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

JAMAR Technologies, Inc.
151 Keith Valley Road
Horsham, PA 19044
215-491-4899

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

215-491-4899

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

You may also contact us by e-mail at:

sales@jamartech.com

Address any correspondence to:

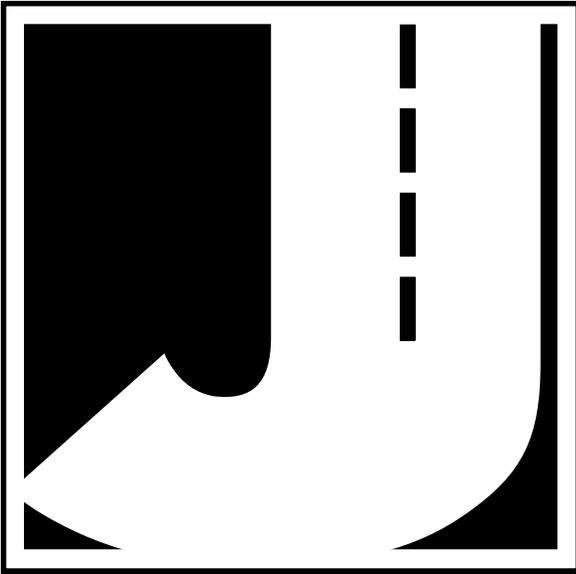
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Quick Setup Guide for the TRAX Plus HS

1. Turn the TRAX Plus HS ON.
2. From the Main Menu, **TAB** to “STAT” and hold down the **DO** key. Check the battery voltage (bat:X.Xv). For longer studies (week or more) the voltage should be at least 6.4. It can be less for shorter counts, but should not be below 6.1. Release the **DO** key when finished checking.
3. **TAB** to “Utilities” and press the **DO** key once. **TAB** to “Defaults” and press the **DO** key once.
4. **TAB** to “Space” and press the **DO** key once. Check the spacing currently set for the study. If you are using the EZ Belt, the spacing should be set to 0.3 ft. Hit the **DO** key when your selection is correct.
5. Hit the **DO** key twice with “Exit” flashing to return to the main menu. The default settings will remain stored in the counter for all future counts. You will not need to set them again unless you are going to do a different type of study.
6. From the Main Menu, press the **DO** key when “Count” is flashing.
7. 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 and Volume Only.
 - Basic:* time-stamped raw data. This study gives you the greatest flexibility and can be used to get volume, class, speed or gap information. This is the selection that is most commonly used with the TRAX Plus HS.
 - Volume Only:* axle or divide-by-two vehicle counting. This study should be used if you are only interested in vehicle volumes. For Volume-Axle, each axle is counted. For Volume-Vehicle, every two axles is counted as one (divide-by-two technique)
8. After selecting your type of study, you will be prompted to select a tube layout. Refer to the descriptions on the TRAX Plus HS or to Chapter 4 for the appropriate selection. **TAB** to your selection and press the **DO** key to select it.
9. 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.
10. Press **DO** with “Start” flashing to begin your study!



Chapter 1

**Introduction
to the
TRAX Plus HS**

What is the TRAX Plus HS?

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

The HS stands for 'high-speed', which best describes the processing power of this unit. With the TRAX Plus HS you can collect data than can be processed for speed, class or gap using a tube spacing as small as four inches.

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

The TRAX Plus HS 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 PDA through the RS-232 serial port. Once the data is in the TRAXPro software, reports for volume, class, speed and gap can be generated.



How is the TRAX Plus HS powered?

The TRAX Plus HS 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 Plus HS 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.

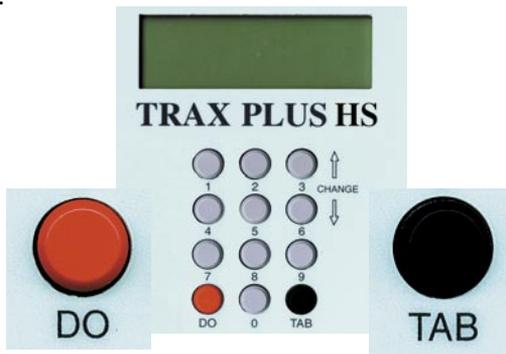
POWER ON, DO and TAB Functions



OFF/ON

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

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



Before You Do a Study

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

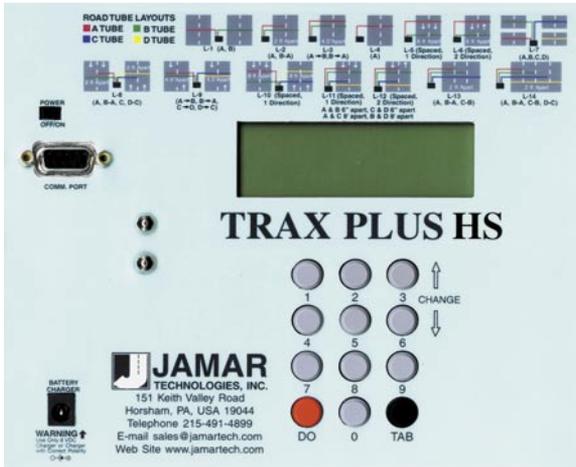
Whenever possible, we recommend that you perform a test study if you are new to the TRAX Plus HS or are planning to collect data that you have not in the past. This will help you become comfortable with the operation of the equipment and how the data is collected, which should make things easier when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

Chapter 2

Operation of the TRAX Plus HS

Start-up Screens

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



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

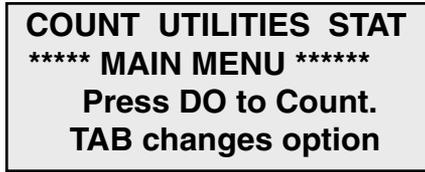
After you power on the TRAX Plus HS the sign-on screen is displayed. This shows the version number of the firmware in the TRAX Plus HS on the bottom line.

The second screen, as shown below, displays the tube spacing that is set in the TRAX Plus HS, 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 Plus HS.



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

Main Menu



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

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

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

STAT Select to display available memory, counts stored, battery power, and time/date. This is the same screen as the second one shown after turning on the TRAX Plus HS. 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 Plus HS. Press the TAB key until Utilities is flashing, then press the DO key to enter this menu. When you have selected UTILITIES from the Main Menu the screen shown here is displayed.

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

Module **Main Menu > Utilities > Module**

The Module option allows you to use a JAMAR data module with the TRAX Plus HS. 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 Plus HS 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 Plus HS into the data module. You can choose to download all studies, or just new studies created since you last downloaded. You are asked to verify this selection several times to make sure this is what you want to do.

