LIMITED WARRANTY

JAMAR Technologies, Inc. warrants the TRAX III Plus against defects in material and workmanship for a period of one (1) year limited warranty on parts and one (1) year limited warranty on labor from the date of purchase. For information on extended warranty call 1-800-776-0940.

JAMAR Technologies, Inc. warrants each new instrument manufactured by the company to be free from defective material and workmanship and agrees to remedy any such defect. At its option, it may furnish a new part in exchange for any part of any instrument of its manufacture which, under normal installation, use and service discloses such defect. The instrument must be returned to our factory or authorized service agent intact, for examination, with all transportation charges prepaid.

This warranty does not extend to any products which have been subject to misuse, neglect, accident, vandalism or incorrect wiring not our own. This warranty does not extend to water damage caused by the use of faulty or improperly installed road tube or damage caused by improper installation in disregard of the instructions furnished by us. This warranty does not extend to products which have been repaired or altered outside our factory or authorized service agent. There is a 90 day warranty on the rechargeable battery of the TRAX.

In no event shall JAMAR Technologies, Inc. be liable for any damages arising from the use of this product including damages arising from the loss of information.

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JAMAR Technologies, Inc. reserves the right to make improvements on the product and/or specifications at any time without notice.

Questions concerning this warranty or any JAMAR Technologies, Inc. product should be directed by mail or telephone to:

<div align="center">

JAMAR Technologies, Inc.
1500 Industry Road, Suite C
Hatfield, PA 19440
215-361-2244

</div>

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If you have any questions about the use of the TRAX III Plus or if you experience any problems with its operation, please call the following number:

1-215-361-2244

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

You may also contact us by fax at:

1-215-361-2244

or via e-mail at:

sales@jamartech.com

For more information on our products, or for the latest news in product development, visit our web site at:

www.jamartech.com

Address any correspondence to:

JAMAR Technologies, Inc.
1500 Industry Road, Suite C
Hatfield, PA 19440

Table of Contents

Quick Setup Guide for the TRAX III Plus

1. Turn the TRAX III 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. From the Main Menu, press the **DO** key when "Count" is flashing.

4. 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 Binned.

> *Basic*: Also known as Raw Data, in this type of study the TRAX time stamps every axle hit. These time stamps are then sorted by the software.
> *Binned*: This study can provide Class, Speed and Gap information in separate files. With this type of study the information for each vehicle is not stored individually, but sorted into pre-defined bins.
> *Volume Only*: the simplest of the studies, it records data on an axle-by-axle basis or divide-by-two basis.

5. After selecting your type of study, you will be prompted to select a layout, using either tubes, loops or a combination of the two. Refer to the descriptions in Chapter 4 for the appropriate selection. **TAB** to your selection and press the **DO** key to select it.

6. 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.

7. Press **DO** with "Start" flashing to begin your study!

Chapter 1

Introduction to the TRAX III Plus

What is the TRAX III Plus?

The TRAX III Plus 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 III Plus can collect data in three modes: basic (raw) data, volume only 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 method used for data collection can be road tubes, loops or piezos. These options allow you to collect accurate data under the most difficult of circumstances.

The TRAX III Plus can store up to 150 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, gap, length or following distance can be generated using JAMAR's TRAXPro software.
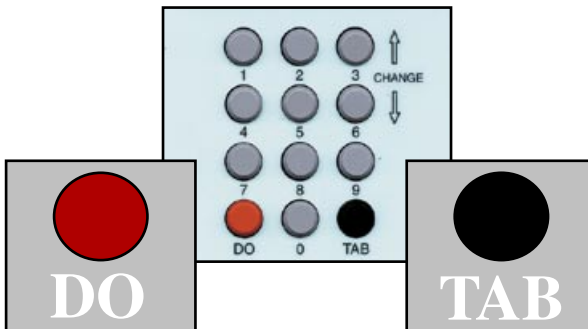
How is the TRAX III Plus powered?

The TRAX Plus III 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 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 also contains an external battery plug for charging the battery or powering the unit from an external solar panel or other external source.

Power, 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.

Inputs and External Power Plug

The TRAX III Plus can be equipped with a variety of inputs for collecting data. These include road tube inputs, loop inputs and piezo inputs. The TRAX III Plus also contains an external power plug that can be used for charging a battery or powering the unit from a solar panel or other external source. The external power plug contains six prongs and is shown at the right in the diagram below.
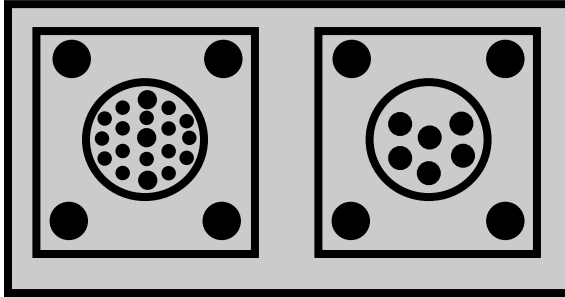
LOOP PLUG   **EXTERNAL POWER PLUG**

Before You Do a Study

Before you attempt to collect important data with the TRAX III Plus we strongly recommend that you familiarize yourself with the operation of the TRAX. 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 study if you are new to the TRAX III 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 study.

CHAPTER 2

Operation of the TRAX III Plus

Start-up Screens

A 4-line, 20-character display located in the TRAX III Plus' front panel is used to display the unit's current options and status. **Note that the display of the TRAX 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, press either the DO or TAB key.

When you turn on the TRAX it will display several screens with information on the current status of the unit. After the title screen is shown, the TRAX will begin a self-check of the loop system.

```
Updating Loops

TIME: 00:01
Press TAB to Cancel
```

If a loop card is detected, you'll see a screen similar to the one below.

```
Loop Card Detected

8 Loops Installed
Version 1.0.00
```

After this, the status screen of the unit will appear.

```
Tube Sp: 2.0 ft.      V0.0
MEM:7827K  Avail.
Counts:  01        bat: 6.3V
TD  14:10:00       02/13/04
```

This screen displays the tube spacing that is set in the TRAX III 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.

After a few seconds this screen will disappear and the main menu will appear.

Main Menu

> **COUNT UTILITIES STAT**
> ******* MAIN MENU ********
> **Press DO to Select**
> **TAB changes option**

The Main Menu is the starting point for all of the options in the TRAX III 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, tune the loops, set the time & date, restore default vehicle settings, and perform diagnostic tests on the TRAX.

Stat

Select to display available memory, counts stored, battery power, and time/date. This is the same screen as the last start up menu described on page 2-2. 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 III 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.

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

Module `Main Menu > Utilities > Module`

The Module option allows you to use a JAMAR data module with the TRAX. 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 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 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.

Default

`Main Menu > Utilities > Defaults`

Note: The nonvolatile memory in the TRAX 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

```
INT  SPACE  DT  DBV
   LOOP            EXIT
```

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

`Main Menu > Utilities > Defaults > Space`

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

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 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. The DT can range from 1 to 9999 ms. The normal setting is 35. Higher settings can be used for low speed traffic. Refer to Chapter 7 for more details.

