

Data Collection

MTE User Manual

3.21

June 2009

MTE provides three programs for collecting data with MetroCount Roadside Units (RSUs):

- **MCSetup** for desktop and laptop PCs (English).
- **MCSetLite CE** for Mobile Devices based on Windows CE or Windows Mobile (multilanguage).
- **MCSetLite PC** for desktop and laptop PCs (multilanguage).

MCSetup provides complete support for all MetroCount RSUs, including RSU setup and unload, Site List management, RSU configuration and diagnostic tools. MCSetLite provides all of the required functionality for RSU control and data checking, with a multilingual user interface.

This chapter covers the fundamentals of gathering data using MCSetup, including:

- understanding RSU modes of operation and behaviour,
- configuring MCSetLite and MCSetup,
- connecting to a RSU,
- checking RSU status,
- setting up a RSU,
- viewing real-time sensor hits to check setup and installation, and
- unloading data.

Installation and usage of MCSetLite is covered in the **MCSetLite User Manual**.

Experimenting with the user interface and features in the office is recommended. This gives an opportunity to become familiar with RSU behaviour, and make field setup a smoother process.

A comprehensive discussion of issues including site selection, sensor installation and information can be found in the corresponding Roadside Unit Operator Guides.

RSU Basics

Philosophy

All MetroCount Roadside Units are designed to make the process of data collection as simple, and as reliable as possible. The primary mode of operation is to store time-stamped sensor hits, forming a hit stream of raw data. This approach to data collection maximizes the analysis potential and results in data unconstrained by units of measurement, classification schemes, or by binning counts. There is no need to decide, and in many cases compromise, the information required before a survey.

Most importantly, the data is auditable. Using a variety of simple software tools and techniques, data quality can be verified, and maintained.

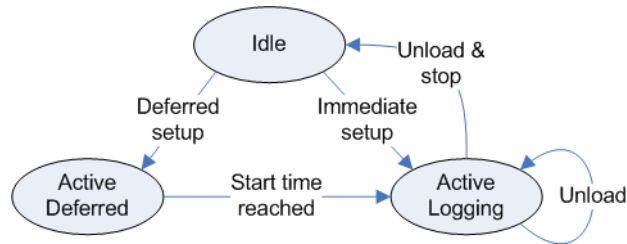
Communication

MetroCount RSUs are controlled via a standard RS-232 serial communications port, using MCSetLite or MCSetup. The ideal scenario is to invest in a mobile PC for use in the field. This provides the advantage of software tools to ensure correct RSU operation on-site, and to verify basic data quality.

A mobile PC is not a requirement. RSUs can be successfully setup using an office PC, and the start time deferred to a time after the RSU has been placed in the field.

Operating States

The following diagram shows the three operating states of a RSU.



RSU Operating States

The **Idle** state is the RSU's low-power, standby state. In this state, the RSU does not log any data and simply retains any existing data in memory. This results in very low battery consumption.

A survey is begun by performing a Setup operation. This is a simple process of specifying the sensor configuration and a number of site description parameters. The RSU may be set to start immediately, or deferred for up to 10 days. Once the start time is reached, the RSU enters its **Active Logging** state.

In its Active Logging state, the RSU time-stamps sensor hits. It also performs a number of maintenance tasks, such as checking battery voltages and monitoring memory usage.

The RSU does not require a stop time or logging duration. It simply continues to time-stamp sensor hits until an Unload operation is performed (with the option to stop the RSU), or its memory capacity is filled. Once the RSU is stopped, it returns to its Idle state.

Data is retained in the RSU's memory until the next setup operation is performed. Thus the data may be unloaded again if required.

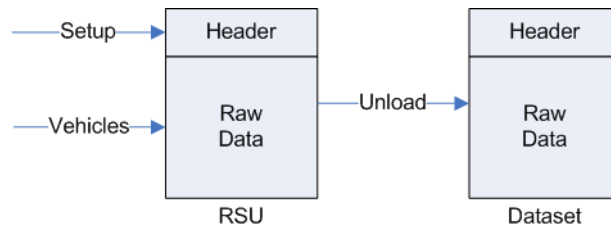
During a survey, data may be retrieved from the RSU, without interrupting the survey, by performing an Unload operation without the stop option. This allows a mid-survey data quality check to be performed.

Datasets

Header Details

All the survey parameters provided at setup, along with the current status of a RSU, are collectively stored in the RSU's **Header**. When checking a RSU's status, it is the unit's header that is retrieved.

When an Unload operation is performed, a **Dataset** is created, which contains the RSU's current header information, followed by the raw data. Datasets are then analysed by MTE's analysis component - MCReport.

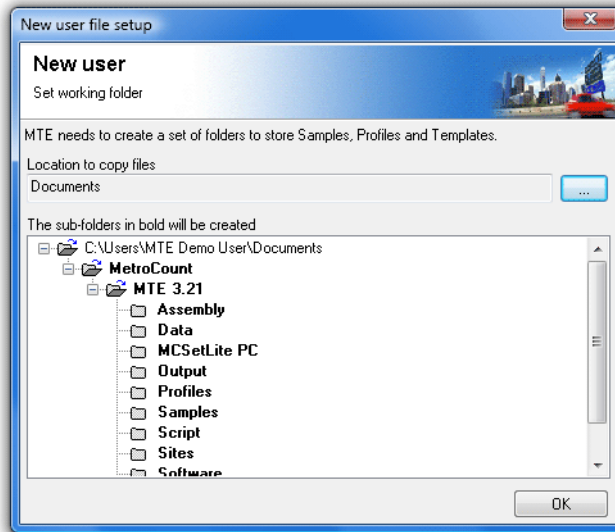


RSU Data Flow

MCSetup Configuration

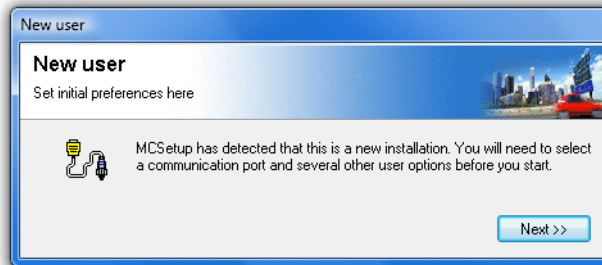
Preferences

MCSetup can be started from the **Start Menu** by locating the **MetroCount v3xx** folder, and selecting **MCSetup**. If this is the first time MCSetup has been started, the **Preferences** dialog box will be automatically displayed. If MReport has not been started, the **New user file setup** dialog box will also be displayed.



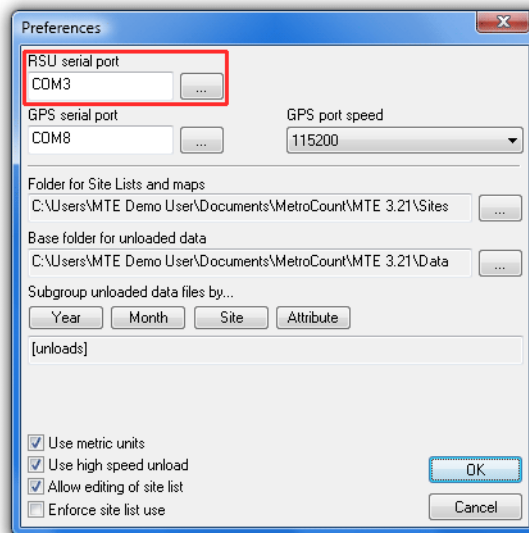
Setting a working folder location

MTE needs a folder location to store working files, such as MetroCount data, Profiles and templates. The default working folder location will be the current user's **Documents** folder. This is highly recommended as it is guaranteed to be accessible under all versions of Windows. To select a different folder, click the ... button. When done, MCSetup will create the list of folders shown in the sub-folders tree, and copy a set of default working files.



