

visionary solutions



image sensing systems
i n c o r p o r a t e d

RTMS[®] G4[™] User Manual

Copyright 2008-2010 Image Sensing Systems, Inc. All Rights Reserved.

RTMS is a registered trademark of Image Sensing Systems, Inc.

No part of this document may be reproduced or quoted without written permission from Image Sensing Systems, Inc.

Windows is a registered trademark of Microsoft Corporation.

All other product names are trademarks or registered trademarks of their respective owners.

Table of Contents

CHAPTER 1 ABOUT THE G4 SYSTEM	1-1
REVISION HISTORY	1-1
WARRANTY	1-1
CAUTION	1-1
SERVICE	1-2
PREREQUISITES	1-2
IMPORTANT SAFETY INFORMATION	1-3
CONTACT ISS CANADA	1-3
BRIEF DESCRIPTION	1-3
SCOPE OF THIS DOCUMENT	1-4
INSPECT YOUR SHIPMENT FROM ISS CANADA	1-4
RTMS OPTIONS	1-5
THE STANDARD RTMS G4 MODEL K4 OFFERS THE FOLLOWING:	1-5
INTRODUCTION TO THE RTMS	1-5
VEHICLE DETECTION	1-6
CHAPTER 2 RTMS G4 INSTALLATION	2-1
SIDE-FIRED MOUNTING AND AIMING	2-1
MOUNTING AND AIMING PROCEDURE	2-2
SET-BACK HEIGHT DIAGRAMS	2-3
ZERO SETBACK OPTIONS	2-3
CABLING	2-4
<i>Surge Suppression</i>	2-4
<i>The RTMS Cable</i>	2-4
<i>Preparing a Cable</i>	2-4
<i>Connecting a Cable to the RTMS</i>	2-5
MS CONNECTOR PIN-OUT	2-5
STANDARD RS-232 PORT WIRING	2-7
THE RS-485 PORT	2-8
THE TCP/IP PORT WITH RS-232	2-9
THE TCP/IP PORT WITH RS-485	2-10
DUAL RS-232 PORTS	2-11
CONTACT CLOSURE	2-12
CONNECTING RTMS TO EXTERNAL MODEMS	2-12
<i>Modem Cables</i>	2-12
MODEM SHARING	2-13
RS-485 MULTI-DROP	2-14
WIRING NOTES	2-15
RTMS TROUBLESHOOTING GUIDE	2-15
RTMS TECHNICAL SPECIFICATIONS	2-17
MICROWAVE SIGNAL AND COVERAGE AREA	2-17
ACCURACY OF MEASUREMENT & ERROR RATES	2-17
<i>*Accuracy Performance Conditions</i>	2-17
MECHANICAL	2-18
POWER REQUIREMENTS & CONSUMPTION	2-18
INTERFACES	2-18
UPGRADE CAPABILITY	2-18

SURGE IMMUNITY	2-19
ENVIRONMENTAL CONDITIONS	2-19
ELECTROMAGNETIC INTERFERENCE.....	2-19
RELIABILITY	2-19
RECOMMENDED SURGE PROTECTION	2-20
CHAPTER 3 G4 SOFTWARE.....	3-1
REFERENCE	3-1
<i>RTMS System Requirements</i>	3-1
<i>About The RTMS Setup Utility</i>	3-1
<i>Communication</i>	3-1
PROCEDURES.....	3-1
MICROSOFT .NET RUNTIME WARNINGS	3-2
HOW TO NAVIGATE THE RTMS INTERFACE.....	3-3
GET STARTED	3-4
ESTABLISH A CONNECTION WITH THE RTMS HARDWARE	3-4
HOW TO RUN WINRTMS IN DEMO MODE	3-5
HOW TO MODIFY OR TROUBLESHOOT THE CONNECTION WITH THE RTMS HARDWARE	3-10
HOW TO SET UP SERIAL COMMUNICATION	3-12
HOW TO SET UP DSS	3-13
HOW TO SET UP TCP/IP COMMUNICATIONS	3-17
HOW TO SET UP BLUETOOTH DEVICE COMMUNICATIONS.....	3-24
<i>Configuring the Bluetooth Device</i>	3-24
HOW TO CONFIGURE THE IP SERVER.....	3-29
HOW TO USE THE AUTOMATIC SETUP WIZARD	3-30
HOW TO FIX SPLASHING	3-33
HOW TO ADJUST SENSITIVITY	3-34
HOW TO VERIFY COUNTS	3-35
HOW TO MODIFY VEHICLE CLASSIFICATIONS.....	3-36
HOW TO UPGRADE FIRMWARE	3-37
HOW TO RECORD DATA.....	3-38
X3 COMPATIBLE—STATISTICAL MESSAGE	3-39
G4 STATISTICAL MESSAGE.....	3-39
HOW TO PERFORM AUTOMATIC SPEED CALIBRATION	3-40
HOW TO PERFORM MANUAL CALIBRATION	3-41
HOW TO CREATE COMMON SETTINGS.....	3-42
HOW TO APPLY COMMON SETTINGS	3-45
HOW TO SAVE A SETUP FILE TO THE HARD DISK.....	3-46
RTMS WORKSPACE.....	3-47
RTMS TITLE BAR	3-48
RTMS STATUS BAR.....	3-48
ABOUT RTMS MAIN SCREEN	3-49
RTMS MAIN SCREEN	3-50
RTMS MANUAL SETUP	3-51
RTMS APPLICATION OPTIONS.....	3-52
RTMS SENSITIVITY OPTIONS	3-53
RTMS ZONE OPTIONS	3-54
RTMS FINE TUNE OPTIONS.....	3-55
RTMS LABELING OPTIONS.....	3-56
RTMS MESSAGE PERIOD OPTIONS.....	3-57
RTMS SENSOR ID OPTIONS	3-58

RTMS VERIFY COUNTS	3-59
RTMS DATA OPTIONS	3-60
RTMS ADVANCED OPTIONS.....	3-61
RTMS ADVANCED CLASSIFICATION OPTIONS	3-62
RTMS CONTACT CLOSURES.....	3-63
RTMS DUAL LOOP OPTIONS	3-64
RTMS FIRMWARE UPGRADE OPTIONS.....	3-65
RTMS COMMUNICATION OPTIONS	3-66
PC SERIAL COMMUNICATION OPTIONS	3-66
RTMS COMMUNICATION OPTIONS.....	3-67
PC TCP/IP COMMUNICATION OPTIONS.....	3-67
RTMS COMMUNICATION OPTIONS.....	3-69
RADIO MODEM COMMUNICATION OPTIONS.....	3-69
RTMS MESSAGE COMPOSITION OPTIONS	3-71
RTMS FILE OPTIONS	3-72
RTMS COMMON SETTINGS	3-73
RTMS STATISTICS	3-74
RTMS VERIFY COUNTS	3-75
RTMS AUTOMATIC SPEED CALIBRATION	3-76
RTMS MANUAL SPEED CALIBRATION	3-77
RTMS INTERNAL MEMORY	3-78
RTMS SELF TEST	3-79

Chapter 1

About the G4 System

Revision History

Revisions to this document are as follows:

Issue No.	Issue Date	Issue Reason
Issue 5.0	May 2008	First issue of G4 product.
Issue 5.1	July 2008	New screenshots and organization. Corrected information pertaining to G4.
Issue 5.2	December 2008	New documentation formation. New information. Corrections.
Issue 5.3	February 2009	New documentation formation. New information. Corrections.
Issue 5.4	March 2010	New documentation formation. New information. Corrections.

Warranty

Image Sensing Systems Inc. warrants this product to be free from defects in material and workmanship for a period of two years from date of delivery. Damage to the product due to accident, abuse by the buyer, or unauthorized modification, improper installation, or operation outside the specifications is not covered by the warranty.

Image Sensing Systems, Inc. warrants that its software and firmware designated for use with the instrument will execute its programming instructions when properly installed. ISS does not warrant that operation of software or firmware will be uninterrupted or error free.

CAUTION



Do not attempt to repair the RTMS unit. Such action will void the warranty. Contact ISS Canada if the unit requires servicing.

Service

If your hardware or software fails to operate, please refer to the troubleshooting guides provided with this documentation or call ISS technical support.

ISS Inc. will repair or replace at its option, any components, which prove to be defective during the warranty period.

- Buyer shall pay for shipping charges to ISS.
- ISS will pay shipping charges and insurance for warranty repaired product.
- Buyer will be invoiced for repair and shipping of product repaired outside of warranty or when no fault is found.

Units returned to ISS for service should include the following information with the shipment:

- Name, address, and contact information of owner.
- Name and telephone number of someone familiar with the problem who may be contacted by ISS personnel for further information if necessary.
- Model number, serial number and software revision number.
- A complete description of the problem. For example:
 - Under what conditions did the problem occur?
 - What equipment was attached?
 - What was the result of the Self Test diagnostic?
- Shipping address for the return.
- Return Merchandise Authorization number. Contact ISS Customer Support prior to shipping merchandise to obtain it.

The unit should be shipped in the original container. If the original container is unavailable, there should be approximately one inch of packing material between the unit and inner carton. For example: use plastic bubble-wrap. The carton should be sealed with strong tape or strapping.

Prerequisites

If you are installing RTMS G4 hardware you must perform the following tasks:

- Choose an appropriate installation location.
- Manage your own personal safety and safety of other personnel.
- Assemble a list of the required equipment.
- Have experience creating cables.

If you are using the WinRTMS software you must perform the following tasks:

- Operate a mouse.
- Operate a keyboard.
- Start Windows.
- Install new software.
- Save and open file using Windows common file dialog.

Important Safety Information

Please review the following information before installation.



Warning

- READ ALL INSTRUCTIONS BEFORE USING
- HEED ALL WARNINGS IN THESE INSTRUCTIONS
- SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

RTMS units must be installed and adjusted in accordance with the installation instructions contained in this manual. Use the RTMS only for its intended purposes as described in this manual. Changes or modifications not expressly approved by ISS Canada Ltd. could void the user's authority to operate the equipment.



Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her expense.

Contact ISS Canada

Please contact ISS Canada with any questions or concerns about the RTMS or other ISS Canada products, toll free at 1-800-668-9385. More information about our complete product line is available on the web at www.imagesensingca.com.

Brief Description

The RTMS (Remote Traffic Microwave Sensor) measures the distance to objects in the path of its microwave beam. This ranging capability allows it to detect moving and stationary vehicles in multiple detection zones.

A single sensor can monitor traffic in up to 12 lanes. The sensor can be mounted on road-side poles and aimed at a right angle to the road; this is referred to as the *side-fired* configuration.

The internal processor calculates volume, occupancy, average speed, and vehicle classifications for each lane and transmits the information using its data ports and communication interfaces. Optional contact closure outputs are also available for compatibility with loop based systems.

**Caution**

- For optimal accuracy, ISS Canada strongly recommends using ISS Canada-trained personnel to install all RTMS-related products.
- ISS Canada also strongly recommends using ISS Canada-trained personnel to survey installation sites for all RTMS-related products.
- For more information about our installation, surveying, and training programs, contact ISS Canada at 1-800-668-9385.

**Warning**

Consult ISS Canada before using the RTMS or other RTMS-related products for any purpose not expressly described in this manual or any other RTMS product manual. Do not use the RTMS to control or operate a gate-opening mechanism. Use of the RTMS for any unauthorized purpose may cause injury to personnel or damage to equipment.

Scope of This Document

This documentation provides the following information for RTMS G4 sensor model K4:

- Setup
- Operation
- Troubleshooting

Software documentation for the RTMS Setup Utility 4.4 (also referred to as WinRTMS) is also provided here.

- RTMS Setup Utility version 4.4 or greater is required for setup of RTMS G4 units with firmware version 7.1 and later.

Inspect Your Shipment from ISS Canada

Please verify your RTMS shipment contains the following items:

- The RTMS sensor with lynch pin.
- Ball-joint mounting bracket; the vertical style is shipped by default; a horizontal style is available on request.
- Connector kit consisting of :
 - MS connector, female crimp pins, backshell, and pin insertion/extraction tool.
 - DB-9F connector, female crimp pins and backshell.
 - RJ-45 jack, if ordered with TCP/IP option.
- RTMS Setup Utility Software on CD.
- Whip antenna, if equipped with an internal modem (indicated by a label).
- **Please notify ISS Canada immediately if the contents are incomplete or if there is physical damage to any items in the shipment.**
- Call toll free at 1-800-668-9385 or contact ISS Canada on the web at www.imagesensingca.com.

RTMS Options

The standard RTMS G4 Model K4 offers the following:

- K-band (24.125 GHz)
- Low Voltage Power 12-24 VAC or DC
- 8MB Internal Data Storage Memory
- RS-232/485 Serial Interfaces

RTMS may be ordered with the following data communication options:

- Bluetooth Wireless Interface
- Additional RS-232/422 Serial Interface
- Integrated TCP/IP Ethernet Interface
- Contact Closure for up to 12 Zones

Introduction to the RTMS

The RTMS G4 (Remote Traffic Microwave Sensor—4th Generation) is a true RADAR device, designed for traffic sensing applications. It measures the distance to objects in the path of its microwave beam. The ranging capability allows the RTMS to detect stationary and moving vehicles in multiple detection zones. When pointed onto a roadway, the RTMS microwave beam projects an oval footprint. Its range is divided into multiple micro-slices, in which vehicles are detected.

The RTMS receives reflected signals from all surfaces within its beam—pavement, barriers, vehicles and trees. It maintains a background signal level for each micro-slice. Vehicles are detected when their reflected signal exceeds the background level in their micro-slice by a certain threshold. If that detection is part of a defined zone, its contact (optional) is closed during the detection period to indicate detection. Statistical measurements are available through two data points, including optional IP and Radio modems.

