

INTERNATIONAL ROAD DYNAMICS INC.

Operator's Manual Mini TRS

Dwg#: 69046602





INTERNATIONAL ROAD DYNAMICS INC.

QUALITY IN MOTION

Operator's Manual Mini TRS

Part No. 69046602 Revision A Date: 4/8/2013

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1.0 INTRODUCTION

This manual describes the operation and use of the Mini TRS (Traffic Recording System) vehicle data recorder.

It includes operation documentation for:

- Use
- Setup
- Specifications
- Schematics
- Diagrams
- Technical Documentation
- Repair Information

1.1 MINI TRS HARDWARE

The Mini TRS classifier has been physically designed to be rugged and for easy maintenance and use.

1.1.1 HOUSING

The case housing the Mini TRS is made of powder coated cast aluminum. The housing is water and dust resistant. It is lockable to prevent unauthorized access to the electronics. The lid of the Mini TRS may contain the optional Solar panel.



Figure 1-1 - MINI TRS Outer Case

1.1.2 SENSOR CONNECTIONS

The connections for the pneumatic road tube sensors are located on the Lower side of the Mini TRS. The unit has ports for up to four pneumatic road tubes. The connectors are brass spigots over which standard ¼ inch ID rubber pneumatic tubing can be fitted:



Figure 1-2 - Road Tube Sensor Connectors

Road tube sensor connector for input #1 is on the left, then input #2, input #3 and input #4 on the right. To remember this, input #1 is closest to the handle.

The mini-TRS is also available with a contact switch input option. This model uses an 8 pin military style connector and can accept inputs from up to eight contact closure switches.



Figure 1-3 - Contact Closure Sensor Connector

The data collection options available from the mini-TRS menus for contact closure switches are identical to those for road tubes, with the exception that only four road tube inputs are available, while there can be up to eight contact closure inputs.

1.1.3 CONTROL PANEL

Under the lid of the Mini TRS is the control panel for operating the Mini TRS:

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Figure 1-4 – Control Panel

1.1.3.1 LCD Screen

The Liquid Crystal Display has four lines by twenty characters.



Figure 1-5 - LCD Screen

If there is no keypad activity for a period of five minutes, the LCD screen will go into "sleep" mode to conserve power. To reactivate the screen display, press the **F1** key (see below).

1.1.3.2 Keypad

The keypad is a four column by four row set of buttons:



Figure 1-6 - Keypad

The first column of keys on the left are function keys F1 through F4. The functions for each key will depend on the current menu displayed (described in section 2.0); For menus in which the function keys are active, the function associated with each key will be displayed along the right side of the LCD screen, adjacent to the F1 – F4 labels on the face plate.

Number entries required for a menu option are made by pressing the corresponding number on the keypad.

If alphabetic characters are required for an entry (such as entering the site identifier), pressing the key with the desired character labeled on the key multiple times will cycle through the number and three characters labeled on that key (a blank space is the 3rd character available on the 9 key).

In the bottom row are two keys labeled **Y / ENT** and **N / DEL**; these are used for entering a **Yes/Enter** or **No/Delete** answer to a menu selection.

1.1.3.3 Power

1.1.3.3.1 ON/OFF SWITCH

This switch is located at the bottom right of the control panel. When **OFF** is selected, power to all electronics in the unit is disconnected (the clock on the main board is maintained by an on board lithium battery). Do not use this switch to stop data collection as this may result in the loss of data for the current interval; use the menu: F2-PROGRAM / 8-STOP option (section 2.4) for stopping data collection.

Note: Mini TRS memory is nonvolatile (no loss of data when power is removed).

1.1.3.3.2 BATTERY

The Mini TRS is equipped with an internally mounted 6v 5Amp-hour gel cell battery prewired with its own harness.

Replacement instructions in section 6.1.

1.1.3.3.3 EXTERNAL POWER/CHARGING

The port to plug in external power is at the top center of the control panel, labeled **SOLAR / CHARGER**. Either the supplied AC adapter or the optional solar panel plugs into this port.



Figure 1-7 - Power Connection

The Mini TRS can operate and the batteries can be charged from either power source (the solar panel option only provides power to the unit when light is shining on it).

Note: only approved chargers are to be used with this unit: for more information please contact your IRD Service Representative for the IRD part numbers.

1.1.4 EXTERNAL CONNECTIONS

The Mini TRS external communications connectors are located in the lower left of the controls panel:



Figure 1-8 - External connectors

Output – the 9 pin D plug labeled **Output** provides a serial output port for a serial connection to a computer to download data and/or configure the mini-TRS from Road Reporter (refer to section 4.2).

Flashdrive – the port labeled **Flashdrive only** is a standard Type A USB Port for downloading data to a USB flash drive (USB memory stick), uploading a configuration file or uploading a new version of firmware (refer to section 4.3).

Computer – the plug labeled **Computer** is a Type B mini USB port for direct connection to a computer to download data and/or configure the TRS from RoadReporter (refer to section 4.1).

1.2 DATA COLLECTION

The min-TRS processes inputs from pneumatic air-switches (road tubes), to produce vehicle data. Road tubes are referred to as "**Axle**" sensors, since they are activated by individual axles. Because there are variations in the input signal between individual sensors, the mini TRS is capable of tuning the electronics to match the sensor inputs. Air-switches can be tuned via the firmware menus (refer to section 2.5.3)

1.2.1 DATA MODES

The Mini TRS can process and store data in a number of different modes:

1.2.1.1 Count

Count mode is the simplest mode of operation; a count is kept of the number of vehicles that pass through each lane for a specified time period; at the end of the time period, the counts are recorded to the data file. With road tubes, an optional count of the number of axles may be saved (by default, the count detected by each tube is divided by two to provide an approximate count of the number of vehicles).

1.2.1.2 Binned

Binned mode is the traditional data recording method. Vehicle data of a specified type such as speed, length, etc.; is subdivided into "bins". The division criteria for a bin will depend on the type of data; for example speed would be divided into a set of ranges, such as 0 to 29, 30 to 39, 39 to 49, etc.; for vehicle class data, the bins would be by vehicle class. Each bin contains a count of the number of vehicles that meet the criteria for that bin over a specified time period; at the end of each time period, the bin counts are recorded to the data file.

Binned Data can be collected in three ways:

Binned Single Data Type

A set of ranges (bins) is configured for the desired data type. The data file contains the number of vehicles counted in each range of that data type in each lane for the specified time period.

- Speed ranges
- Vehicle class (e.g.: FHWA Vehicle Classification Appendix B.0)
- Gap (distance between back of one vehicle and the front of the next vehicle)
- Headway (distance from the front of one vehicle to the front of the next)

Multiple Data Types (AND)

Two types of binned data can be selected to be collected at the same time: Class AND Speed.

The data collected is a count of the vehicles in each bin of the selected Data Types for each Interval in each Lane.

Matrix (Table) Type Data (BY)

A matrix of bins is defined by two sets of binning criteria The data for each bin is the count of vehicles that meet both criteria specified for that bin. The data types for matrix type data are Class BY Speed.

1.2.1.3 Per Vehicle Data Type (PV)

The mini TRS can store a separate individual record of data for each vehicle that passes over the sensors; this type is referred to as Per Vehicle (PV) data. The data recorded will include: time, lane, speed, number of axles, spacing between each axle and vehicle classification.

If Per Vehicle Data is collected, the mini TRS will also automatically collect Binned Class AND Speed data.

The user can select not to save individual record data for vehicles from classes 1 through 3 (private passenger vehicles)

1.2.2 DATA COLLECTION

A new data file is created for each day or partial day that the Mini TRS is recording data.

Binned data is collected at user selectable intervals such as every 15 minutes. After collecting the counts for the interval, the binned data is stored in the data file and counts set back to 0 to start the count for the next interval. Intervals start by the clock, so if the interval is set to 20 minutes, an interval would start at hh:00, hh:20, hh:40 for each hour, hh. If the interval is set to 15 minutes, the intervals would start at hh:00, hh:15, hh:30, hh:45.

Per Vehicle records are stored regularly into the data file. The binned data collected in this mode is stored as described above, i.e., at the end of each interval.

2.0 PROGRAM FUNCTIONS

The Mini TRS functions described in this section are available either through the keypad and LCD Display Screen or using a serial connection to a computer running the Road Reporter software (refer to the Road Reporter User's Manual, IRD Part No. 69046201).

2.1 STARTUP DISPLAY

When the Mini TRS is turned on, the display will show an initial startup display for a few seconds:



Figure 2-1 - Startup Display

The startup display shows the firmware name (Mini Traffic Recording System), the current copyright (IRD c2013), the current firmware version (v4.08A) and the release date of the firmware (01/28/13).

2.2 MAIN MENU

After a few seconds, the main menu from which all other functions are accessed will be displayed:



FILES – displays the number of data files currently stored in memory.

MEM – the current number of bytes of memory still available for storing data.

Time (15:58:56 in the example above) – the current time of day (in 24 hour notation).

- Status (OFF in the example above) the current status of data collection. The display options are:
 - **SET** if the start time for data collection has been set but the unit has not yet begun collecting data,
 - **REC** if the unit is recording data,
 - **OFF** if data collection has stopped.

Power (CHG in the example above) – the current power status for the unit. The display options are:

- **Blank** if the internal battery is powering the unit
- **LB** if the battery charge is running low
- CHG if an external power source is charging the battery and/or powering the unit.
- **CHGLB** if the unit is connected to an external power source but the battery voltage is low; typically this may occur on a unit with a solar panel in low light conditions or when a charger has recently been connected to a unit with a low battery)

MONITOR – the **F1** key function; opens the monitoring menu, refer to section 2.3

PROGRAM – the **F2** key function; opens the programming menu, refer to section 2.4.

- SYSTEM the F3 key function; opens the system configuration menu, refer to section 2.5.
- **Power level indicator** the icon in lower right corner of the LCS screen is the power level indicator. When completely black, it indicates that the power is above 6.4 volts; if the unit is running on battery power, this indicates that the battery is at full charge. The icon will slowly empty as the battery discharges. When the icon is just an outline with a lightning bolt in it, this indicates that the power is below 5.9 volts; the unit should be connected immediately to an external power source to continue operation and/or recharge the battery.

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Y/ENT – pressing this key displays the firmware part number and version information:



2.3 MONITOR FUNCTION

Pressing the **F1** key on the main menu will begin displaying real time vehicle data (for up to four lanes). The screen display will vary depending upon the type of data the unit has been configured to collect (refer to section 2.4.1 for a description of configuring data collection mode); the subsections below describe the display for each data collection option.

The monitor function operates independently of whether or not the unit is collecting data. If the Mini TRS is recording data (Status is REC on the Main Menu), the counts will reset to 0 at the end of an interval. If the Mini TRS is not recording data, the count will reset to 0 each time the monitor function is entered.

2.3.1 VOLUME

If the Mini TRS has been configured to collect traffic volume counts, the count for the current interval for each lane is displayed, preceded by the lane number:



This display is updated each time a vehicle passes.

If the unit is configured to count axles (section 2.5.7), then the count of every axle will be displayed, otherwise the axle count divided by 2 is displayed.