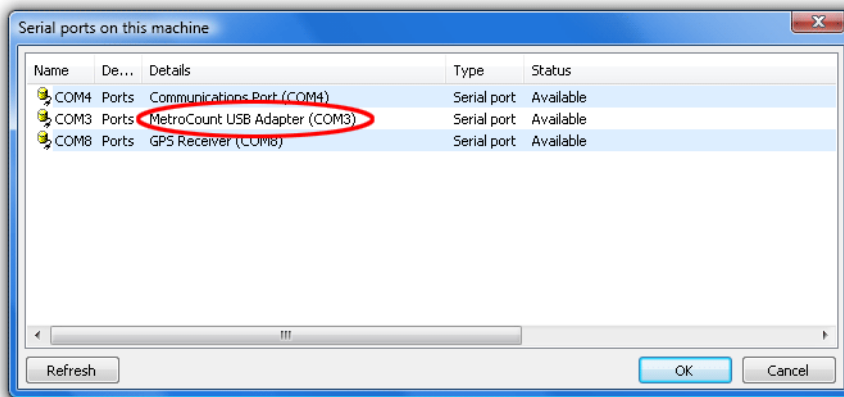
MCSetup new user settings

MCSetup's Preferences contain a number of options that need to be set before communicating with Roadside Units. These options can be reviewed at any time by selecting **View » Preferences** from the main menu.



MCSetup's Preferences

The most important setting is the **RSU serial port**. This is the serial communications port that will be used to communicate with MetroCount RSUs, which may be a MetroCount USB Adapter, or a physical serial port on a desktop or laptop. For a list of available serial ports, click the ... button.



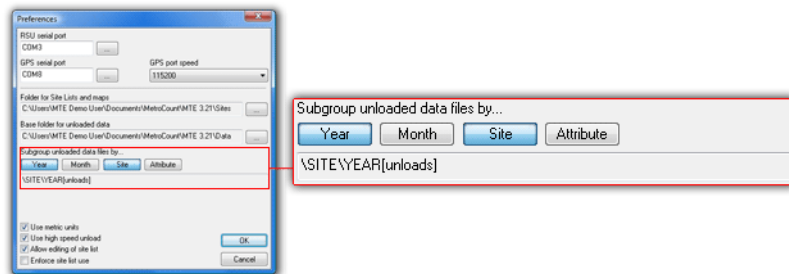
Selecting a serial port

A suitable serial port should have a status of **Available** with a yellow icon. A red-circle icon indicates the port is unavailable, possibly because it is already in use. Simply select the desired serial port, and click the **OK** button.

The **GPS serial port** setting is used to retrieve coordinates from a GPS unit, to be stored in a Site List or dataset header. Click the ... button to select from a list of available ports. USB and Bluetooth GPS units generally create a virtual serial port, which can be used by MCSetup. Refer to the GPS unit's documentation for the default serial port speed.

The **Folder for Site Lists and maps** is where MCSetup will first look for Site Lists, and their associated maps. The default folder is the **Sites** folder in MTE's working folder location.

The **Base folder for unloaded data** is where MCSetup will place data unloaded from a RSU. The default folder is the **Data** folder in MTE's working folder location. MCSetup can also automatically group data into subfolders using the **Year**, **Month**, **Site** and **Attribute** buttons. Folders will be created in the order the buttons are pushed.



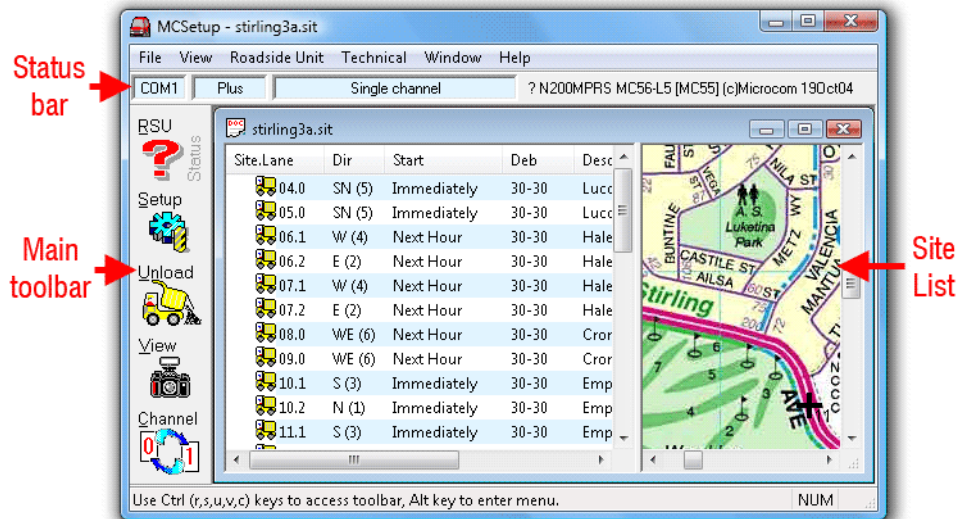
Grouping data into subfolders

The **Use metric units** option is for MCSetup's internal use only, such as displaying vehicle speed in the Sensor View. This option in no way affects the data being logged by a RSU. The units of measurement used for data analysis are set in MCReport.

Unchecking the **Allow editing of Site List** will prevent editing of sites in a Site List, to discourage site editing in the field. The **Enforce site list use** option will disable the Setup and Unload buttons on MCSetup's main toolbar until a site is selected in a Site List.

MCSetup Layout






MCSetup's basic layout is shown in the diagram below.



MCSetup's layout

The **Status bar** displays information about the currently connected RSU, including Signature type, current channel (for multi-channel RSUs), and the RSU's identifier and firmware revision.

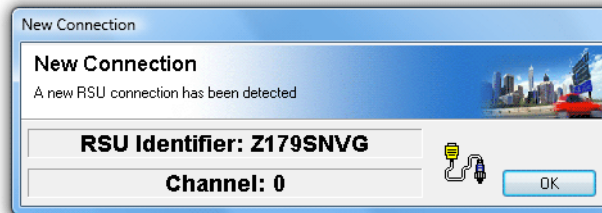
The main toolbar provides the core RSU functions. Note the shortcut keys listed at the bottom of the screen for convenient keyboard operation.

Button	Shortcut key	Function
	Ctrl + r	Get RSU status
	Ctrl + s	Setup RSU
	Ctrl + u	Unload data
	Ctrl + v	View sensor hits
	Ctrl + c	Change RSU channel (multi-channel RSUs only)

The document area of MCSetup is used for displaying Site Lists.

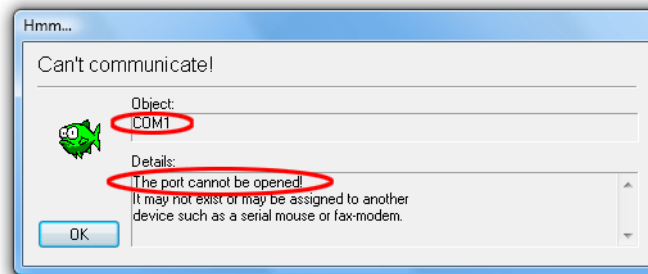
Establishing a Connection

Once a serial port has been selected in MCSetup's Preferences, connect a RSU and click the **RSU Status** button on MCSetup's main toolbar. If the **New Connection** dialog box appears, a successful connection has been established. This dialog box appears every time a different RSU is connected to MCSetup.