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 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 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 the axles spaced at 30 feet could be from the same vehicle, but the axles spaced at 42 feet must be from separate vehicles.
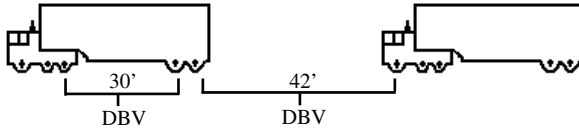
LOOP   `Main Menu > Utilities > Defaults > Loop`

This setting allows you to adjust a number of different values that deal with how the TRAX III Plus handles loops.

```
SV VC TO RT DT TRD
LSP LPSP LL RST   EXIT
```

SV   This stands for sensitivity value and allows you to set how sensitive the TRAX should be when recording vehicles. The range of values is from 1 (least sensitive) to 99 (most sensitive). In general, if you are getting extra counts from vehicles you should lower the sensitivity. If you are missing vehicles you should raise the sensitivity. The default value is 85. This can be set for all loops simultaneously or for individual loops.

VC   This stands for Vehicle Count and allows you to set the number of vehicles that will be recorded before the TRAX checks to see if it needs to retune itself. The range of values is from 01 to 99 vehicles. The default value is 01. This can be set for all loops simultaneously or for individual loops.

TO   This stands for Time Out and allows you to set the length of time the TRAX will wait with a constant vehicle presence before it checks to see if it needs to retune itself. The range of values is from 30 seconds to 60 minutes. The default value is 1 minute. This can be set for all loops simultaneously or for individual loops.

RT   This stands for Re-tune Time and allows you to set the length of time before the TRAX checks to see if it needs to re-tune itself, regardless of all other factors. The range of values is from 30 seconds to 60 minutes. The default value is 30 minutes.

DT   This stands for Dead Time and allows you to set the length of time the TRAX will wait after recording a vehicle before it will record another one. The range of values is from 10 milliseconds to 990 milliseconds. The default value is 100 ms.

TRD   This stands for Trailer Distance and allows you set the spacing within which any new recording will be considered a trailer from the previous recording. The range of values is from 0.1 to 99.9 ft. As an example, if the TRD is set to 20.0 ft and a vehicle is recorded, any new recording seen within the next twenty feet will be recorded as a trailer for the previous vehicle. The default value is 20 ft.

LSP   This stands for Loop Spacing and allows you to enter the distance between the loops to which the TRAX is connected. This distance is from leading edge to leading edge of the loops and the range of values is from 0.1 to 99.9 ft. The default value is 16 ft.

LPSP   This stands for Loop Piezo Spacing and allows you to enter the distance between the loops and piezos to which the TRAX III Plus is connected. This distance is from leading edge to leading edge of the loops and the range of values is from 0.1 to 99.9 ft. The default value is 12 ft.

LL   This stands for Loop Length and allows you to enter the distance the loop covers on the road from front edge to back edge. The range of values is from 0.0 to 99.9 ft. The default value is 0 ft.

RST   This stands for Reset Loops System and will restore all of the factory defaults to the settings.

Tune   Main Menu > Utilities > Tune

The Tune option allows you to both check the current status of the loops as well as tune them. To check the loop status, press the TAB key until Loop Status is flashing then press the DO key. You can Tune all the loops by pressing the TAB key until Tune All is flashing, then pressing the DO key. Or, to tune an individual loop, press the TAB key until the letter for the loop you want to tune is flashing then press the DO key.

```
LOOP STATUS  TUNE ALL
I J K L M N O P     EXIT
```

Time/Date   Main Menu > Utilities > T/Date

This option allows you to program the date and time to be used in your TRAX.

```
HR MIN      MON DAY YR
08:05            02/13/04
Press  3 & 6 to change
Press DO to set date
```

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 uses a 24-hour military format; i.e. 5:00 P.M. is 17:00.

System (Sys)

`Main Menu > Utilities > Sys`

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

```
VEH  DATE  UNITS  PERM
FULLMEM  SPLIT    EXIT
```

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. 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 III Plus' 16 MB of internal memory will record over 6 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 to be sure they are operating correctly.

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

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 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.**

Pin 3   Pin 2
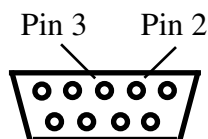
Tubes

The Tubes test allows you to check the quality of the pulses 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.

```
A:XXXX - - - - - - - - GGGG!!
B:XXX
C:XXXX - - - - - - - - GGGG!!
D:XXXX - - - - - - - - GGGG!!
```

Press the 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 road 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 2-11.

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 and you are only using road tubes for the data collection. This type of data cannot be collected with loops. Selecting this type of count will take you into the 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 using road tubes, where every two hits is counted as one. Select VOL-AXLE for an axle count, where every hit is counted as one. **Important: If you are collecting volume only data with loops, use the VOL-AXLE selection.** After you select the type of study you want, you will be taken to the 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

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

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.

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

Layout Selection

> **L1   L2   L3   L4   L21**
> **L22   L23   L32   L33**
> **L1: Two Channel Vol.**
> **A,B**

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

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 4 *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
1 Loop	L21
2 Loops	L22
4 Loops	L23
6 Loops	L32
8 Loops	L33

Bin

|	
2 Road Tubes	L5, L6
4 Road Tubes	L10, L11, L12
2 Loops	L24
4 Loops	L25
6 Loops	L34
8 Loops	L35
Loop - Piezo- Loop	L26, L27
Piezo - Loop - Piezo	L28
Loop - Piezo - Piezo	L30

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-L12, L24-L28, L30, L34 & L35 layouts can produce data that can be analyzed for speed, class/length or gap data.

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 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

```
YES      NO           EXIT

        Enter Site Code
      Press DO to select
```

guarantee that the data you collected at a particular site was indeed collected there.
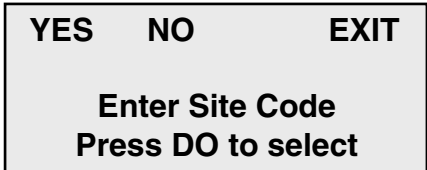
To enter a Site Code, press DO while YES is flashing. You then have the option of using either a numeric (numbers only) site code or an alpha-numeric (numbers, letters and symbols) site code.

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

```
0-9   A-Z   a-z   SYM   OK
- - Press DO for next - -
```

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 infor-
mation 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 supports the NMEA
protocol, which is a standard for the transmission of GPS data avail-
able in most GPS units.

> You must have the GPS upload screen up on the TRAX **before** con-
> necting your GPS receiver to it.

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
each unit's RS-232 serial port.

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

Some GPS units may require you send the data, others may auto-
matically 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 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 is collecting data. Press the TAB key to page though 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

```
L06  BASIC-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 fourth line tells you what the dead

```
L6: Two Equal Tubes
with spacing; 2 dir

DT:35ms
```

time (or D-bounce) is set for (DT:35ms).

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

```
07:13:12   04/13/02
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   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.

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 (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:35ms    Intv: 15 min.
```

D-bounce) is set for in the TRAX (DT:35ms) 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. The next three lines provide information on the site code that has been programmed for the study.

```
07:13:12   04/13/02
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

```
OPT=Class  Speed  Gap
#V0000000

Interval:000010
```

shows the number of the current interval.

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

> **L5: Two Equal Tubes**
> **with spacing; 1 dir**
> **DBV:40.0 SP:2.0 ft**
> **DT:35ms   Intv: 15 min.**

distance between vehicle (DBV:40.0) and tube spacing (SP:2.0 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.

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

> **07:13:12   04/13/02**
> **SITE CODE:**
> **3469788**

Ending a Count

To end a count, turn the TRAX III Plus off. The count will be stored in the TRAX III Plus's internal memory. Additional studies can then be conducted with the unit. The TRAX 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 2-4 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.