MENU – press the F1 key to return to the main menu

TOT – pressing the F4 key will momentarily display the total vehicle count in each lane since the start of the current data collection period. The totals will be displayed as long as the F4 key is pressed:

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2.3.2 SPEED

If the Mini TRS has been configured to collect binned speed data, each lane number is displayed followed by the speed of the most recent vehicle prefixed with an 'S', and followed by the total count for the lane in the current interval.



This display is updated each time a vehicle passes.

Depending upon the Configuration (section 2.5.7), the speed displayed will be in either MPH or KPH.

- MENU press the F1 key to return to the main menu
- NEXT this menu option is non-functional in the Mini TRS.
- TOT pressing the F4 key will momentarily display the total vehicle count in each lane since the start of the current data collection period. The totals will be displayed as long as the F4 key is pressed.

2.3.3 CLASS, CLASS & SPEED, CLASS X SPEED

If the Mini TRS has been configured to collect data based on vehicle Class, Class AND Speed, or Class BY Speed, the Monitor display will show each lane number, followed by the speed of the most recent vehicle in that lane prefixed with an 'S', and then the class of the vehicle prefixed with a 'C', followed by the vehicle count in the lane for the current interval.



This display is updated each time a vehicle passes.

Depending upon the Configuration (section 2.5.7), the speed displayed will be in either MPH or KPH.

MENU – pressing the F1 key returns to the main menu

NEXT – this menu option is non-functional in the Mini TRS.

PV – will display per vehicle information (see 2.3.6 below)

TOT – pressing the F4 key will momentarily display the total vehicle count in each lane since the start of the current data collection period. The totals will be displayed as long as the F4 key is pressed.

2.3.4 GAP

If the Mini TRS has been configured to collect data on the gap between vehicles, each lane number is displayed followed by the gap (in seconds) between the front and rear of the two most recent vehicles, prefixed with a 'G', and followed by the total count in the lane for the current interval.



This display is updated each time a vehicle passes.

Gap is the time from the last axle of the previous vehicle to the first axle of the current vehicle.

- MENU pressing the F1 key returns to the main menu
- NEXT this menu option is non-functional in the Mini TRS.
- TOT pressing the F4 key will momentarily display the total vehicle count in each lane since the start of the current data collection period. The totals will be displayed as long as the F4 key is pressed.

2.3.5 HEADWAY

If the Mini TRS has been configured to collect data on the headway between vehicles, each lane number is displayed followed by the headway time (in seconds) between the front of the two most recent vehicles, prefixed with a 'H', and followed by the total count for the current interval.

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This display is updated each time a vehicle passes.

Headway is the time from the first axle of the previous vehicle to the first axle of the current vehicle.

MENU – pressing the F1 key returns to the main menu

NEXT – this menu option is non-functional in the Mini TRS.

TOT – pressing the F4 key will momentarily display the total vehicle count in each lane since the start of the current data collection period. The totals will be displayed as long as the F4 key is pressed.

2.3.6 PER VEHICLE DATA

If the "Per Vehicle" data collection mode has been selected, the **PV** option will be displayed next to the **F3** key:



If this option is available, pressing the **F3** key will display "per vehicle" data for the most recent vehicle to pass over the sensors:



The top two lines of the display show the axle spacings (up to 8 spacings for a 9 axle truck). Axle spacings are shown in feet with one decimal place precision, regardless of whether metric or imperial units are selected.

- L: the lane of the current vehicle.
- C: the current vehicle's class.
- **S:** the current vehicle's speed.

MONITOR – press the **F3** key to return to the previous monitoring display.

FREEZE / UNFREEZE – the **F4** key will toggle freezing or unfreezing the per vehicle display update. When **FREEZE** is displayed, the screen will update each time a vehicle passes. When **UNFREEZE** is displayed, the display is frozen and will hold the current vehicle display on the screen until it is unfrozen. When the screen is unfrozen, it will update the next time a vehicle passes; the PV information for any vehicles that passed while the screen was frozen will not be displayed (the data will still have been saved to memory).

Pressing the **1** or **2** number key will display only vehicles in lane 1 or lane 2. Press the **0** key to return to viewing all lanes.

While not labeled in the display, the **F1 Menu** key is still functional to return the user to the main menu.

2.4 PROGRAM MENU

Pressing the **F2** key on the main menu will open the menu displaying the options for programming the unit's operation:



- 1- MODE opens the sub-menu for options to select the data collection mode; section 2.4.1
- 2- LAYOUT opens the sub-menu for options to configure the physical layout of the data collection site, including the number of lanes and the sensor configuration; section 2.4.2
- 3- START opens the sub-menu where the options to start data collection are configured; section 2.4.3
- 4- INTVL opens the sub-menu for options to set the time interval for each data collection period; section 2.4.4
- 5- LOCATION opens the sub-menu for options to enter a location description for the data collection site; section 2.4.5
- 6- SITE ID opens the sub-menu for options to enter the site ID and station number; section 2.4.6
- 7- SPEED opens the sub-menu for options to select a pre-defined speed bin scheme or use the user defined bins; section 2.4.7
- **8– STOP** stops data collection; a confirmation message will be displayed:



Press the **Y** key to confirm stopping data collection or the **N** key to ignore the command and continue collecting data.

Note that if the TRS is recording, changes to any of the parameters in the **Program** menus above will require the recording stopped, the current data file to be closed and a new one opened using the new settings. The TRS will display a **STOP COUNTING** message to give you the option of either stopping current recording session and starting a new one to put the changes into effect or discarding the changes and continuing on with the current recording session.



2.4.1 MODE

The MODE menu selects the type(s) of vehicle data to be collected.

The menu will be similar to the illustration below:



The current mode of data collection (if any) will be indicated by an asterisk "*", ampersand "&" or capital "X" next to the name(s) of the data type(s) that will be collected(s). An asterisk indicates that only the single data type indicated is to be collected. An ampersand indicates that multiple types of data are to be collected (for example, Speed and Class data). A capital X indicates that a table made from two data types is to be collected (for example: Speed by Class).

To select any single type of data for collection, press the keypad number corresponding to the desired data type; an asterisk "*" will be displayed next to the selected type (in the example illustration above **3-SPD** has been selected).

1- VOL - the volume of vehicles (vehicle count) for each lane is collected

2- CLS – vehicle data is collected divided into vehicle classes. By default, the vehicle classifications will be the FHWA system (refer to Appendix B.0 for information); the system can also accept a user defined classification scheme (refer to section 2.5.7).

Note that in order to determine vehicle classification, the site must have two axle sensors in order to determine the number of axles and axle separations for each vehicle.

- 3- SPD vehicle data is collected divided into pre-defined speed bins or the user defined speed bins specified in the PROGRAM menu (section 2.4.1.1).
- 4- PV data is collected for each individual vehicle (i.e. on a per vehicle basis). When Per Vehicle data collection is selected, Classification and Speed data collection are also automatically selected, as indicated by an ampersand "&" after each data type.
- 5- GAP vehicle data is collected divided into bins based on the time gap between the last axle of one vehicle and the front axle of the next following vehicle, as specified in the PROGRAM menu (section 2.4.1.1).
- 6- HDY vehicle data is collected divided into bins based on the time separation between the front axles of successive vehicles as specified in the PROGRAM menu (section 2.4.1.1).
- **PROG** pressing the **F1** key opens the program menu (section 2.4.1.1) to program the binning options for the type(s) of data collection selected.
- & pressing the F2 key selects the "AND" mode to collect data of each selected type. For example, data may be collected on speed and classification by pressing the 2 key to select Class type data, the pressing the F2 key for the "AND function, and then pressing the 3 key to select Speed type data; an ampersand (&) will be displayed after the two selected data types to indicate that both are selected for AND mode data collection (see example below).

Note that only Class, Speed and Per Vehicle data are valid for AND mode data collection.



Note that selecting PV will automatically also select Class and Speed data for collection

X – pressing the F3 key selects the "BY" mode to collect data into bins based on a combination of both selected data types (a table or data matrix). For example, data may be collected on Speed by Class by pressing the 2 key to select Class type data, then pressing the F3 key for the "BY function, and then pressing the 3 key to select Speed data; an X will be displayed after the two selected modes to indicate the data types selected for BY mode data collection (see example below).

Note that only Class and Speed are valid data types for BY mode data collection.

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CHNG – pressing the F4 key saves the changes made to the data collection mode and then returns to the program menu (section 2.4). If the Mini TRS is recording, the screen will display a STOP COUNTING message:



If **Y/ENT** is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If **N/DEL**, then the display returns to the **Mode** menu. To return to the program menu (section 2.4) without saving any changes made, select the **N / DEL** key.

2.4.1.1 PROGRAM Bins

The **PROGRAM** menu defines the bins into which the vehicle counts for the selected data type (speed, gap or headway) will be collected:



Select the type of data to be collected by pressing the key number that corresponds to the data type.

Note that the TRS has three pre-defined sets of speed bins (refer to section 2.4.7); speed bins need only be defined here if the **USER** defined speed bin option is selected under the **Speed** menu, section 2.4.7.

The binning definition menu for the selected data type will be displayed:

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The bin parameters will be listed in the menu

- **BIN** # displays the bin number to which the parameters will apply. By default binning starts at bin #01. After the parameters for this bin have been set, select the next bin by pressing the Y / ENT key. The maximum number of bins that may be defined is 15.
- XXX YYY defines the lower and upper bounds of the current bin. By default the definition of bin limits will start with bin #01. For all type of bin data except predefined speed bins (see note below), bin 1 will have a default lower limit of 000 and a default upper limit at the highest value allowed, so that all vehicles will be counted in bin 01. If more than one bin is to be used for the selected data type, the limits of each bin must be defined using the options in this menu.

The lower limit for each bin (except bin 1) will automatically be defined as one greater than the upper limit of the preceding bin.

For each bin's upper limit value, enter the 3 digit value (include leading zeros); the cursor will automatically move to the next position after a key is pressed. To edit a number, move the cursor to the next digit to be changed using the **F2** or **F3** keys, and then enter the digit.

Move to the next bin by pressing the **Y** / ENT key.

Note: the upper limit for each bin (except the last) must be greater than the lower limit; if a number that is less than the lower limit for the bin is entered then no data will ever be captured in that bin and there will possibly be an overlap in other bins preventing vehicles from being counted in the proper bin

ENTER 000 TO END – to mark the last bin to be recorded, enter 000 as the upper bound of the last number bin to be recorded. All vehicles with speeds greater than the minimum value of this last bin will be counted in this bin. For example, if the last bin is set to the range 091-000, all vehicles with a speed greater than 91 will be recorded in this bin. No data will be recorded in higher numbered bins.

When the all parameters have been set, press the **F4** key to save any changes and return to the MODE menu. Press the **N / DEL** key to discard any changes and return to the MODE menu.

Note that if the Mini TRS is recording, changes to any bin parameters will require the current data file to be closed and a new one opened using the new settings. The mini TRS will display a **STOP COUNTING** message to give you the option of either stopping current recording session and starting a new one to put the changes into effect or discarding the changes and continuing on with the current recording session.

2.4.2 LAYOUT

The LAYOUT menu defines the layout of the sensors in each lane at this data collection site:



Refer to section 3.0 for a description of the recommended procedures for installing sensors at a data collection site.

