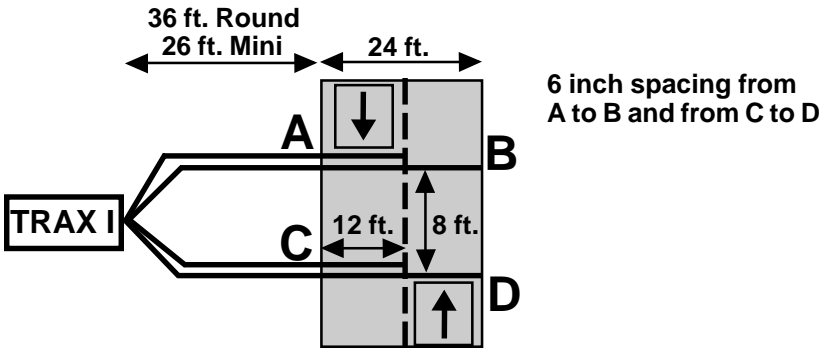
The A and C tubes should be spaced eight feet apart, as should the B and D tubes. The A tube should be spaced six inches from the B tube and the C tube should be spaced six inches from the D tube. Remember, vehicles must always strike the short tube first.



L12 ó Two Directions With Lane Separation A to C, D to B ó Basic, Per Veh, Binned (Class, Speed, Gap)

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 eight 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.



Chapter 5

Downloading the TRAX I

Downloading a TRAX I

The TRAX I 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 cable, shown to the right. Note that you cannot download a TRAX I to a computer or module while it is collecting data. You must end any counts (by turning the unit off) before you download.

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 4. 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 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. Mice, digitizer boards, Palm Pilots 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 in, or if you are using a switch box, be sure that the device does not have a driver running in memory.

Once the universal cable is plugged into the computer, plug the **BLACK** plug on the other end into the TRAX I and slide the ON/OFF switch on the unit to the ON position. After a brief period of self diagnostics, the counter

will display the Main Menu shown below.

```
COUNT UTILITIES STAT
***** MAIN MENU *****
Press DO to Count.
TAB changes option
```

This is the screen from which all downloading is done. At this point, refer to your software manual for information on how to setup the software for downloading. Note that the TRAX I will automatically sense whatever baud rate you select in the software. The higher the baud rate, the faster your data will be dumped. Most newer computers can download at 19200 or higher.

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

```
TRANSFER IN PROGRESS
COUNT:01 BLOCK:01
*****
```

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, you may turn the TRAX I off. **Do not clear the data out of the unit until you are certain that it has been downloaded successfully to the computer.**

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Chapter 6

Battery Care

Battery Care

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.

A battery should not be allowed to discharge too low (5.8 volts and below). This will cause a chemical build-up on the cells that will eventually destroy the battery. Symptoms of these conditions are:

1. The battery will not charge to its full capacity of 6.4 volts or higher.
2. The battery will only hold its 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, leave your battery in the TRAX I until the voltage discharges to 6.0 or 5.9 volts under normal use, then recharge the battery to its highest potential (normally from 6.4 volts and up). The battery can be charged through the charge port with the TRAX I charger or a similar 6VDC charger with the correct plug and polarity. The battery may also be removed for charging if desired.

Charging

*****CAUTION*****

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

Charging a battery is very important for obvious reasons. Your TRAX I 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. Measure or monitor your battery by using a voltmeter or through the counter's display. We recommend that the battery be recharged to its highest charge level (usually 6.4 volts and above) once it discharges to 6.0 or 5.9 volts. A good battery may charge as high as 7.0 volts or better. A defective battery may not charge any higher than 6.0 volts after a rea-

sonable charge time. Charge time will vary with the level of the battery voltage. Usually, a battery of 5.9 volts can be charged to its highest potential in 12 hours or less.

After a battery has been charged, allow it to sit for at least 8 hours and check the voltage again to determine if the battery maintained its charge. Some decay is acceptable; however, if the battery falls below 6.0 volts, recharge it for a longer period of time. If this does not improve the charge, the battery is most likely defective and it would not be wise to use it for any lengthy data collections. 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.

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Chapter 7

**Low Speed
Counting**

Low Speed Counting (Below 10 mph)

The TRAX I 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 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.

Chapter 8

Trouble shooting

Troubleshooting

The following are some common questions/problems that can be encountered when using the TRAX I. 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. **Additional support information can also be found on our web site at www.jamartech.com.**

There is no display visible on the TRAX I.