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

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

Clear (Clr)

Main Menu > Utilities > Clr

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

Defaults

Main Menu > Utilities > Defaults

Note: The nonvolatile memory in the TRAX Plus HS 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 mode. It allows you to internally store data in 5, 10, 15, 30, or 60 minute intervals. Use the TAB button to select INT

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

INT SPACE DT DBV PZ
EXIT

Select time interval
for Binned Data

Space

Main Menu > Utilities > Defaults > Space

The Space selection applies to data collected in Basic mode. It allows you to set the proper spacing for the tube layout you will be using. Use the TAB button to select SPACE and press DO. Use the keypad to enter your correct tube spacing. When finished, press DO. Note: If you are using the EZ Belt to collect data, the spacing should be set to 0.3 ft.

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 Plus HS will wait after it has recorded a pulse before it will accept another one.

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

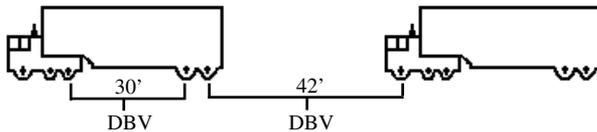
However, if you need to use a longer time, the DT selection allows you to set the dead time up to as high as 990 ms. This setting is generally only used for very low speed counting. Refer to Chapter 7 for more information.

DBV

Main Menu > Utilities > Defaults > DBV

This selection allows you to set the default Distance Between Vehicles. Enter, in feet, the longest distance between consecutive axles of the largest vehicle you would expect to see at the study site. The TRAX Plus HS 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 Plus HS 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 Plus HS the axles spaced at 30 feet could be from the same vehicle, but the axles spaced at 42 feet must be from separate vehicles.



PZ

Main Menu > Utilities > Defaults > PZ

This selection allows you to set the sensitivity for any piezoes that are being used with the TRAX. The default value is 160, which is most commonly used with temporary installations on the surface road. This setting will need to be adjusted for permanent installations on a case-by-case basis. The lower the value, the higher the sensitivity. The 2 & 3 keys can be used to lower the value while the 5 & 6 keys will raise the value.

Time/Date

Main Menu > Utilities > T/Date

This option allows you to program the date and time to be used in your TRAX Plus HS. 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 Plus HS uses a 24-hour military format; i.e. 5:00 P.M. is 17:00.

HR	MIN	MON	DAY	YR
14:06		09/	16	/05
Press to change.				
Press DO to set date.				

System (Sys)

Main Menu > Utilities > Sys

This option allows you to program some of the system settings of the TRAX Plus HS. 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	
Restore Default			
Vehicle Table			

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 Plus HS. 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 Plus HS' 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 Plus HS 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 16 MB memory. To perform the test, press DO while Memory is flashing and the TRAX Plus HS 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

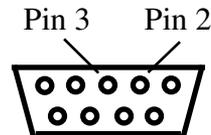
Main Menu > Utilities > Test > Keys

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



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

Tubes

Main Menu > Utilities > Test > Tubes

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

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

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

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

Count Menu

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

BASIC	VOLUME ONLY
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 2-9.

Basic

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

Volume Only

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

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

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

Tube Layout Selection

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

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

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

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

Volume Only

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

Basic

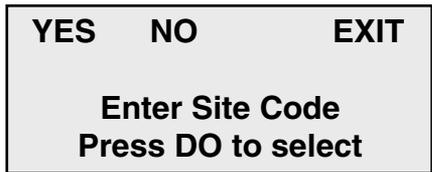
- 1 or 2 Road Tubes L1, L2, L3, L4, L5, L6
- 3 or 4 Road Tubes L7, L8, L9, L10, L11, L12, L13, L14

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

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

Site Code

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



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

Numeric Site Code

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

Alpha-numeric Site Code

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

When you first enter the Alpha-numeric site code screen the first field is flashing, along with the OK selection. To enter a value, press the TAB key until the

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

field for numbers, upper case letters, lower case letters, or symbols is flashing. Use the Change keys (3 and 6) to scroll through the values for the option you've selected. Once the character you want is entered, press DO and the highlight will move to the next field.

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

Count Start-up Menu

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

START STAT GPS
EXIT
Press DO to Start

Stat

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

L5: Two Equal Tubes
with spacing; 1 dir

DT: 35 ms

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

GPS

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

To load GPS information into the TRAX, connect the GPS unit to the TRAX using the JAMAR GPS cable (also used with the data module) to link each unit's RS-232 serial port.

Receiving GPS Data
LAT:
LON:
Press DO to Accept

Note: The 'Receiving GPS Data' screen needs to be up on the TRAX Plus display **before** you connect the GPS device to the TRAX. If the GPS device is connected first, the TRAX may not receive the signal properly.

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

Start

When you select Start from the Count Start-up menu, the TRAX Plus HS 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 Plus HS is collecting data. Press the TAB key to page through the available status screens. The following are examples of the types of screens that are available for review depending on the study you have programmed.

Basic Data Status Screens

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

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

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

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

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

```
07:13:12 02/13/05
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). 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 Plus HS.

```
CHNL CNTS Int:0001  
A:0006  
B-A:0008  
TD 07:19:50 02/13/05
```

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
```