The layout may also be configured using a configuration defined using the Road Reporter software and uploaded to the TRS using a connection between the TRS and the computer (refer to the Road Reporter User's Manual, IRD Part No. 69046201) or from a USB flash drive (refer to section 4.3.2).

LANES: – defines the number of lanes in which data will be collected at this site, up to a maximum of 4.

- LANE: the number of the lane currently being configured. When all the parameters for the current lane have been configured, move to the next lane by pressing the **F1** key.
- **DIR:** sets the direction of traffic flow in the currently selected lane.

SENSORS: – selects the sensor configuration in all lanes.

Note that the layout will be the same in all lanes; changing the layout in the currently selected lane will change all other lanes to that sensor configuration. The layout options are:

- Single axle sensor
- || Double axle sensors
- > || < Double axle sensors, bi-directional lane*.

- One axle sensor spanning two lanes and a second axle sensor that spans only one lane (Short Long).
 - * A bi-directional lane will collect traffic data in both directions and be able to differentiate which direction a vehicle was travelling. Counts for vehicles travelling in one direction will be counted in one lane and counts for vehicles travelling in the other direction will be counted in a different lane; e.g. if axle sensor 1 is hit first, the vehicle will be counted in lane 1, if axle sensor 2 is hit first the vehicle will be counted in lane 2. Similarly if axle sensor 3 is hit first, the vehicle will be counted in lane 3, and if axle sensor 4 is hit first the vehicle will be counted in lane 4.
- (ALL) indicates all lanes will have the same sensor configuration.
- **SPACING** the spacing (in meters if the TRS has be configure for metric units, in feet if not) between the axle sensors if there are two axle sensors in the selected lane. This option is ignored if there is only a single axle sensor in the lane.
- Use the F2 or F3 keys to cycle through the available options for the selected parameter.

Move to the next parameter in the menu by pressing the **Y** / ENT key.

CHNG – pressing the F4 key saves the changes made to the sensor layout and then returns to the program menu (section 2.4). If the Mini TRS is recording, the screen will display the STOP COUNTING message. If Y/ENT is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If N/DEL, then the display returns to the Layout menu. To return to the program menu (section 2.4) without saving any changes made, select the N / DEL key again.

2.4.3 START

The START menu defines the start and end dates and times:



START YY/MM/DD – indicates that the entry on the next line is the start of the data collection period.

Note that the year, month and day numbers must be entered in the order and format shown.

Enter the hour (24 hour clock) and minutes, followed by the year (last two digits), month number and day number on which data collection is to start. To set the

start time to the current time and date (as set on the Mini TRS, section 0), press the F1 key (**NOW**).

END YY/MM/DD – indicates that the entry on the next line is the end of the data collection period.

Note that the year, month and day numbers must be entered in the order and format shown.

Enter the hour (24 hour clock) and minutes, followed by the year (last two digits), month number and day number on which data collection is to end. To have the unit collect without stopping, set all values to **9**.

- NOW When the cursor is in the Start field, pressing the F1 key will set the start time to the current time; data collection will start at the beginning of the next full minute after the F4 key is pressed to save the change. The F1 key function will change to CONT and the cursor will move to the End field.
- CONT When the cursor is in the End field, pressing the F1 key will set the end time to 99:99 99/99/99, which will set the Mini TRS to continue collecting data indefinitely. The F1 key function will change to NOW and the cursor will move to the Start field.

The cursor will automatically move to the next digit to be entered, or can be moved using the **F2** or **F3** keys, and then enter the digit. Repeat for each digit to be changed in the time and date

Switch between the **START** and **END** fields in the menu by pressing the **Y / ENT** key.

CHNG – pressing the F4 key saves the changes made to times and dates and then returns to the Main menu (section 2.4). If the Mini TRS is recording, the screen will display the STOP COUNTING message. If Y/ENT is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If N/DEL, then the display returns to the Start menu. To return to the program menu (section 2.2) without saving any changes made, select the N / DEL key.

2.4.4 INTVL

The INTVL menu sets the collection period (in **minutes**) that will be used by the Mini TRS for collecting binned data:



Select the interval to be used by pressing the keypad number that corresponds to that period in the menu. The selected interval will be indicated with an asterisk "*'.

The complete set of data bins configured for data collection (section 0) will be saved to the data file at the end of each collection period. The shorter the time period, the more quickly the Mini TRS memory will be filled up.

CHNG – pressing the F4 key saves the changes made to the recording interval and then returns to the program menu (section 2.4). If the Mini TRS is recording, the screen will display the STOP COUNTING message. If Y/ENT is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If N/DEL, then the display returns to the IntvI menu. To return to the program menu (section 2.4) without saving any changes made, select the N / DEL key.

2.4.5 LOCATION

The LOCATION menu displays the current location description and allows the entry of two lines of text to describe the data collection site's location; this will typically be a more meaningful way to identify the site than the site ID number (section 2.4.6), particularly for users who may not be familiar with the data collection sites. If no location description has been entered yet both lines will be blank.



To change the location description, enter the first line of the location description (up to 16 characters) using the keypad to select numbers and alphabetic characters.

After selecting a character, advance to the next character position using the **F2** or **F3** keys, and then enter the character. Repeat for each character to be changed in the Location description.

Move to the second line of the location description in the menu by pressing the **Y / ENT** key.

CHNG – pressing the F4 key saves the changes made to the location descriptions and then returns to the PROGRAM menu (section 2.4). If the Mini TRS is recording, the screen will display the STOP COUNTING message. If Y/ENT is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If N/DEL, then the display returns to the Location menu. To return to the program menu (section 2.4) without saving any changes made, select the N / DEL key.

2.4.6 SITE ID

The SITE ID menu defines the site identification number and station number (if required).

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Enter the Station Number (up to 16 characters) using the keypad to select numbers and alphabetic characters (if ALPHA mode has been selected in the SYSTEM/CONFIG menu (section 2.5.7)).

After selecting a character, advance to the next digit to be character position using the **F2** or **F3** keys. Repeat for each character to be changed in the Site ID.

Move to the Site ID entry by pressing the **Y / ENT** key.

CHNG – pressing the F4 key saves the changes made to the Site ID and then returns to the PROGRAM menu (section 2.4). If the Mini TRS is recording, the screen will display the STOP COUNTING message. If Y/ENT is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If N/DEL, then the display returns to the Site ID menu. To return to the PROGRAM menu (section 2.4) without saving any changes made, select the N / DEL key.

2.4.7 SPEED

The SPEED menu selects the set of speed bins to be used for data collection:



- HI selects the high speed set of predefined speed data bins. This set of speed bins would typically be used for collecting data at a site where traffic will normally be travelling at highway speeds. The upper bounds of the high speed bins are: 30, 35, 40, 45, 50, 55, 60, 65, 70,75, 80, 85, 90, 91 and over.
- 2 LO selects the low speed set of predefined speed data bins. This set of speed bins would typically be used for collecting data at a site where traffic will normally be travelling at restricted speeds. The upper bounds of the low speed bins are: 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 71 and over.
- **3 TMG** selects the set of predefined speed data bins defined by the Federal Highway Authority (FHWA) Traffic Monitoring Guide (TMG). The upper bounds of the TMG bins are: 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 86 and over.

- 4 USER selects the speed bins configured by the user in the PROGRAM/MODE/PROG/SPEED menu (section 2.4.1.1).
- CHNG pressing the F4 key saves the changes made to the speed bin definition and then returns to the PROGRAM menu (section 2.4). If the Mini TRS is recording, the screen will display the STOP COUNTING message. If Y/ENT is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If N/DEL, then the display returns to the Speed menu. To return to the PROGRAM menu (section 2.4) without saving any changes made, select the N / DEL key.

2.5 SYSTEM MENU

The **F3** key on the main menu selects the SYSTEM menu:



The options in the SYSTEM menu are selected by pressing the number key displayed for each option. The menu options are:

- 1-TIME opens a sub-menu to set the time of day and date; section 0
- 2-BAUD opens a sub-menu to adjust the baud rate of the unit's serial port; section 2.5.2
- 3-DIAG opens a sub-menu to display diagnostic information about system operation; section 2.5.3
- **4–BATT** opens a sub-menu that displays the status of the battery and power supply; section 2.5.4
- 5-ERASE DATA queries user to erase any data recorded in the system memory; section 2.5.5
- 6-MODEM opens a sub-menu to test and configure a modem connection to the Mini TRS ; section 2.5.6
- 7-CONFIG opens a sub-menu to display information about the site configuration; section 2.5.7

Note that if the TRS is recording, changes to certain parameters in the **System** menus above will require the recording stopped, the current data file to be closed and a new one opened using the new settings. The TRS will display a **STOP COUNTING** message to give you the option of either stopping current recording session and starting a new one to put the changes into effect or discarding the changes and continuing on with the current recording session.



2.5.1 TIME

The current time and date settings are displayed.

Note that time is displayed as hours : minutes : seconds and date as year / month / day and that any changes must be entered in this format.



To adjust the time and/or date, move the cursor to the digit to be changed using the **F2** or **F3** keys and then enter the desired number. The cursor will automatically move to the next number in sequence; to move to a different number use the **F2** or **F3** keys. Press the **Y/ENT** key to switch between the time and date fields

When the time and date digits has been changed, press the **F4** key to reset the time and date to the values entered and return to the Configuration menu. If the Mini TRS is recording, the screen will display the **STOP COUNTING** message. If **Y/ENT** is selected, then any current recording session in progress will be stopped and the changes will go into effect when data collection is restarted. If **N/DEL**, then the display returns to the **Speed** menu. To return to the Time menu without saving any changes made, select the **N / DEL** key.

DAYLIGHT SAVINGS TIME: The Mini TRS has the built in capability to automatically change time for daylight savings: moving ahead one hour in the spring and back an hour in the fall. By default, this function is active. The function must be turned off if this is not required. To de-activate this function, use Road Reporter to program the unit from the computer one time; (refer to the Road Reporter User's Manual, IRD Part No. 69046201).

2.5.2 BAUD

The current baud rate for the RS232 serial connection will be indicated by an asterisk to the left of the rate. To change the baud rate, press the number key corresponding to the desired rate, and then press the **F4** key to save the change.



2.5.3 DIAG

The Diagnostics menu lists a number of options to display diagnostic information about parts of the Mini TRS

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To view the diagnostic display for one of the options, press the number key corresponding to the desired option. The diagnostic displays are described in the subsections below:

2.5.3.1 MEM

If the memory test is selected, a sequence of screens will be displayed, as described below.

The memory test cannot be performed while the unit is recording, so if the unit is recording when this option is selected, the **STOP COUNTING** warning message will be displayed; press **Y/ENT** to stop recording session and proceed with the memory test or **N/DEL** to cancel the memory test and returns to the **Diag** menu.

The first test is the system RAM, where the system configuration and settings are stored; if the test is successful, a RAM IS GOOD message will be displayed,



If the RAM memory test fails, the message RAM IS BAD and the memory location will be displayed. Press **Y / ENT** to continue.

Press **F4** to continue the memory test. The system will move to the next test, the Secure Digital (SD) card memory. Testing the SD card memory involves erasing any existing data, writing in test data and verifying that the test data has been written correctly.