Chapter 3

Road Tube Installation & Loop Connections

Installing Road Tube

Proper road tube installation is very important for collecting accurate data with your TRAX III Plus. The road tube and the TRAX III Plus' 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.

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.

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

Round Tube   Mini Tube
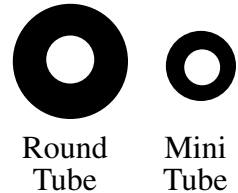
A slideshow demonstration of the proper techniques for installing road tubes can be viewed on the JAMAR web site at:
www.jamartech.com/Tube Install.htm
We recommend viewing this demonstration if you are new to the process of installing road tubes, or would like additional tips on installation.

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, 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 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.

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 road-way 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 each lane. Additional mastic should be used as deemed necessary to prevent the tube from moving when stuck by a vehicle.

Round Tube Installation

Clamp, End Plate, Chinese Finger or Figure 8

Mastic

Clamp, End Plate, Chinese Finger or Figure 8

TRAX

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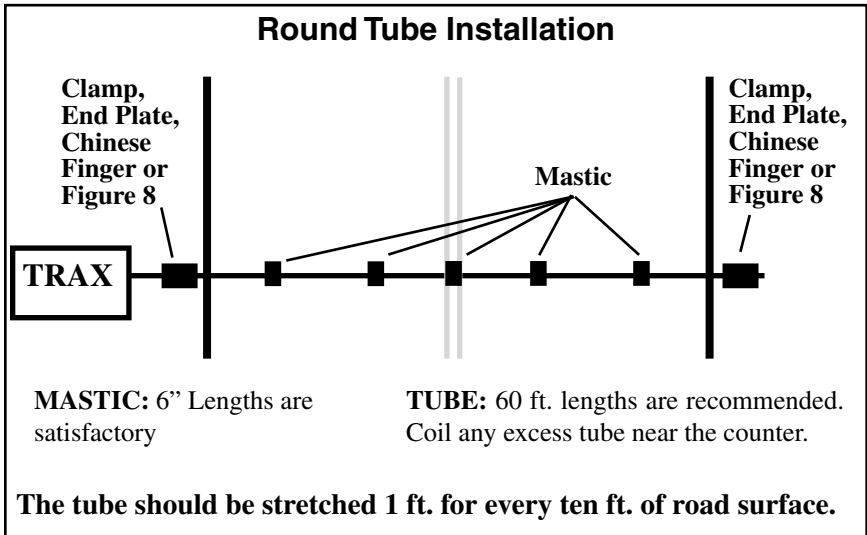
Mini-Road Tube (.20 ID x .375 OD)

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.

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.

Mini Tube Installation

Webbing

Mastic or Duct Tape

Webbing

TRAX

Knot in Tube

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.
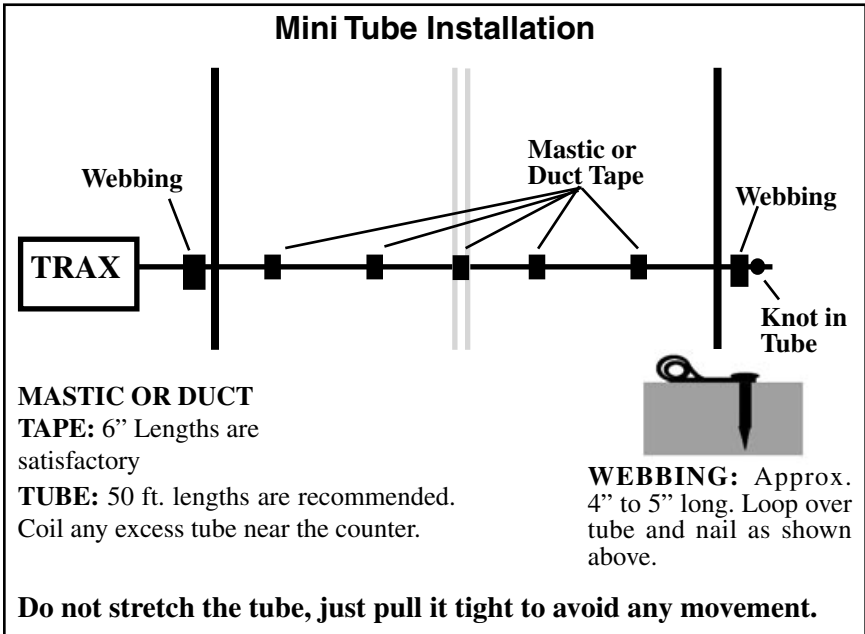
Checking for Accuracy

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.

Connecting to a Loop

The TRAX III Plus is connected to a loop using a loop cable like the one shown here. This cable contains wires for connecting from one to eight loops to the TRAX.

Generally, the wires from the loop cable are connected to the wires from the loop itself using a terminal block.

The following color code is used for the wires:

Loop 1: Red & Black with Red Stripe
Loop 2: White & Black with White Stripe
Loop 3: Green & Black with Green Stripe
Loop 4: Blue & Black with Blue Stripe
Loop 5: Yellow & Black with Yellow Stripe
Loop 6: Orange & Black with Orange Stripe
Loop 7: Brown & Black with Brown Stripe
Loop 8: Green & Red with Green Stripe

The connections from the individual loops do not have to be in a specific order. For example, the red wire on the loop cable can be connected to either wire from Loop 1. After screwing the black connector of the loop cable to the TRAX, connect the wires of the loop cable to their corresponding loop, using the color code above.

Loop Specifications

We highly recommend that the TRAX III Plus be used with loops that have been professionally installed by experienced loop installers. If your loops are installed incorrectly, you will not get accurate data.

The recommended inductance of the loops is between 100 and 200 microHenries, although the TRAX should function within an inductance range of 70 to 350 microHenries.
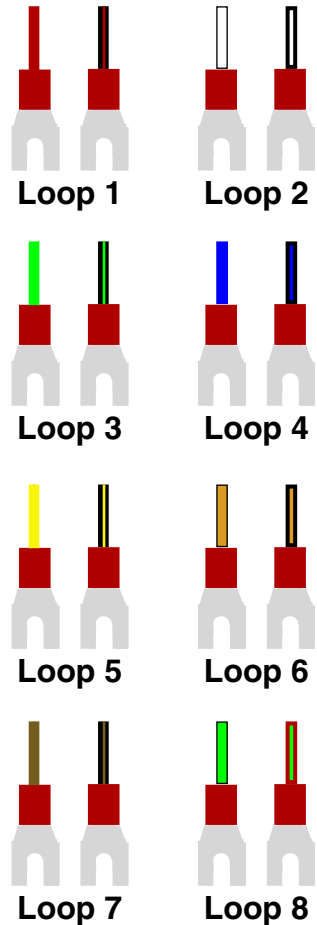
Chapter 4

Layouts

Layouts for the TRAX III Plus

The TRAX III Plus is equipped with many pre-programmed layouts for recording traffic data. These 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 sensors being used (loops or tubes) and the manner in which they are installed are critical to achieving good results. Refer to Chapter 3 *Road Tube Installation & Loop Connections* 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, except where otherwise indicated.

• 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.

• For counts done in the Volume Only mode, the TRAX will either do a straight axle count (Volume-Axle) or use the divide-by-two technique (Volume-Vehicle), in which every two axle hits will increment the TRAX by one. When using loops, the Volume-Vehicle mode should be selected.

• 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. To be able to get class, speed or gap information from basic data you must use one of the designated layouts for this (layouts L5, L6, L10, L11 & L12).