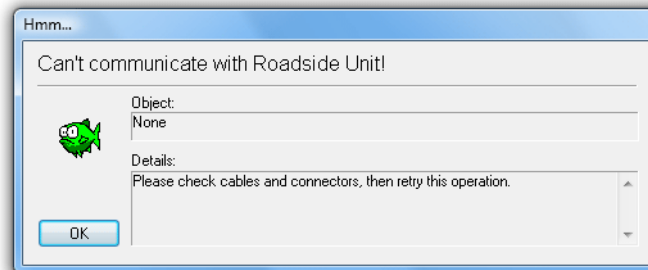
New Connection dialog box indicates a successful connection

If the **Can't communicate** error appears, with the details **The port cannot be opened**, either the wrong serial port has been selected in the Preferences, or the serial port is in use by another program.



Can't communicate - port cannot be opened

If the **Can't communicate with Roadside Unit** error appears, this indicates MCSetup was able to open the selected serial port, but did not receive a response from a RSU. With a RSU connected, click the **RSU Status** button and check whether the RSU's Status LED comes on. If the Status LED does not come on, the most likely cause is selecting the wrong serial port in the Preferences.



Can't communicate - check the RSU's Status LED

RSU Status

Overview

Clicking the **RSU Status** button on the main toolbar displays a snapshot of a RSU's current status, grouped into separate pages. It is advisable to do a status check regularly:

- Before setup - to check remaining battery life.
- After setup - to check the setup was successful, and the RSU is active.
- During a survey - to monitor axle statistics and memory usage.

If a potential problem exists in any of the status pages, the relevant page will be automatically displayed, along with a warning message describing the problem.



Note:

Use the left and right arrow keys to step through the RSU Status pages.

Site Information

The **Data** page displays the survey parameters of the data currently in memory, as specified when the RSU was setup.

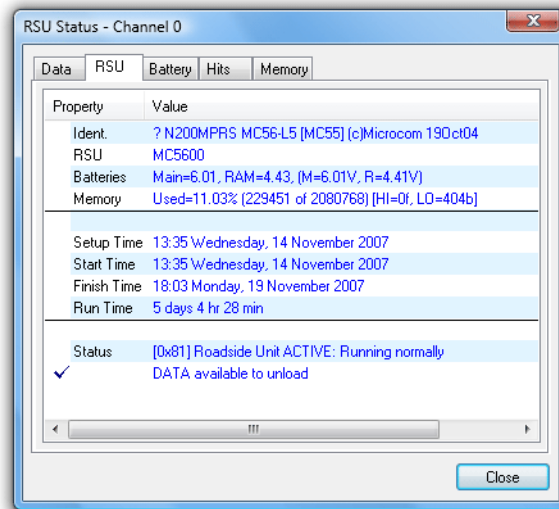
Property	Value
Site Name	001
Attribute	MetroCount HQ
Lane	00
Description	O'Connor Close north of Rollinson Rd
Layout	Axle sensors - Paired (Class/Speed/Count)
Direction A	7 - North bound A>B, South bound B>A. [7]
Direction B	0 - Unused or unknown. [0]
First Data	Unknown! (Roadside Unit start = 13:35 Wednesday, 14 ...
Last Data	Unknown! (Roadside Unit finish = 18:03 Monday, 19 Nov...
Debounce	A=10ms, B=10ms
Spacing	1000 mm - 3 ft 3.4 in
Operator	GC

Close

RSU Site Information

RSU Activity

The **RSU** page displays information about the RSU's hardware, and the Status list at the bottom shows the RSU's current state of activity. It also lists recent events that may impact the data currently in memory, or the RSU's condition.



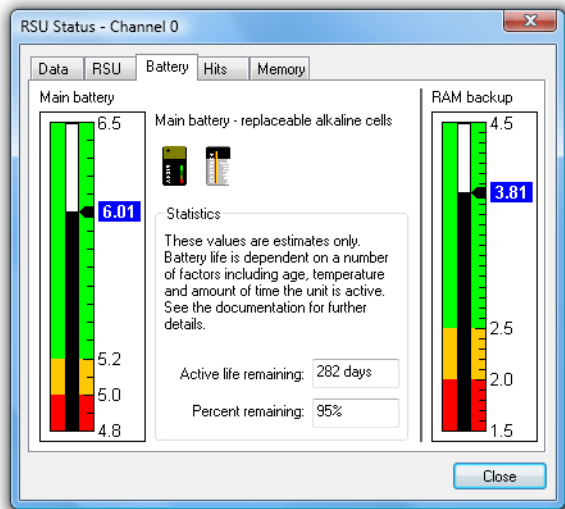
RSU status information

Text	Description
Roadside Unit not ACTIVE	The RSU is in its idle state.
Roadside Unit ACTIVE: Waiting for start time	The RSU has been setup with a deferred start time. When the start time is reached the RSU will switch to its active state.
Roadside Unit ACTIVE: Running normally	The RSU is in its active state, logging data.
DATA available to unload	The RSU contains data that has not been unloaded. This will remain until the RSU is stopped.
Memory FULL	The RSU has filled to capacity, and will have stopped logging data.
Main battery ran down	The RSU will switch to its idle state if the main battery drops below a certain level. This ensures that there is always sufficient power to communicate, barring battery failure. This message indicates the RSU may have stopped logging sooner than expected.
Roadside Unit POWER was interrupted	Power was interrupted while the RSU was active. If power is interrupted the RSU will stop logging data.
Dropped to IDLE (No hits)	The RSU stopped logging because no hits were detected for seven days.

Battery Levels

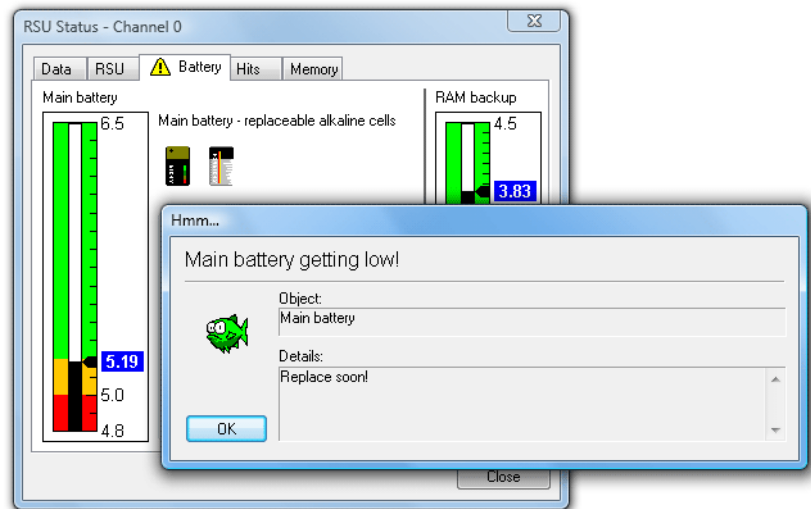
Non-rechargeable Main Battery

For RSUs with a non-rechargeable battery pack, the RSU Status gives an estimated number of days of continuous use, until the pack will need to be replaced. This estimate is based on the typical discharge curve for a battery pack supplied by MetroCount.



RSU battery status

When the battery voltage enters the yellow region of the graph, a reminder to replace the pack will be issued. Once in the red region, the battery should be replaced before any further use.



Battery warning message

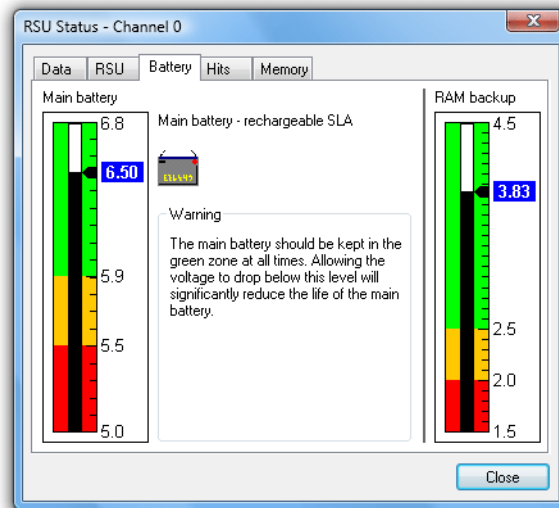
Even if the voltage is in the red region, the battery pack still has sufficient power for the RSU to

communicate, unload any data, and retain data almost indefinitely. The RSU will automatically shutdown below the red region to ensure communication will still be possible.