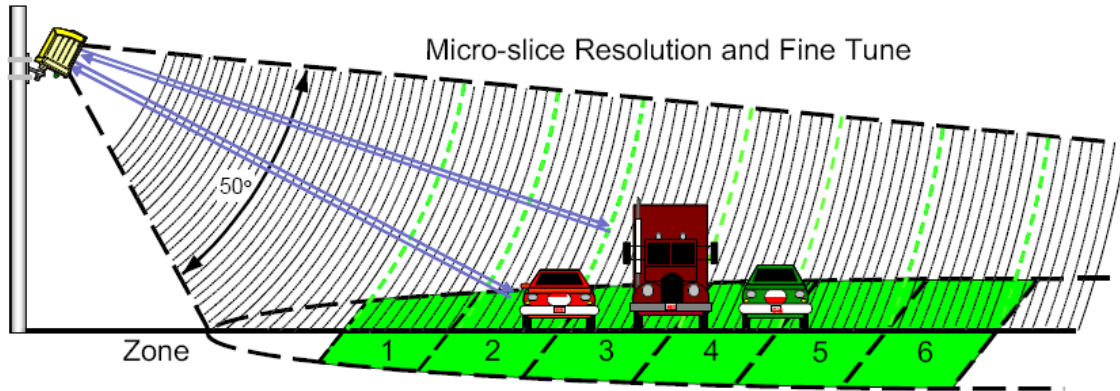


Figure 1.1. RTMS Microwave and Beam Footprint

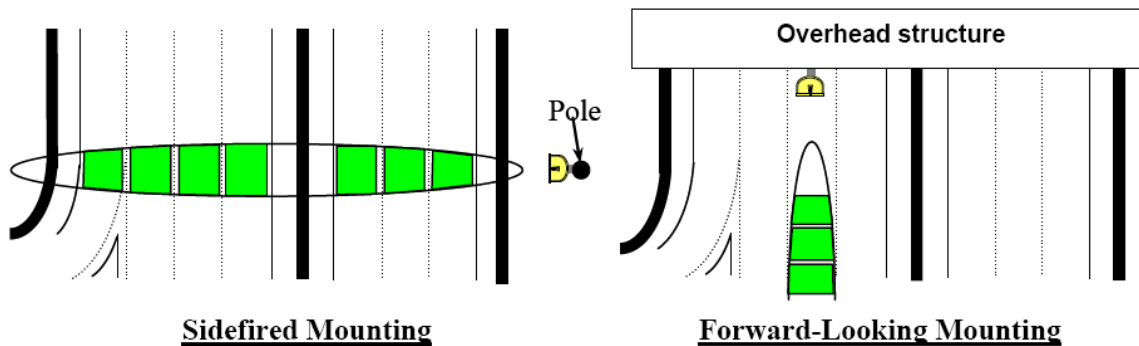
Several operating modes optimize internal parameter settings for highway and intersection applications. Two mounting configurations are possible: *side-fired* and *forward-looking*.

In *side-fired* mounting:

- The RTMS is located on a roadside pole and is aimed perpendicular to the traffic lanes.
- Micro-slices corresponding to the location of traffic lanes are allocated as detection zones during the setup process.
- Each detection zone consists of multiple micro-slices.
- The length of the detection zone is determined by the width of the beam's footprint.

In *forward-looking* mounting:

- The RTMS is mounted on an overhead structure and is aimed along the center of the lane.
- In highway applications the sensor's aiming angle is adjusted to confine the footprint to one or two lanes.
- The RTMS accurately measures vehicle speed and travel direction.



Sidefired Mounting

Forward-Looking Mounting

Figure 1.2. RTMS Mounting Configurations

Vehicle Detection

RTMS technology allows accuracy in the following conditions, even with a relatively low mounting-height:

- Severe weather.
- Strong vibrations common to roadways that carry large vehicles.
- When vehicles are completely occluded by other vehicles.

Chapter 2

RTMS G4 Installation

Side-Fired Mounting and Aiming

The distance between the close edge of the first lane of traffic to be monitored and the front of the structure on which the RTMS is mounted is referred to as *set-back*. Set-back is a limiting installation parameter of the RTMS. More lanes can be covered with a larger set-back.

Use the diagrams in Figures 2.1, 2.2, and 2.3 to determine the setback required to monitor a given number of lanes. The correct installation height can be determined once the set-back is set. Height is measured relative to the road surface of the detection area. Do not measure height from the bottom of the mounting pole.

Example: For 3 lanes the minimum set-back is 5 feet [1.5 m].



Note

It is almost always better to be 20 feet [6 m] further back from the minimum than 2 inches [5 cm] closer than the minimum. If real estate is available, move the RTMS further back.

The mounting height is based on the setback. Using the correct height value allows the RTMS to be aimed so that it receives maximum return signal while covering all required lanes. Mounting the RTMS at an incorrect height will reduce accuracy.

Median strips are equivalent to lanes and must be included in total lane count. For example: an eight lane road with a two lane-wide median strip has 10 equivalent lanes.

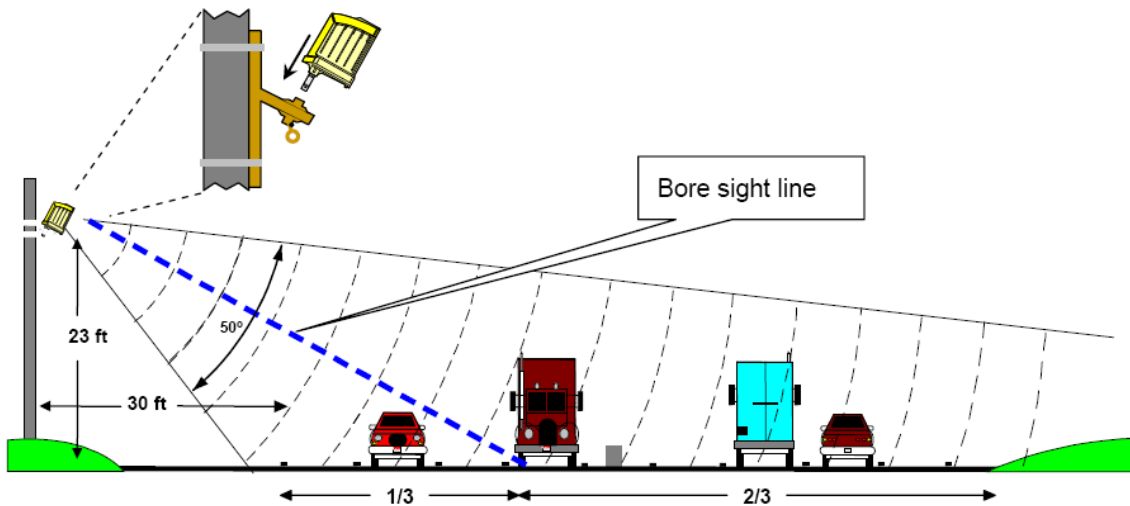


Figure 2.1. RTMS Aiming

Mounting and Aiming Procedure



Warning

Installation of ISS Canada hardware may require that you work above the ground on a ladder or bucket truck. Please make sure you have all the required equipment and are aware of potential safety issues before starting any installation. **DO NOT** install any RTMS hardware if you are unsure how to complete the installation or lack appropriate safety equipment. ISS Canada does not recommend installing this hardware during inclement weather.

The following equipment is required to mount and aim the RTMS unit:

- *Provided By ISS Canada.* RTMS unit and its housing. Lynch pin.
- *Not Provided.* Bolts or stainless steel banding. The bolt specifications depend on the mounting requirements: for example, different bolts may be required when the RTMS unit is mounted on a wooden pole than when the RTMS unit is mounted on a concrete wall.
7/16" wrench, 1/2" wrench, assorted tools to be determined by mounting specifications.

To mount and aim the RTMS unit:

1. Attach the bracket to the roadside pole (or another specified location) using bolts or stainless steel banding.
2. Secure the RTMS to the mounting bracket by inserting the lynch pin.
3. Aim the RTMS as indicated on Figure 2-1. A 7/16" wrench is required to release/tighten the ball-joint bolt.
4. Adjust the RTMS to be perpendicular to the travel lanes and level side to side.
5. Look from behind the unit and use the top sight-ridge as a guide to align the bore sight.
6. Tilt so that the top of the RTMS is aimed to the first 1/3 of the monitored lanes.
7. Secure the position by tightening the bolt.

Set-Back Height Diagrams

Total width is the distance from the close edge of the first lane to the outside edge of the last lane. Divide this number by the average lane width. For most applications, 12 feet is considered a typical lane width. Example: total detection area = 120 feet; lane = 12 feet; $120/12 = 10$ equivalent lanes. Minimum setback is 5 feet. Minimum height is 17 feet.

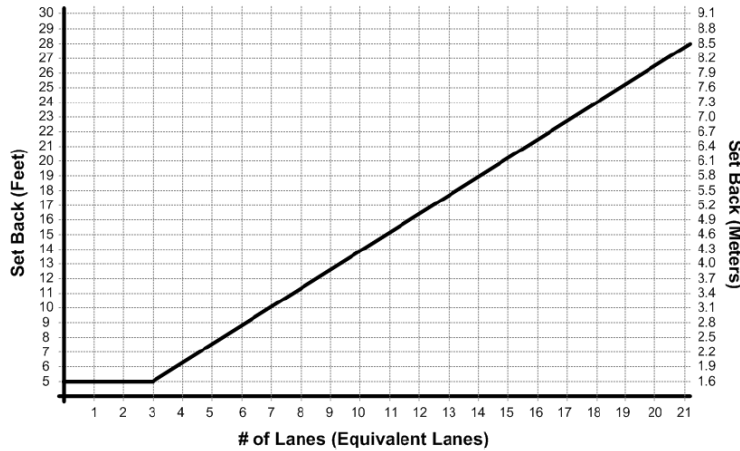


Figure 2.2. Set-Back Distance Chart

A setback greater than the minimum is desirable if room is available. Obtain the proper mounting height based upon actual setback distance.

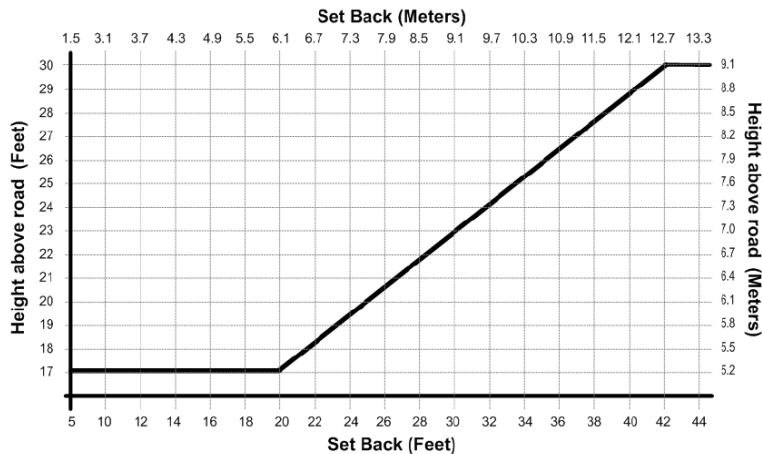


Figure 2.3. Mounting Height Chart.

Zero Setback Options

The G4 hardware/software has new features that enable the RTMS sensor to work with zero setback. For example: zero setback might be required for installation on a bridge. However, appropriate setback distance should always be used when setback is available.

- The zero setback feature has a Max range of ~50 feet, or 4 lanes of traffic.
- Recommended mounting height is 14 feet.

Cabling

Surge Suppression

Each RTMS unit has built-in surge-suppression hardware. Please keep in mind the following:

- ISS Canada recommends installing external surge-suppression devices with every detector.
- The communication and power lines of the RTMS should be equipped with external surge-suppression devices when long cable runs are required.
- Install surge-suppression devices close to the sensor. For example, in a cabling cabinet mounted on the pole below the RTMS.

See Recommended Surge Protection for further details on installing surge-suppression devices.

The RTMS Cable

The RTMS ships with all required connectors, crimp pins, and back-shells.

- RTMS G4 units (same as earlier RTMS models) use a single 32-pin MS connector for power and communications.
- The RTMS cable should be made from 20 or 22 gauge stranded wire arranged in twisted pairs.
- Cables exposed to outdoor conditions should be UV shielded.

The number of pairs required depends on the communication options chosen:

Table 2.1. Cable Pair Requirements

Communication Options	Number Of Pairs
Standard RS-232/485 plus power	3; 4 for RTS/CTS option or 485
Standard RS-232/485 and Internal RF modem option plus power	4
RS-232/485 and TCP/IP plus power	5 for RS-232, 6 for RS-485
RS-232/485 and second serial port RS-232/422 plus power	5, 7 if RTS/CTS Option used for both ports
Zone contact option added to any of the above:	Option 1 one wire for each contact (Max 16) Option 2 two wires (1 pair) for each contact (Max 8)

Preparing a Cable

Use cable such as the Belden number 95xx (xx indicates number of pairs. For example: 9516 is a 6-pair cable). In preparing a cable note the following:

- Decide whether or not to install extra cable pairs for growth purposes.
- The crimp pins are designed for stranded wire only.
- **Do not use cable employing solid wires.**
- ISS suggests the Daniels Manufacturing Corporation crimping tool M22520/1-01 AF8 with head number M22520/1-02 or equivalent.
- **Do not solder crimp pins!**

Connecting a Cable to the RTMS

Use the following to create a cable to the RTMS device:

1. Thread cable through the backshell before inserting pins into shell.
2. Use the insertion tool (red) to insert wires with crimped pin into shell.
3. Use the extraction tool (white) to remove a crimped wire to correct an error.
4. Access to the serial connection should be available within view of the monitored lanes.
 - For example: inside an access panel or cabinet on the pole.
 - Verifying the sensor's calibration is easy when the user sees the RTMS data together with manual counts.

MS Connector Pin-Out



Caution

Pin labeling in Figure 2-4 is a guideline only – verify pin location on actual connector before inserting wire.



Warning

The RTMS unit can be configured for a variety of communication options. It is important to know which options are included with your unit prior to preparing cables. MS connector pins cannot be shared. Take note of the individual wiring instructions provided in this manual.