To test the SD card memory, press the Y / ENT key;

To return without performing the test, press the N / DEL or the F4 key.

While the test is being performed, the display will show messages to indicate that memory is being erased, written to and verified as the system proceeds through the test.



When the test is complete, an SD IS GOOD message will be displayed.

	F1
SD IS GOOD	F2
PRESS <f4></f4>	F3
	F 4

If the flash memory test fails, the message SD IS BAD and the memory location will be displayed.

Press the **F4** key to return to the Diagnostics menu after the memory test is complete.

2.5.3.2 KEYS

The Keys diagnostic will display a four row by four column grid of open rectangles, with the exception of the second position in the bottom row which will be an **X**; these correspond to the key positions, with the **X** being the **N** / DEL key.

When any key except the **N/DEL** key is pressed, the corresponding rectangle should fill in to show a solid black rectangle if the key is operating properly. When the **N / DEL** key is pressed, the display should return to the Diagnostics menu.

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2.5.3.3 LCD

The LDC diagnostic screen will blink on and off at a rate of approximately one per second and should show every pixel in every character position on the display in black when the display is on:



To return to the Diagnostics display, press the **F4** or **N / DEL** key.

2.5.3.4 AX SENS

The Axle Sensors diagnostic display shows the number of every possible axle sensor connection to the Mini TRS with a dotted vertical line to the left of the sensor number (the sensor will be displayed regardless of whether or not there is actually a sensor connected to that position). When a sensor is activated by an axle rolling over the sensor, the line adjacent to the number corresponding to that sensor will become solid black.

For the first 4 sensors, a number will be displayed between 0 and 9 after the sensor indicating the relative strength of the last hit on the road tube.



2.5.3.5 Lane

The Lane diagnostic menu item is only active if there are more than 1 sensor in each lane. The Lane diagnostic display initially shows the sensor layout configured in each lane.

The first line shows the configured lanes. The second line shows the sensors configured in each lane with the first sensor in the lane to the left under the lane number and the second sensor to the right.

Similar to the Axle Sensor display, when a sensor is activated by an axle rolling over the sensor, the line corresponding to the activated sensor will become solid black



Press F1 NEXT to move to the next lane diagnostic display.

The second lane diagnostic display shows each lane on a separate line with the lane number followed by the first sensor in the lane, then the second sensor in the lane. When a sensor is activated by an axle rolling over the sensor, the line corresponding to the activated sensor will become solid black. In addition, a count of the number of activations of each sensor is displayed to the right of the sensors: the first count beside the axle sensor graphic is for the first sensor in the lane; the next count is the second sensor in the lane.



The counts will increment to 255 and then reset to 0. To reset the counts to 0 at any time, press the **F3 CLR** key.

2.5.4 BATT

The Battery diagnostic displays the current battery voltage and a status message.



The normal voltage should be in the range from 5.5 to 6.5 volts. If it is below 5.9 volts, the external charger should be connected immediately.

The possible status messages are:
- **NOT CHARGING** the system is operating normally and not connected to an external power source.
- **CHARGING** he system is operating normally and is connected to an external power source.
- **BATTERY LOW** the battery is low and should be connected to an external power source as soon as possible to continue normal operation.
- **TEMP** the current CPU temperature.

To return to the Diagnostics menu, press the N / DEL.

2.5.5 ERASE DATA

To clear the Mini TRS memory by erasing all the recorded data, press the Y / ENT key;

To return without making any changes, press the **N / DEL** or the **F4** key.



2.5.6 MODEM

The Modem menu provides options to initialize and/or test a modem connection to the Mini TRS. To perform these tests, the Mini TRS must be properly connected to a Hayes compatible modem. Data transfer over a modem connection is described in section **Error! Reference source not found.**



1–INITIALIZE – initializes the modem connection for remote communications. While the connection is initializing, an INITIALIZE message will be displayed at the bottom of the screen. If the initialization is successful, an OK message will be displayed; if the initialization fails, a NO REPLY message will be displayed.

2–TEST – runs the communications test to check that the modem is functioning correctly by attempting to command the modem to answer the phone. While the test is running, an ANSWER message will be displayed at the bottom of the screen. If the test

is successful, an OK message will be displayed; if the test fails, a NO REPLY message will be displayed.

Note: once the modem initialization or modem test is started it will run to completion or time out (after approximately a minute) before control returns to the keypad. The only way to terminate the initialization or test before it is finished is to turn the Mini TRS power switch off and then back on.

3–CDPD – select this option if the modem is for a CDPD type connection (cellular digital packet data, as opposed to a switched circuit). If this option is selected, it will be indicated with an asterisk. Enable this option to wake the counter up based on a steady control signal such as Carrier Detect from a modem rather than Ring Indicate.

4–COMMS ON – maintains power to the serial port continuously even when the display goes blank. Normally, the serial port is powered off at the same time as the display to save power.

2.5.7 CONFIG

The Configuration menu configures the options for Mini TRS operation:



The options 1 through 4 configure how the Mini TRS saves data; an asterisk next to an option indicates that option is selected, if not selected then the default setting will be used. Remember to press **F4 CHNG** to save any changes to the first 4 options.

The TRS may also be configured using a configuration defined using the Road Reporter software and uploaded to the TRS using a connection between the TRS and the computer (refer to the Road Reporter User's Manual, IRD Part No. 69046201) or from a USB flash drive (refer to section 4.3.2).

Options 5 through 8 will open sub-menus to configure parameters for that selection.

- METRIC if selected, data will be recorded and parameters configured in metric units. If this option is not selected, data will be recorded in U.S units of measurement.
- 2 AXLE if selected, counts will be on a per axle basis. If this option is not selected, counts will be axles divided by 2.
- 3 ALPHA if selected, keypad entries for site ID and site reference will cycle through the number and alphabetic characters labeled on the key when performing an entry. If this option is not selected, only numeric entries will be performed.
- 4 USER CL if selected, the Mini TRS will employ a user defined classification table to classify vehicles according to the number of axles and axle spacings. This

table must be downloaded from the Road Reporter software package (refer to section 4.0 for information on data transfer).

Be sure your definitions are correct, or the result will be bad data. See Road Reporter manual 690462, for User Classification details.

- 5 -AX SENS opens a sub-menu to adjust the sensitivity and/or the debounce time of the axle sensors; section 2.5.7.1
- 6 MAX LEN opens a sub-menu to adjust the maximum length of vehicle which the unit will detect; section 2.5.7.2.
- 7 PV opens a sub-menu to select whether vehicle data for FHWA classes 1 through 3 (passenger vehicles) is saved as binned data or as individual vehicle data when PV data is being collected; section 2.5.7.3.

2.5.7.1 AX SENS

The top two rows in the display adjust the sensitivity of pneumatic road tube axle sensors:



- ALL TUBES a reminder that the sensitivity and debounce time for all pneumatic road tubes will be adjusted by the entry in the line below; the Mini TRS does not perform individual pneumatic sensor adjustments.
- SENS/DEB= the current values for the road tube axle sensor sensitivity and debounce time are displayed (refer to Appendix A.1.2 for information on the actual values corresponding to the pneumatic tube airswitch sensitivity and debounce settings). For the road tube sensitivity parameter, smaller numbers are more sensitive, larger numbers are less sensitive. For the Debounce Time parameter, the Mini TRS will ignore any input signals

For the Debounce Time parameter, the Mini TRS will ignore any input signals after the initial pneumatic signal for the length of time indicated.

The default values for pneumatic axle sensors are: SENS/DEB = 05/01; maximum range 15/15.

To adjust either setting, use the **F2** or **F3** key to move the cursor to the number to be changed and then press the number key for the new value. Repeat for any other numbers that need to be changed. Press the **Y/ENT** to switch between the sensitivity and debounce fields.

When all values have been set, press the **F4** key to enter the change into the Mini TRS memory and return to the Configuration menu.

2.5.7.2 MAX LEN

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MAX LEN= – displays the current value for the maximum axle spacing that the Mini TRS will consider a set of sensor activations to belong to a single vehicle (measured in meters if metric, feet otherwise); when a spacing longer than this occurs, the sensor activations will be separated into two separate vehicles. To adjust the maximum length, use the F2 or F3 key to move the cursor to the number to be changed and then press the number key for the new value. Repeat for any other numbers that need to be changed. When all values have been set, press the F4 key to enter the change into the Mini TRS memory and return to the Configuration menu.

2.5.7.3 PV



1-BIN 1-3 – selects whether vehicle data for FHWA classes 1 through 3 (passenger vehicles) is recorded as only a count in the binned data or as individual vehicle data when the Mini TRS is configured to collect PV data. To toggle the selection on or off, press the 1 key; press the F4 key to enter the change into the Mini TRS memory and return to the Configuration menu.

3.0 SITE SET-UP

This section describes typical site considerations and procedures. The recommendations outlined here may not apply to all applications.

Always follow corporate and governmental safety regulations when working at any traffic monitoring site.

3.1 PREPARE MINI TRS

In order to collect the most accurate data possible, two key requirements must be met: the unit must be programmed properly (refer to section 2.0) and the site must be accommodating to data collection (see '3.2 Site Selection below).

Recommended checklist to be performed prior starting data collection:

- 1) Be sure the Mini TRS batteries are fully charged.
- 2) Inspect the counter for any visible damage to any vital parts.
- 3) Review the counter configuration to be certain it matches the site layout and data collection requirements.
- 4) Check any accessory equipment that is needed at the site (road tubes, cabling, locks, etc.) to be sure it is in good operating condition.

3.2 SITE SELECTION

Site selection is one of the most important factors in obtaining accurate counts.

If speed or vehicle classification data (which is dependent on accurate speeds) are collected, the site should be at a location where vehicles travel at a nearly constant speed, i.e. away from controlled intersections, sharp curves (including intersections or on interchange ramps), posted speed changes, construction, etc.

For pneumatic road tube axle sensors, rutted pavement will cause inaccuracies in traffic counts because of slapping of the road tubes against the surface. Try to find a section of road with a uniform cross sectional profile.

Traffic counters should be secured to a large fixed object such as a signpost or light standard.

3.3 ROAD TUBE AXLE SENSORS

The Mini TRS uses Road Tube axle sensors (also known as air switch sensors, pneumatic sensors or just "tubes"). Road Tubes are hollow rubber tubes that are stretched across the roadway so that vehicle traffic drives over them. This generates an "air pulse" which travels down the tube to an "air switch" inside the TRS. The air switch converts the air pulse into an electrical signal that the Mini TRS electronics detect as a vehicle axle.

Tubes offer the advantage of being easily movable, quick to install, inexpensive, and capable of detecting individual axles of a vehicle. Their disadvantages include rapid wear, hard to secure for long periods, and drivers noticing the tubes and possibly changing speed, lanes, etc.

The type and number of sensors used at a data collection site will depend on the type of data to be collected.

Count data requires only a single sensor per lane.

Speed, gap and headway data requires two axle sensors (road tubes) per lane (or per site if the user is only interested in the site as a whole).

Vehicle Classification and Per Vehicle data requires two axle sensors.