• The spacings listed for loops are from the front edge of the loops.

• Road Tube Sensors (A, B, C, D) can be replaced with Piezoelectric sensors in the following layouts. Piezos are recommend for permanent site installations.

• Loop layouts can be used with either permanently installed loops or temporarily installed loops.

• For best results, loops in lanes next to each other should be offset from each other to reduce the chance of crosstalk from one loop to another.

The diagrams for the following road tube 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: Temporary Installation
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.
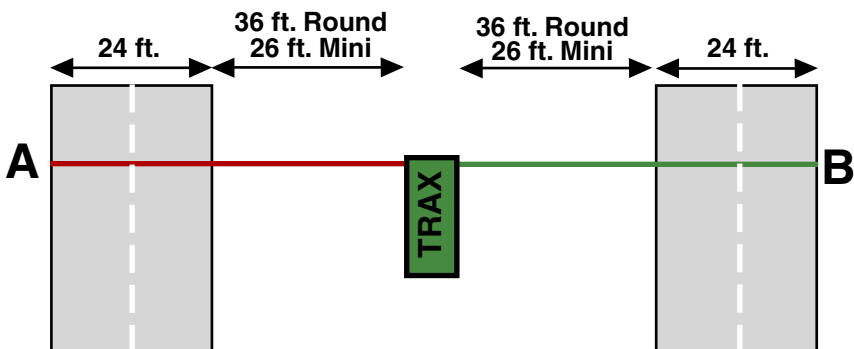
Layout: L2

Layout Type: Temporary Installation
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.
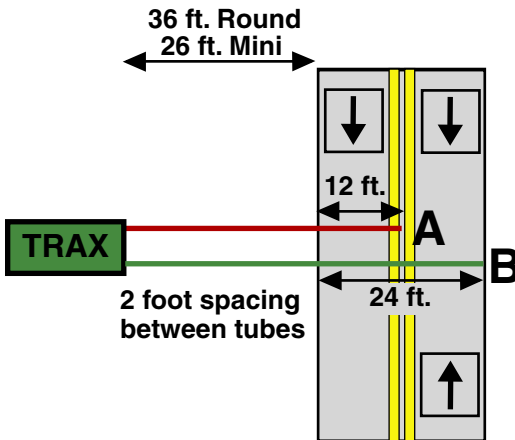
Layout: L3

Layout Type: Temporary Installation
Sensors Used: 2 Road Tubes
Spacing: 4.5 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.
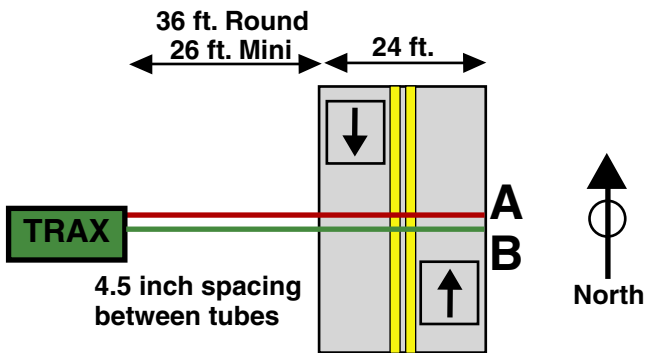
Layout: L4

Layout Type: Temporary Installation
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.
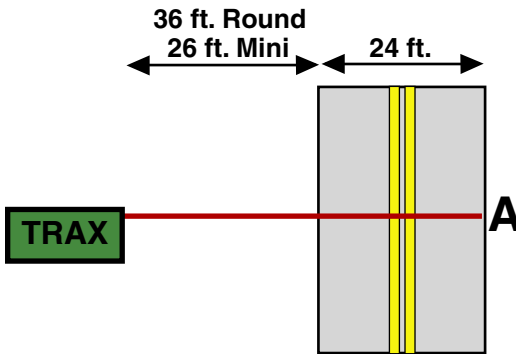
Layout: L5

Layout Type: Temporary Installation
Sensors Used: 2 Road Tubes
Spacing: Two Feet
Count Formats: Basic, Bin
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.
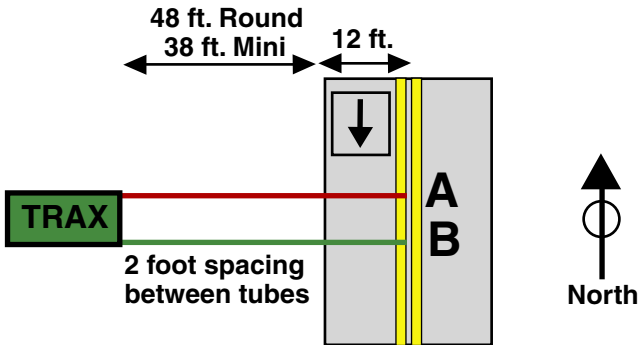
Layout: L6

Layout Type: Temporary Installation
Sensors Used: 2 Road Tubes
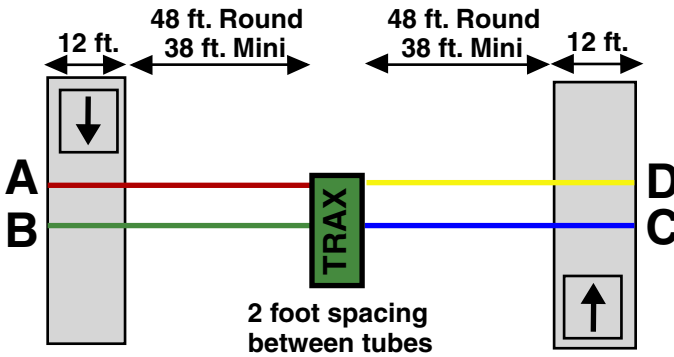Spacing: Two Feet
Count Formats: Basic, Bin
Data: Class, Speed, Gap, Volume
Directions: 2 Directions, A to B, B to A

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.
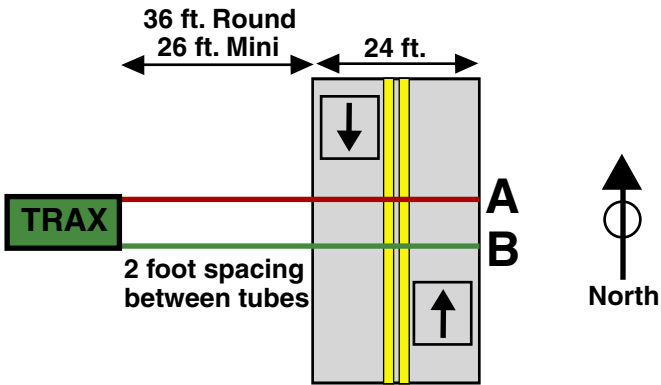
Layout: L7