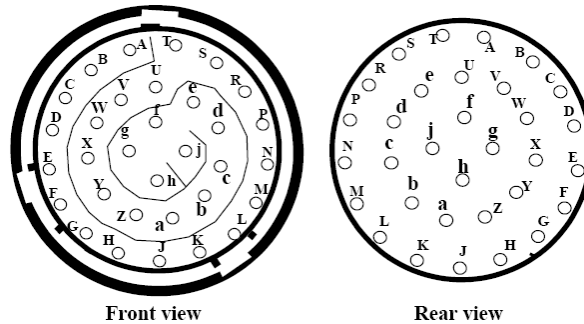


Figure 2.4. MS Connector

Table 2.2. Cable Pair Requirements

Pin Number	Function	Dual Loop Pin Assignment	Dual Loop / Contact Closure
A, B	Isolated Zone 1 or Zones 1, 2	A, J	Contact 1 Primary, Contact 9 Secondary
C, D	Isolated Zone 2 or Zones 3, 4	B, K	Contact 2 Primary, Contact 10 Secondary
E, F	Isolated Zone 3 or Zones 5, 6	C, L	Contact 3 Primary, Contact 11 Secondary
G, H	Isolated Zone 4 or Zones 7, 8	D, M	Contact 4 Primary, Contact 12 Secondary
J, K	Isolated Zone 5 or Zones 9, 10	E, N	Contact 5 Primary, Contact 13 Secondary
L, M	Isolated Zone 6 or Zones 11, 12	F, P	Contact 6 Primary, Contact 14 Secondary
N, P	Isolated Zone 7 or Zones 13, 14	G, R	Contact 7 Primary, Contact 15 Secondary
R, S	Isolated Zone 8 or Zones 15, 16	H, S	Contact 8 Primary, Contact 16 Secondary
W	Rx+ Ethernet or Rx 2nd port	Not Applicable	Not Applicable
T	Rx- (negative) Serial Port RTMS input RS-232 Rx or RS-485 Rx- (negative)	Not Applicable	Not Applicable
V	Tx- (negative) Serial Port RTMS output RS-232 Tx or RS-485 Tx- (negative)	Not Applicable	Not Applicable
U	Serial Ports and Contacts Signal Ground	Not Applicable	Not Applicable
X	CTS or RS-485 Tx+	Not Applicable	Not Applicable
Y	RTS or RS-485 Rx+	Not Applicable	Not Applicable
Z	Rx- Ethernet or RTS 2nd Serial port	Not Applicable	Not Applicable
a	Not used.	Not Applicable	Not Applicable
b	Not used.	Not Applicable	Not Applicable
c	Not used.	Not Applicable	Not Applicable
d	Tx- Ethernet Tx 2 nd Serial port	Not Applicable	Not Applicable
e	Tx+ Ethernet or CTS 2 nd Serial port	Not Applicable	Not Applicable
f,g	Low Voltage power 12-24 VAC or DC	Not Applicable	Not Applicable
h,j	115 VAC power	Not Applicable	Not Applicable

Standard RS-232 Port Wiring

The standard RTMS RS-232 port wiring consists of Transmit (Tx), Receive (Rx), RTS, CTS and Ground lines wired to the MS pins respectively. The use of a female DB9 connector and wiring shown allows the use of standard serial cable for direct connection to the PC for setup purposes.

Rear views of connectors are shown to assist in cable preparation. The RTMS is configured as a DCE device.

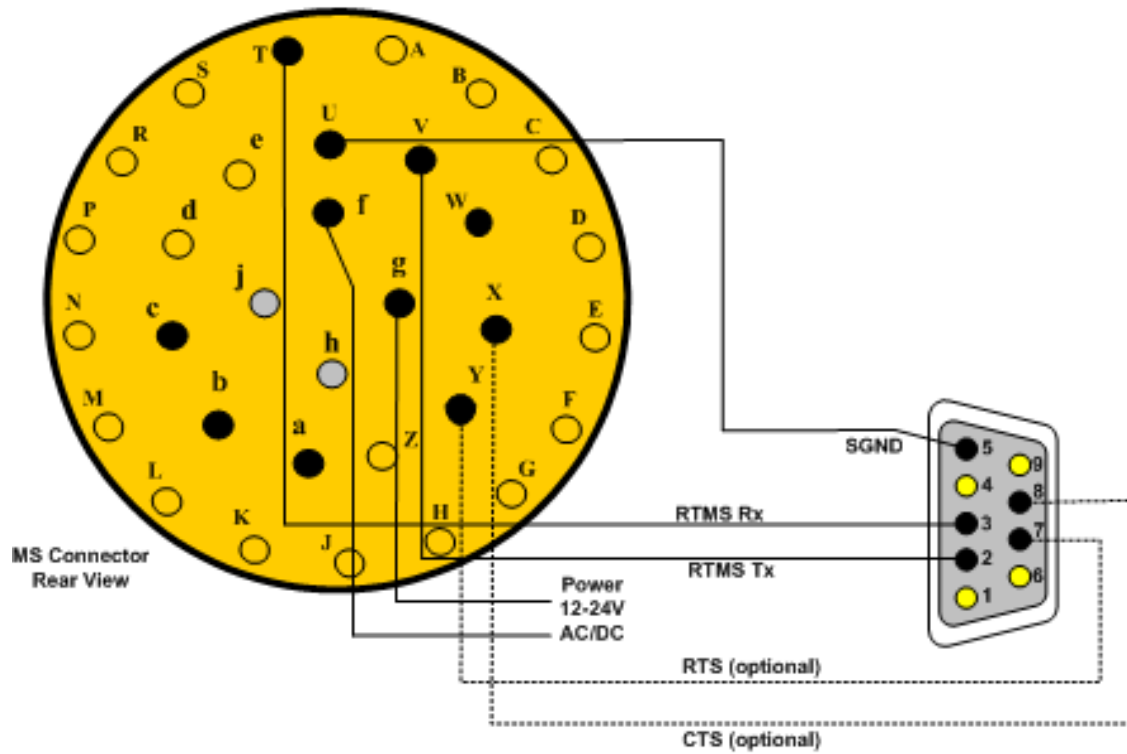


Figure 2.5. RS-232 Wiring Diagram

Table 2.3. G4 RS-232 Wiring Matrix (See Figure 2.5)

DB9 Pin	Signal	MS Connector Pin
1	NC	N/A
2	Tx	V
3	Rx	T
4	NC	N/A
5	SGnd	U
6	NC	N/A
7	RTS	Y
8	CTS	X
9	NC	N/A

The RS-485 Port

Over short distances (30 ft [9 m]) the wiring diagram shown below is compatible with an RS-232 port. There is no standard pin configuration for RS-485 on a DB9 connector. The wiring diagram shown will connect directly to a RS-232 configured DB9 without the need for an RS-232/RS-485 converter.

A disconnect point is recommended to allow the RTMS to be detached from the transmission line without disruption of communications with other sensors on the line. See Connecting RTMS to External Modems for details.

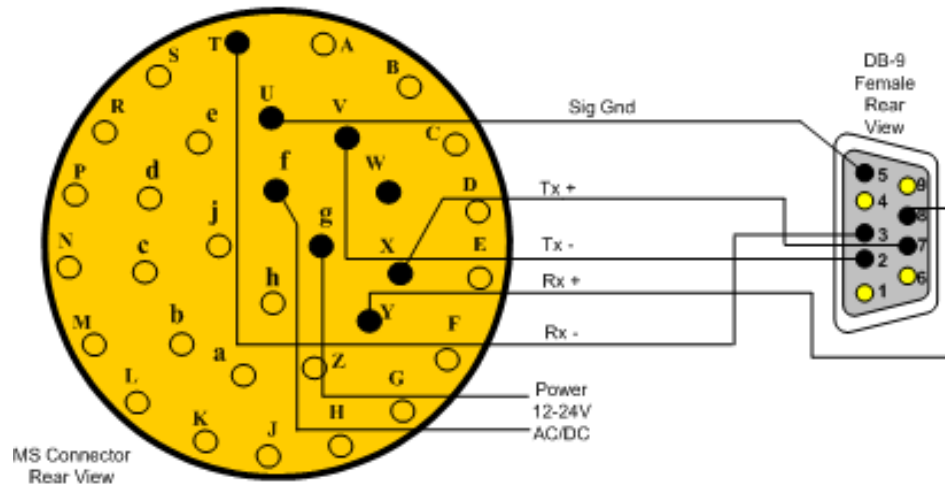


Figure 2.6. RS-485 Wiring Diagram

Table 2.4. G4 RS-485 Wiring Matrix (See Figure 2.6)

DB9 Pin	Signal	MS Connector Pin
1	NC	N/A
2	Tx-	V
3	Rx-	T
4	NC	N/A
5	SGnd	U
6	NC	N/A
7	Tx+	X
8	Rx+	Y
9	NC	N/A

The TCP/IP Port with RS-232

CAT5 cable must be used for lengths between 30 ft (10 m) and 330 ft (100 m). Lengths greater than 330 feet are not supported for Ethernet communication.

It is recommended that both TCP/IP and RS-232 ports be brought out to their respective connectors, as shown. The RS-232 port is useful for setup and maintenance purposes, the IP port for data collection and remote setup.

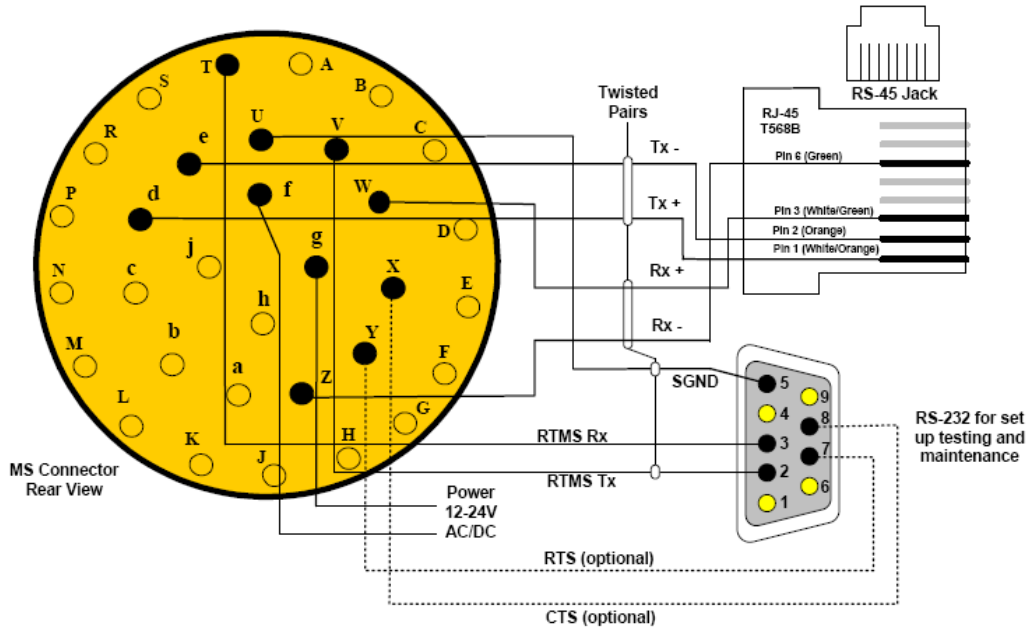


Figure 2.7. TCP/IP Port with RS-232 Wiring Diagram

Table 2.5. G4 RS-232 with TCP/IP Wiring Matrix (See Figure 2.7)

DB9 Pin	Signal	MS Connector Pin	RJ 45	Signal	MS Connector Pin
1	NC	N/A	1	Tx+	d
2	Tx	V	2	Tx-	e
3	Rx	T	3	Rx+	W
4	NC	N/A	4	NC	N/A
5	SGnd	U	5	NC	N/A
6	NC	N/A	6	Rx-	Z
7	RTS	Y	7	NC	N/A
8	CTS	X	8	NC	N/A
9	NC	N/A			

The TCP/IP Port with RS-485

It is recommended that both TCP/IP and RS-485 ports be brought out to their respective connectors, as shown. The RS-485 port is useful for setup and maintenance purposes, the IP port for data collection and remote setup.

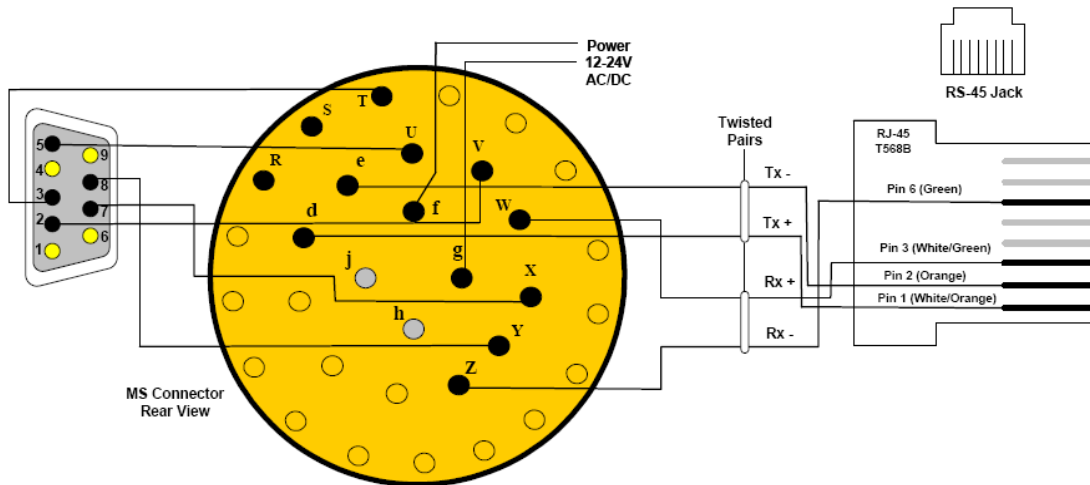


Figure 2.8. TCP/IP Port with RS-485 Wiring Diagram

Table 2.6. G4 RS-485 with TCP/IP Wiring Matrix (See Figure 2.8)

DB9 Pin	Signal	MS Connector Pin	RJ-45	Signal	MS Connector Pin
1	NC	N/A	1	Tx+	d
2	Tx	V	2	Tx-	e
3	Rx	T	3	Rx+	W
4	NC	N/A	4	NC	N/A
5	SGnd	U	5	NC	N/A
6	NC	N/A	6	Rx-	Z
7	RTS	X	7	NC	N/A
8	CTS	Y	8	NC	N/A
9	NC	N/A			

Dual RS-232 Ports

The G4 has two independent serial ports (only available with additional hardware). The primary port can be soft-configured to RS-485 operation for increased range. The secondary port can be soft-configured to RS-422. The second port is also used when another device such as an RF Modem or TCP/IP server is ordered with the unit. Below is the wiring for two independent RS-232 ports configuration. Each port can be operated separately at its own speed and carry different streams of information.