Some RSUs have a separate RAM backup battery to retain the RSU's memory while the main battery is changed. This is automatically charged from the main battery.

Rechargeable Main Battery

To ensure optimal capacity and service life, RSUs with rechargeable main batteries should have their battery voltage kept in the green region at all times. Actual days of use between charging will vary depending on the age of the battery.



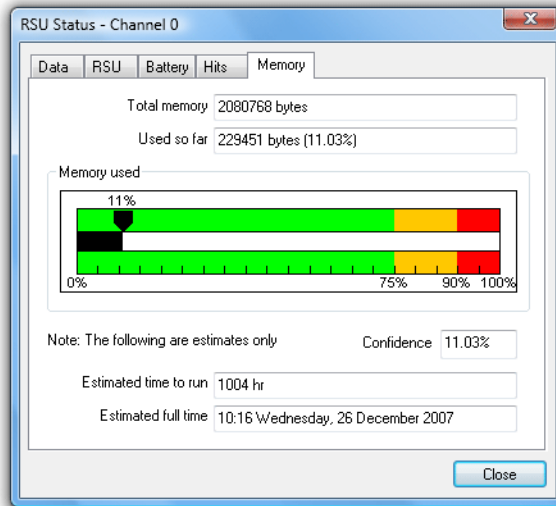
RSU battery status (rechargeable)

Running the main battery down to the red zone may result in irreversible damage to the battery, and it will probably need to be replaced.

Memory Usage

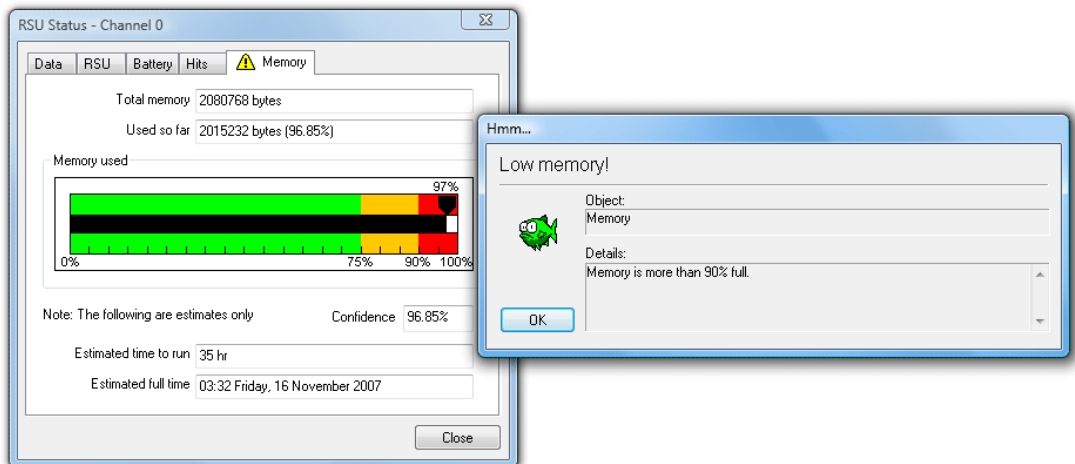
RSUs dedicate their entire memory to the current survey, and data must be unloaded onto a PC before the next setup. The RSU's Operator Guide lists an approximate hit capacity for each RSU memory size. Obviously the higher the traffic volume at a site, the shorter the survey that can be conducted. Once full, a RSU will stop logging data, and return to its idle state.

A RSU's status reports the percentage of capacity used so far, and an approximate time remaining until full. This is simply extrapolated from the amount of data logged and the Run Time (time elapsed since the RSU was setup).



Checking memory usage

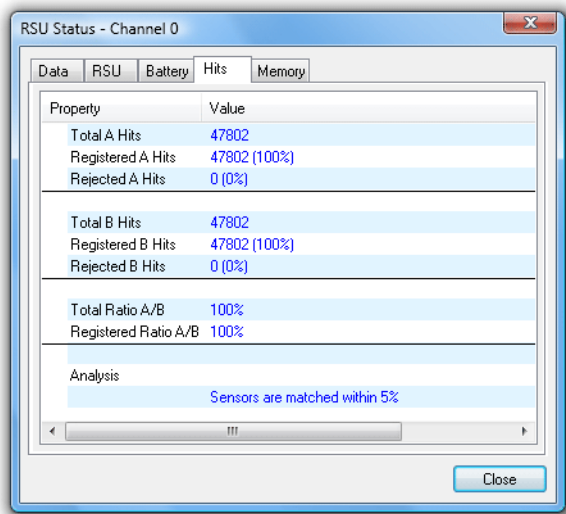
When checking a RSU's status, warning messages will be issued if the unit is more than 90% full.



Memory usage warning message

Sensor Statistics

The Sensor or Hit statistics can be used as a rough guide to the quality of raw data logged by a RSU.

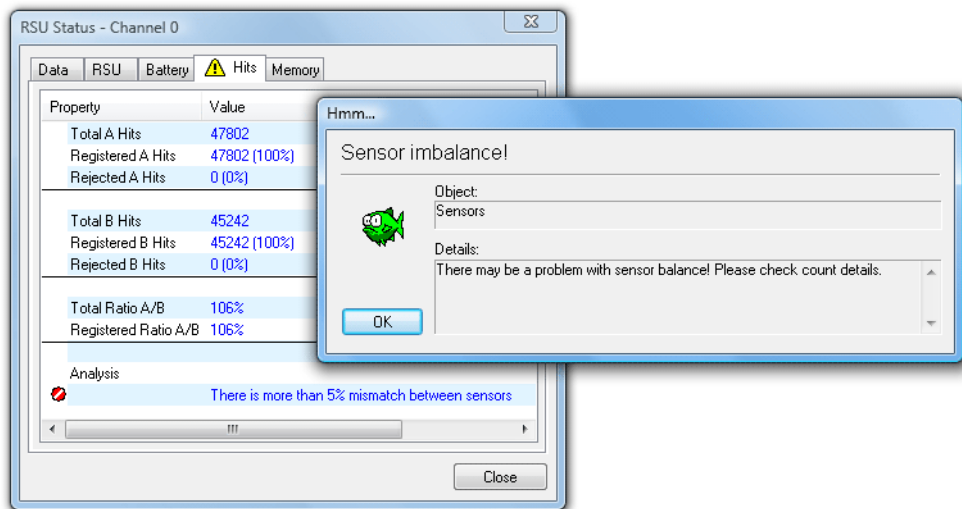


Checking sensor hits

Parameter	Description
Totals	The sensor Total counts are the total number of hits detected by each sensor. Registered represents the actual number of hits stored in memory.
Ratios	Ratios between the number of hits on each sensor.
Analysis	Conclusions and warnings related to the sensor totals and ratios. Warnings will only be issued if there is at least 200 axle hits on both sensors.