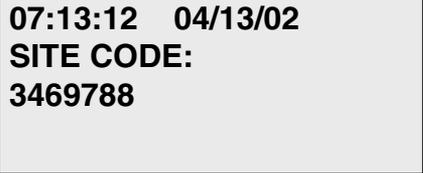
The top line of this screen tells you the layout that has been selected (L2) and the type of study being done (VOL-VEH). The next two lines represent the channels that data is being recorded on (A and B). As the tires from an axle strike the tubes, an asterisk is recorded in the appropriate channel. The bottom line tells you what number count this study is in the TRAX Plus HS (CNT:02), the percentage of memory available (MEM:99%) and the battery voltage (6.4v).

```
L02-VOL-VEH  
A:*****  
B:*****  
CNT:02 MEM: 99% 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 D-bounce) is set for in the TRAX Plus HS (DT:25ms) and what length of interval is being used for the study (Intv:15min).

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

The top line of this screen gives the date and time as they are set in the TRAX Plus HS. 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

There are two ways to end a count. The most common way to end a count is to turn the TRAX Plus HS off. The count will be stored in the TRAX Plus HS's internal memory. Additional studies can then be conducted with the unit. The TRAX Plus HS can hold up to 150 different studies in its memory.

You can also end the count through the options that can be accessed by hitting the DO key while a study is in progress.

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.



EXIT MODULE NEW

The *New* option will end the current count and immediately begin a new one with the same default settings. This option is useful if you want to download data you have collected, but still want to leave the TRAX in place.

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

Downloading a TRAX Plus HS

The TRAX Plus HS is designed to be downloaded to a computer running the TRAXPro software or a PDA running the TRAXPDA software. The download of data is done through the communications (serial) port of the TRAX using either a JAMAR universal download cable for a computer or serial cable for a PDA.

To prepare to download your data, connect the universal cable to a serial port on your computer. Most serial ports are a 9 pin plug, and there may be more than one on the computer. 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 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 Plus HS 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 Plus HS 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

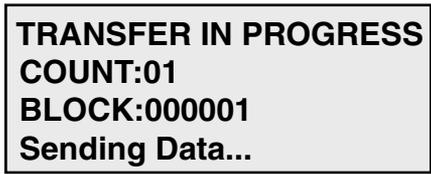
these devices available on-line and at computer stores. Go to the hardware support section of our web site (www.jamartech.com) for a link to one of these devices that we have tested and found to work well.

Once the universal cable is plugged into the computer, plug the other end into the TRAX Plus HS. If you have a count in progress that you would like to download you must end the count, using one of the options discussed on page 2-17.

On the TRAX itself, you must have either the Main Menu or the Count Status screen visible to download data. If the Main Menu is visible, the download will transfer all data currently stored in memory. If the Count Status screen is visible, the download will transfer all counts stored in memory, but not the count currently being done. Refer to page 2-17 for options on storing the current count for download.

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

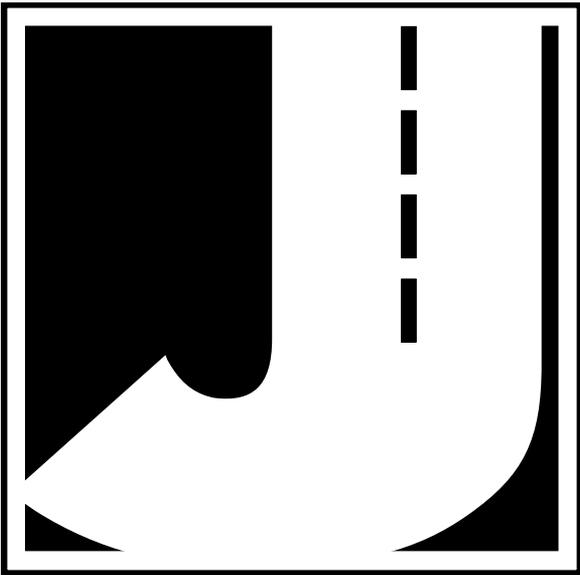
While the data is being downloaded, the display on the TRAX Plus HS will show:

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

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

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