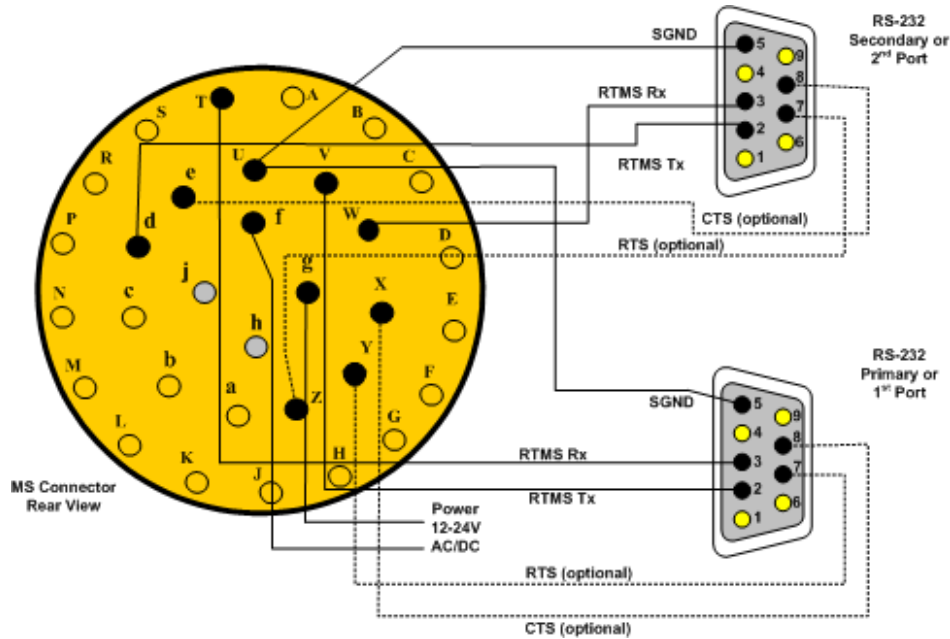


Figure 2.9. Dual RS-232 Wiring Diagram

Table 2.7. G4 Dual Serial Port Wiring Matrix (See Figure 2.9)

DB9 Pin Port 1	Signal	MS Connector Pin	Port 2	Signal	MS Connector Pin
1	NC	N/A	1	NC	N/A
2	Tx	V	2	Tx	d
3	Rx	T	3	Rx	W
4	NC	N/A	4	NC	N/A
5	SGnd	U	5	SGnd	U
6	NC	N/A	6	NC	N/A
7	RTS	Y	7	RTS	Z
8	CTS	X	8	CTS	e
9	NC	N/A	9	NC	N/A

Contact Closure

The G4 can provide, in parallel with the serial port and RF/IP/Cellular communications, up to 16 contact closures, delivering real time presence indication in each of its detection zones. The contacts are arranged in two wiring configurations and operating modes:

- 8 Isolated contact pairs (as in RTMS Models X2/X3 and K3). In this configuration each of the contacts is isolated from the other.
- 16 contact pairs. In this configuration all contacts will share a common Serial Ground. The contact closures can be configured to operate either in Single Loop mode or Dual Loop (Speed Trap) mode. Single mode provides up to 12 lanes or zones of detection, Dual mode provides up to 8 lanes of Dual Loops.

You should wire the cable based on your preferred contact closure output mode and set the RTMS mode using the Contact Closure Setup in the Advanced screen of WinRTMS.

Connecting RTMS to External Modems

The RTMS may be connected to a remote traffic data collection system over private telephone lines using modems.

Multiple RTMS units connecting to remote systems, including the Cluster Hub or NEWS Hub systems must be placed in Polled mode and may require the use of modems.

Modem Cables

A cable connecting the RTMS RS-232 port to the modem's RS-232 port must provide the following:

- Male connectors at both ends (null cable).
- The cable must operate within the parameters provided below.

A modem's RS-232 ports will usually employ DB9 or DB25 connectors.

Table 2.8. Modem Cabling

Function	From RTMS DB9	To Modem DB9	To Modem DB25
Transpose Tx and Rx	Pin 2, Pin 3	Pin 3, Pin 2	Pin 2, Pin 3
Connect ground	Pin 5	Pin 5	Pin 7
RTS to RTMS G4	Pin 7	Pin 8	Pin 5
Modem Side Control Looping			
DCD to CTS		Pin 1 to Pin 7	Pin 4 to Pin 8
DSR to DTR		Pin 4 to Pin 6	Pin 6 to Pin 20

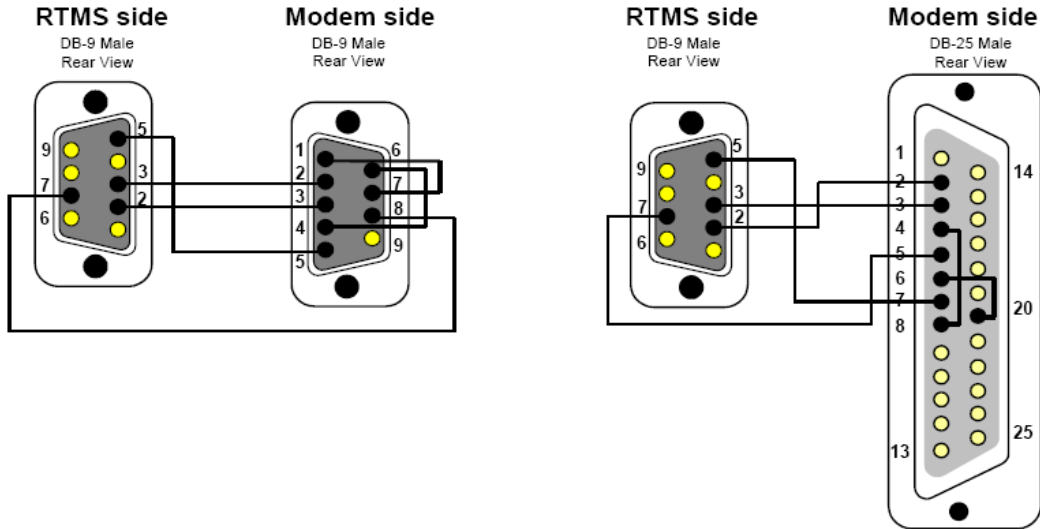


Figure 2.10. RTMS G4-To-Modem Connections

Modem Sharing



Note

Downloading of the internal memory is not available with this configuration.

RTMS units located in close proximity may connect to a single modem. A modem sharing cable will have “Y”- construction and will consist of one DB-9M connector per RTMS, and one DB-9M or DB-25M connector at the modem (as shown below).

Modem side strapping provides required flow control functions, not provided by the standard RTMS RS-232 port.

Table 2.9. Modem Cabling

Connection/Function	From RTMS DB9	To Modem DB9	To Modem DB25
Transpose Tx and Rx	Pin 2, Pin 3	Pin 3, Pin 2	Pin 2, Pin 3
Connect ground	Pin 5	Pin 5	Pin 7
Modem Side Strapping			
Strap RTS to CTS		Pin 7 to Pin 8	Pin 4 to Pin 5
Strap DTR to DSR		Pin 4 to Pin 6	Pin 6 to Pin 20
Connect a 4.7 kΩ resistor from Tx ground to prevent noise.		Pin 3 to Pin 5	Pin 2 to Pin 7

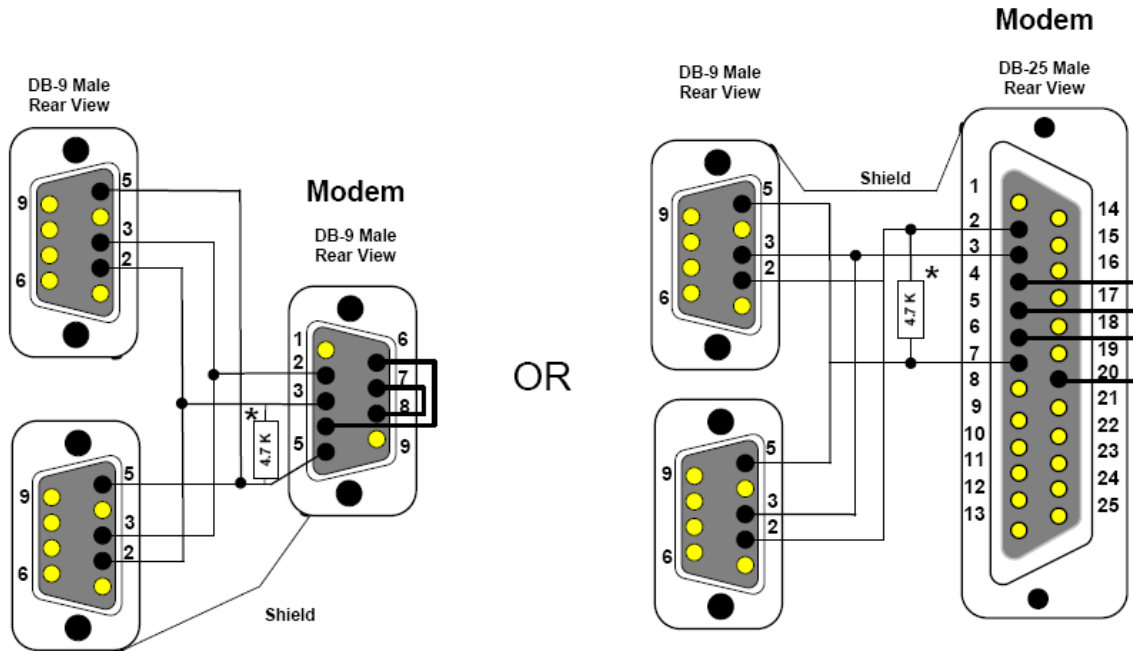


Figure 2.11. Modem sharing "Y" cables. (No Memory Download.)

RS-485 Multi-Drop

The RS-485 setting of the G4 Serial Port allows up to 32 RTMS units to be employed on the same serial bus over distances up to 4000 feet [1200 m].

The diagram Figure 2-12 shows the use of a 4-Wire line. The use of a half-duplex 2-Wire line is feasible but it is suitable for data collection only. Consult RS-485/422 Application Guides for details on wiring solutions for your project.

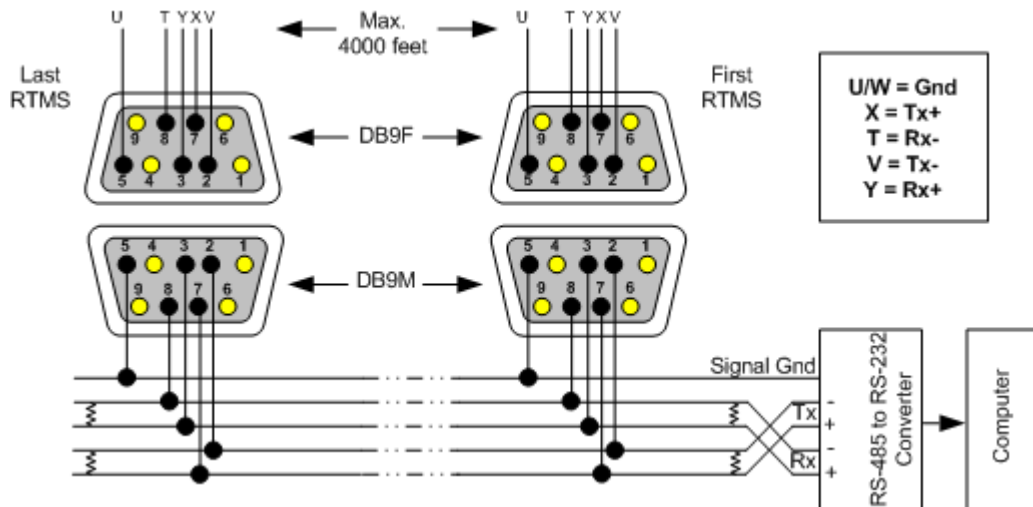


Figure 2.12. RS-485 Multi-Drop Wiring

Wiring Notes

1. The DB9 connectors and terminal blocks serve as a disconnect point, which allows disconnecting the RTMS from the transmission line for direct connection to the laptop's COM port for setup.
2. Terminating resistors (100-120 ohms) are required at the extreme ends of the Receive and Transmit transmission pairs.
3. Transmit and receive pairs must be transposed when connecting to a DTE (PC, Data processing System). To interface with a PC an RS-485/232 converter may be required as PCs typically do not have RS-485 interfaces.
4. RS-485/232 converter connector type and pin assignment are not shown as these are not standardized and vary between models.

RTMS Troubleshooting Guide

Field troubleshooting of the RTMS consists mainly of ensuring that the unit is powered and communicating. Communication with the sensor in Normal mode is confirmed by presence of the moving vehicles and menu buttons, and by the flashing of the indicator in the lower right corner of the screen, denoting data transmission activity. The table below outlines symptoms and suggested action in troubleshooting power and communication problems. Further information on problems with the power supplied to the unit, with the wiring, or with the communications parameters not being set correctly is provided below the table:

Symptoms	Possible Causes	Suggested Action
Timeout has expired and the main Communication Screen is displayed.	RTMS is not powered.	Check that the supply voltage is within limits at source and at the MS connector. Voltage outside the limits (too low or too high) will cause power supply to shut down.
	Cable problem.	Check cable pin-out and continuity.
PC and sensor are communicating (Sensor settings are displayed on buttons) but target "blips" are not shown on the main screen.	RTMS is not in Normal mode. Unit is improperly aimed. Internal parameters corrupted. MW module fault.	Ensure the unit is in the Normal mode. Check sensitivity setting. See if targets appear when sensitivity is increased. Cycle power to unit and then edit parameters (mode, sensitivity, zone setup, etc). Run Self-Test if above not successful. Report findings to ISS Canada.
Main screen shows target blips but no zone icons or parameters on buttons.	RTMS transmits and WinRTMS displays received data but RTMS has not received the WinRTMS READ command.	Check cable to ensure continuity between MS connector pin T and COM port's pin 3.

Notes on Power:

The RTMS G4 is a constant power device that requires in its basic configuration 3 watts of power. Electrical power has two components, voltage and current; both must be available in

the correct ranges to operate the G4.

The voltage must be between 12 and 24 volts (DC or AC RMS) with the voltage level read at the RTMS. Voltages below 12 volts will be insufficient to turn on the G4; voltages above 24 volts will cause the G4 to shut down to protect itself from an overvoltage condition. Losses in the cable must be addressed in setting the voltage to be supplied to the unit.

Current in sufficient quantity must be available: at 12 volts, the G4 will draw 250 mA of current; at 24 volts 125 mA (base model, higher for units with additional communications options).

Using an adaptor that provides 12 volts and 100 mA of current means that the total power to the RTMS will be $12 \times 0.1 = 1.2$ watts, or roughly 40% of the power needed to turn the G4 on.

On power up, there will be an inrush current that will be several times higher than the operating current. The power supply must be able to handle this temporary current flow.

If the power supply is unregulated (such as a simple step-down supply from 120 VAC to 24 volts (AC or DC)), the output voltage may be higher than specified when the current draw is less than maximum available from the supply. This may cause the G4 to sense an overvoltage condition and shut down to protect itself.