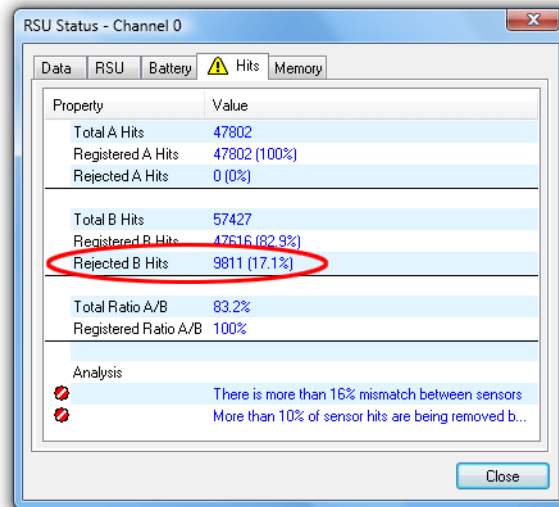
When using a Classifier Sensor Layout, a 100% match between A and B sensor hits is ideal. In reality, there will be a slight difference due to extra or missed hits.

A variation in total counts of more than 5% will give a **Sensor Imbalance** warning, highlighting a potential sensor problem at some point during the survey. The best way to examine if a problem with data quality exists is to unload the data and examine a plot of sensor hits, to determine where the mismatch occurred. For example, if a sensor problem started late in a survey, and there is sufficient usable data at the start, then the mismatch is not an issue.



Sensor imbalance warning

A Sensor Imbalance warning may also be triggered if more than 10% of the total hits are being removed by the debounce filter. For example, this can be caused by an incorrectly installed sensor, or vehicles traversing the sensors at an angle, giving multiple, closely-spaced hits. Again, it is simply a warning that there is something unusual about the data.



Rejected hits warning

RSU Setup

Overview

This section introduces the fundamental *software* concepts associated with setting up a RSU. For important issues relating to physically installing a RSU, refer to the *Roadside Unit Operator Guide* for the corresponding model of RSU.

Starting a RSU is an extremely simple process of describing the site via a set of **setup parameters**, and specifying a start time. For the most part, the setup parameters are purely descriptive, and do not affect RSU operation. The RSU continues logging until stopped, or filled to capacity.

For simple, infrequent surveys, RSUs can be easily configured on site. For planned surveys, **Site Lists** simplify the process even further, and minimize user error.

Setup Parameters

Site

The **Site** parameter is user-defined and may be up to 20 characters long. This is commonly used to represent the name or serial number assigned to the site where the RSU is placed.

The Site parameter is used as the first part of a dataset's filename when unloading data.

Attribute

The **Attribute** parameter is user-defined and may be up to 25 characters long. This is commonly used for site coordinates, or sub-grouping sites, for example by suburb or county. The Attribute parameter can be optionally used for grouping datasets into different folders when unloading data.

Operator

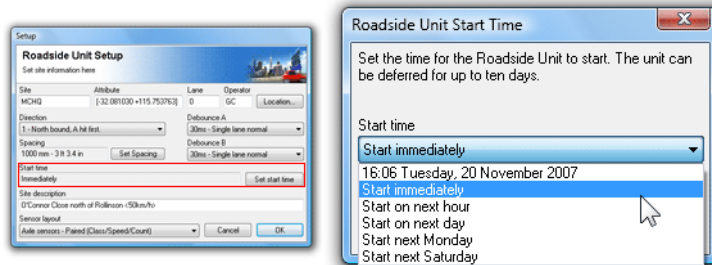
The **Operator** parameter is the initials (up to three characters) of the RSU operator's name. This is useful for identifying field operators if they need to be asked about a particular survey.

Start Time

A RSU becomes **active** once it is setup, however the logging of sensor hits can be deferred for up to 10 days. This feature is useful for conserving memory by only logging during the specific period of interest. It is also useful when a RSU is to be setup in the office and placed in the field some time later.

Note that a survey end time is not specified. The finish time of the data is set at the point the RSU is unloaded and/or stopped. MCRReport provides tools for selecting a report's period from the available data.

The default setting is to start logging immediately. To defer logging, any time in the next 10 days can be manually specified, or several automatically calculated boundaries are provided.



Deferring RSU Start Time

Sensor Layout

Layout Options

A RSU can be installed using a variety of **Sensor Layouts**, to obtain either classification data using a pair of sensors, or event-count data from a single sensor. The Sensor Layout *describes* the configuration of the sensors for use by MCRReport during analysis - it does not affect the operation of the RSU. The options for Sensor Layout will change depending on the model of RSU connected.

Setup

Roadside Unit Setup

Set site information here

Site	Attribute	Operator
MCHQ	[-32.0811016 +115.753860]	GC

Location...

Start time
Immediately

Start time...

Site description
O'Connor Close north of Rollinson <50km/h>

Sensor layout

- Axle sensors - Paired (Class/Speed/Count)
- Axle sensors - Paired (Class/Speed/Count)
- Axle sensors - Separate (Count)
- Axle sensors - Split (Count)

0 - Unused or unknown.

0 - Unused or unknown.

0 - Unused or unknown.

0

0

0

Spacing
1000 mm - 3 ft 3.4 in

Set Spacing

Lockout (ms)
10

Set Lockout

Cancel

OK

Selecting Sensor Layout



Note: For Sensor Layout recommendations and limitations, refer to the Roadside Unit Operator Guide for the model of RSU.

Axle Sensors - Paired (Classifier Layout)

Axle Sensors - Paired, also referred to as a **Classifier Layout** requires a pair of parallel axle sensors (tube/hose or piezo sensors) spaced a known distance apart. This is the most commonly used sensor layout as it gives the best value-for-effort in terms of the wealth of information that can be obtained from the raw data. MCRReport partitions the raw hits into vehicles, and calculates vehicle class, speed, direction, headway and so on.

The screenshot shows the 'Roadside Unit Setup' dialog box. The 'Sensor layout' dropdown is set to 'Axle sensors - Paired (Class/Speed/Count)'. Below it, the 'Direction' dropdown is set to 'A > B' and the 'Lane' dropdown is set to '0'. The 'Spacing' is set to '1000 mm - 3 ft 3.4 in'. The 'Lockout (ms)' is set to '30'. A diagram on the right shows two parallel sensors with arrows indicating traffic flow. The 'Direction' and 'Lane' dropdowns are highlighted with a red box.

Site	Attribute	Operator
MCHQ	[-32.081102 +115.753860]	GC

Start time: Immediately

Site description: O'Connor Close north of Rollinson <50km/h>

Sensor layout: Axle sensors - Paired (Class/Speed/Count)

Direction: A > B

Lane: 0

Lockout (ms): 30

Spacing: 1000 mm - 3 ft 3.4 in

Axle Sensors - Paired

This Sensor Layout provides one **Direction** option (either unidirectional or bidirectional) and one **Lane** designator. The **Spacing** between the sensors must also be specified.

Axle Sensors - Separate or Split (Count Layout)

The **Separate** and **Split** layouts can be used to obtain short-term counts of raw hits or events, but not classified vehicles. These layouts are useful for sites where a Classifier Layout is inappropriate, such as multiple lanes with traffic flows in the same direction.

A **Separate** layout indicates the event counts on each sensor bear no relationship, such as being on opposing carriage-ways.

Setup

Roadside Unit Setup

Set site information here

Site: MCHQ Attribute: [-32.081102 +115.753860] Operator: GC Location...

Start time: Immediately Start time...

Site description: O'Connor Close north of Rollinson <50km/h>

Sensor layout: Axle sensors - Separate (Count)

Direction	Lane
A 1 - North bound.	1
B 3 - South bound.	2
0 - Unused or unknown.	0
0 - Unused or unknown.	0

Lockout (ms): 30 Set Lockout

Spacing: 1000 mm - 3 ft 3.4 in Set Spacing

Cancel OK

Axle Sensors - Separate

A **Split** layout can be used to differentiate event counts across a pair of lanes. Using a pair of sensors (one long and one short), the short sensor gives one lane, and the long minus the short gives the other lane. Using additional RSUs, this method can be extended to more than two lanes.

When selecting either of these layouts, a **Direction** and **Lane** number are available for both inputs.