Layout Type: Temporary Installation
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.
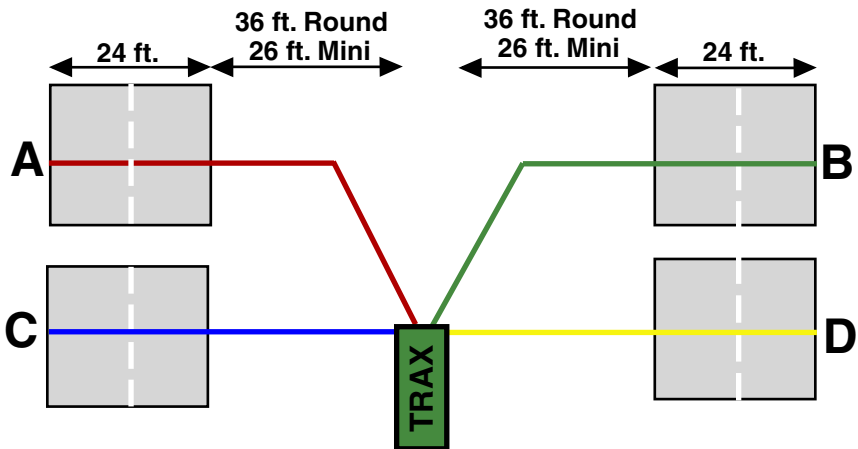
Layout: L8

Layout Type: Temporary Installation
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.
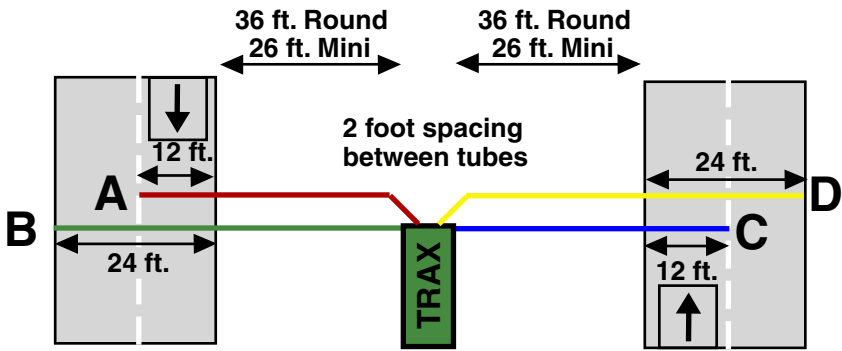
Layout: L9

Layout Type: Temporary Installation
Sensors Used: 4 Road Tubes
Spacing: 4.5 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.
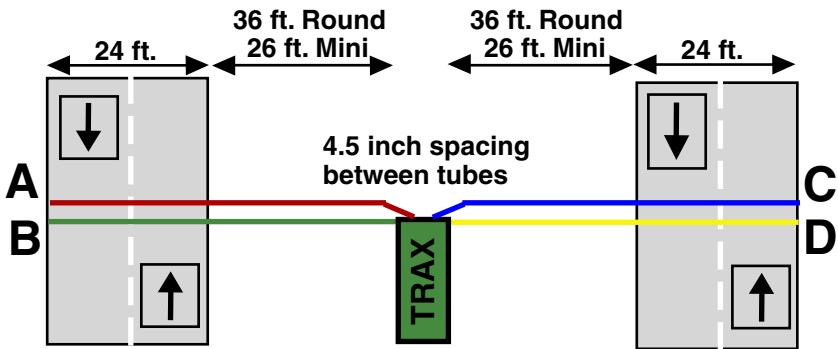
Layout: L10

Layout Type: Temporary Installation
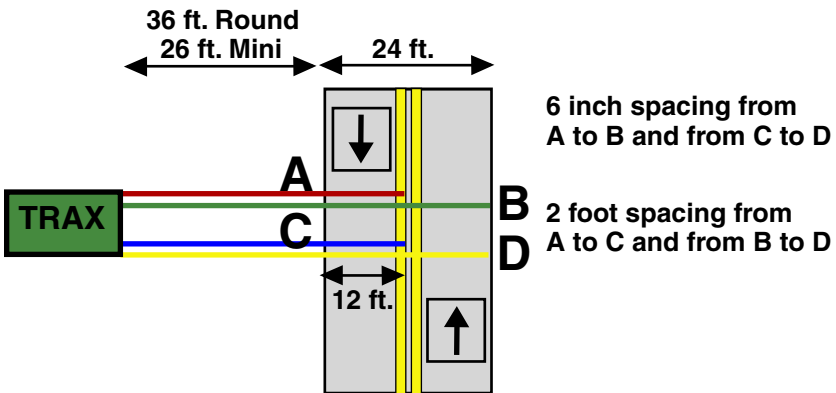Sensors Used: 4 Road Tubes
Spacing: Two Feet
Count Formats: Basic, Bin
Data: Class, Speed, Gap, Volume
Directions: 2 Directions, A to B, C to D

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 feet apart and be of equal length.

Layout: L11

Layout Type: Temporary Installation
Sensors Used: 4 Road Tubes
Spacing: Two Feet, A to C and B to D. Six inches, A to B, C to D
Count Formats: Basic, Bin
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.
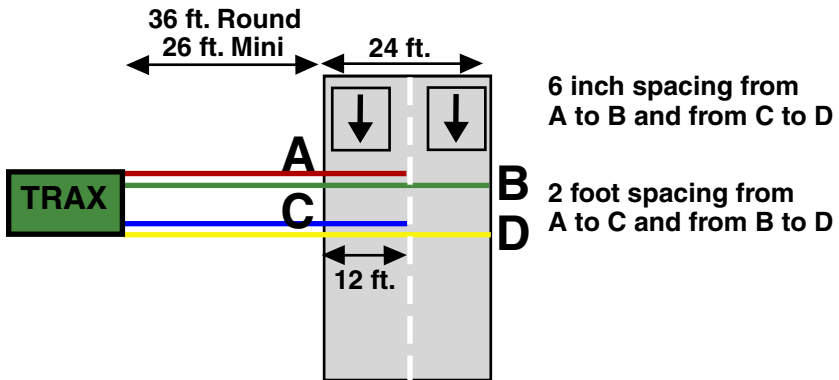
Layout: L12

Layout Type: Temporary Installation
Sensors Used: 4 Road Tubes
Spacing: Two Feet, A to C and B to D
Count Formats: Basic, Bin
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: Temporary Installation
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 for more information.
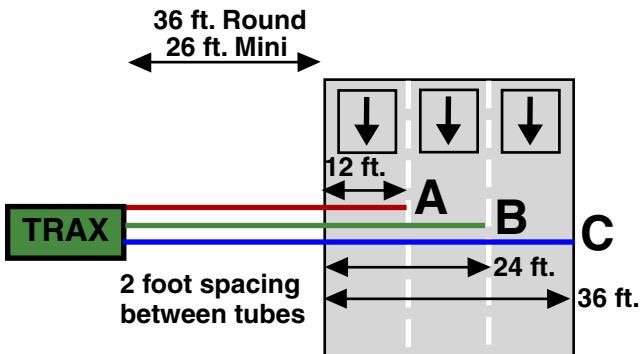
Layout: L14

Layout Type: Temporary Installation
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 for more information.
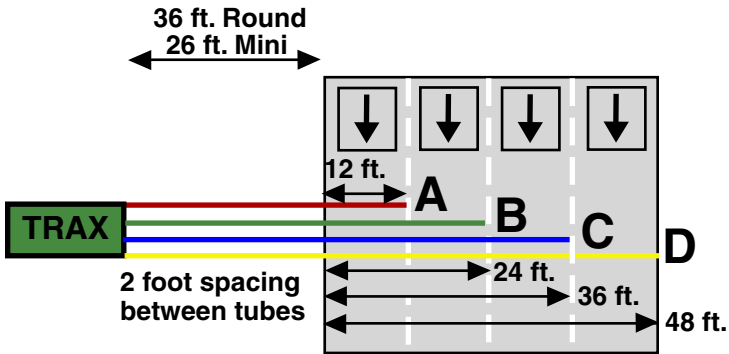
Layout: L21
Layout Type: Permanent Site or Temporary Installation
Sensors Used: 1 Loop
Spacing: None
Count Formats: Volume Only
Data: Volume
Channels: 1 Channel, I