If additional hardware is added to the G4, such as a radio modem or an Ethernet card, the power required to operate the G4 will increase. The voltage seen by the G4 will remain the same, but the current will increase to meet the new power requirement.

Note on Cabling:

ISS Canada recommends that the design of an RTMS installation include a breakout box close to the RTMS that can be used for setup and maintenance purposes, and can include surge suppression circuitry and external communications devices as required. Reference designs are available.

Notes on Communications:

The base communication method used with the G4 is serial RS-232 or RS-485. Port 1 is the main port that is connected to the outside world, Port 2 (optional) is installed to speak with other internal devices such as a DSS or Cellular radio, or a serial-to-Ethernet converter. Port 2 can also be connected to the MS connector for direct access to the outside world (factory option).

It is recommended that serial port 1 be accessible to the outside world for maintenance purposes, even if the primary communication with the G4 will use another method.

Communication between the second serial port and another device will be fixed at a rate of 115200 bps. When connecting to an internal device through the serial ports, it is necessary that serial port 1 is set to 115200 bps for the connection to be successful.

Both serial ports can support hardware handshaking if the external lines are available. It is critical that hardware handshaking (RTC/CTS) not be enabled using the WinRTMS software if the lines are not installed in the cabling. Enabling RTS/CTS without these lines will prevent the RTMS from communicating with the outside world.

RTMS Technical Specifications

Microwave Signal and Coverage Area

	Model K4
Center Frequency	24.125 GHz
Bandwidth	50 MHz
Power Output	100 mW
Beam Width—Vertical (Elevation)	50°
Beam Width—Horizontal (Azimuth)	12°
Side Lobes	>-20 dB
Range	6-250 feet [2-75 Meters]
Number Of Detection Zones And Lanes	12

Accuracy of Measurement & Error Rates

Measurement	% Error *
Per Lane Volume—Side-Fired	5%
Volume Range	0-65535
Per Lane Occupancy—Side-Fired	5%
Occupancy Range & Resolution	0-100%, 0.1%
Per Lane Classification By Length (6 classes)	10%
Class Lengths Limits range and resolution	83.6 ft [25.5 m 0.1 m]
Average Per Vehicle Speed—Side-Fired	10%
Speed range and resolution	100 MPH, 1 MPH [0-160 km/h, 1 km/h]
Resolution of time events	1.25mS
Voltage readout resolution	0.1v

*Accuracy Performance Conditions

Error performance parameters outlined above are achieved under normal, high-flow traffic conditions and are subject to proper installation and setup. Lower accuracy is expected under the following conditions:

- Low speed, high congestion conditions: The RTMS tends to be less accurate under very low speed conditions (below 1 mph [1.6 km/h]).
- Improper selection of installation site: insufficient set-back, height beyond the recommendation, obstruction by barriers or high fences before monitored lanes.
- Improper fine tune setting for the road geometry (lane width, barriers, etc.) will result in “splashing” and, therefore, over-counting.
- In Forward-Looking Hwy configuration the following conditions may result in errors:
 - High variance between the volumes in the speed trap zone.
 - Improper aiming, mounting height (too high) or incorrect offset parameters
 - Obstructions within the trap range.

Mechanical

Measurement	Dimensions
Enclosure Dimensions	8×8×6 inches [21×21×16 cm]
Weight (Without Optional Equipment)	3.5 pounds [1.5kg]
Enclosure Material	polycarbonate
Weatherproofing	NEMA-4X and IP-65
Mounting	Zinc plated steel universal ball-joint bracket capable of support a load of up to 20 lbs [8.33 kg]. (Vertical or horizontal). Lynch-pin locking allows quick sensor replacement without disturbing the aiming.
Allowable pole flexing	Less than 5 degrees

Power Requirements & Consumption

Component	Details
RTMS standard power requirement	12-24 VAC or DC
Polarity protection	not polarity sensitive
Over-voltage shutdown limit	34 VDC or 24 VAC
Recommended fusing (external)	2 A slow blow minimum
Power consumption (Without optional equipment)	3 Watts
Automatic recovery from power failure	Within 20 seconds
Commercial AC power option	115±20 VAC @ 50-60 Hz

Interfaces

- Isolated Serial ports programmable to RS-232/485 including hardware handshake. (Second serial port is only available with additional hardware.) Speed is adjustable between 2400 and 115200 bits-per-second. RS-485 range: up to 4000 feet [1200 m].
- Optional Bluetooth wireless connection
- Optional Second Serial port programmable to RS-232/422 including hardware handshake
- Optional integral 10/100 Base-T Ethernet supporting TCP, UDP, IP, ARP, ICMP
- Optional IP Camera with multiple modes of operation (See separate specification.)
- Optional Contact pairs: 8 isolated contacts or 16 common ground contacts rated at Maximum current 100 mA; Maximum voltage 350 V; Maximum dissipated power 300 mW.
- Internal Data memory capacity: 8 Mb (90 days with all reporting options on and a 5-minute message period, 6 months for typical configuration.)

Upgrade Capability

User upgrades of both hardware and firmware available. RTMS supports remote firmware upgrade.

Surge Immunity

The RTMS withstands $\pm 1\text{kV}$ surge (rise time = 1.2 μsec , hold = 50 μsec) applied in differential mode to all lines, power and output, as defined by IEC 1000-4-5 and EN 61000-4-5 standards.

Environmental Conditions

	Operating Limits	Shipping & Storage
Temperature Range	-35 to 165°F [-37 to +74°C]	-40° to 171°F [-40° to 80°C]
Humidity	Up to 95% Relative Humidity	Up to 95% Relative Humidity
Vibration	2 g up to 200 Hz	
Shock		5 g 10 ms sine wave
Wind	Winds up to 100 mph [160 km/h] will not degrade performance	
Precipitation	Up to 100 mm/h	

Printed circuit boards are conformally coated for protection against humidity and corrosion. Except as may be other stated herein for a particular item, no item, component, or subassembly shall emit a noise level exceeding the peak level of 55 dBa when measured at a distance of one meter away from its surface.

Electromagnetic Interference

Certified under US FCC Rule part 15 Class A; Canadian CSA C108.8 M1983 Class A; CE.

Reliability

The RTMS is designed for *Mean Time Between Failures* (MTBF) in its operating environment of 90000 hours [10 years].

Recommended Surge Protection

It is recommended that communication and power lines of the RTMS be equipped with surge protecting devices, located as close as possible to the sensor. For example: locate surge protection in a cabling cabinet mounted on the same pole as the RTMS. The surge suppression should be applied as follows:

- The Tx and Rx communication lines should employ low capacitance, bipolar surge suppressors with a clamping voltage of 15 V.
- The Signal ground line should be grounded.
- A bipolar surge suppressor with a clamping voltage of 40 V shall be placed between two low voltage (16-18V AC or 12-24VDC) power lines.
- One of the power lines, negative line in case of DC, shall be grounded.

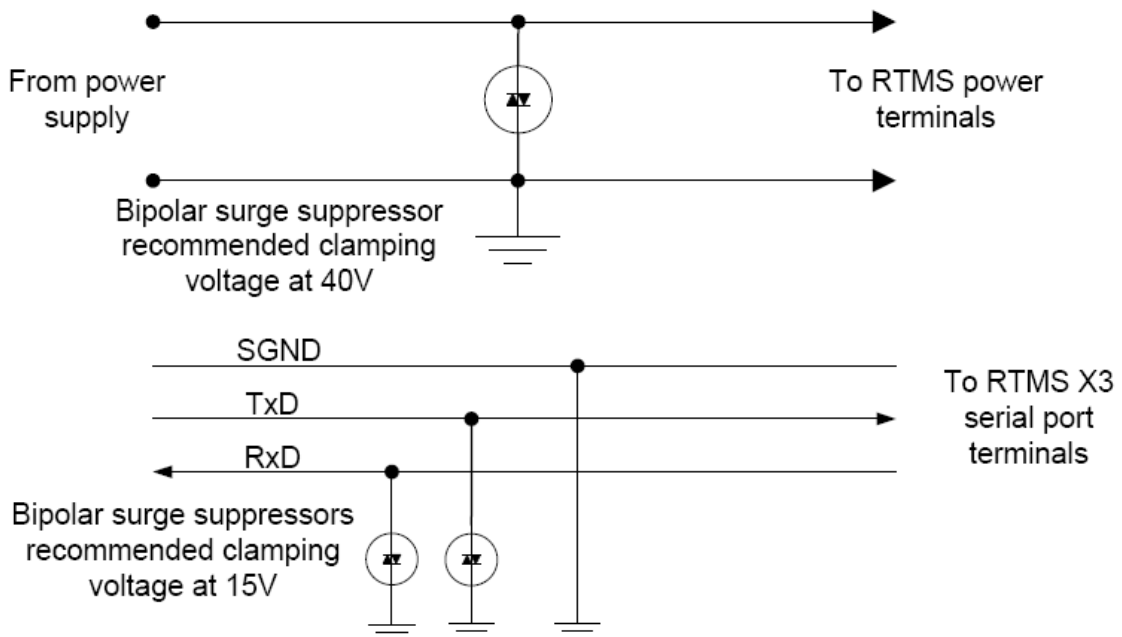


Figure 2.13. RTMS Surge Suppression

Reference

RTMS System Requirements

Once installed, RTMS sensors must be calibrated using the RTMS Setup Utility software. System requirements are as follows:

Component	Requirements
Operating System	Windows XP, Windows Vista
Software	Microsoft .NET Framework 3.5
Hardware	USB (with a USB-to-serial adapter), serial, or Ethernet port to communicate with RTMS hardware

About The RTMS Setup Utility

WinRTMS is supplied as a self-installing program named WinRTMSxxxinstall.msi.

- Will install C:\Program Files\EIS\WinRTMS.
- This folder contains the WinRTMS4.exe executable program and auxiliary files.
- The installer places a shortcut on the desktop.

Communication

The WinRTMS program can communicate:

- With a single RTMS (*Direct*)
- With multiple RTMS sensors (when these sensors are on the same communications channel and *Polled Data Mode* is active (*Multidrop*)).

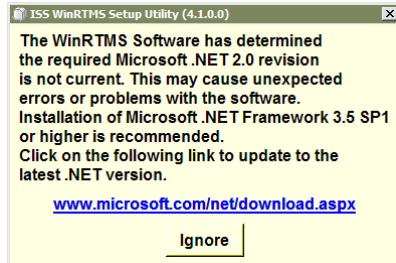
Procedures

The procedures listed below show you how to perform all common setup and software procedures.

Microsoft .NET Runtime Warnings

WinRTMS runs with Microsoft .NET 2.0 and higher. Run the software with Microsoft .NET 3.5.1 for optimal performance. In most cases the software performs acceptably but you may notice visual differences in the graphical user interface. The software provides a warning if the .NET version is incompatible.

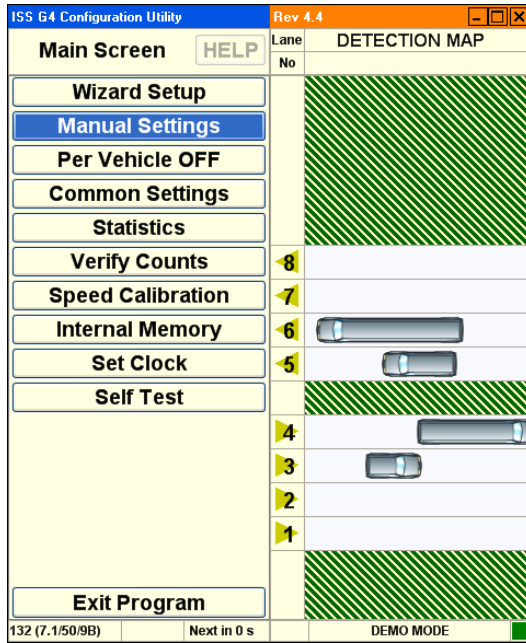
Figure 3.1. The .NET Version Warning. Click Ignore to proceed.



How to Navigate the RTMS Interface

The WinRTMS buttons and menus may be operated by any method listed below. The terms *select* and *click* are used throughout this manual to describe actions you can complete using the mouse or keyboard:

Figure 3.2. The RTMS User Interface.



- The interface consists of buttons and text displays.
- Point and click to select a button.
- Navigate using **up/down/left/right** keys and **ENTER** keys. Select by the arrow keys and take action by hitting **ENTER**.
- In some cases the **TAB** key can be used to navigate between the two main panels.

Get Started



Caution

Windows may disable the COM port if port activity is detected during the boot process. **DO NOT** connect the RTMS to the COM port before Windows startup is complete.

When the hardware installation is complete, getting started with the RTMS software is a three-part process:

1. Establish Physical Connection: power up computer and connect computer to RTMS hardware via appropriate cable.
2. Establish Data Connection: establish an active data connection with the RTMS hardware.
3. Establish Traffic Detection: configure traffic detection parameters and begin detection.

While configuring your system, use the three-part list shown above to create your own task list and gauge your progress.

Establish a Connection with the RTMS Hardware

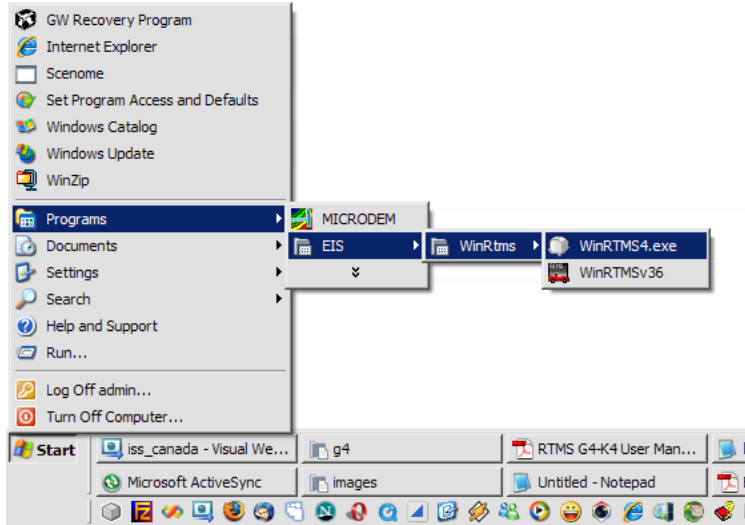
Once the hardware is installed, you must establish a data connection between the RTMS hardware and a computer running the RTMS software. To establish a connection between the RTMS hardware and software:

1. Connect the RTMS hardware to an already-running personal computer.
2. With the RTMS sensor powered and connected to the PC, click the **WinRTMS4.exe** icon to launch the RTMS Setup Utility program.
 - While trying to establish communications, WinRTMS looks for a single sensor that matches the current settings (address, communication rate).
 - If successful in establishing communications, WinRTMS displays setup options on the Main Screen.
 - If unsuccessful, WinRTMS performs a scan for various baud rates to find the correct one. This might take a few minutes.
3. If unable to establish communications, WinRTMS opens the Communications Screen to allow you to direct a search for the RTMS. Possible causes are:
 - See the Troubleshooting Guide for additional suggestions.
 - Microsoft .NET Framework 3.5 is not installed.
 - RTMS is not powered.
 - RTMS is not connected to the PC.
 - RTMS connection cable is faulty.
 - Wrong COM port is selected.
 - Communication to RTMS is IP.
 - Tx & Rx lines are crossed.
 - COM port is being used by another program.