3.4 ROAD TUBE INSTALLATION

It is essential to inspect road tubes prior to installation (and periodically at an installation that will be in place for more than a few days) for punctures, cracks, or blockage; any of these will result in inconsistent readings or failure to collect data.

The counter will work with road tubes between 20 feet (\sim 6.1 m) and 100 feet (\sim 30.5 m) long. Shorter lengths generally produce more accurate results, so use shorter lengths when possible. Where the traffic is traveling below 20 mph (\sim 32 kph), it is recommended that less than 50 feet (\sim 15.2m) of road tube be used. If the unit is being used to collect classification data, it is strongly recommended that the tubes be equal length.

The road tubes must be installed perpendicular to the direction of traffic flow. If the tube is angled across the road, inaccurate data will be recorded.

The end of the road tube which is not connected to the counter should be plugged with a brass end plug or a 1/4-20x1" screw. The free end should be fitted with a road clamp (P-type, woven mesh or figure 8); be sure to point the tail of the clamp away from the counter when sliding it over the tube. At the edge of the pavement nearest the counter it is suggested that the tube be fastened down with a figure eight clamp or woven mesh clamp. If there is a curb, the clamp should be fastened at the foot of the curb face.

To secure the tube clamps to the pavement, it is suggested that a masonry or PK nail be used. After fastening the clamps down, stretch the tube by pulling the tube through the clamp at the edge of the road. The tube should be stretched approximately 10%, so for a 12 foot (3.5 m) lane, after taking the slack out of the tube, it should be stretched an additional 1.2 feet (35 cm).

After the road tubes are installed on the road, check for proper operation (refer to section 2.5.3.4). Wrap any excess road tube loosely around the counter.

Multi-tube Studies

If the Mini TRS is being used for a multi-tube study (class, speed, gap, headway or PV) with road tubes extending across both lanes, it is recommended that the road tubes be held down in the middle (at the lane divider) with a road clamp or piece of road tube tape. This will prevent the road tube separation distance from changing when a vehicle runs over the road tubes.

Lane Layouts

While there are many layouts that are possible using all 4 inputs, not all of them will provide optimal results; in some cases it may be better to use more than one Mini TRS at a site in order to get consistent data.

Refer to Appendix A.1.2 for information on adjusting the sensitivity of the air switches. Refer to Section **Error! Reference source not found.** for information on potential problems and solutions when using road tube sensors.

3.4.1 TUBE SENSORS FOR COUNT DATA:

The following layouts for road tubes are commonly used for the collection of vehicle count data using the Mini TRS Counter:



Note that a tube may tube cross multiple lanes and may be used for bi-directional counting.

In short-long layouts where one road tube is stretched across two lanes and the adjacent tube is across only one lane (the lane closest to the Mini TRS), and the appropriate sensor layout has been selected from the menu (section 2.4.2), the count of the single lane sensor (closest lane) will be subtracted from the two lane sensor count (both lanes) to obtain the count for the second lane (far lane). The Road Reporter software will determine the tube that was across both lanes based on which tube has the higher count.

At a site configured for a bi-directional layout (section 2.4.2), two tubes may be stretched across two or more lanes, with traffic crossing the tubes in both directions. The Mini TRS will be able to differentiate vehicle data based on the vehicles direction. The two tubes should be connected to adjacent inputs (1 and 2 or 3 and 4). If the first tube struck is connected to input 1, the vehicle is considered to be in lane 1. If the first tube struck is connected to input 2, the vehicle is considered to be in lane 2. Similarly for inputs 3 and 4.

3.4.2 TUBE SENSORS FOR BINNED OR PV DATA:

The following layouts for road tubes are commonly used for the collection of Binned or Per Vehicle data (such as speed and/or vehicle class) using the Mini TRS:



Figure 3-2 – Tube sensor binned or PV layouts

- Two equal length road tubes are required for each lane from which data will be collected. Try to stretch the tubes the same amount when securing them to the roadway.
- Install the two road tubes from 1 to 25 feet apart (8 feet is the recommended separation) perpendicular to the direction of traffic.
- Connect the road tube which will be hit first by oncoming traffic into air switch input 1 on the Mini TRS (nearest the handle)
- Connect the road tube which will be hit second by oncoming traffic to air switch input 2 on the Mini TRS
- Data can be collected from two (or more) lanes with two way traffic by configuring the sensor layout to Bi-Directional axle sensors (Section 2.4.2).

3.5 TESTING AND VERIFICATION

Once the Mini TRS has been installed at the site with the appropriate sensors, it is essential that the unit be tested and the setup be verified. At a minimum, perform the following:

A) Using the firmware menus and the monitor screen, verify that the correct data is being displayed for all lanes.

B) Be sure unit or traffic cabinet is locked securely before leaving the site.

4.0 DATA TRANSFER

There are three methods available to transfer data from the Mini TRS memory to another computer: via a USB connection, a direct serial connection, or to a USB flash drive.

The USB flash drive can also be used for other purposes. See section 4.3.

4.1 USB CONNECTION

To transfer to a computer over a USB port connection, follow the steps below:

- 1. Connect the USB cable from the mini USB connector labeled **Computer** on the Mini TRS to a USB port on the computer.
- 2. Start Road Reporter running on the computer to which the Mini TRS data is to be transferred.
- 3. In the Road Reporter software, configure the direct serial port to match that which is created when the USB cable is connected to the computer. The baud rate can be set to the highest possible value (and does not need to match that set in the Mini TRS).
- 4. Select **TRS** from the **Interface** menu, then select one of **All Data**, **New Data**, or **Select Data** to read the data from the Mini TRS
- 5. When complete, the data can be erased using one of two methods:.
 - directly using the TRS keypad, select F3 SYSTEM menu and then select
 5-ERASE DATA
 - remotely using the appropriate function from Road Reporter software (refer to the Road Reporter User's Manual, IRD Part No. 69046201).

4.2 SERIAL CONNECTION

To transfer to a computer over a serial port connection, follow the steps below:

- 1. Connect the serial cable from the 9 pin D connector labeled **OUTPUT** on the Mini TRS to a serial port on the computer.
- 2. Start Road Reporter running on the computer to which the Mini TRS data is to be transferred; configure the direct serial port to match the physical port to which the Mini TRS is connected.
- The baud rate of the Mini TRS must match the selected rate on the Road Reporter software running on the computer. Check the Mini TRS baud rate setting; under the F3 SYSTEM menu, select 2-BAUD and adjust if necessary (section 2.5.2) or adjust the baud rate in Road Reporter.
- 4. In the Road Reporter software select **TRS** from the **Interface** menu, then select one of **All Data**, **New Data**, or **Select Data** to read the data from the Mini TRS
- 6. When complete, the data can be erased using one of two methods:.
 - directly using the TRS keypad, select F3 SYSTEM menu and then select 5-ERASE DATA

• remotely using the appropriate function from Road Reporter software (refer to the Road Reporter User's Manual, IRD Part No. 69046201).

4.3 FLASH DRIVE

When a drive is inserted into the USB Flash Drive port on the Mini TRS, the screen will indicate that the drive has been detected along with the model and amount of total memory on the drive:



After a few seconds, it will then display the flash drive menu:



F1 - RETRIEVE – transfer files from the Mini TRS to the flash drive; refer to section 4.3.1.

F2 - SETUP – load a configuration from the flash drive to the Mini TRS; refer to section 4.3.2

F3 - ERASE – erase all traffic counter data from the flash drive folder called IRD_DATA. It does not delete files outside this folder.

F4 - UPGRADE – load a new version of firmware to the counter; refer to section 4.3.3

When functions with the flash drive are complete, normally the Mini TRS will return to the main menu. The flash drive can then be removed. When the flash drive is removed the Mini TRS will briefly display a message which reads **DRIVE REMOVED**.

4.3.1 RETRIEVE

Files may be downloaded via the USB flash drive port to a USB Flash Drive. These files are stored in a folder on the flash drive called **IRD_Data**.

The file names are in the format YYYYMMDD.xxx where:

- YYYY is the four digit year
- MM is the two digit month with 01 = January
- DD is the two digit day of the month

• xxx is an index which is incremented each time the same day is written by the TRS to the flash drive. This index may be incremented as a result of a TRS having multiple files for the same day, downloading files for the same day from multiple TRS units, or re-downloading the same file from a single TRS.

The flash drive files are then read into the Road Reporter software from the flash drive using the **TRS** interface and choosing the **Flash Drive** radio button (refer to the Road Reporter User's Manual, IRD Part No. 69046201).

When **F1** is pressed in the Flash Drive menu, a new menu is displayed to download **ALL** files or **NEW** files:



F1 - ALL files will transfer all the files in the Mini TRS to a folder on the flash drive called IRD_DATA.

F2 - NEW files will transfer any files which haven't been downloaded previously including the current file if the Mini TRS is recording data.

When either one is pressed an ARE YOU SURE? (Y/N) prompt will be displayed:



Press the **Del/N** key to return to the flash drive menu.

Press the **Ent/Y** key to transfer the selected files (all or new) from the Mini TRS to the flash drive. The display will display the **RETRIEVING DATA** screen with the current file number and the total number of bytes which have been transferred:



When the transfer is complete, the Mini TRS display will return to the main menu.

4.3.2 SETUP

To use the **Setup** option, a flash drive containing a valid TRS configuration file must be available.

To Load a TRS configuration onto a flash drive, use the following procedure:

Plug the flash drive into a computer running IRD Road Reporter software. Using the **TRS Interface** menu in the Road Reporter software, select the **TRS** interface and choose the **Flash Drive** radio button. Click the **Program** button to open the **TRS Programming Interface**. Enter the desired configuration parameters into the programming interface, then click the **Save** button. Enter a desired name for the configuration. The configuration file will be written to the flash drive (as configured in the Road Reporter **Setup** dialog) in a folder called **IRD_CFG** of the flash drive. Refer to the Road Reporter User's Manual, IRD Part No. 69046201 for more information

To load the configuration onto the Mini TRS, plug the flash drive containing the configuration file into the **Flash Drive** port on the Mini TRS and use the following procedure:



Select F2 – Setup from the Flash Drive menu:

The ARE YOU SURE? (Y/N) prompt will be displayed:



Press the **Del/N** key to return to the flash drive menu.

Press the **Ent/Y** key to have the Mini TRS examine the **IRD_CFG** folder for configuration files (any file with a **.CFG**) extension.

If no files are found, the Mini TRS will briefly display a message which reads **SETUP ERROR** and return to the main menu.

If files are found, up to the first 4 files will be listed on the display with a number to the left of each filename:

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MINI TRS



Select the number of the desired configuration file, which will then be loaded into the Mini TRS. The Mini TRS will display a brief message which reads **SETUP COMPLETE**:



After a short pause the display will return to the main menu.

4.3.3 UPDATE FIRMWARE

Warning: the firmware update procedure described in this section should only be performed under the direction of an IRD service representative. Attempting to update the firmware may cause issues with the operation of the Mini TRS that will require returning the unit to IRD for reprogramming.

Note: normally, a firmware update will not erase data files or configuration parameters. However it is a good practice to retrieve all data files and record configuration parameters before proceeding.

At various times, IRD may release a firmware update for the Mini TRS. The update is provided to customers as a file in the format, **M**<*revision info*>.BIN.