In this layout, one loop is installed in one lane. For every vehicle that passes over the loop a count of one is registered in the TRAX.
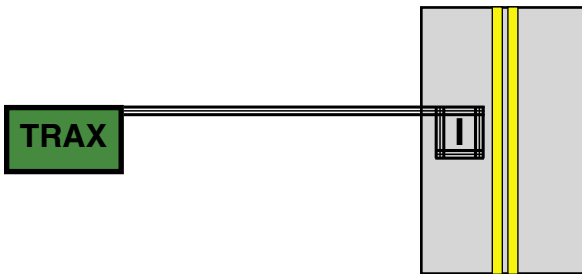
Layout: L22

Layout Type: Permanent Site or Temporary Installation
Sensors Used: 2 Loops
Spacing: None
Count Formats: Volume Only
Data: Volume
Channels: 2 Channels, I, J

In this layout, one loop is installed in each lane of a two lane road. For every vehicle that passes over the loop a count of one is registered in the TRAX for the appropriate lane.
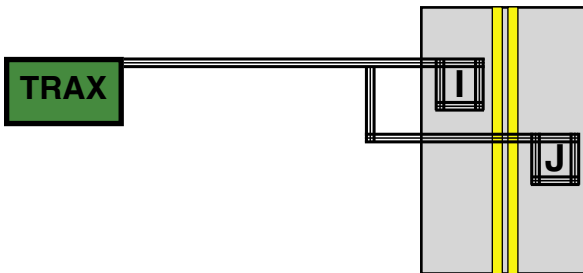
Layout: L23

Layout Type: Permanent Site or Temporary Installation
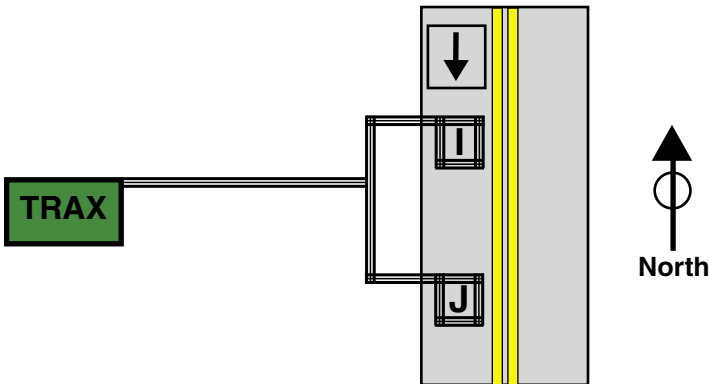Sensors Used: 4 Loops
Spacing: None
Count Formats: Volume Only
Data: Volume
Channels: 4 Channels, I, J, K, L

In this layout, one loop is installed in each lane of a four lane road. For every vehicle that passes over the loop a count of one is registered in the TRAX for the appropriate lane.
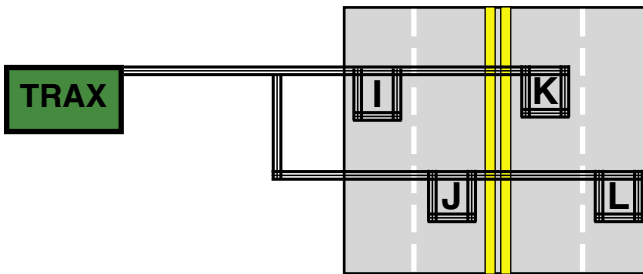
Layout: L24

Layout Type: Permanent Site or Temporary Installation
Sensors Used: 2 Loops
Spacing: Sixteen Feet, Front Edge to Front Edge
Count Formats: Bin
Data: Length, Speed, Gap, Volume
Directions: 1 Direction, I to J

In this layout, two loops are installed in one lane. Channel I and channel J record dependent on each other.

EXAMPLE: A car is traveling southbound, approaching the loops. As the vehicle passes over the front of the first loop and then the front of the second loop, the speed and length 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 in recording volume. Each individual vehicle counts as only one.

North

Layout: L25

Layout Type: Permanent Site or Temporary Installation
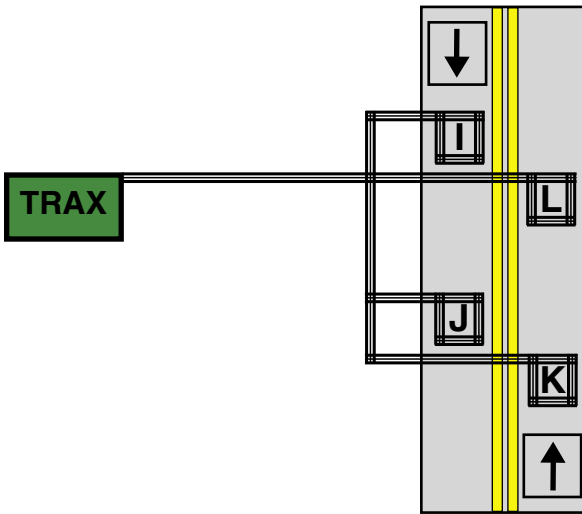Sensors Used: 4 Loops
Spacing: Sixteen Feet, I to J, K to L, Front Edge to Front Edge
Count Formats: Bin
Data: Length, Speed, Gap, Volume
Directions: 1-2 Directions, I to J, K to L

This layout is the same as the L24, but with two additional loops in a separate lane.

Layout: L26

Layout Type: Permanent Site or Temporary Installation
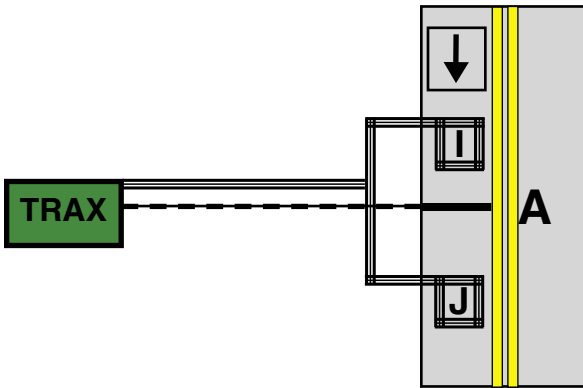Sensors Used: 2 Loops, 1 Piezo
Spacing: Loops - Sixteen Feet, I to J, Front Edge to Front Edge. Loop to Piezo - Twelve Feet Front Edge Loop I to Piezo A
Count Formats: Bin
Data: Class, Speed, Gap, Volume
Directions: 1 Direction, I to A to J

This layout is the same as the L24, but with the addition of a piezo between the loops to provide vehicle classification.