Downloaded counts will remain in the memory of the TRAX until they are cleared. Refer to page 2-5 for information on how to clear the memory. **Important: Do not clear the memory of the TRAX until you are certain that the data has been successfully downloaded to you computer.**



Chapter 3

Using the EZ Belt

What is the EZ Belt?

The EZ Belt is a revolutionary new form of road tube that eliminates the need to measure tube spacing in the field.

The belt consists of two pneumatic tubes connected together at a 4 inch spacing by a thin layer of rubber. Since the two tubes are manufactured at a set distance apart, there is no need for you to do any measuring while in the field. When connected to a TRAX Plus HS recorder, you can record accurate data for volume, speed, class and gap using the EZ Belt.

The EZ Belt comes in two sizes - 14 feet for one lane applications and 26 feet for two lane applications. The EZ Belt is installed in the lanes you want to record, then mini-tubes are connected from the end of the belt back to the TRAX recorder.

Installing the EZ Belt

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

The EZ Belt should be replaced on a fairly consistent basis. Older belts will eventually develop splits in the tubes 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 the EZ Belt after 30 days of use.

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

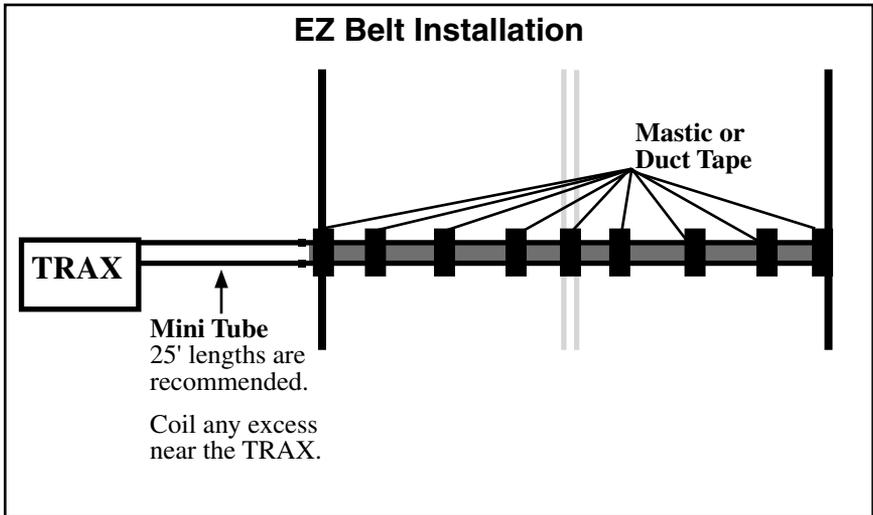
www.jamartech.com

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

The EZ Belt should be placed exactly perpendicular to the flow of traffic to prevent double counting. Apply mastic tape to each end of the belt to start, then additional mastic can be applied to the EZ Belt to further secure it.

Once the EZ Belt has been secured, two 25 ft. mini tubes should be connected from the end of the belt back to the TRAX recorder.

IMPORTANT - It is critical that the mini tubes used to connect the EZ Belt back to the TRAX Plus be **IDENTICAL** in length. The margin for error when using a four inch tube spacing is very small, so having the tubes be mismatched by even a small amount can have a negative effect on your results. We recommend using matched 25 foot lengths when connect either a one lane or two lane EZ belt back to the TRAX.



Checking for Accuracy

Once the EZ Belt is 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 EZ Belt periodically during the study to ensure they it has not been damaged and data is being recorded as programmed.

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

Chapter 4

Road Tube Installation

Installing Road Tube

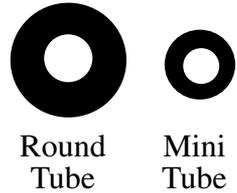
In addition to the EZ Belt (discussed in Chapter 3), the TRAX Plus HS can also use traditional road tubes for data collection.

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



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

www.jamartech.com

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

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 Plus HS. 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 Plus HS. 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 Plus HS. 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 Plus HS.

Tube Placement

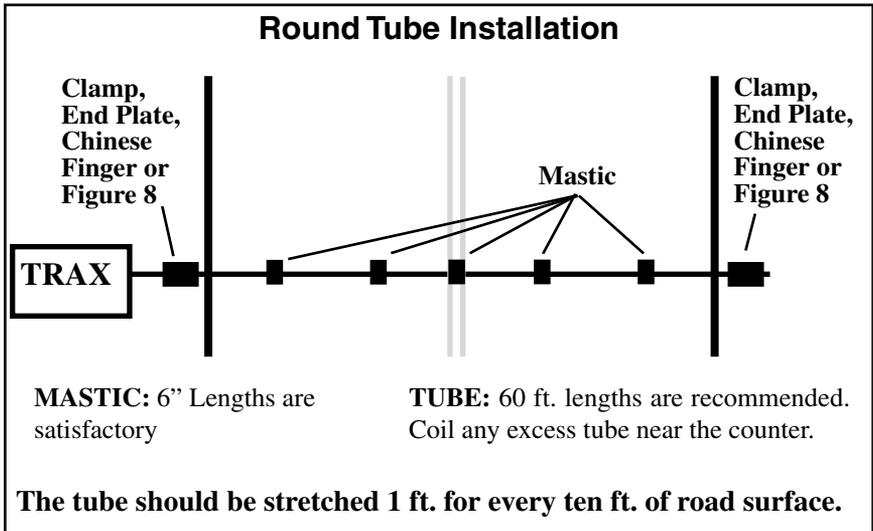
Tubes should be placed exactly perpendicular to the flow of traffic to prevent double counting. When using two or more tubes that must be set at specific distances from each other, always use a tape measure or ruler to measure from the center of each tube to determine the proper spacing. In short tube,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

Installation

Round Tube (.25 ID x .60 OD)