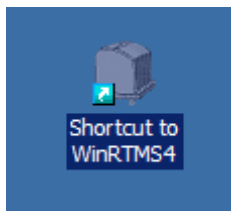
How to Run WinRTMS in Demo Mode

If you are a new user, use the following instructions to start and configure the RTMS:

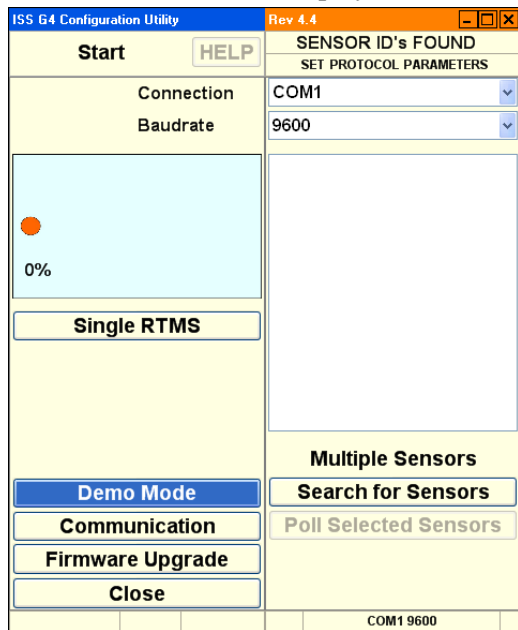
1. Select **Start » Programs » ISS Canada » WinRTMS » WinRTMS4.exe**.



2. Alternatively, you may start the software from the desktop if you chose to install a desktop shortcut during the installation process.
3. Double click the shortcut icon.



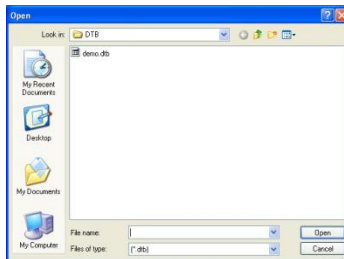
The software starts and displays the start screen.



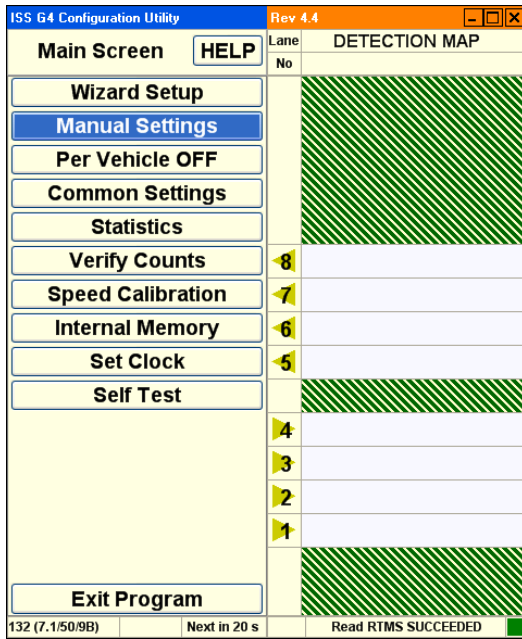
4. Left click the button named **Demo Mode**. This button is found at the bottom left of the user interface.

This displays the Open file dialog.

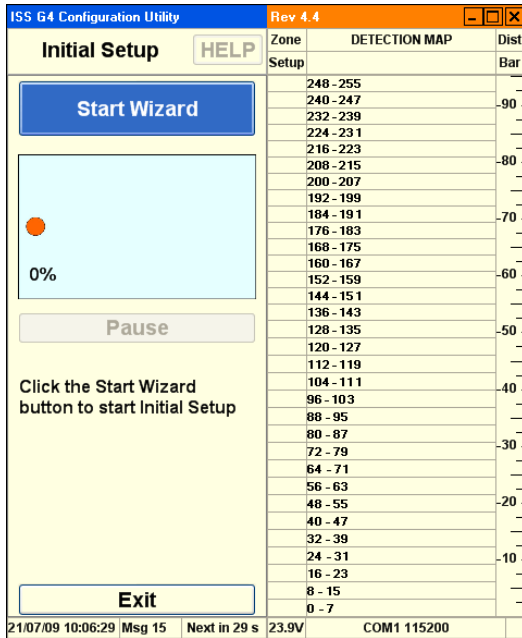
5. Double click the sample file named **DEMO.DTB** or any other saved G4 setup file.



This initializes the program with sample data.

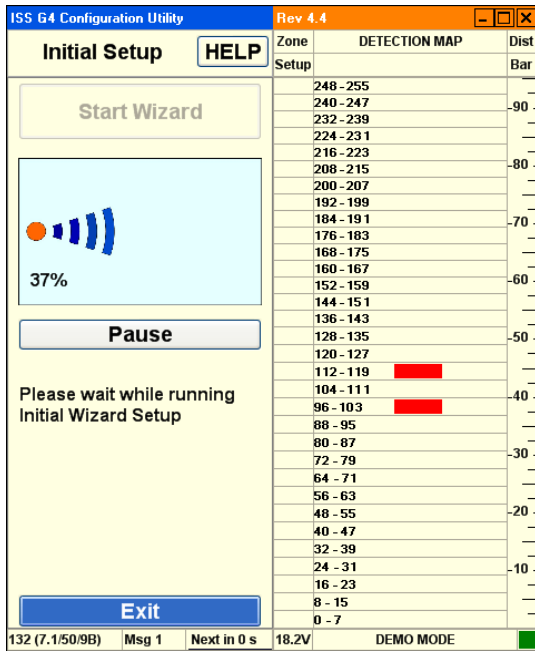


- Left click the button named **Wizard Setup**. This displays the wizard setup screen:

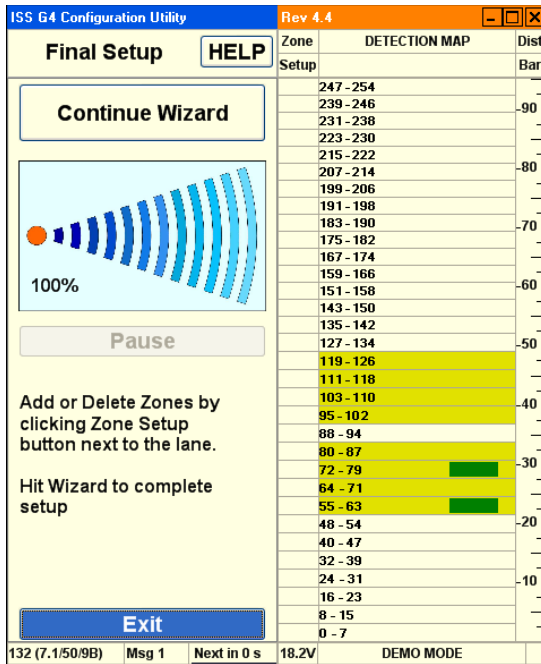


- Left click the button named **Start Wizard**.

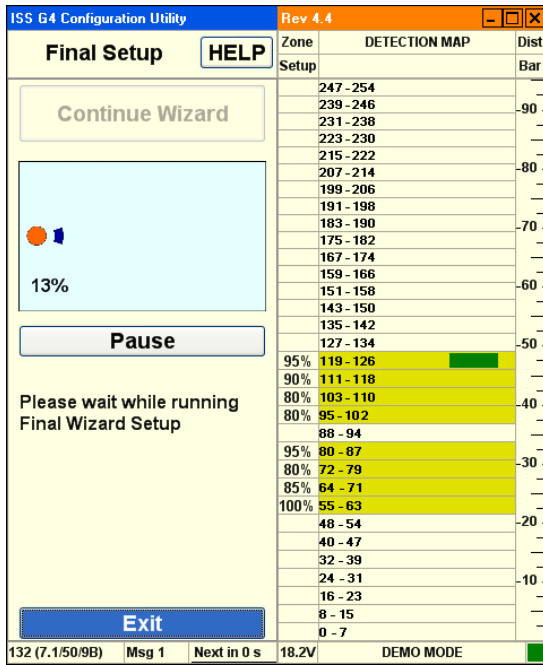
The wizard starts and displays progress



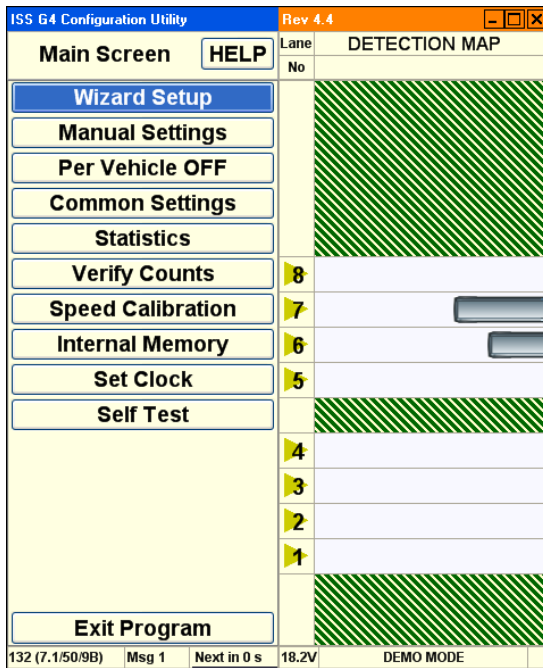
8. When complete, the wizard displays lane and traffic information. Configure these options as appropriate:
9. Left click the button named **Continue Wizard** to complete the setup process:



The software displays progress.



The RTMS Main Screen is displayed when complete:

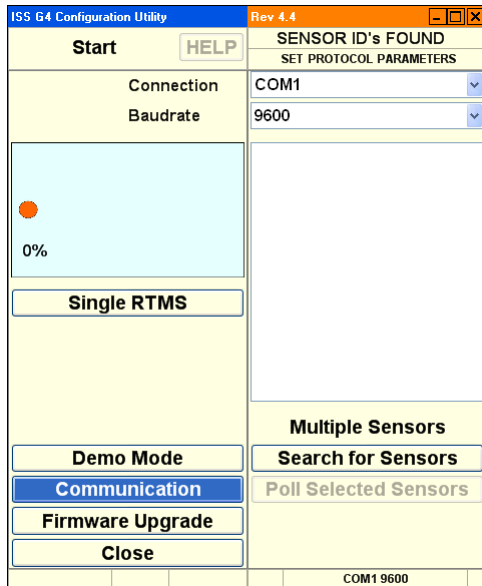


10. Configure the remaining options as needed.

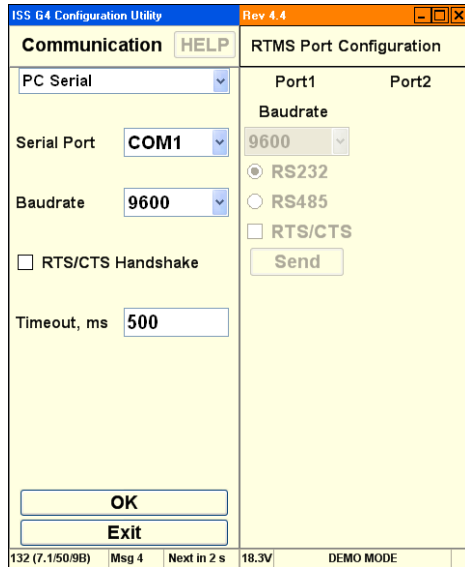
How to Modify or Troubleshoot the Connection with the RTMS Hardware

The Communications Screen allows you to troubleshoot data connections if you encounter a problem making a data connection on startup. You can also use these options to reconfigure communication parameters as needed throughout the product life-cycle.

The basic communication options screen:



1. Use the basic communication screen to accomplish the following:
 - Change the WinRTMS Utility communication parameters such as the mode from Single RTMS (Direct) to Multiple Sensors (Multidrop).
 - Search for Sensors by first using the default port (and parameters) before making any changes. During the search for Multiple Sensors, several sensors may be found. In this case their Sensor ID numbers will be displayed, allowing polling of all of them or a Selected Range of IDs as well as focusing on a single sensor ID.
8. Click the **Communication** button to display advanced communication parameters in both panels:



9. Use the advanced communication options on the left side of this screen to accomplish the following:
 - Set the WinRTMS PC COM port and baud rate for communicating with the RTMS when **Serial** is selected.
 - The TCP/IP selection allows you to set the IP address WinRTMS uses to communicate via IP-based connections.



Warning

Activating RTS/CTS without wiring in place to the RTMS leads to loss of communication.

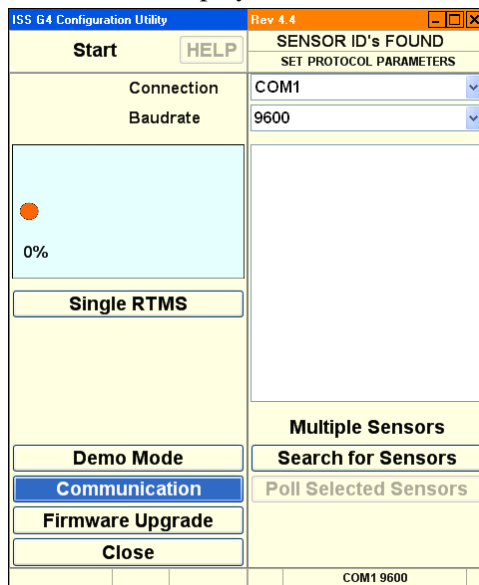
10. Use the advanced communication options on the right side of this screen to accomplish the following:
 - Set RTMS Sensor communication parameters of both ports to the correct speed from the drop menu.
 - Activate RTS/CTS handshake when necessary.
 - Alter communication speed (baud rate).
 - 9600 bits per second (bps) is the factory default for serial units.
 - Data rates below 9600 are useful where high quality transmission lines are not available. They are however, unsuitable for setup and must be selected after setup has been completed. When using data rates below 9600 bps, the RTMS data mode must be set to STAT to reduce the amount of data and prevent communication problems. See DATA MODE for further details.
11. Click **Send** to change the RTMS and WinRTMS will change automatically.
12. Click **OK** to finish.