Layout: L27

Layout Type: Permanent Site or Temporary Installation
Sensors Used: 4 Loops, 2 Piezos
Spacing: Loops - Sixteen Feet, I to J, K to L, Front Edge to Front
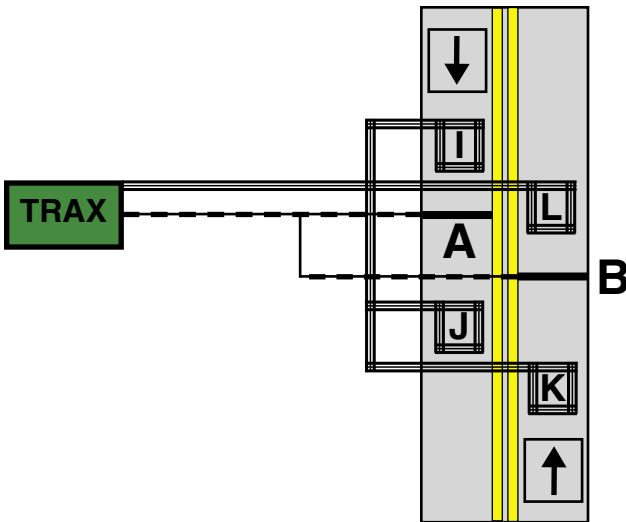Edge. Loop to Piezo - Twelve Feet Front Edge Loop I to Piezo A,
Loop K to Piezo B
Count Formats: Bin
Data: Class, Speed, Gap, Volume
Directions: 1-2 Directions, I to A to J, K to B to L

This layout is the same as the L26, but for two lanes of traffic.

Layout: L28

Layout Type: Permanent Site or Temporary Installation
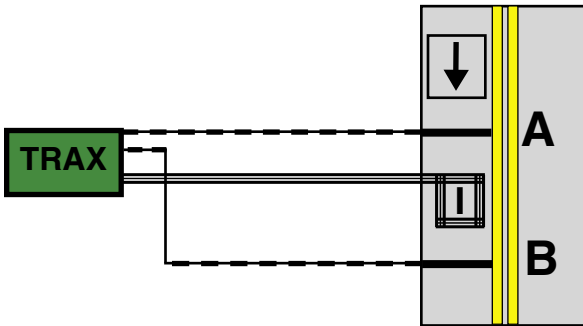Sensors Used: 2 Piezo, 1 Loop
Spacing: 8 ft. from Piezo A to B, Loop centered between piezoes
Count Formats: Bin
Data: Class, Speed, Gap, Volume
Directions: 1 Direction, A to I to B

In this layout, two piezoes are installed in one lane, with one loop centered between them. The piezoes are used to calculate speed and class, while the loop records volume.

Layout: L30

Layout Type: Permanent Site or Temporary Installation
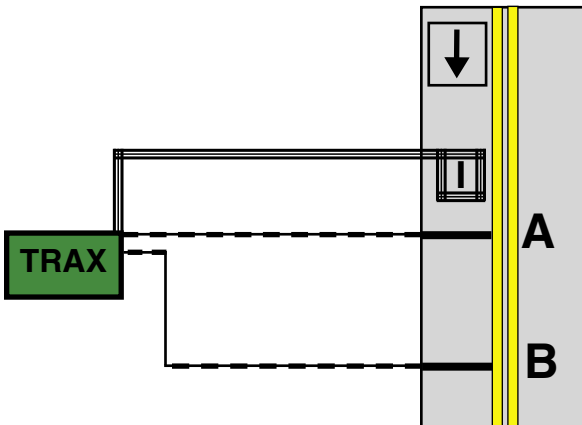Sensors Used: 1 Loop, 2 Piezo
Spacing: 8 ft. from Piezo A to B, Loop in front of piezo A
Count Formats: Bin
Data: Class, Speed, Gap, Volume
Directions: 1 Direction, I to A to B

In this layout, two piezoes are installed in one lane, with one loop installed before the first piezo. The piezoes are used to calculate speed and class, while the loop records volume.

Layout: L32

Layout Type: Permanent Site or Temporary Installation
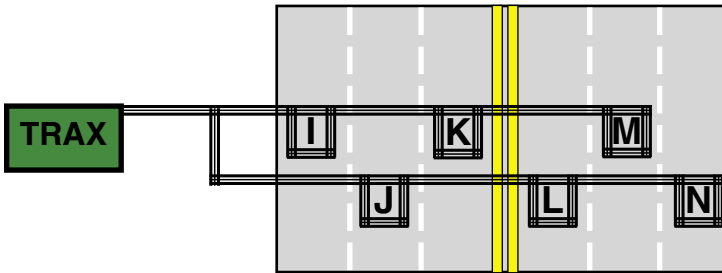Sensors Used: 6 Loop
Spacing: None
Count Formats: Volume Only
Data: Volume
Channels: 6 Channels, I, J, K, L, M, N

In this layout, one loop is installed in each lane of a six lane road. For every vehicle that passes over the loop a count of one is registered in the TRAX for the appropriate lane.

Layout: L33
Layout Type: Permanent Site or Temporary Installation
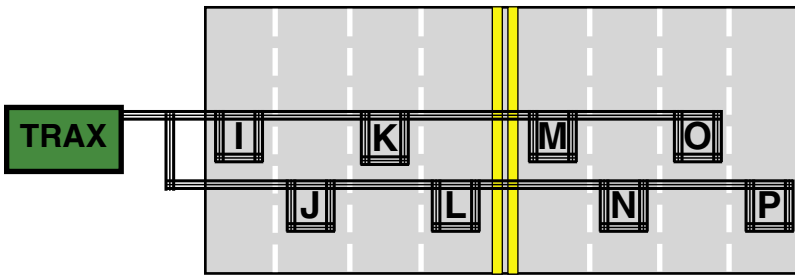Sensors Used: 8 Loops
Spacing: None
Count Formats: Volume Only
Data: Volume
Channels: 8 Channels, I, J, K, L, M, N, O, P

In this layout, one loop is installed in each lane of an eight lane road. For every vehicle that passes over the loop a count of one is registered in the TRAX for the appropriate lane.

Layout: L34

Layout Type: Permanent Site or Temporary Installation
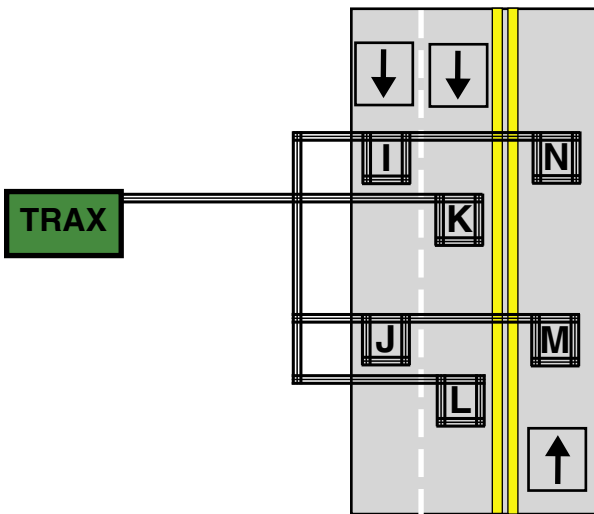Sensors Used: 6 Loops
Spacing: Loops - Sixteen Feet, I to J, K to L, M to N, Front Edge to
Front Edge.
Count Formats: Bin
Data: Length, Speed, Gap, Volume
Directions: 1-3 Directions with lane separation, I to J, K to L, M to N

This layout is the same as the L24, but with four additional loops for two
additional lanes.