Setup

Roadside Unit Setup

Set site information here

Site: MCHQ Attribute: [-32.081102 +115.753860] Operator: GC Location...

Start time: Immediately Start time...

Site description: O'Connor Close north of Rollinson <50km/h>

Sensor layout: Axle sensors - Split (Count)

Direction	Lane
A 1 - North bound.	1
B 1 - North bound.	2
0 - Unused or unknown.	0
0 - Unused or unknown.	0

Lockout (ms): 30 Set Lockout

Spacing: 1000 mm - 3 ft 3.4 in Set Spacing

Cancel OK

Axle Sensors - Split

Vehicle Sensors - Separate (Count Layout)

The **Vehicle Sensors** layout is available for RSUs with vehicle sensors (loops). The layout assumes a single sensor per lane, to provide vehicle counts. A direction and lane designator is available for each input.

Roadside Unit Setup
Set site information here

Site: MCHQ Attribute: [-32.081102 +115.753860] Operator: GC Location...

Start time: Immediately Start time...

Site description: O'Connor Close north of Rollinson <50km/h>

Sensor layout
Vehicle sensors - Separate (Count)

	Direction	Lane
0A	1 - North bound.	1
0B	1 - North bound.	2
1A	1 - North bound.	3
1B	1 - North bound.	4

Lockout (ms): 350 Set Lockout

Spacing: 1000 mm - 3 ft 3.4 in Set Spacing

Cancel OK

Vehicle Sensors - Separate

Site Description / Text

The **Site Description** parameter may be up to 70 characters long. It is used to identify a survey site. It is useful to settle on a convention, such as the road name and nearby intersecting roads, landmarks or sign posts.

A site's posted speed limit (PSL) can also be entered into this field. MCRReport will optionally scan for a speed limit in the following form:

- Must be enclosed in angle brackets < >
- Default is km/h. Append an 'm' or 'M' for mph.
- The speed limit can appear anywhere in the description, but other angle brackets cannot be inserted when using this feature.

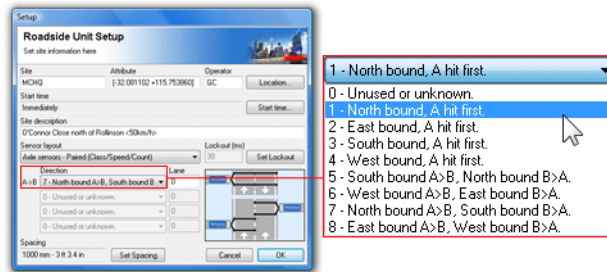
Example Site Descriptions	
km/h	mph
Hay St <60>	<40 mph> Speed test, Euston Road
<60km/h> Hay Street	ACPO test, Harrow Road <40m>
Hay St, <50 km/h> study	Harrow Road, PSL=<40 MPH>

Direction(s)

The **Direction** parameter specifies the approximate direction vehicles at the site are headed, or the overriding direction of a carriageway of a freeway or highway. Direction is specified as north, south, east or west bound, so it is simply a matter of selecting the compass point that best approximates the actual direction of travel.

For a Classifier Layout (pair of sensors), the direction a vehicle was travelling is determined by the sensor that was hit first. Vehicles travelling from A to B is known as the **primary** direction, and vehicles travelling from B to A is called the **secondary** direction.

There are eight direction codes to choose from. The first four are for single lane sites, and only the primary (A>B) direction is specified. The second four direction codes are for bidirectional sites, and both the primary (A>B) and secondary (B>A) directions are specified.



Direction Codes

Remember that the direction code is a purely descriptive field, for reference during data analysis. For single lane sites, vehicles travelling in the secondary direction (for example, overtaking) will still be logged. The RSU does not filter vehicles.

When using a Count Layout, the analysis software has no concept of vehicles, so the concept of A>B and B>A is dropped. A second direction code is provided for Separate mode, when the A and B sensors can be placed independently.

Lane

The lane number is used to distinguish data collected from multiple lanes at one site. By convention, a lane number of zero (0) is used for single-lane or bidirectional sites.

For multi-lane sites where multiple RSUs are required, each should be setup with a unique lane number starting at 1, through to a maximum of 15. When data is unloaded, the lane number is included in the file extension of the suggested dataset name. For example, the files for a multi-lane site with two RSUs can be easily recognised as having the same file name with **.ec1** and **.ec2** file extensions respectively.

A consistent numbering convention will help differentiate datasets. For example, number the lanes consecutively, start at one (1) from the west (north-south roads), or north (east-west roads).

Lockout

For RSUs with axle-sensors, the Lockout time is used to eliminate spurious, closely-spaced sensor hits, primarily to avoid wasting data storage space. Extra hits that are actually logged will be filtered out by the data analysis software.

The **Lockout** setting specifies the time period (in milliseconds) after a logged sensor hit, for which further sensor hits will be rejected. The recommended Lockout setting are:

- 10ms if the sensor spans multiple lanes, and
- 30ms if the sensor spans a single lane.

For RSUs with loop sensors, the Lockout time is used to eliminate multiple counts for long vehicles where the loop may "untrigger" mid-vehicle. The default setting is 350 milliseconds.

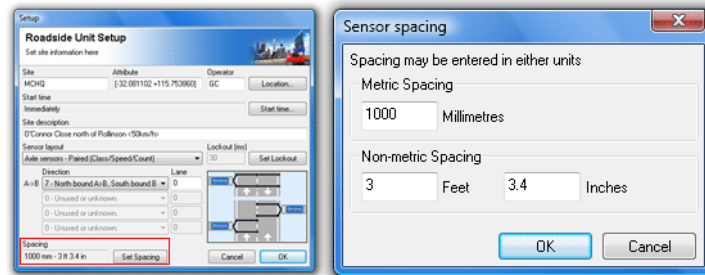
Spacing

The **Spacing** parameter specifies the distance between the sensors when using a pair of sensors in a

Classifier Layout. This parameter is disabled when using a Count Layout.

MCReport is optimised for a spacing of one metre (three to four feet). A longer spacing of up to three metres (or 10 feet) can be used for improved speed accuracy.

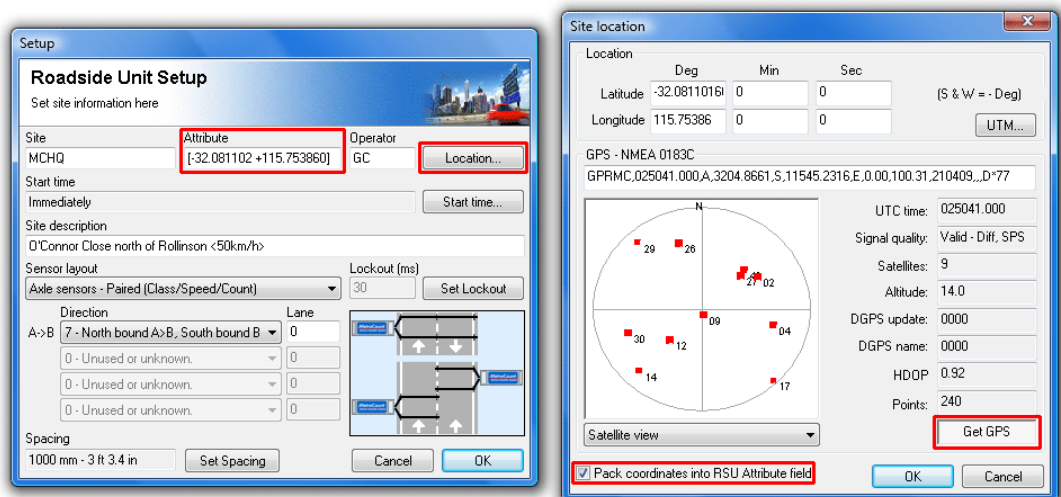
The spacing is stored by the RSU in millimetres. During setup, the spacing can be entered in either metric or non-metric units.