Round tube should be stretched one foot for every ten feet of roadway when being installed. Each tube should be secured at each end of the roadway by using a galvanized C-Clamp, Chinese Finger, Figure 8 Grip or an End Plate. Whichever is used, ensure the proper nail size is used. Use the longer nail size (normally 2 1/2 inch or longer) in hot weather due to the softness of the asphalt. In cold weather applications, the asphalt becomes harder, making it more difficult to drive in the nails. In this situation, smaller nails (1 1/2 inch) can be used.

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

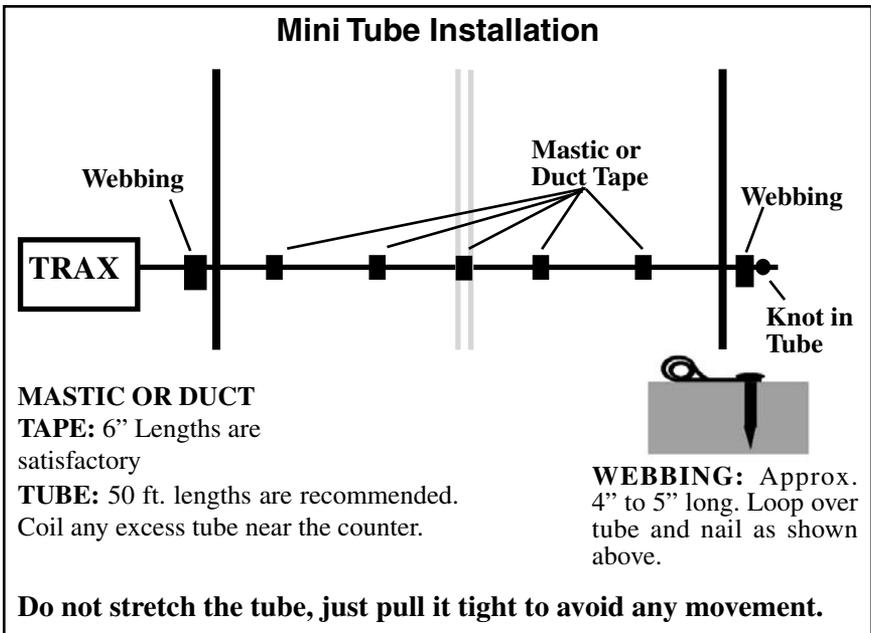


Mini-Road Tube (.20 ID x .375 OD)

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.



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.

Chapter 5

**Road Tube
Layouts**

Road Tube Layouts for the TRAX Plus HS

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

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

- The condition of the road tubes, the manner in which they are installed and the length of the tubes are all critical to achieving good results. Refer to Chapter 4 *Road Tube Installation* for more information on this.
- A tube length of sixty (60) feet is recommended for round tube, and a tube length of fifty (50) feet is recommended for mini tube.
- In all tube setups of more than one tube, the tube length from the end of the road to the counter must be the same for all tubes.
- In all short tube, long tube layouts, the vehicle must strike the short tube first.
- To collect class or speed data, a minimum of two feet of tube spacing is required to achieve accurate results when using traditional road tubes. If using the EZ Belt, the spacing should be set at 4 inches (0.3 ft.).
- For counts done in the Volume Only mode, the TRAX Plus HS will either do a straight axle count or use the divide-by-two technique, in which every two axle hits will increment the TRAX Plus HS by one.
- Data can be collected in the Basic mode with any of the tube layouts, since basic data is essentially a collection of all the sensor activations on an individual basis. However, the minimum tube spacing requirements still apply to Basic data. If a layout says volume only, that is the only information you will be able to accurately get from it. You can collect data in the Basic mode with an L1 layout, but you will only be able to get volume data, not class, speed, etc.

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

Layout: L1 - Volume

Layout Type: Traditional Road Tubes

Sensors Used: 2 Road Tubes

Spacing: None

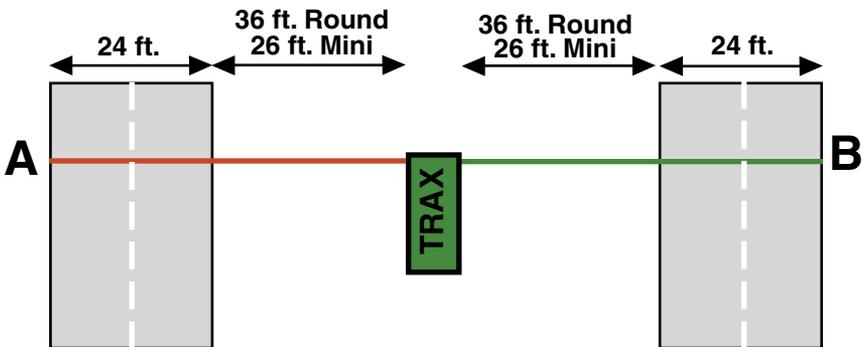
Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 2 Channels, A, B

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

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



Layout: L2

Layout Type: Traditional Road Tubes

Sensors Used: 2 Road Tubes

Spacing: 2 Feet

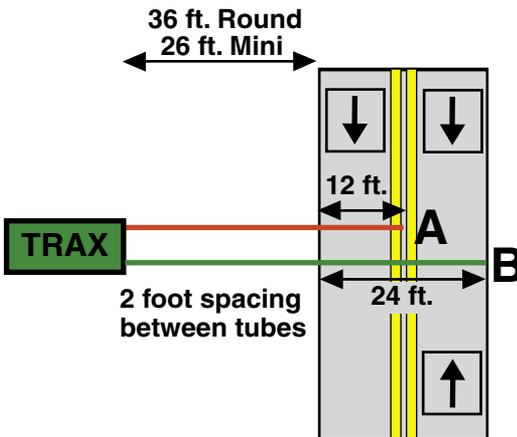
Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 2 Channels, A, B-A

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

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



Layout: L3

Layout Type: EZ Belt or Traditional Road Tubes

Sensors Used: 2 Road Tubes

Spacing: 4 Inches

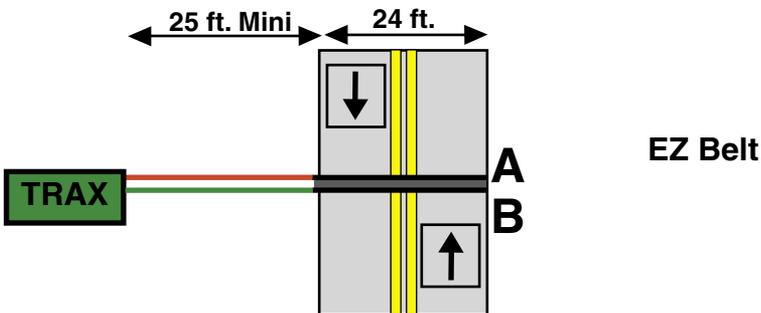
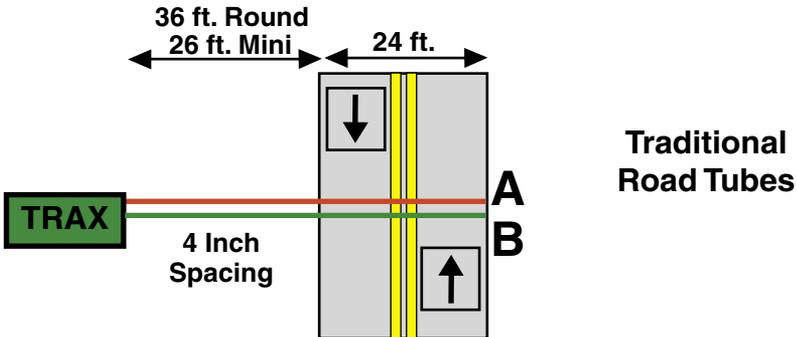
Count Formats: Basic, Volume Only

Data: Volume, Gap

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

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

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



Layout: L4

Layout Type: Traditional Road Tubes

Sensors Used: 1 Road Tube

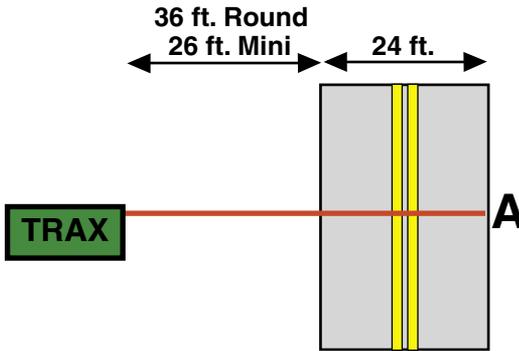
Spacing: None

Count Formats: Basic, Volume Only

Data: Volume, Gap

Channels: 1 Channel, A

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



Layout: L5

Layout Type: EZ Belt or Traditional Road Tubes

Sensors Used: 2 Road Tubes