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

The display on the TRAX I will not come on.

The battery voltage may have gone too low to power the display. Connect the TRAX I 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 TRAX I was set in the field to collect data but no counts have been stored.

Check your setup procedure to see if incorrect Start/Stop times were programmed. If start/stop times have been enabled, the TRAX I must reach the start time that has been set to begin storing data. Also check that the real-time date and time are set correctly for your location.

When downloading, not all of the studies done are appearing.

The software used with the TRAX I will download all of the counts stored in the unit. You will be prompted for file names for each of the studies that are downloaded. If you assign the same name several times in a row, you will be copying over the previously named files.

Binned (Cls/Speed/Gap) data collection is not providing all of the data desired.

Check the TRAX I's setup to be sure the correct data options have been programmed.

The data is not being collected in the intervals desired.

Check the Interval setting in the TRAX I'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 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 disconnect the tube from the TRAX I and hold the end to your cheek. You should feel the air pulse as tires cross the tube. If you do not, there may be a tear in the tube or it may be blocked. After setting up a counter, always observe the display and traffic to be sure data is being recorded properly.

The TRAX I will not download.

Check your connection between the TRAX I and the computer. Refer to Chapter 5 *Downloading the TRAX I* for other items to check.

The TRAX I displays 'File Error' during the download process.

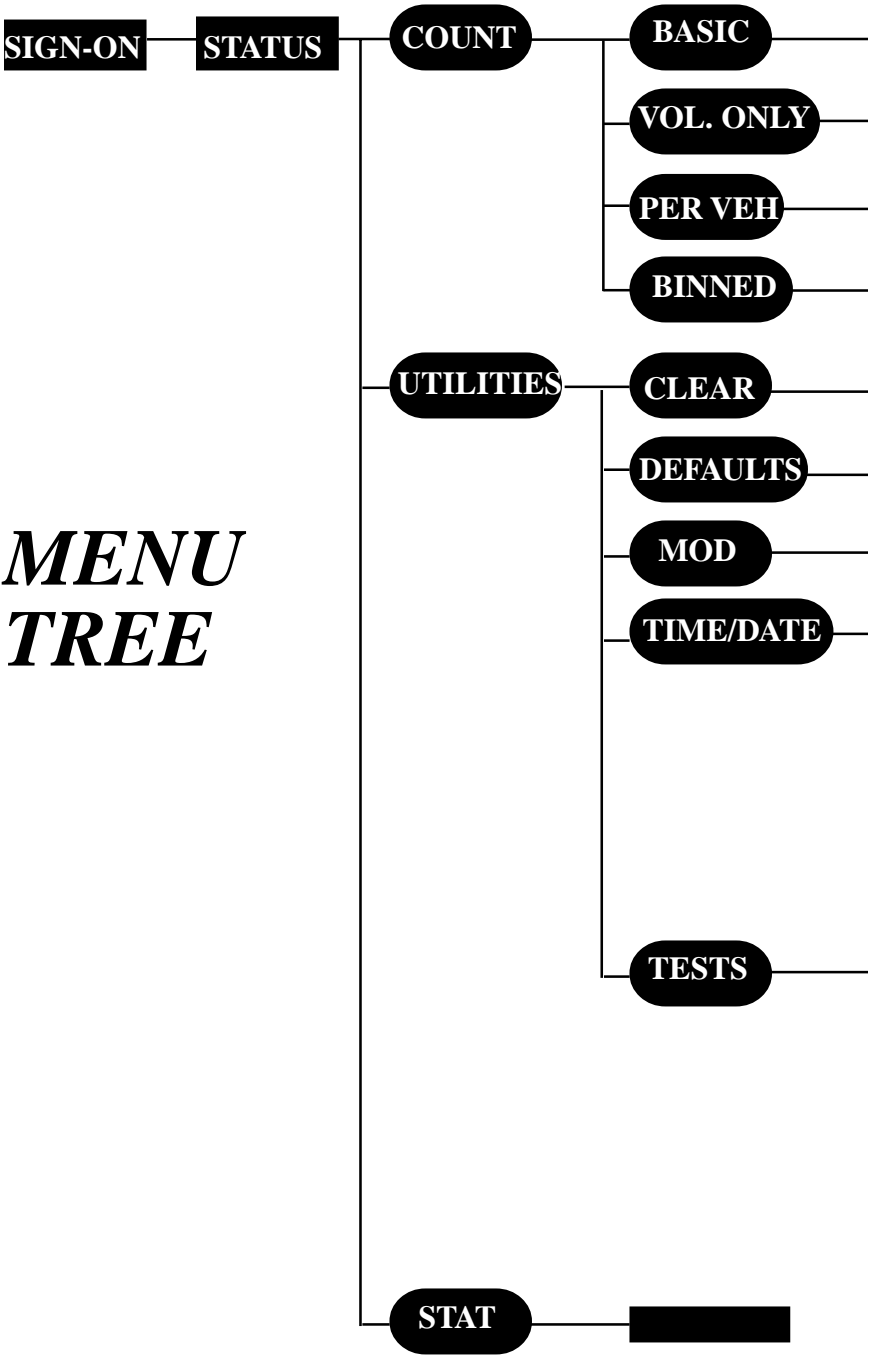
The counter may not have been cleared properly. Once the clearing memory process has started, it must be allowed to finish before the counter is turned off. If this error appears, the counter must be cleared properly before future use.