How to Set Up Serial Communication

Serial communication is the simplest form of communication between an RTMS sensor and WinRTMS. To configure serial communication:

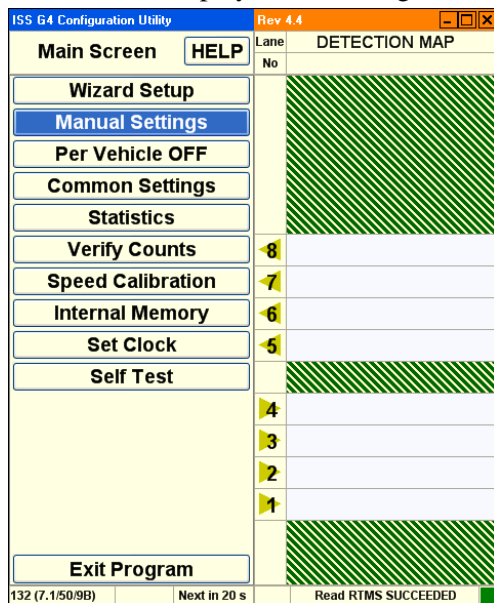
1. Power up the computer.
2. Connect the RTMS sensor to the computer with a serial cable.
3. Start WinRTMS.
4. The WinRTMS software starts and begins to search for sensors. The software splash screen is displayed. This process may take a few minutes.

The software displays the search screen if a sensor is not found:



This screen allows you to direct a search for sensors.

The software displays basic configuration if a sensor is found:

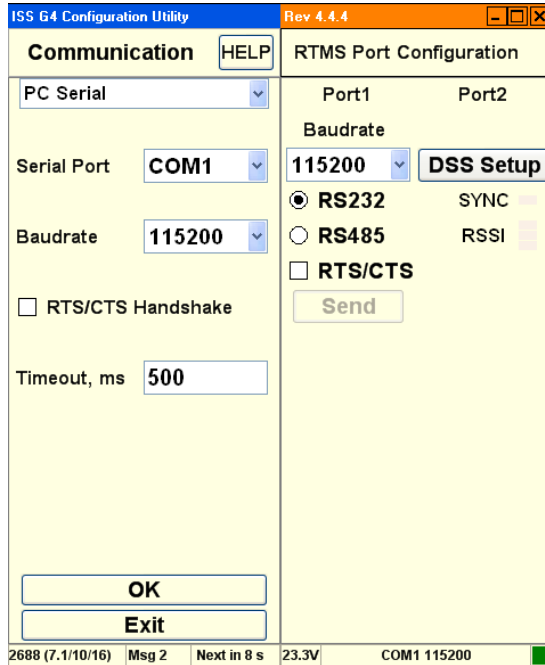


This screen allows you to configure the RTMS.

How to Set Up DSS

To configure WinRTMS to communicate with a sensor via digital radio modem:

1. Start WinRTMS and connect to the RTMS sensor.
2. Select **Manual Settings** from the listed options.
3. Select **Communication** from the listed options. The RTMS Port 1 **Baudrate** must be set to **115200** before accessing the internal DSS radio modem:

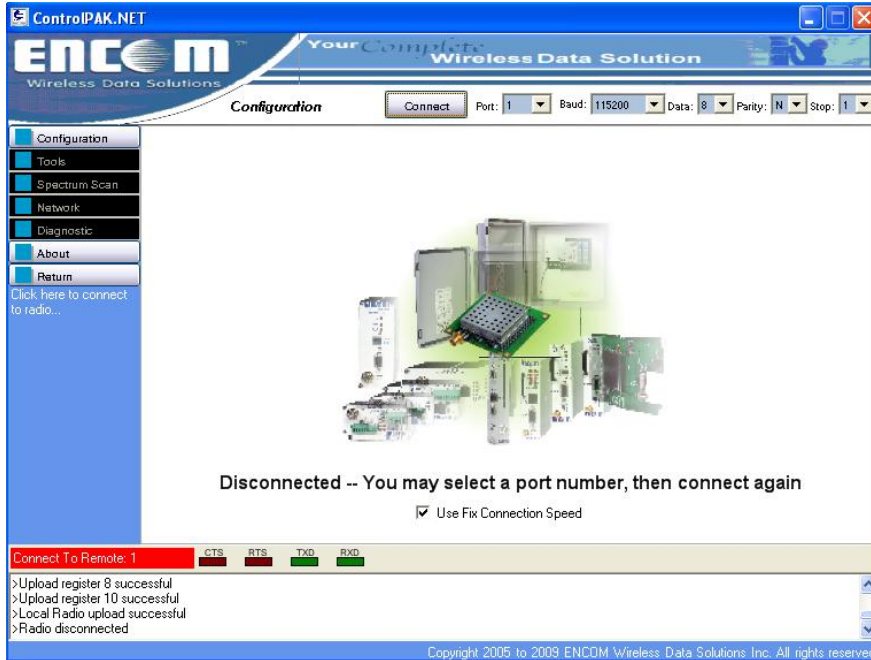


4. Left click the button named **DSS Setup**. This will automatically open a window so that Encom's Controlpak utility can be located and run. (Encom's ControlPak software must be run on the same computer. Select **SERIAL** and **520 Series**:



5. Ensure the connection settings are set to **115200**, **8** data bits, **no** parity and **1** stop bit. The

COM port may vary if you are using a USB-to-serial converter. Use **Fix Connection Speed** should already be checked. To access radio settings, click **Connect**:



6. Enter **Network Setup** values: **Network Address**, **Unit Address** (unit address must match G4 sensor ID), **Primary Hop**, **Encryption**, and **Output Power**.
7. To load radio settings, click **Program Radio**.
8. Verify the bottom window shows **Local Radio upload successful**.
9. To close Controlpak utility, click **Return**, and then **Exit program**.

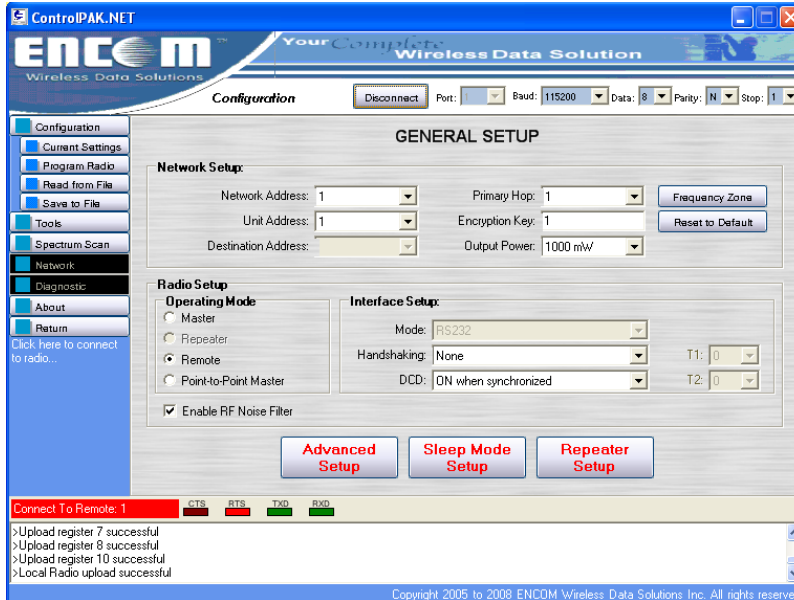
10. Left click **File**, and select a text file containing a properly formatted modem instruction set:



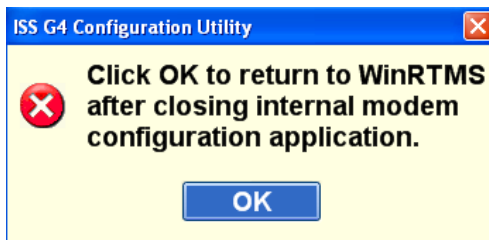
Network setup limits for 520 series radio:

- Network address. Range is 0-99.
- Unit address. Range is 1-254.
- Primary hopping pattern. Range is 0-61.
- Encryption key. Range is 0-65535.

Power setting range is 1, 10, 100 and 1000 mW.

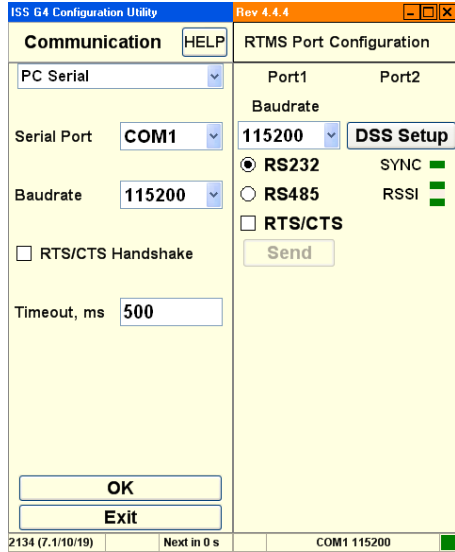


11. To return to WinRTMS, click **OK**:



12. From the Manual Settings dialog, select **Data Mode**.

Proper communication is indicated by the green synchronization indicator below the DSS Setup button. The RSSI (Received Signal Strength Indicator) reflects the RSSI status: 1, 2, or 3 bars. Three bars indicate the strongest received signal:

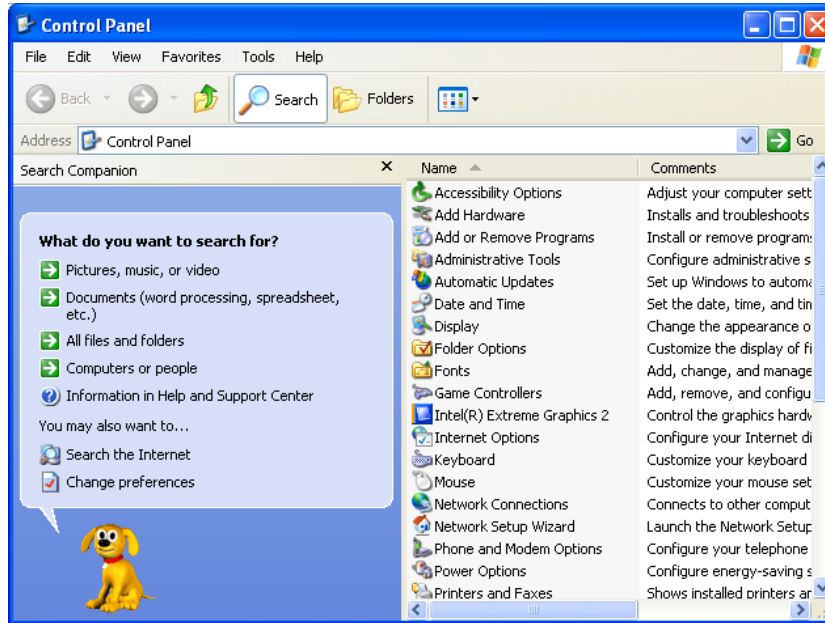


- The master DSS communicating with the RTMS slave or repeater must be of the same type and frequency band. All units supplied on the same order will be of the same type and frequency. Refer to the manufacturer's documentation and instructions for setup of the master DSS parameters.
- Output Power Level is determined based upon the Radio Site Survey. Strength of signal is important to ensure data quality. If the power setting is too high, it may interfere with other radio systems in the area. If it is too low, the data messages may be missed.
- You must set the Unit Address=RTMS Sensor ID.
- The Spider Controller only accepts 8 lanes per sensor. Therefore only 8 lanes can be configured when G4 is operating in Spider mode.

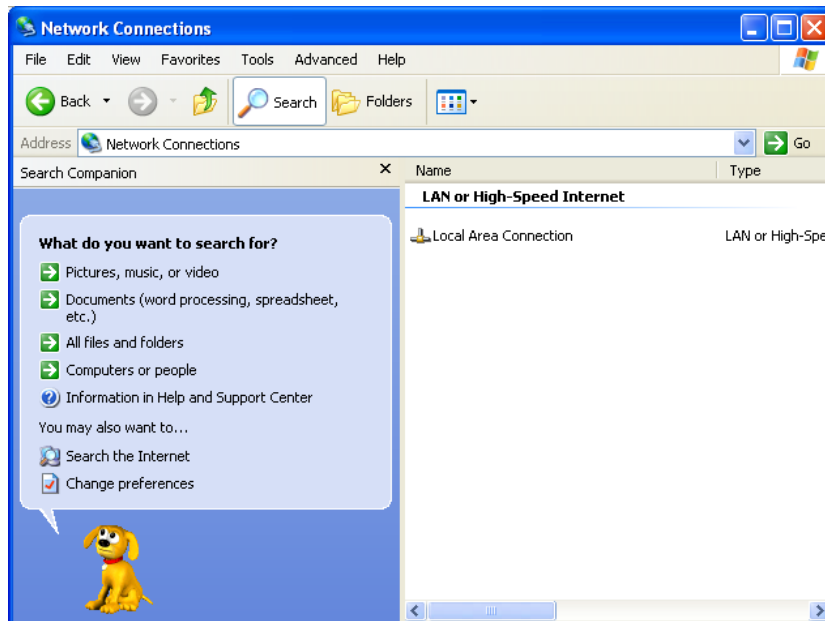
How to Set Up TCP/IP Communications

To set up the RTMS TCP/IP Interface:

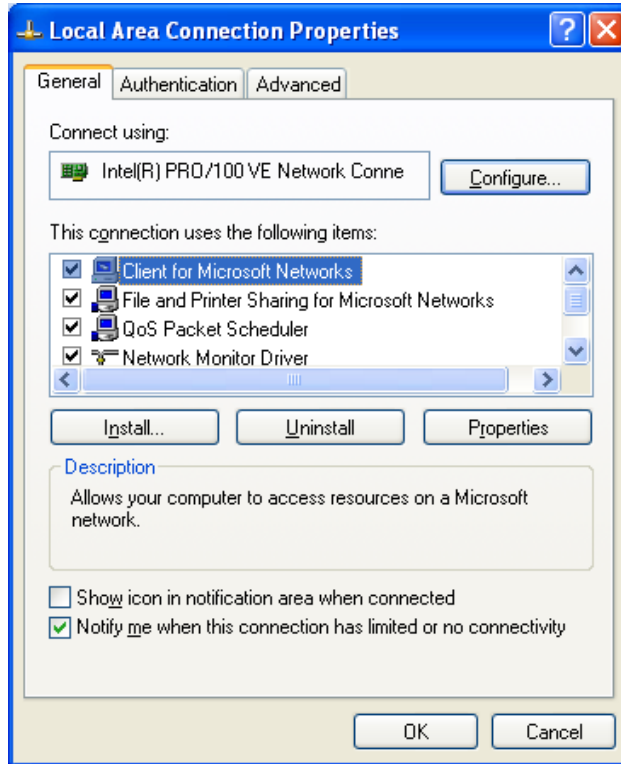
1. Connect RTMS to the PC. The PC's Network Port Link and Activity Indicator lights indicate power and connection.
2. Use a crossover (Null) cable if communication is not established.
3. Open the Windows® Control Panel.