Place the upgrade file into a folder named **IRD_CFG** on a flash drive and insert the flash drive into the Mini TRS and select **UPGRADE** from the flash drive menu.

The user will be prompted with a message which reads UPDATE FIRMWARE? (Y/N):



Press the **Del/N** key to return to the flash drive menu.

If the **Ent/Y** key is pressed, the user **ARE YOU SURE? (Y/N)** confirmation message will be displayed:



Again, press the **Del/N** key to return to the flash drive menu.

If the **Ent/Y** key is pressed to confirm the update, the Mini TRS will examine the **IRD_CFG** folder for firmware upgrade files (any file with a **.BIN**) extension.

If files are found, up to the first 4 files will be listed on the display with a number to the left of each filename:



On the keypad, select the number of the desired firmware update file. The file will then be loaded into the Mini TRS. The Mini TRS will display a message which reads **READING UPDATE FILE** for a few seconds:



Warning: DO NOT turn off the counter or remove the flash drive after the counter displays the **READING UPDATE FILE** message. Doing so will corrupt the program memory and require return of the MiniTRS to IRD for reprogramming.

This will be followed by the programing screen which indicates a firmware update is in progress along with the current block of memory being programmed:

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When the programming is complete, the Mini TRS will reboot and return to the main menu followed by the flash drive menu. The flash drive may now be removed.

All configuration parameters should be checked and proper operation tested before restarting data recording.

5.0 EXAMPLES

This section describes a number of examples of the various data collection setups available with the Mini TRS

In each of the following examples it is assumed that the system configuration parameters such as time and sensor layout for the site have been configured prior to beginning on the setup specific to the example (refer to the SYSTEM menu, section 2.5)

5.1 VOLUME

This is a step by step example for using the Mini TRS for a volume count with a 15 minute interval in a single lane with one road tube axle sensor. Be sure the sensors are tuned before starting the following steps. See section 2.5.7.1 for information on tuning the sensors.

1) From the Main Menu select F2 PROGRAM:



2) The Program Menu will be displayed:



3) Press '1' on the keypad to select '**MODE**' from the Program Menu; the different modes of data collection will be displayed:



4) Press '1' on the keypad to select VOL mode; an '*' will appear next to the selection, then press F4 'CHNG' to save the change to the selected mode and return to the Program Menu.

5) Select **2** '**LAYOUT**' from the Program Menu; the site layout information will be displayed:



- 6) Enter a '1' for the number of lanes (even if the sensor may cross multiple lanes) and press the '**Y/ENT**' key.
- 7) The LANE : field will display **01** to indicate lane 1 is being configured (this example has only one lane). Use the F2 and F3 keys to select the lane direction in the **DIR** field. Press the **'Y/ENT**' key to move the cursor to the **SENSORS** field
- 8) Select the single axle sensor from the graphical choices available and press the '**Y/ENT**' key.



- 9) An entry for **SPACING** is not required with a single sensor; press **F4** '**CHNG**' to save the changes and return to the Program Menu.
- 10) Select **4** '**INTV**' from the Program Menu to display the interval selection screen:



11) Press the '1' key to select 15 minute intervals; an '*' will appear next to the selection, then press **F4** '**CHNG**' to return to the Program Menu.

Note: all intervals displayed on this screen are shown in minutes.

12) Select 5 'LOCATION' from the Program Menu and enter the first line of the location description; use the F2 and F3 arrow keys to move the cursor. Press the 'Y/ENT' key to move to the second line and enter the second line of the location description. Press F4 'CHNG' to save the entry and return to the Program Menu.

- 13) Select 6 'SITEID' from the Program Menu and enter a station number; press the 'Y/ENT' key to move the cursor to the SITE ID field and enter the site identification. Press F4 'CHNG' to save the entry and return to the Program Menu.
- 14) Select **3** '**START**' from the Program Menu to set when the Mini TRS to begin counting; the START menu will be displayed:



15) Either press the 'F1' key to have the counter start immediately (at the start of the next minute) or enter the desired hour, minute, year, month and day. The arrow keys 'F2' and 'F3' can be used to move the cursor to the right and left.

NOTE: date format is: YEAR, MONTH, DAY; ensure that the date is entered in this format for correct data recording.

- 16) When the start time entry is complete, press the 'Y/ENT' key to move to the END time and date. Either press the 'F1' key to have the Mini TRS count indefinitely or enter the desired end hour, minute, year, month and day.
- 17) When complete, press the F4 'CHNG' to save the changes and begin collecting data at the specified time. The display will return to the Main Menu and will show 'SET' on the bottom line to indicate that the configuration was accepted and the unit will begin to collect data at the time entered. When the start time is reached, the display will change to 'REC' to indicate that data is being recorded for data collection.
- 18) To view the real time data, press the **F1** '**MONITOR**' key and the volume count for the current collection period will be displayed (refer to section 2.3.1).

5.2 SPEED

This is a step by step example for using the Mini TRS in a two lane speed count with a 60 minute interval using two road tube axle sensors in each lane.

1) From the Main Menu select F2 PROGRAM:



2) The Program Menu will be displayed:

1-MODE5-LOCATIONF12-LAYOUT6-SITE IDF23-START7-SPEEDF34-INTVL8-STOPF4

3) Press '1' on the keypad to select '**MODE**' from the Program Menu; the different modes of data collection will be displayed:



Press '3' on the keypad to select **SPD** mode; an '*' will appear next to the selection, then press **F4** '**CHNG**' to save the change to the selected mode and return to the Program Menu.

4) Select **2 'LAYOUT**' from the Program Menu; the site layout information will be displayed:



- 5) Enter a '2' for the number of lanes and press the 'Y/ENT' key.
- 6) The LANE # field will display 01 to indicate lane 1 is being configured; the next three steps will apply to the lane 1 configuration. Use the F2 and F3 keys to select the lane direction in the DIR field. Press the 'Y/ENT' key.
- 7) In the **SENSORS** field, select two axle sensors from the graphical choices available and press the '**Y/ENT**' key to set the sensor layout for all lanes.
- 8) In the **SPACING** field, enter the distance between the leading edges of the lane 1 axle sensors (in decimeters (tenths of a meter) if the unit has been configured as metric, otherwise in tenths of a foot).
- Press the F1 'NEXT ' key to configure lane 2; the LANE# will change to 02 to indicate that lane 2 is being configured; the next 2 steps will apply to the lane 2 configuration. (

Note: the sensor configuration is the same in all lanes and only set once.)

- 10) Enter the lane 2 direction in the **DIR** field. Press the 'Y/ENT' key.
- 11) In the **SPACING** field, enter the distance between the leading edges of the lane 2 axle sensors
- 12) Press **F4** '**CHNG**' to save the configuration changes and return to the Program Menu.
- 13) Select **4** '**INTV**' from the Program Menu to display the interval selection screen:



Press the '**3**' key to select 60 minute intervals; an '*' will appear next to the selection.

Note: all intervals displayed on this screen are shown in minutes.

- 14) Press **F4** 'CHNG' to return to the Program Menu
- 15) Select 5 'LOCATION' from the Program Menu and enter the first line of the location description; use the F2 and F3 arrow keys to move the cursor. Press the 'Y/ENT' key to move to the second line and enter the second line of the location description. Press F4 'CHNG' to save the entry and return to the Program Menu.

Select 6 'SITEID' from the Program Menu and enter a station number; press the 'Y/ENT' key to move the cursor to the SITE ID field and enter the site identification. Press F4 'CHNG' to save the entry and return to the Program Menu.

16) Press the '7' key to select **SPEED** from the Program menu, the Speed Binning options will be displayed:



- 17) Press the '3' key to select TMG; an '*' will appear next to the selection; the unit will collect speed data using the pre-defined Traffic Monitoring Guide speed bins (refer to section 2.4.7 for a description of speed bins). Press F4 'CHNG' to return to the Program Menu.
- 18) Select **3** '**START**' from the Program Menu to set when the Mini TRS is to begin and end counting; the START menu will be displayed:

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START	YY/MM/DD	NOW	F1
11:52	13/01/22		F2
END	YY/MM/DD	anne +	F3
99:99	99/99/99	CHNG	F4

19) Either press the 'F1' key to have the counter start immediately (at the start of the next minute) or enter the desired hour, minute, year, month and day. The arrow keys 'F2' and 'F3' can be used to move the cursor to the right and left.

NOTE: date format is: YEAR, MONTH, DAY; ensure that the date is entered in this format for correct data recording.

- 20) When the start time entry is complete, press the '**Y/ENT**' key to move to the **END** time and date. Either press the '**F1**' key to have the Mini TRS count indefinitely or enter the desired end hour, minute, year, month and day.
- 21) When complete, press the F4 'CHNG' to save the changes and begin collecting data at the specified time. The display will return to the Main Menu and will show 'SET' on the bottom line to indicate that the configuration was accepted and the unit will begin to collect data at the time entered. When the start time is reached, the display will change to 'REC' to indicate that data is being recorded for data collection.
- 22) To view the real time data, press the **F1** '**MONITOR**' key and the speed counts for the current collection period will be displayed (refer to section 2.3.2).

5.3 CLASS & SPEED

This is a step by step example for using the Mini TRS for a class & speed count with 5 minute intervals in a single lane with two road tube axle sensors.

1) From the Main Menu select F2 PROGRAM:



The Program Menu will be displayed:



2) Press '1' on the keypad to select '**MODE**' from the Program Menu; the different modes of data collection will be displayed:



Press the **F2** '**&**' key to select the "AND" mode of data collection. Press '**2**' on the keypad to select **CLS**; an '**&**' will appear next to the selection; press '**3**' on the keypad to select **SPD**; an '**&**' will appear next to the selection, indicating data will be collected for Class AND Speed. Press **F4** '**CHNG**' to save the mode changes and return to the Program Menu.

 Select 2 'LAYOUT' from the Program Menu; the site layout information will be displayed:

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- 4) Enter a '1' for the number of lanes (even if the sensors may cross multiple lanes) and press the 'Y/ENT' key.
- 5) The LANE # field will display 01 to indicate lane 1 is being configured (this example has only one lane). Use the F2 and F3 keys to select the lane direction in the DIR field. Press the 'Y/ENT' key to move the cursor to the SENSORS field
- 6) Select two axle sensors from the graphical choices available and press the 'Y/ENT' key.
- 7) At the **SPACING** field, enter the distance between the leading edges of the axle sensors; press **F4** '**CHNG**' to save the changes and return to the Program Menu.
- 8) Select **4** '**INTV**' from the Program Menu to display the interval selection screen:



9) Press the '6' key to select 5 minute intervals; an '*' will appear next to the selection, then press F4 'CHNG' to return to the Program Menu.

Note: all intervals displayed on this screen are shown in minutes.