Spacing: 4 inches for EZ Belt, Two Feet for Road Tubes

Count Formats: Basic

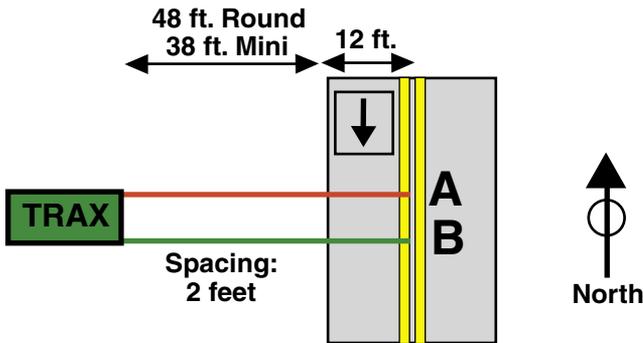
Data: Class, Speed, Gap, Volume

Directions: 1 Direction, A to B

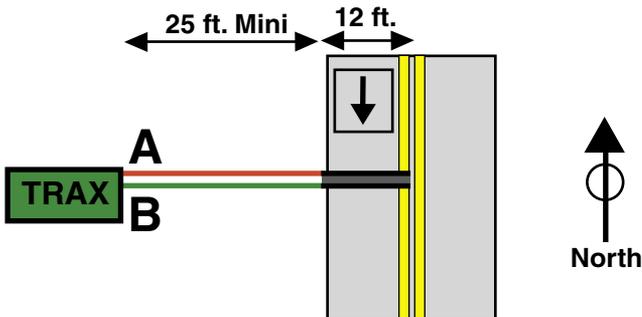
In this layout, both tubes (A and B) are extended across the lane to be studied. Channel A and channel B record dependent on each other. The tubes should be spaced two feet apart and be of equal length.

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.

Traditional Road Tubes



EZ Belt



Layout: L6

Layout Type: EZ Belt or Traditional Road Tubes

Sensors Used: 2 Road Tubes

Spacing: 4 inches for EZ Belt, or Two Feet for Road Tubes

Count Formats: Basic

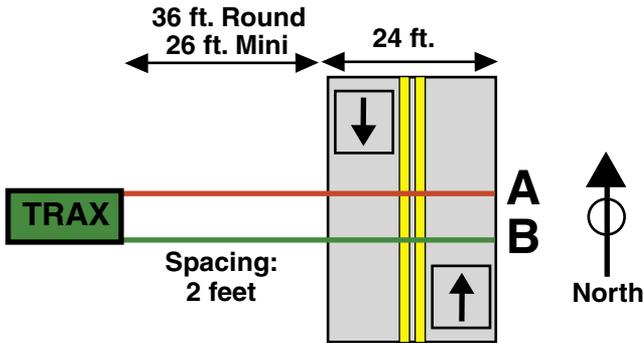
Data: Class, Speed, Gap, Volume

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

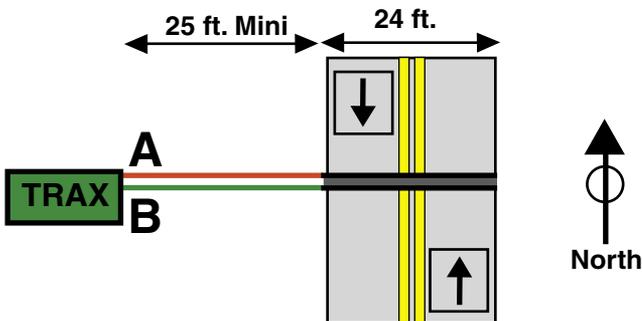
In this layout, both tubes (A and B) are extended across the lanes to be studied. Channel A and channel B record dependent on each other. The tubes should be spaced two feet apart and be of equal length.

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.

Traditional Road Tubes



EZ Belt



Layout: L7

Layout Type: Traditional Road Tubes

Sensors Used: 4 Road Tubes

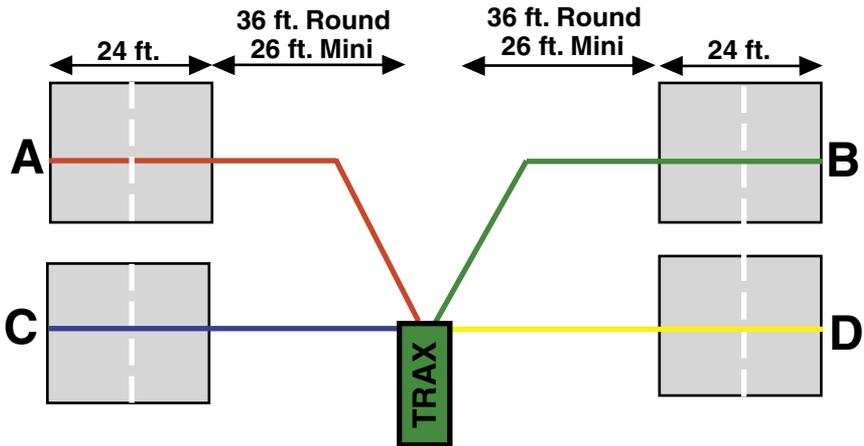
Spacing: None

Count Formats: Basic, Volume Only

Data: Volume, Gap

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

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



Layout: L8

Layout Type: Traditional Road Tubes

Sensors Used: 4 Road Tubes

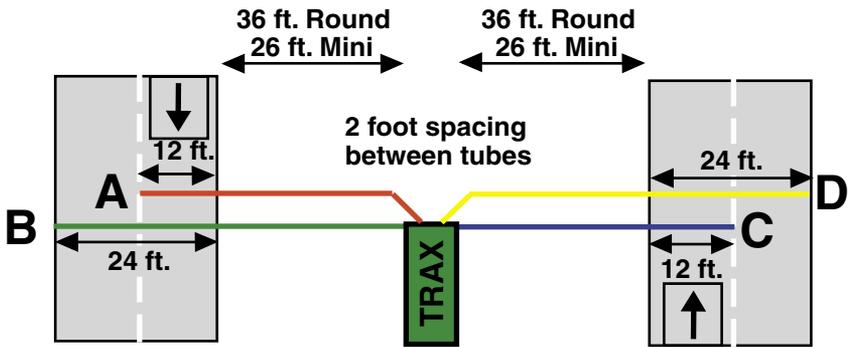
Spacing: Two Feet

Count Formats: Basic, Volume Only

Data: Volume, Gap

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

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



Layout: L9

Layout Type: EZ Belt or Traditional Road Tubes

Sensors Used: 4 Road Tubes

Spacing: 4 inches

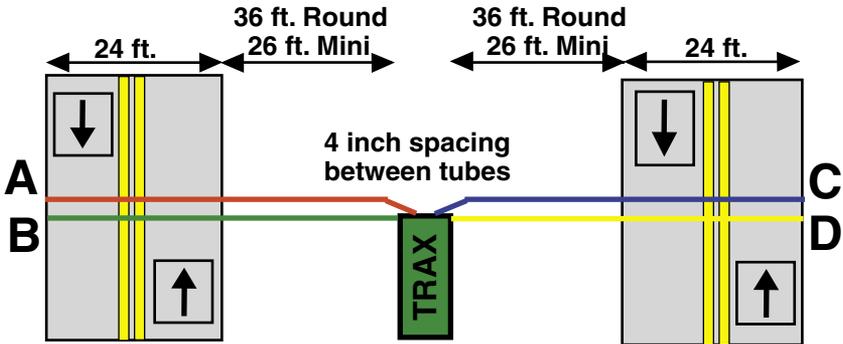
Count Formats: Basic, Volume Only

Data: Volume, Gap

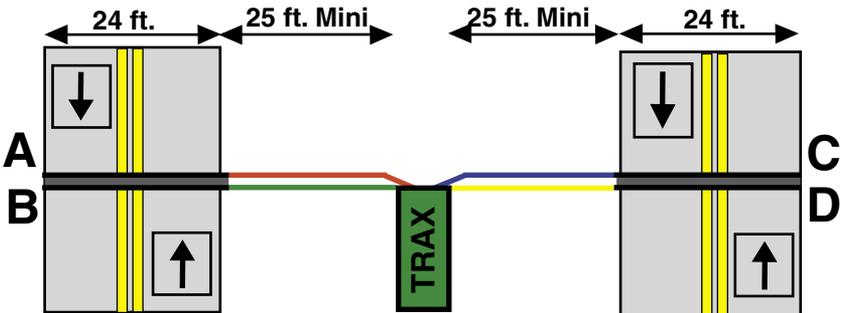
Channels: 4 Channels, A to B, B to A, C to D, D to C

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

Traditional Road Tubes



EZ Belt



Layout: L10

Layout Type: EZ Belt or Traditional Road Tubes

Sensors Used: 4 Road Tubes

Spacing: Two Feet

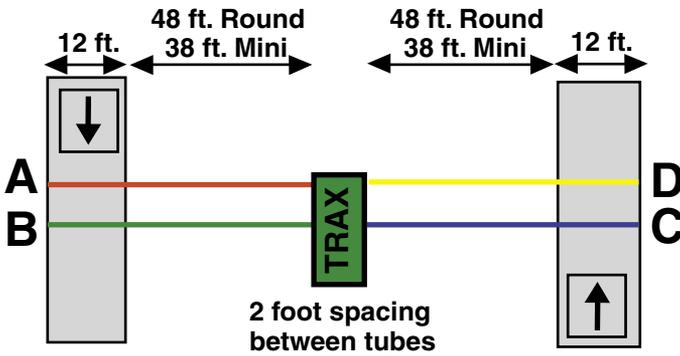
Count Formats: Basic

Data: Class, Speed, Gap, Volume

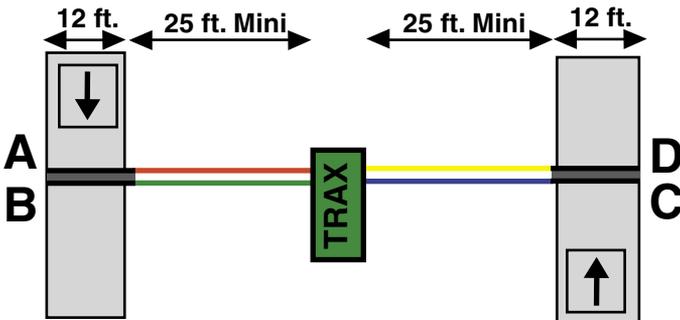
Directions: 2 Directions, A to B, C to D

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 two feet apart and be of equal length.

Traditional Road Tubes



EZ Belt



Layout: L11

Layout Type: Traditional Road Tubes

Sensors Used: 4 Road Tubes

Spacing: Two Feet, A to C and B to D. Six inches, A to B, C to D

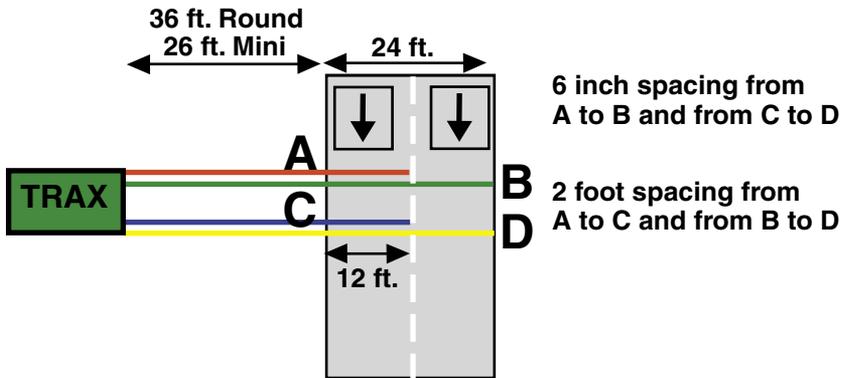
Count Formats: Basic

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: Traditional Road Tubes

Sensors Used: 4 Road Tubes

Spacing: Two Feet, A to C and B to D

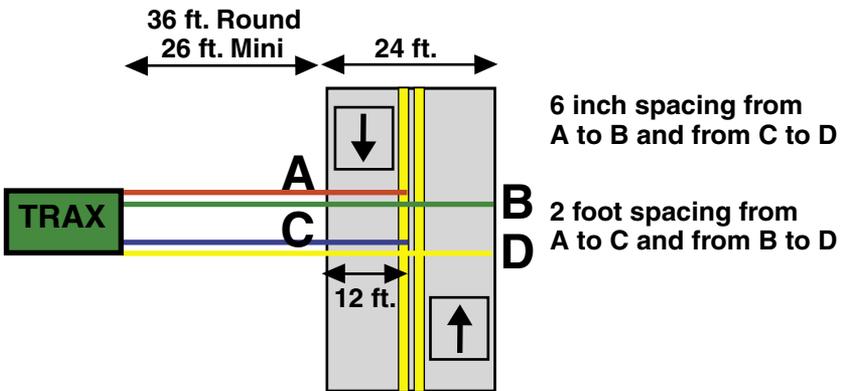
Count Formats: Basic

Data: Class, Speed, Gap, Volume

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

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

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



Layout: L13

Layout Type: Traditional Road Tubes

Sensors Used: 3 Road Tubes

Spacing: Two Feet

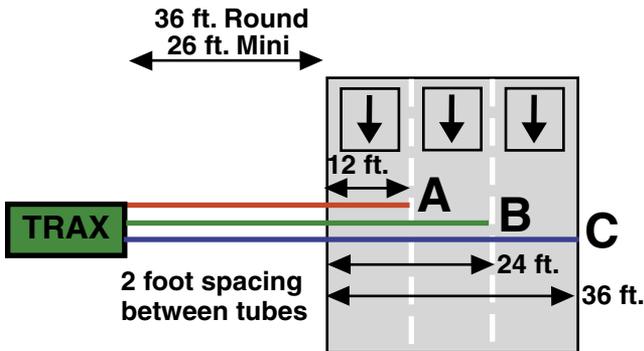
Count Formats: Basic, Volume

Data: Volume, Gap

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

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

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



Chapter 6

Battery Care

Battery Care

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

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

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