Layout: L35

Layout Type: Permanent Site or Temporary Installation
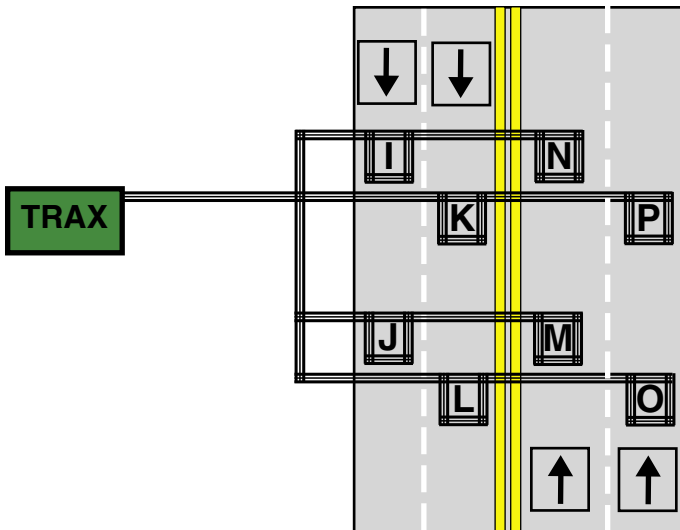**Sensors Used:** 8 Loops
Spacing: Sixteen Feet, I to J, K to L, M to N, O to P, Front Edge to Front Edge.
Count Formats: Bin
Data: Class, Speed, Gap, Volume
Directions: 1-4 Directions with lane separation, I to J, K to L, M to N, O to P

This layout is the same as the L24, but with six additional loops for three additional lanes.

Chapter 5

Downloading the TRAX III Plus

Downloading a TRAX III Plus

The TRAX III 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 TRAXPro software, an available serial port on your computer, and a JAMAR universal download cable. The download cable uses a specific pin configuration. **Use of a standard serial cable can cause data to be lost or damage to occur to the TRAX.**

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.
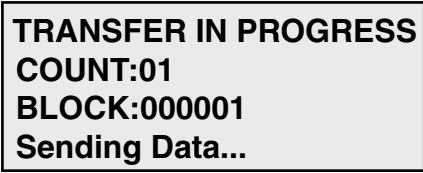
1) You must correctly identify what port you are plugging the cable into. The 25 and 9 pin connectors used for serial ports are also used for serial or parallel printers, mice, plotters, video cards and other devices. Just because your cable fits into a connector on your PC does not mean it is a serial 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 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 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) 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. 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 2-20 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 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 will show:

```
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 page 2-5 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 your computer.**

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 III 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 either through the unit's solar panel (if equipped) or 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 Charging

If your TRAX is equipped with a solar panel, this panel will charge the battery automatically if it is able to draw enough sunlight. The solar panel draws sunlight and converts it to voltage which is regulated and sent to the battery. This regulated voltage can reach as high as 7.0 volts for charging the battery. Whenever the voltage coming from the solar panel is higher than the current charge of the battery, charging takes place.

If your TRAX is used frequently and exposed to sunlight often, the battery should maintain a high charge. However, if your unit is used infrequently, and not exposed to sunlight, you may need to occasionally charge it manually.

Manual 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.

Chapter 7

Low Speed Counting

Low Speed Counting (Below 10 mph)

The TRAX III Plus is capable of recording vehicle data as low as idle speeds and above with a high degree of accuracy. If you are using loops to record data, no changes to the normal setup procedures need to be made. However, if you are using road tubes, there are a few recommended changes. Tube length, tube placement, and the air switch dead time (DT) setting are important in achieving good results. The following guidelines should be used for low speed volume installations using road tubes.

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 DT 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 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)

The DT setting is measured in milliseconds, which controls the output pulse interval from the air switch. Typically, this 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 DT setting of 200 to 300 milliseconds to avoid double counting.

> 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.

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.

Chapter 8

Troubleshooting

Troubleshooting

The following are some common questions/problems that can be encountered when using the TRAX III 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 in the front of this manual.

There is no display visible on the TRAX.
Check that the unit is not in its power-saving mode. The display automatically goes out when the TRAX has not been disturbed for several minutes. To bring the display back up, hit any key.

The display on the TRAX will not come on.
The battery voltage may have gone too low to power the display. Connect the TRAX 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's default settings.

Bin (Cls/Speed/Gap) data collection is not providing all data desired.
Check the TRAX's setup to be sure the correct data options have been programmed.

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 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 2-11 for more information on this.

The TRAX will not download.
Check your connection between the TRAX and the computer. Refer to Chapter 5 *Downloading the TRAX III Plus* for other items to check.

The TRAX displays 'File Error' during the download process.
The File Error is an indication that something has corrupted the memory of the TRAX during the data collection. If the File Error occurs immediately at the start of the download process, no data can be retrieved. The memory should be cleared and a short test count performed to verify that the unit is working correctly. If the unit does transfer some data before the File Error occurs, it may be possible to retrieve some data. Contact us using the information located in the front of the manual.

Additional support information can also be found on our web site at www.jamartech.com.

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

Appendix

# FHWA Type F Vehicle Classification Scheme

Class 1 - <u>**Motorcycles.**</u> 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 - <u>**Passenger cars.**</u> 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.
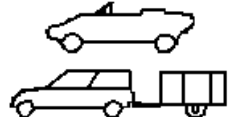
Class 3 - <u>**Pickups, Vans and other 2-axle, 4-tire single unit vehicles.**</u> This class includes all two-axle, four tire vehicles other than passenger cars, which includes pickups, vans, campers, small motor homes, ambulances, minibuses and carryalls. These types of vehicles which are pulling recreational or other light trailers are included.
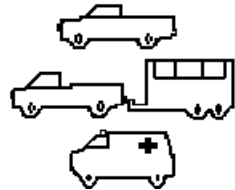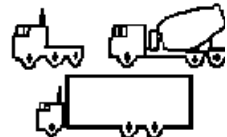
Class 4 - <u>**Buses.**</u> This class includes all vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This includes only traditional buses, including school and transit buses, functioning as passenger-carrying vehicles. All two-axle, four tire minibuses should be classified as Class 3. Modified buses should be considered to be trucks and classified appropriately.
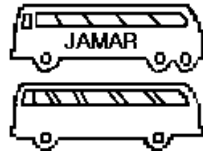
Class 5 - <u>**Two-Axle, Six-Tire Single Unit Trucks.**</u> This class includes all vehicles on a *single frame* which have *two axles and dual rear tires*. This includes trucks, camping and recreation vehicles, motor homes, etc.
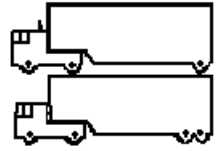
Class 6 - <u>**Three-Axle Single Unit Trucks.**</u> This class includes all vehicles on a *single frame* which have *three axles*. This includes trucks, camping and recreation vehicles, motor homes, etc.
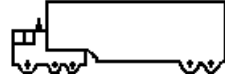
Class 7 - <u>**Four or More Axle Single Unit Trucks.**</u> This class includes all vehicles on a *single frame* with *four or more axles*.

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

Battery Life: Minimum of 30 days without recharging

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 Class/Speed/Gap, Time-stamped raw data

Inputs: Loops, Piezos and/or road tubes

Temperature Range: Minus 40F (-40C) to 155F (68C)

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

Recording Intervals: 5, 10, 15, 30 or 60 minutes for volume or binned data

Units: English (feet) or Metric (meters)

Display: 4-line by 20-character LCD display, temperature range minus 4F (-20C) to 140F (60C)

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

We are pleased that you have chosen the JAMAR TRAX III Plus for your data collection needs. We have strived to develop a unit that is easy to use and has the options that our customers require. The TRAX III Plus has undergone extensive testing to verify the accuracy of its operations, and each unit is tested before it leaves our facility. However, just like other complex electronic devices, problems can occur. We recommend that users verify the continuing accuracy of any device they use. Verification of data 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.