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

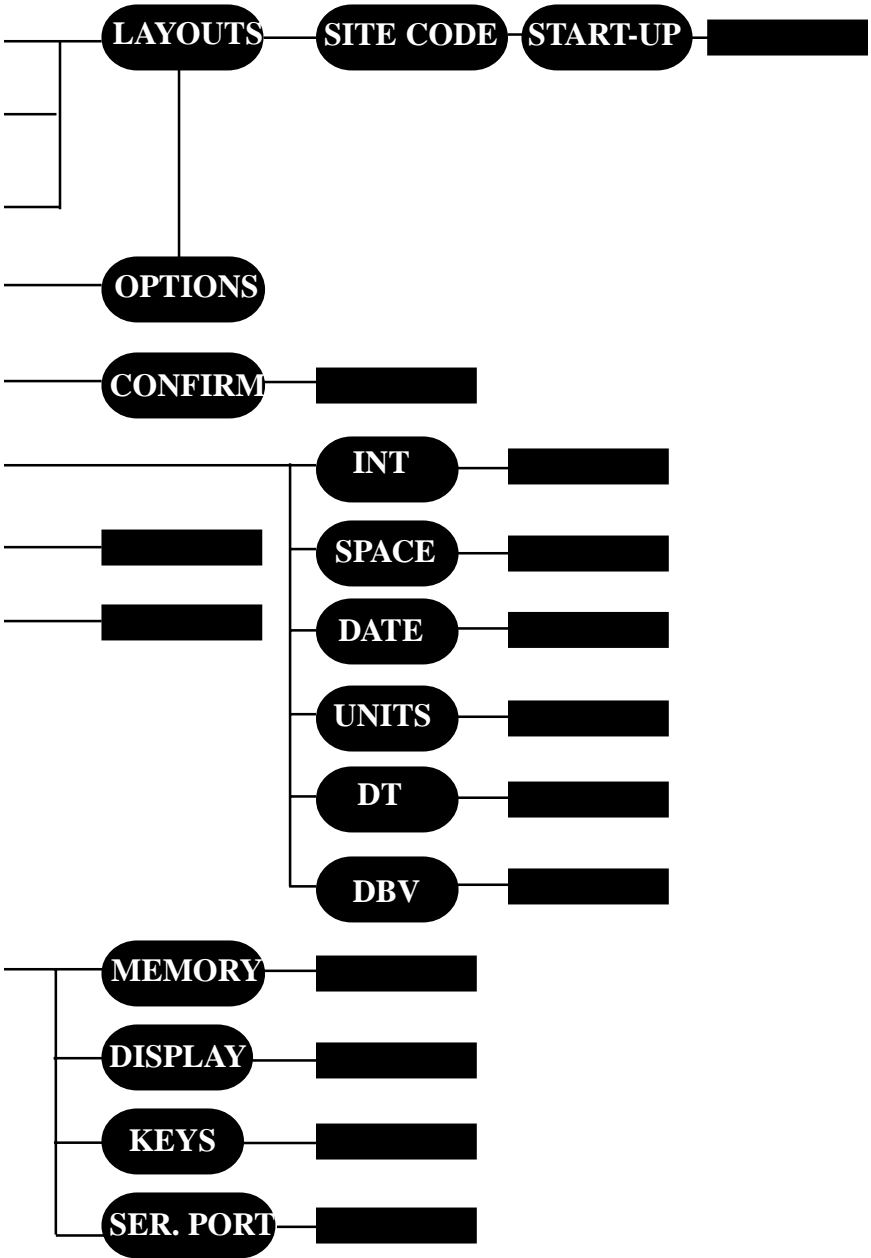
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Chapter 9