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

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

Solar Panel Use

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

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

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

Manual Battery Charging

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

Low Speed Data Collection

The default settings of the TRAX are designed to accurately collect traffic data at speeds ranging from 10 to 70 mph. In these situations, data can usually be collected without making any adjustments to the settings of the TRAX.

However, the TRAX Plus HS is capable of recording vehicle data with a high degree of accuracy from as low as idle speeds to 10 mph. If you are attempting to collect data at locations where speeds will be very low (such as driveways and parking lots), adjustments should be made to compensate for the speed of the vehicles being recorded. The following guidelines should be used for these applications.

Dead Time (DT)

When recording traffic with road tubes, there is always the possibility that the tires from each side of an axle will hit the tubes a fraction of a second apart, either from the road tubes being slightly angled or from the vehicle being slightly angled as it hits the tubes.

The Dead Time setting is used to keep these extra hits from showing up as additional volume in the data. This setting allows you to set a specific time in the TRAX when it will not accept a new pulse from the road tube after it has just received a pulse. At normal traffic speeds, the time from one tire of an axle hitting the tube to when the other tire from an axle hits the tube is usually just a few milliseconds. However, this time increases the slower vehicles are moving.

In the TRAX, the DT is typically set at 20 to 40 milliseconds for normal traffic, as this will cover most speeds. Speeds from idle to 10 mph will require the DT setting to be increased.

When recording traffic in a very low speed situation, use a DT setting of 200 to 300 milliseconds to avoid double counting. Whenever you adjust the DT setting, we recommend that you watch the TRAX as a few vehicles are recorded to be sure the TRAX is recording correctly.

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

Tube Length

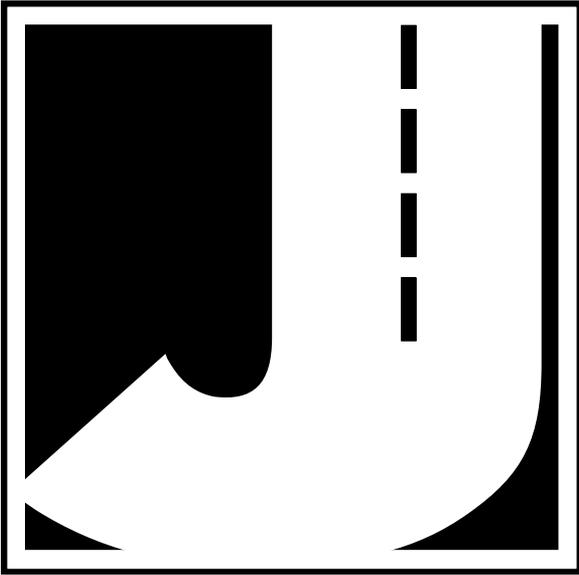
The total length of road tubes used in low speed applications should not exceed forty (40) feet. Shorter lengths may be used provided all traffic is travelling at low speeds.

Tube Placement

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 a result, you may choose to extend the road tube only as far as is necessary to be hit by one side of the vehicle.

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.

With low speed data collection, we recommend that data be collected in the Basic mode. This allows you to make further adjustments in the TRAXPro software once your data has been downloaded.



Chapter 8

Trouble shooting

Troubleshooting

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

There is no display visible on the TRAX Plus HS.

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

The display on the TRAX Plus HS will not come on.

The battery voltage may have gone too low to power the display. Connect the TRAX Plus HS 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 Plus HS's default settings.

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

Only certain layouts can be used depending on the mode of data collection requested. Refer to Chapter 5 for more information.

Cannot view all of the information desired on the TRAX Plus HS 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.

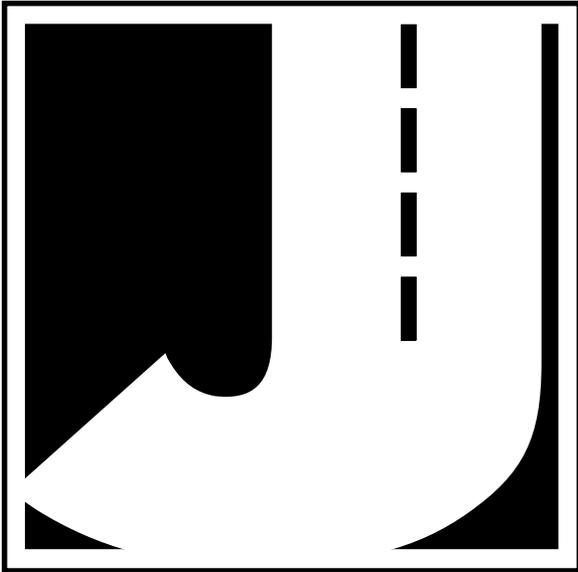