- Select 5 'LOCATION' from the Program Menu and enter the first line of the location description; use the F2 and F3 arrow keys to move the cursor. Press the 'Y/ENT' key to move to the second line and enter the second line of the location description. Press F4 'CHNG' to save the entry and return to the Program Menu.
- 11) Select 6 'SITEID' from the Program Menu and enter a station number; press the 'Y/ENT' key to move the cursor to the SITE ID field and enter the site identification. Press F4 'CHNG' to save the entry and return to the Program Menu.
- 12) Press the '7' key to select **SPEED** from the Program menu, the Speed Binning options will be displayed:



- 13) Press the '3' key to select TMG; an '*' will appear next to the selection; the unit will collect speed data using the pre-defined Traffic Monitoring Guide speed bins (refer to section 2.4.7 for a description of speed bins). Press F4 'CHNG' to return to the Program Menu.
- 14) Select **3** '**START**' from the Program Menu to set when the Mini TRS to begin counting; the START menu will be displayed:



15) Either press the 'F1' key to have the counter start immediately (at the start of the next minute) or enter the desired hour, minute, year, month and day. The arrow keys 'F2' and 'F3' can be used to move the cursor to the right and left.

NOTE: date format is: YEAR, MONTH, DAY; ensure that the date is entered in this format for correct data recording.

- 16) When the start time entry is complete, press the 'Y/ENT' key to move to the END time and date. Either press the 'F1' key to have the Mini TRS count indefinitely or enter the desired end hour, minute, year, month and day.
- 17) When complete, press the F4 'CHNG' to save the changes and begin collecting data at the specified time. The display will return to the Main Menu and will show 'SET' on the bottom line to indicate that the configuration was accepted and the unit has been set to begin to collect data at the time entered. When the start time is reached, the display will change to 'REC' to indicate that data is being recorded for data collection.
- 18) To view the real time data, press the **F1** '**MONITOR**' key and the class and speed counts for the current collection period will be displayed (refer to section 2.3.3).

5.4 PER VEHICLE

This is a step by step example for using the Mini TRS to collect data as individual vehicle records ("per vehicle" data) at a two lane site with two road tube axle sensors per lane. Per vehicle data collection will be turned off for vehicles in classes 1 through 3 (private passenger vehicles).

1) From the Main Menu select **F2 PROGRAM**:



2) The Program Menu will be displayed:



3) Press '1' on the keypad to select '**MODE**' from the Program Menu; the different modes of data collection will be displayed:



Press '4' on the keypad to select **PV** (per vehicle) mode; Class and speed data will automatically also be selected, all will have an '**&**' to indicate that they have been selected. Press **F4** '**CHNG**' to save the change to the selected mode and return to the Program Menu.

4) Select **2 'LAYOUT**' from the Program Menu; the site layout information will be displayed:

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- 5) Enter a '2' for the number of lanes and press the 'Y ENT' key.
- 6) The **LANE #** field will display **01** to indicate lane 1 is being configured; the next three steps will apply to the lane 1 configuration. Use the F2 and F3 keys to select the lane direction in the **DIR** field. Press the '**Y**/**ENT**' key.
- 7) In the **SENSORS** field, select two axle sensors from the graphical choices available and press the '**Y/ENT**' key to set the sensor configuration for all lanes.
- In the SPACING field, enter the distance between the leading edges of the lane 1 axle sensors (in meters if the units have been configured as metric, otherwise in feet).
- 9) Press the **F1** '**NEXT** ' key to configure lane 2; the **LANE#** will change to **02** to indicate that lane 2 is being configured; the next 2 steps will apply to the lane 2 configuration.

Note: the sensor configuration is the same in all lanes.

- 10) Enter the lane 2 direction in the **DIR** field. Press the '**Y/ENT**' key.
- 11) In the **SPACING** field, enter the distance between the leading edges of the lane 2 axle sensors.
- 12) Press **F4** '**CHNG**' to save the configuration changes and return to the Program Menu.
- 13) Select 4 'INTV' from the Program Menu to display the interval selection screen:



Press the '7' key to select 10 minute intervals; an '*' will appear next to the selection.

Note: all intervals displayed on this screen are shown in minutes. Press **F4** '**CHNG**' to return to the Program Menu.

14) Select **5** '**LOCATION**' from the Program Menu and enter the first line of the location description; use the **F2** and **F3** arrow keys to move the cursor. Press the

'Y ENT' key to move to the second line and enter the second line of the location description. Press **F4 'CHNG**' to save the entry and return to the Program Menu.

- 15) Select 6 'SITEID' from the Program Menu and enter a station number; press the 'Y ENT' key to move the cursor to the SITE ID field and enter the site identification. Press F4 'CHNG' to save the entry and return to the Program Menu.
- 16) Press the '7' key to select **SPEED** from the Program menu, the Speed Binning options will be displayed:



- 17) Press the '3' key to select TMG; an '*' will appear next to the selection; the unit will collect binned speed data using the pre-defined Traffic Monitoring Guide speed bins (refer to section 2.4.7 for a description of speed bins). Binned Class data will also be collected (PV data mode automatically selects Speed AND Class binned data collection). Press F4 'CHNG' to return to the Program Menu; press the DEL/N key to return to the Main menu.
- 18) Select F3 'SYS' to go to the System menu:



19) Select 7 'CONFIG' to go to the Configuration menu:



20) Select **7** '**PV**' to go to the Per Vehicle data mode menu:

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Press the **1** key to enable binning only of data for vehicles in classes 1 through 3 (per vehicle data will not be saved for vehicles in these classes); an "*" will be displayed to show that the option is enabled.

Press **F4** '**CHNG**' to return to the Configuration Menu, press **F4** '**CHNG**' to return to the System menu, press the **DEL/N** key to return to the Main menu.

21) Press **F2** '**PROGRAM**' to open the Program menu. Select **3** '**START**' from the Program Menu to set when the Mini TRS to begin counting; the START menu will be displayed:



22) Either press the '**F1**' key to have the counter start immediately (at the start of the next minute) or enter the desired hour, minute, year, month and day. The arrow keys '**F2**' and '**F3**' can be used to move the cursor to the right and left.

NOTE: date format is: YEAR, MONTH, DAY; ensure that the date is entered in this format for correct data recording.

- 23) When the start time entry is complete, press the '**Y/ENT**' key to move to the **END** time and date. Either press the '**F1**' key to have the Mini TRS count indefinitely or enter the desired end hour, minute, year, month and day.
- 24) When complete, press the **F4** '**CHNG**' to save the changes and begin collecting data at the specified time. The display will return to the Main Menu and will show '**SET**' on the bottom line to indicate that the configuration was accepted and the unit has been set to begin to collect data at the time entered. When the start time is reached, the display will change to '**REC**' to indicate that data is being recorded for data collection.
- 25) To view the real time data, press the **F1** '**MONITOR**' key; the speed, class and count for the most recent vehicle in each lane will be displayed. To switch the display to axle data, select **F3** '**PV**' (refer to section 2.3.6).

5.5 BI-DIRECTIONAL VOLUME

This is a step by step example for using the Mini TRS to collect a bi-directional volume count with a 60 minute interval at a two lane site with double road tube axle sensors in each lane (i.e. two tubes all the way across both lanes).

1) From the Main Menu select **F2 PROGRAM**:



2) The Program Menu will be displayed:



3) Press '1' on the keypad to select '**MODE**' from the Program Menu; the different modes of data collection will be displayed:



Press '1' on the keypad to select **VOL** mode; an '*' will appear next to the selection, then press **F4** '**CHNG**' to save the change to the selected mode and return to the Program Menu.

4) Select **2 'LAYOUT**' from the Program Menu; the site layout information will be displayed:



5) Enter a '2' for the number of lanes and press the 'Y/ENT' key.

Note that in bi-directional mode, each direction counts as a lane

- 6) The LANE # field will display 01 to indicate lane 1 (the primary direction for the lane) is being configured; the next three steps will apply to the lane 1 configuration. Enter the primary lane direction in the DIR field. Press the 'Y/ENT' key.
- 7) In the **SENSORS** field, select bi-directional two axle sensors from the graphical choices available and press the '**Y/ENT**' key to set the configuration for all lanes.



- 8) The distance between the two sensors should be 6" (15 cm). The entry in the **SPACING** field is ignored for this type of layout.
- 9) Press the F1 'NEXT ' key to configure lane 2 (the opposite direction of traffic flow to lane 1); the LANE# will change to 02 to indicate that lane 2 is being configured; the next 2 steps will apply to the lane 2 configuration.
- 10) Enter the lane 2 direction in the **DIR** field (this will be the opposite of the lane 1 direction). Press the '**Y/ENT**' key.
- 11) Press **F4** '**CHNG**' to save the configuration changes and return to the Program Menu.
- 12) Select 4 'INTV' from the Program Menu to display the interval selection screen:

1-15	5-2		F1
2-30	6-5	當動製設式建築	F2
3-60	7-10	CUNC	F3
4-1*	通過影響 另外觀量	CHNG	F4

Press the '**3**' key to select 60 minute intervals; an '*' will appear next to the selection.

Note: all intervals displayed on this screen are shown in minutes. Press **F4** '**CHNG**' to return to the Program Menu.

 Select 5 'LOCATION' from the Program Menu and enter the first line of the location description; use the F2 and F3 arrow keys to move the cursor. Press the 'Y/ENT' key to move to the second line and enter the second line of the location description. Press F4 'CHNG' to save the entry and return to the Program Menu.

- 14) Select 6 'SITEID' from the Program Menu and enter a station number; press the 'Y/ENT' key to move the cursor to the SITE ID field and enter the site identification. Press F4 'CHNG' to save the entry and return to the Program Menu.
- 15) Select **3** '**START**' from the Program Menu to set when the Mini TRS to begin counting; the START menu will be displayed:



16) Either press the 'F1' key to have the counter start immediately (at the start of the next minute) or enter the desired hour, minute, year, month and day. The arrow keys 'F2' and 'F3' can be used to move the cursor to the right and left.

NOTE: date format is: YEAR, MONTH, DAY; ensure that the date is entered in this format for correct data recording.

- 17) When the start time entry is complete, press the 'Y/ENT' key to move to the END time and date. Either press the 'F1' key to have the Mini TRS count indefinitely or enter the desired end hour, minute, year, month and day.
- 18) When complete, press the F4 'CHNG' to save the changes and begin collecting data at the specified time. The display will return to the Main Menu and will show 'SET' on the bottom line to indicate that the configuration was accepted and the unit has been set to begin to collect data at the time entered. When the start time is reached, the display will change to 'REC' to indicate that data is being recorded for data collection.

To view the real time data, press the **F1** '**MONITOR**' key and the volume counts for each lane (i.e. direction) for the current collection period will be displayed (refer to section 2.3.2).

5.6 CLASS BY SPEED

This is a step by step example for using the Mini TRS for a Class BY Speed count (binned data matrix) with a 30 minute interval at a site with one lane using two road tube axle sensors.

1) From the Main Menu select F2 PROGRAM:



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The Program Menu will be displayed:



2) Press '1' on the keypad to select '**MODE**' from the Program Menu; the different modes of data collection will be displayed:



Press '2' on the keypad to select **CLS**; an '*' will appear next to the selection. Press the **F3 -** 'X' key to select the "BY" mode of data collection. The '*' will change to an 'X'. Press '3' on the keypad to select **SPD**; an 'X' will appear next to both selections, indicating data will be collected for Class BY Speed. Press **F4** '**CHNG**' to save the mode changes and return to the Program Menu.