Spacing can be entered in metric or non-metric units

Site Location

MCSetup provides the option to store a site's coordinates (latitude and longitude) in the **Attribute** field. Coordinates can be entered manually, or read from any serial GPS unit that supports the **NMEA 0183** data format. The serial port used by the GPS unit is set in MCSetup's Preferences. USB and Bluetooth GPS devices usually create a virtual serial port that can be used by MCSetup, provided other GPS software it not using the port.



Using a GPS unit to set a site's location

MCSetup's GPS interface is accessed via the **Location** button in the Setup dialog box. The **Get GPS** button at the bottom will start taking continuous readings.

Setup Procedure

A setup operation transfers a new set of setup parameters into the RSU's header, and sets the RSU active, effectively erasing the previous set of data.



Note: A data protection feature prevents a RSU from being setup if the RSU has not been stopped using the normal unload procedure. If the RSU's data is not required, its status can be quickly cleared by performing a Factory Setup.

It is good practice to check a RSU's status before and after a setup. Before, to check the unit is successfully communicating, and a final check of battery levels. After, to verify the setup was successful, and the RSU is active.

When performing a setup, the initial setup values are taken from the RSU's current header. This feature is useful when a RSU is close to or has reached full capacity, and further data is required from the same site. After the existing data has been unloaded and the RSU stopped, restarting the RSU does not require the setup parameters to be re-entered. Multiple datasets from the same site can be easily combined into a single report in MCReport.

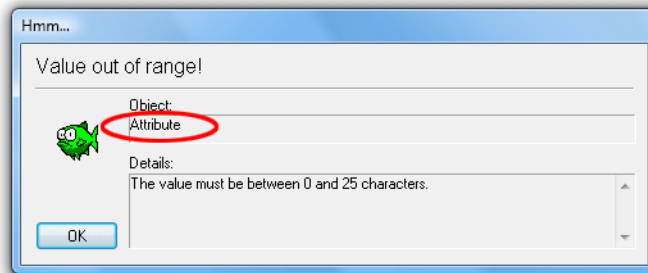


Note: RSU's do not have a real-time clock. The PC's time is stored in the RSU's header at setup, and the time-stamped hits are referenced from this time. Remember to check the PC's time regularly!

To setup a RSU

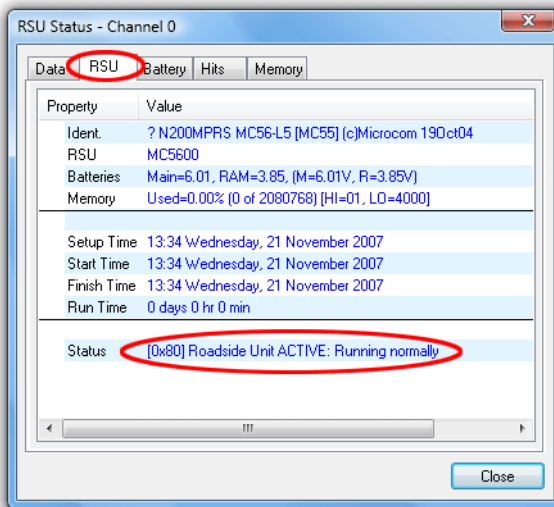
1. Connect a RSU and click the **Setup** button on MCSetup's main toolbar, or type **Ctrl + s**.
2. Fill in each of the setup parameters as described in the previous section.
3. Click the **OK** button to send the setup information to the RSU.

Each of the setup parameters will be automatically checked before sending to the RSU. If any of the values are outside of their allowable range, a warning message will be displayed, indicating the setup parameter that is in error.



Example setup parameter warning

4. Check the RSU's status to confirm it is active.



Check the RSU is active after a setup

5. Use the Sensor View to verify sensor operation.

Sensor View

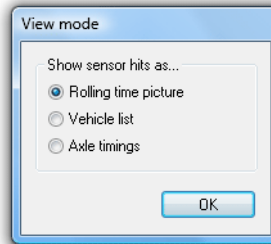
Overview

MCSetup provides several real-time views of the data being logged. The choice of view modes depends on the type of RSU connected, and the unit's current configuration and setup.



To view sensors in real-time

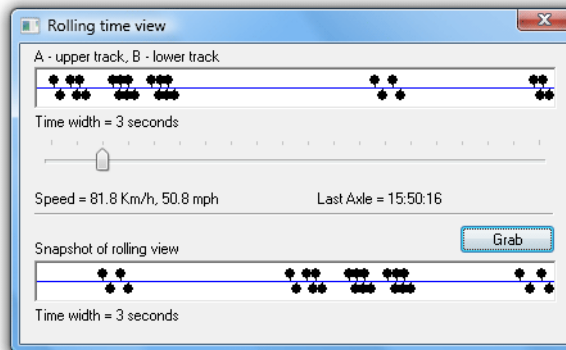
1. Setup a RSU, and click the **View** button on MCSetup's main toolbar.
2. The **View mode** dialog box will appear if more than one mode is available for the connected RSU. Select one option and click the **OK** button.



Selecting a View Mode

Rolling Time View

The Rolling Time view displays a variable-width window of recently logged sensor hits. As vehicles pass over the sensors, the logged hits are displayed on the time-line at the top, providing confirmation of correct sensor installation and RSU setup.



Rolling Time View

When using a Classifier Layout, there should be matching A and B sensor hits for each axle. The offset between matching hits is determined by the speed and direction of the vehicle. An approximate speed is displayed for the last pair of matching hits.

The **Time width** slider bar determines how many seconds the rolling window represents. Increasing the display width will increase the number of axles visible at a time, but will decrease the resolution.



Note:

The **Last axle** time is the time-stamp of the last logged sensor hit, giving the current time according to the RSU. Over the period of a survey, this time may drift from the time of the PC used to setup the RSU. If syncing manual counts at the end of a survey, remember to use the last axle time, not the PC's time.

The **Grab** button copies the current time picture to the snapshot picture at the bottom.

Vehicle List View

The Vehicle List mode provides a basic, on-the-fly partitioning from the immediate hit stream being logged by the RSU. It includes an array of information about each vehicle and a scaled wheel picture. The Vehicle List mode is only available when a Classifier Layout is used.



Note: The Vehicle List mode should only be used as a rough guide. Vehicles are formed by joining hits less than a fixed time (DeltaV) apart into a vehicle. Remember that in this mode, the RSU is logging time-stamped sensor hits - not vehicles. MCReport uses a more advanced partitioning algorithm.

Time	Dir	Vel	Wb	Ax	Gp	Er	Wheel Picture - Metric [...]
15:52:48	A>B	62.6	26.0	12	5		o o o o o o o o o o
15:52:56	A>B	69.7	2.8	2	2		o o
15:53:01	A>B	67.5	2.7	2	2		o o
15:53:05	A>B	59.2	2.3	2	2		o o
15:53:15	A>B	60.8	11.3	6	3		o o o o o o
15:53:21	A>B	70.8	6.8	4	2		o o o o
15:53:29	A>B	77.1	5.7	3	3		o o o
15:53:37	A>B	88.2	23.2	9	4		o o o o o o o o o o
15:53:56	A>B	67.5	1.6	2	1		o o
15:53:59	A>B	64.5	2.4	2	2		o o
15:54:02	A>B	81.5	2.8	2	2		o o
15:54:06	A>B	80.0	2.4	2	2		o o
15:54:09	A>B	60.8	2.3	2	2		o o