Menu Tree & Specifications



MENU TREE



TRAX I Specifications

Size — 9" X 6.5" X 4.5"

Weight — approximately 7 lbs. in a cast aluminum housing

Sensor Inputs — Two or four air switches

Memory — 1024 KB internal memory backed up by lithium battery

Power — 6 volt, 10 amp hour rechargeable lead gel battery, with solar panel option.

Interface — RS-232 serial, 9 pin DBS socket

Temperature Range — Minus 40 F (-40 C) to 165 F (72 C)

Date Format — USA or World Time

Recording Intervals — 5, 10, 15, 30 or 60 minutes

Display — wide temperature, 4-line by 20 character LCD display

Output — binary file capable of being read by JAMAR (or compatible) software

Data Collection — Basic, Per Vehicle, Binned (Class, Speed, Gap) and Volume

Clock — always active real-time clock

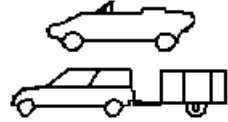
Appendix

FHWA Type F Vehicle Classification Scheme

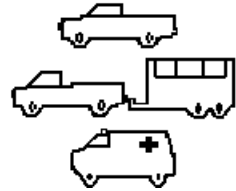
Class 1 - Motorcycles. This class includes all two- or three-wheeled motorized vehicles. These vehicles typically have a saddle-type of seat and are steered by handlebars rather than a steering wheel. This includes motorcycles, motor scooters, mopeds, motor-powered bicycles and three-wheel motorcycles.



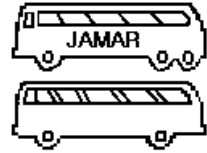
Class 2 - Passenger cars. This class includes all sedans, coupes and station wagons manufactured primarily for the purpose of carrying passengers, including those pulling recreational or other light trailers.



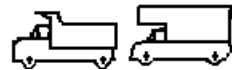
Class 3 - Pickups, Vans and other 2-axle, 4-tire single unit vehicles. This class includes all two-axle, four tire vehicles other than passenger cars, which includes pickups, vans, campers, small motor homes, ambulances, mini-buses and carryalls. These types of vehicles which are pulling recreational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



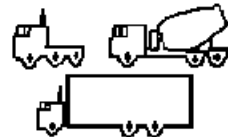
Class 4 - Buses. This class includes all vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This includes only traditional buses, including school and transit buses, functioning as passenger-carrying vehicles. All two-axle, four tire minibuses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



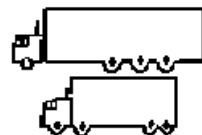
Class 5 - Two-Axle, Six-Tire Single Unit Trucks. This class includes all vehicles on a *single frame* which have *two axles and dual rear tires*. This includes trucks, camping and recreation vehicles, motor homes, etc.



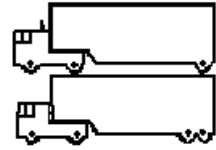
Class 6 - Three-Axle Single Unit Trucks. This class includes all vehicles on a *single frame* which have *three axles*. This includes trucks, camping and recreation vehicles, motor homes, etc.



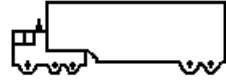
Class 7 - Four or More Axle Single Unit Trucks. This class includes all vehicles on a *single frame* with *four or more axles*.



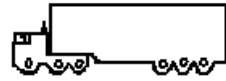
Class 8 - Four or Less Axle Single Trailer Trucks. This class includes all vehicles with *four or less axles* consisting of *two units*, in which the pulling unit is a tractor or single unit truck.



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.

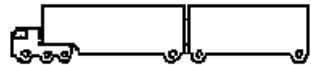


Class 11 - Five or Less Axle Multi-Trailer Trucks.

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 also collects data for **Class 14 - Unclassified Vehicles.** This class includes all vehicles which the TRAX I 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.

We are pleased that you have chosen the JAMAR TRAX I 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 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 have always suggested that users verify the continuing accuracy of any device they use. We feel verification against manual counts 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.