3) Select **2 'LAYOUT**' from the Program Menu; the site layout information will be displayed:



- 4) Enter a '1' for the number of lanes and press the 'Y/ENT' key.
- 5) The LANE # field will display 01 to indicate lane 1 is being configured (this example has only one lane). Use the F2 and F3 keys to select the lane direction in the DIR field. Press the 'Y/ENT' key to move the cursor to the SENSORS field
- 6) Select two axle sensors from the graphical choices available and press the 'Y/ENT' key.
- 7) At the **SPACING** field, enter the distance between the leading edges of the axle sensors; press **F4** '**CHNG**' to save the changes and return to the Program Menu.
- 8) Select 4 'INTV' from the Program Menu to display the interval selection screen:

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9) Press the '2' key to select 30 minute intervals; an '*' will appear next to the selection, then press F4 'CHNG' to return to the Program Menu.

Note: all intervals displayed on this screen are shown in minutes.

- Select 5 'LOCATION' from the Program Menu and enter the first line of the location description; use the F2 and F3 arrow keys to move the cursor. Press the 'Y/ENT' key to move to the second line and enter the second line of the location description. Press F4 'CHNG' to save the entry and return to the Program Menu.
- 11) Select 6 'SITEID' from the Program Menu and enter a station number; press the 'Y/ENT' key to move the cursor to the SITE ID field and enter the site identification. Press F4 'CHNG' to save the entry and return to the Program Menu.
- 12) Press the '7' key to select **SPEED** from the Program menu, the Speed Binning options will be displayed:



- 13) Press the '1' key to select **HI**; an '*' will appear next to the selection; the unit will collect speed data using the pre-defined High Speed bins (refer to section 2.4.7 for a description of speed bins). Press **F4** '**CHNG**' to return to the Program Menu.
- 14) Select **3** '**START**' from the Program Menu to set when the Mini TRS to begin counting; the START menu will be displayed:



15) Either press the 'F1' key to have the counter start immediately (at the start of the next minute) or enter the desired hour, minute, year, month and day. The arrow keys 'F2' and 'F3' can be used to move the cursor to the right and left.

NOTE: date format is: YEAR, MONTH, DAY; ensure that the date is entered in this format for correct data recording.

- 16) When the start time entry is complete, press the 'Y/ENT' key to move to the END time and date. Either press the 'F1' key to have the Mini TRS count indefinitely or enter the desired end hour, minute, year, month and day.
- 17) When complete, press the F4 'CHNG' to save the changes and begin collecting data at the specified time. The display will return to the Main Menu and will show 'SET' on the bottom line to indicate that the configuration was accepted and the unit has been set to begin to collect data at the time entered. When the start time is reached, the display will change to 'REC' to indicate that data is being recorded for data collection.
- 18) To view the real time data, press the **F1** '**MONITOR**' key and the speed, class and Class By Speed count for the current collection period will be displayed (refer to section 2.3.3).

6.0 MAINTENANCE

6.1 BATTERY

In the event the recorder's battery should fail, the following procedure should be followed to replace the battery.

- 1. Turn the power off with the ON/OFF switch and disconnect any charger from the Mini TRS.
- 2. Remove the four screws holding the face plate to the housing.
- 3. Remove the face plate and carefully place it face down.

Warning: do not twist or crimp the internal wiring to the airswitches and battery.

4. The battery comes standard with a harness attached. Disconnect the battery from the unit at the harness quick connector. Remove the battery bracket and remove the battery.

Note: the battery is kept in place with a bracket to protect the unit against shock, so be sure to put the bracket back in place when finished.



Figure 6-1 – Main battery and harness

- 5. Insert the new battery. Reconnect the quick connector; because the battery comes with a keyed harness attached, there is little chance of connecting a battery with the reverse polarity.
- 6. Replace the face plate and replace the screws.

7. Turn unit back on and check the battery voltage; the new battery may require charging before use.

6.2 GASKETS

The Mini TRS uses gaskets installed in key locations for weather resistance. All gaskets are available from IRD.

- 1. The lid gasket is attached to the inner perimeter of the lid. It is made of a compressible foam material to provide a seal along the upper edge of the counter box.
- 2. The keypad is made of flexible material which compresses against the LCD plate. Although this is not a gasket which guarantees waterproofing, it does form a weather resistant fit which will help to prevent moisture from entering the counter.
- 3. The sensor input connectors on the front end of the unit each have their own gasket. Whenever a connector is removed from the housing, it is recommended that the gasket be replaced.

6.3 CONNECTIONS



Figure 6-2 – Tube sensor connectors

The Mini TRS has four road tube connectors. Keep connectors capped when not in use to prevent damage and/or contamination. If the connectors become contaminated with dirt or moisture, clean them using isopropyl alcohol and a soft bristle brush. In the event, a connector should be damaged, order the appropriate replacement connector and gasket.
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Figure 6-3 – Contact switch input connector

If the unit has the optional contact sensor connector, keep the connector cap in place when not in use.

6.4 STORAGE

If the counter is going to be stored for any length of time, the following procedure is strongly recommended:

Turn the power switch to OFF

A regular schedule for battery charging should be maintained. Schedule battery cycling and recharging at least once every two to three months. If the counter is to be stored for an extended length of time, remove the battery and place it in a separate area for periodic recharging.

Locate an area where the counters can be accessed for routine maintenance. The area should be clear of obstructions to reduce the possibility of damage to the counters by knocking the unit to the ground or objects falling on them.

DO NOT STACK COUNTERS.

6.5 CLOCK BATTERY

The lithium battery which powers the system clock in the unit, should be changed every 3 to 5 years. This will require access to the CPU board.

Prior to removal, disconnect the charger or solar panel and **SWITCH THE POWER OFF**; failure to do this may result in damage to the board. When removing and working with any electronics board, observe all necessary electrostatic discharge working procedures to avoid damage to the board. To access the board, first remove the hold down screws at the corners of the face plate. Next, lift up on the face plate; the CPU board is attached to the underside of the face plate.

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Figure 6-4 - mini TRS CPU board on back of faceplate

Disconnect the battery leads at the quick connector and the 9 pin connector on the board with wires from the sensor inputs to the CPU board.



Figure 6-5 - Clock battery on CPU board

Unsolder the battery from the board and solder in the new battery, taking care to maintain the correct polarity, as marked on the board. Reconnect the sensor harness connector and the main battery quick connector. Reinstall the faceplate.

6.6 BOARD IDENTIFICATION

Each Mini TRS CPU board is clearly marked on the silk screen with board specific identification information. This information may be needed during hardware level support. The board serial number and revision are located on the solder side of the printed circuit board (the side next to the faceplate) on the edge of the board near the Solar / Charger connector:



Figure 6-6 - Board ID

7.0 TROUBLESHOOTING

The Mini TRS firmware menus provide a number of internal diagnostic tools which are located under the System menu (section 2.5.3). These include memory testing, key board testing, LCD testing and data card testing. Should any of these fail, please contact IRD.

7.1 UNIT WILL NOT TURN ON

1) Be sure the unit is switched ON. Locate the On/Off switch on the lower center of the face plate, then verify position.

2) Check battery to make sure it is above 5.0 volts.

3) Verify battery harness is connect properly.

4) Attach unit to the computer using the communications cable. If the unit can communicate with the computer, the display may be faulty

7.2 UNIT WILL NOT COUNT

1) Check to see if the sensors are operating under the System/Diagnostics menu (section 2.5.3).

2) Check to be sure the unit is programmed correctly (section 2.4).

3) Make sure all the sensors are operating correctly.

4) Check the sensor connections to be sure they are attached properly.

7.3 UNIT WILL NOT COMMUNICATE

1) Check the communications cable using another counter.

2) If the serial port is being used for communications, check to be sure the baud rate is the same in the counter and the Road Reporter software. Also check to make certain the serial port is set correctly in the Road Reporter software.

3) If the USB computer port is being used for communications, check to be sure the serial port is set correctly in the Road Reporter software.

4) Check the Unit ID in the Site ID (see section 2.4.6) is set to 01.

5) Be sure the battery voltage is above 5.5 volts in the unit.

7.4 UNIT WILL NOT CHARGE BATTERY

1) Check charger to make sure it is working properly by connecting to other counters.

2) Check battery to make sure it will take and retain a charge.

Note: rechargeable batteries lose their ability to hold a charge after a number of years depending upon use.

3) If the unit is equipped with an optional solar panel, check the solar panel in the sun to be sure that the panel is outputting enough voltage to charge the battery.

A.0 SENSITIVITY ADJUSTMENTS

The sensitivity adjustment for the various sensors are located on the electronics boards that receive the sensor inputs. The adjustment is described in the sections that follow.

A.1 AXLE SENSOR SENSITIVITY

Road tube axle sensors have adjustments for sensitivity and debounce time available in the Axle Sensor configuration menu (F3 System / 7- Config / 5 – Ax Sens).

A.1.1 SENSITIVITY AND DEBOUNCE MENU ADJUSTMENTS

The top two rows in the display adjust the sensitivity of pneumatic road tube axle sensors.



- ALL TUBES the sensitivity and debounce time for all pneumatic road tubes will be adjusted by the entry in the line below; the Mini TRS does not perform individual pneumatic sensor adjustments.
- SENS/DEB= the current values for the pneumatic axle sensor sensitivity and debounce setting are displayed (refer to Appendix A.1.2 for information on the actual values corresponding to the pneumatic tube airswitch sensitivity and debounce settings). For the pneumatic tube sensitivity parameter, smaller numbers are more sensitive, larger numbers are less sensitive. The defaults for tube sensors are SENS/TIME = 05/01; maximum values: 15/15. For the Debounce Time parameter, the Mini TRS will ignore any input signals after the initial pneumatic signal for the length of time indicated.

To adjust either setting, use the **F2** or **F3** key to move the cursor to the number to be changed and then press the number key for the new value. Repeat for any other numbers that need to be changed. Press the **Y/ENT** key to switch between the sensitivity and debounce fields. When all values have been set, press the **F4** key to enter the change into the Mini TRS memory and return to the Configuration menu.

A.1.2 MINI TRS AIR SWITCH SETTINGS

The adjustments for the air switches are made using the system firmware menu, refer to section 2.5.7.1; the sensitivity (in millivolts) and debounce (in milliseconds) valued for the corresponding number entered in the menu are listed below:

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MINI TRS

<u>Sensitivity</u>	<u>Debounce</u>
00 = 100mV	00 = 32mS
01 = 200mV	01 = 40mS
02 = 300mV	02 = 50mS
03 = 400mV	03 = 60mS
04 = 500mV	04 = 70mS
05 = 600mV	05 = 80mS
06 = 700mV	06 = 90mS
07 = 800mV	07 = 100mS
08 = 900mV	08 = 110mS
09 = 1.0V	09 = 120mS
10 = 1.2V	10 = 130mS
11 = 1.4V	11 = 140mS
12 = 1.6V	12 = 150mS
13 = 1.8V	13 = 175mS
14 = 2.0V	14 = 200mS
15 = 2.2V	15 = 250mS

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B.0 FHWA VEHICLE CLASSES



C.0 MENU TREE

changes in all menus except the F1-Monitor menu.

DWG. #69046602 REV A



4/8/2013