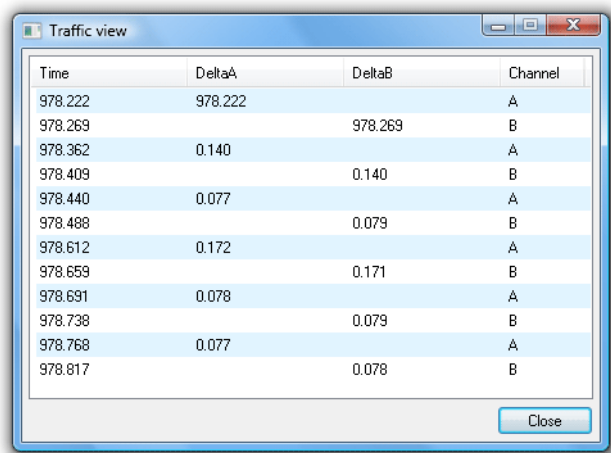
Viewing sensor hits partitioned into vehicles

Parameter	Description
Time	Time of the first axle of the vehicle.
Direction (Dir)	Direction of the vehicle.
Velocity (Vel)	Speed of the vehicle. Units may be km/h or mph, depending on the selection of units in MCSetup's Preferences.
Wheelbase (Wb)	Wheelbase of the vehicle. Units may be metres or feet, depending on the selection of units in MCSetup's Preferences.
Axles (Ax)	Number of axles in the vehicle.
Groups (Gp)	Number of axle groupings in the vehicle.
Error (Er)	Error number indicating a mismatch in sensor hits.
Wheel Picture	Character based representation of vehicle axle groupings.
DeltaV	This setting is the minimum gap in the hit stream that MCSetup uses to separate vehicles. Note that this Delta-V setting does not affect the data that is being

Parameter	Description
	logged.

Axle Timing View

The Axle Timings mode displays the raw hit information that the RSU is logging. The Axle Timings mode is only available for a Classifier Sensor Layout.



The screenshot shows a window titled "Traffic view" with a table containing four columns: Time, DeltaA, DeltaB, and Channel. The data is as follows:

Time	DeltaA	DeltaB	Channel
978.222	978.222		A
978.269		978.269	B
978.362	0.140		A
978.409		0.140	B
978.440	0.077		A
978.488		0.079	B
978.612	0.172		A
978.659		0.171	B
978.691	0.078		A
978.738		0.079	B
978.768	0.077		A
978.817		0.078	B

Viewing precise sensor hit timing

Parameter	Description
Time	Time in seconds since the RSU was setup.
DeltaA	Offset in seconds since the last A sensor hit.
DeltaB	Offset in seconds since the last B sensor hit.
Channel	The sensor channel that was hit.

Data Unload

Overview

The Unload process transfers a RSU's header and data to a proprietary-format binary data file known as a **Dataset**. An Unload can be performed at any time, without interrupting logging. At the end of a survey, the RSU should be stopped as part of the Unload process.



Note: Unloading data from a RSU does not erase the data from memory. All data remains until the next setup is performed, so data can be unloaded again if necessary, until the next setup.

Dataset Location

MCSetup uses the **Base folder for unloaded data** location specified in the Preferences to store unloaded data. MCSetup also supports automatic creation of a folder structure, based on a combination of a RSU's Site and Attribute, and the current year and month. Refer to the section **MCSetup Configuration** for details.

Naming Conventions

When unloading data from a RSU, the dataset's filename will be automatically generated. This is based on the RSU's **Site** parameter, and the current date.

The dataset's filename need only be unique. If a file by the same name already exists, an overwrite warning will be displayed. There is no need to make the dataset filename descriptive. When browsing for datasets with MCReport, files will always be listed by their key header details.



Note: The three character file extension is extremely important. Datasets are created with a file extension of .ecX where X is the lane number. MCReport uses this file extension to recognise MetroCount datasets. Do not change this file extension.

The Unload Process

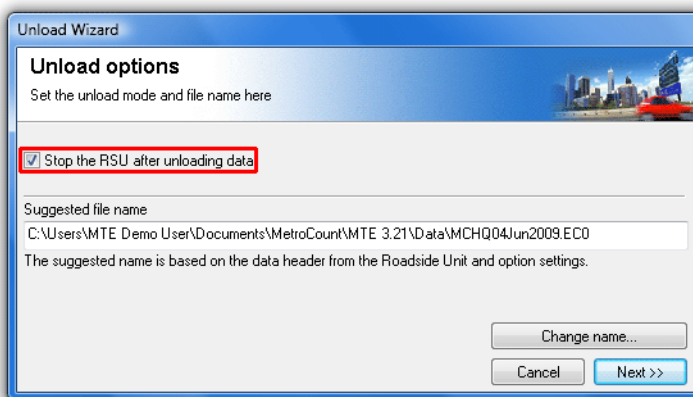
If possible, unload a RSU's data before removing from the site. This provides an opportunity to view basic data quality, and collect further data in the unlikely event of sensor failure. An Unload should complete in under 10 minutes, dependent on capacity.



To unload data from a RSU

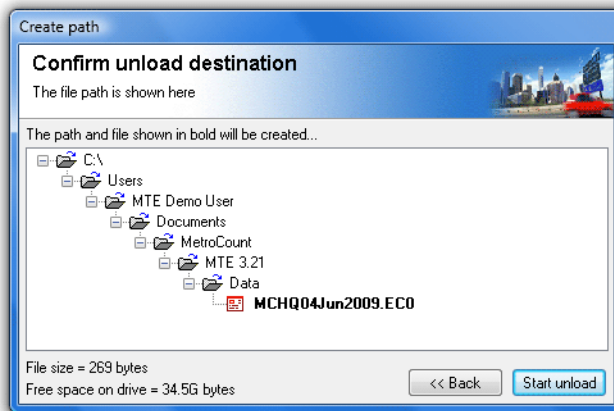
1. Connect a RSU, and click the **Unload** button on MCSetup's main toolbar.

If this is the first connection to the RSU, the "New connection" dialog will appear. A quick status check prior to an Unload is always good practice.



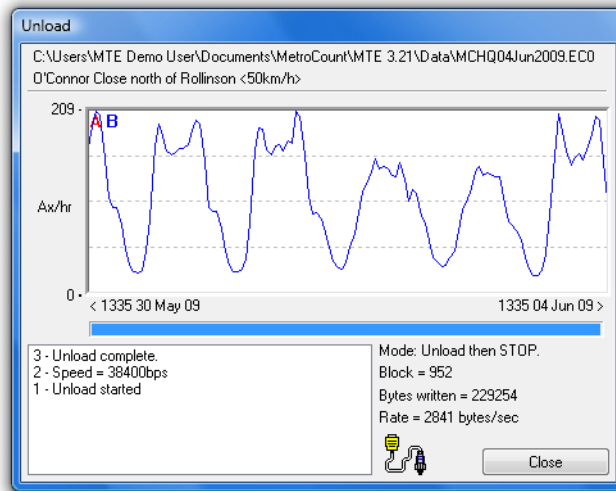
Start of the Unload Wizard

2. If this is the end of a survey, check the **Stop RSU after Unload** option.
Upon successful completion of the Unload, the RSU will be set to its **Idle** state, ready for a new setup. With this option unchecked, logging will not be interrupted.
3. The suggested folder and file name will be as described previously. In the unlikely event that it needs to be changed, click the **Change name** button, remembering to keep the **.ecX** file extension.
4. Click the **Next** button to continue the wizard.
5. A confirmation dialog box is shown next, with any folders that will be automatically created shown in bold. Click the **Start unload** button to continue.



Confirmation of folders and dataset to be created

6. During the Unload, a dynamic plot of the A and B hits is displayed as the data is transferred. For ideal classification data, the A and B plots will perfectly overlay.



Unload progress showing sensor hits

7. When the Unload is complete, click the **Close** button.
If the option to stop the RSU was checked, use a quick status check or the RSU's status LEDs to verify the RSU is now inactive, to prevent unnecessary battery drain.

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