Check the tube layout used in the field and the condition of the tubes. Make sure the tubes were set with the proper length, spacing and perpendicular to the flow of traffic. One simple condition check of a tube that is laid out in the field is to go to use the Tube Test diagnostic. Refer to page 2-9 for more information on this.

The TRAX Plus HS will not download.

Check your connection between the TRAX Plus HS and the computer. Refer to pages 2-18 & 2-19 for other items to check.

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 on the first page of this manual.



Appendix

FHWA Type F Vehicle Classification Scheme

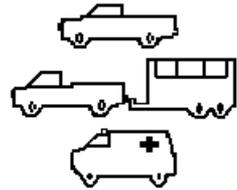
Class 1 - Motorcycles. This class includes all two- or three-wheeled motorized vehicles. These vehicles typically have a saddle-type of seat and are steered by handlebars rather than a steering wheel. This includes motorcycles, motor scooters, mopeds, motor-powered bicycles and three-wheel motorcycles.



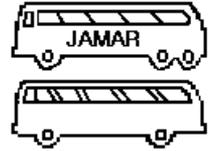
Class 2 - Passenger cars. This class includes all sedans, coupes and station wagons manufactured primarily for the purpose of carrying passengers, including those pulling recreational or other light trailers.



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



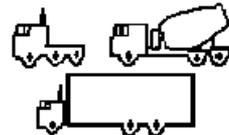
Class 4 - Buses. This class includes all vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This includes only traditional buses, including school and transit buses, functioning as passenger-carrying vehicles. All two-axle, four tire minibuses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



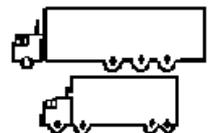
Class 5 - Two-Axle, Six-Tire Single Unit Trucks. This class includes all vehicles on a *single frame* which have *two axles and dual rear tires*. This includes trucks, camping and recreation vehicles, motor homes, etc.



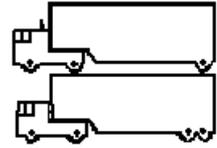
Class 6 - Three-Axle Single Unit Trucks. This class includes all vehicles on a *single frame* which have *three axles*. This includes trucks, camping and recreation vehicles, motor homes, etc.



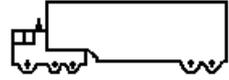
Class 7 - Four or More Axle Single Unit Trucks. This class includes all vehicles on a *single frame* with *four or more axles*.



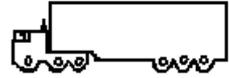
Class 8 - Four or Less Axle Single Trailer Trucks. This class includes all vehicles with *four or less axles* consisting of *two units*, in which the pulling unit is a tractor or single unit truck.



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



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

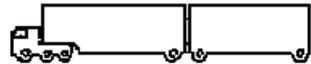


Class 11 - Five or Less Axle Multi-Trailer Trucks.

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



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



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



The TRAX Plus HS also collects data for **Class 14 - Unclassified Vehicles.** This class includes all vehicles which the TRAX Plus HS 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 Plus HS 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 Plus HS 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 optional solar panel

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

Download Speed: Up to 115200 bps

Memory: 16 MB Internal Memory

Clock: Always active real-time clock

Data Collection Formats: Volume, Time-stamped raw data

Inputs: Four road tubes

Temperature Range: Minus 40F (-40C) to 165F (74C)

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

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

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

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