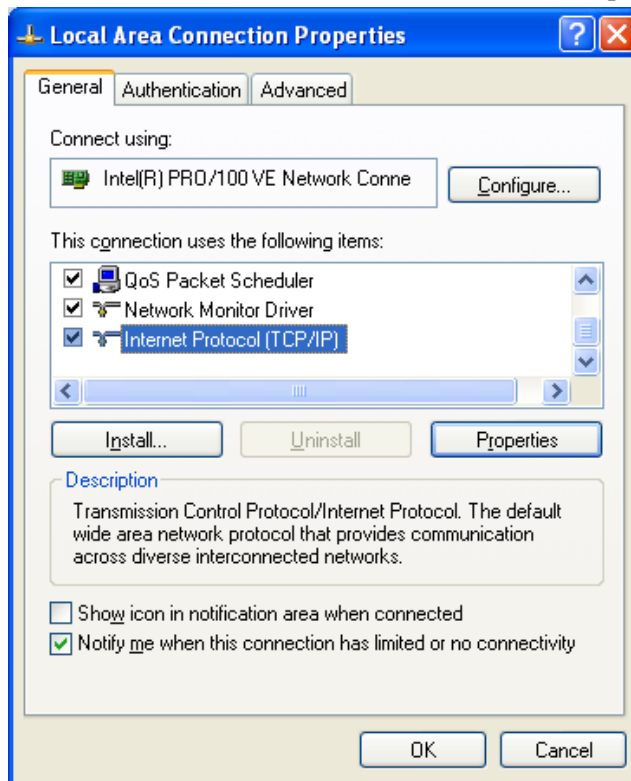
4. Double click the **Network Connections** icon.



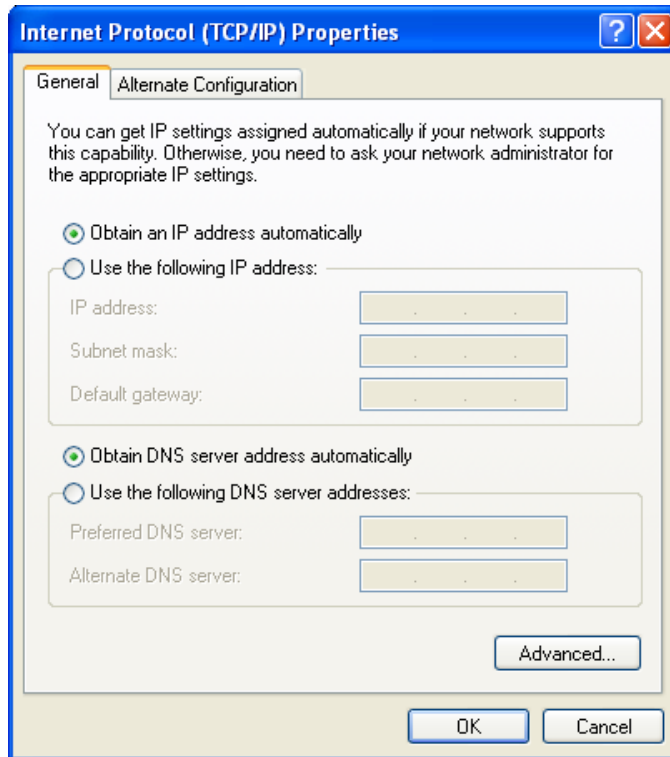
5. Right click over **Local Area Connection** and select **Properties** from the listed options.



6. Select **Internet Protocol (TCP/IP)** from the listed protocols.

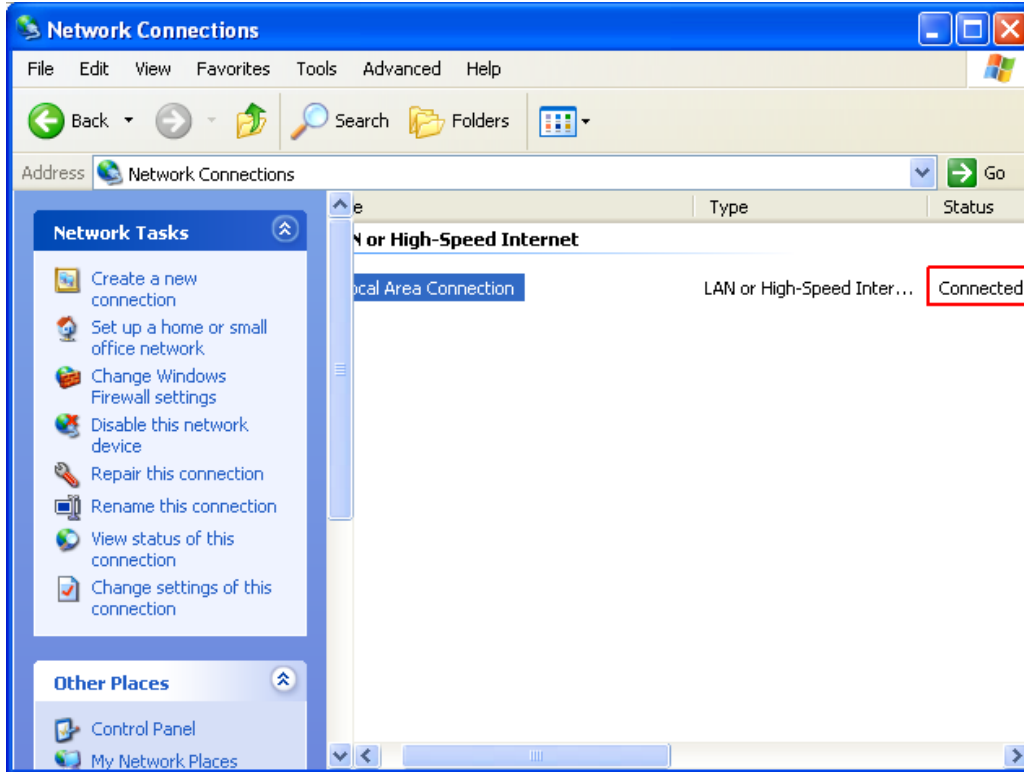


7. Left click the button named **Properties**.



8. Select **Use the following IP address**.
9. Set IP address to **128.100.101.1**.
10. Set Subnet mask to **255.255.0.0**.
11. Click **OK**. This returns to the Network Connections screen.
12. Click **Close**. This closes Network Connections.

13. Examine the Network Connections screen. **Status** should indicate **Connected**. This verifies that the RTMS and the computer are connected.



14. Start WinRTMS.
 15. Select **Communication**.
 16. Select **TCP/IP** from the drop down below the **Help** button.
 17. Enter the IP address in the **Remote Server** field. This default address is **128.100.101.254** (set at the factory).
 18. Set **Remote Port** to **2000**.

19. Set **Local Port** to **2000**.

The screenshot shows the 'RTMS Port Configuration' dialog box within the 'ISS G4 Configuration Utility' (Rev 4.4). The dialog is split into two panes. The left pane, titled 'Communication', contains the following fields and controls:

- PC TCP/IP: dropdown menu
- Existing addresses: dropdown menu with '<select ip address>' selected
- Remote server: radio buttons for 'Address' (selected) and 'Name'
- Address field: '128 . 100 . 101 . 254'
- Remote port: text box with '2000'
- Local port: text box with '2000' (highlighted in blue)
- Timeout, ms: text box with '3000'
- Buttons: 'OK' and 'Exit'

The right pane, titled 'RTMS Port Configuration', contains the following fields and controls:

- Port1: dropdown menu with '9600' selected
- Baudrate: dropdown menu with '9600' selected
- Port type: radio buttons for 'RS232' (selected), 'RS485', and 'RTS/CTS' (checkbox)
- Send: button

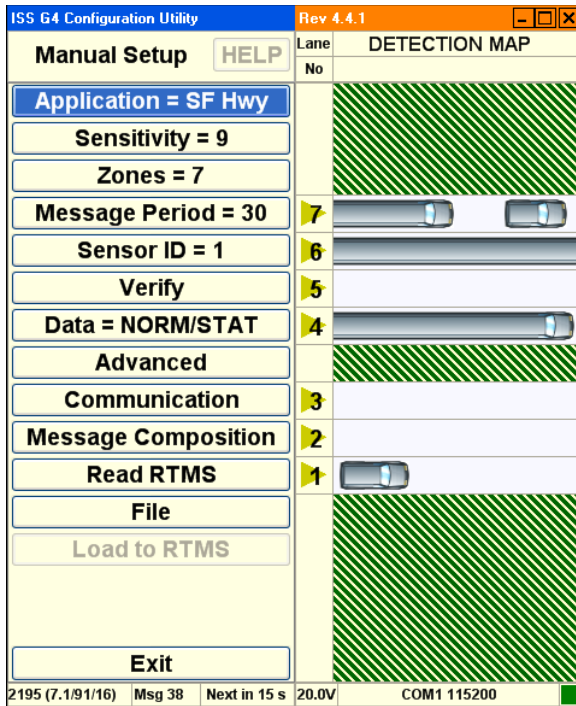
At the bottom of the dialog, a status bar displays: '939 (7.1/AC:F1) | Msg 10 | Next in 50 s | 12.1V | COM1 9600'

20. Click **OK**.21. Click **Single RTMS**.

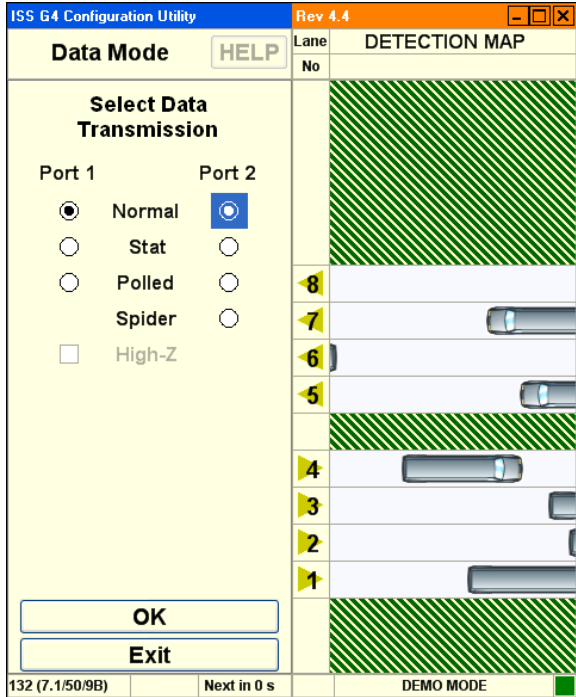
22. WinRTMS connects to the RTMS sensor and displays the main screen.

23. Proceed with sensor configuration (run the wizard).

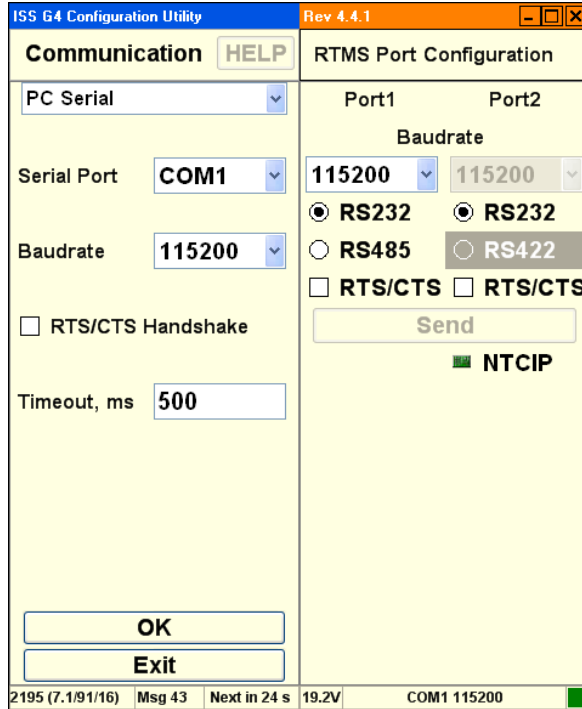
1. The Manual Setup dialog appears. Set **Message Period** to **30**:



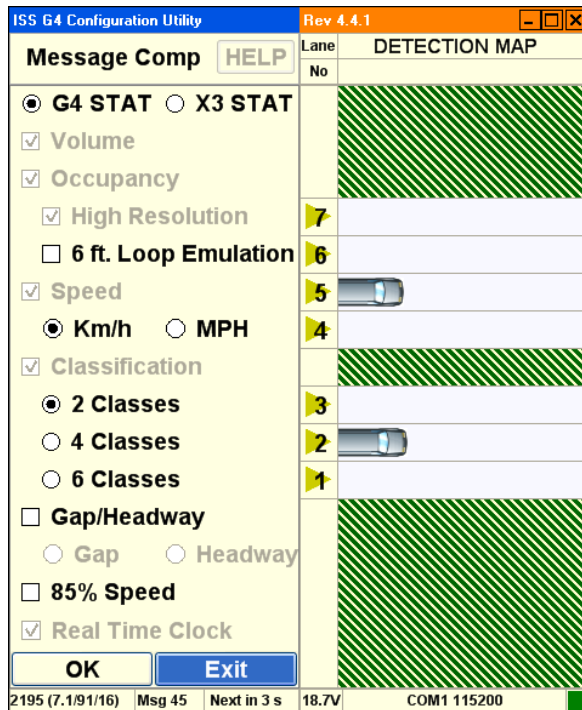
2. Select **Data Mode**. Set **Port 2** to **Normal**, then click **OK**:



3. Select **Communication** and check RTMS PC Serial port configuration is set up as follows, then click **OK**:



4. Select Message Composition and check settings are as follows:



The NTCIP setup is now complete.

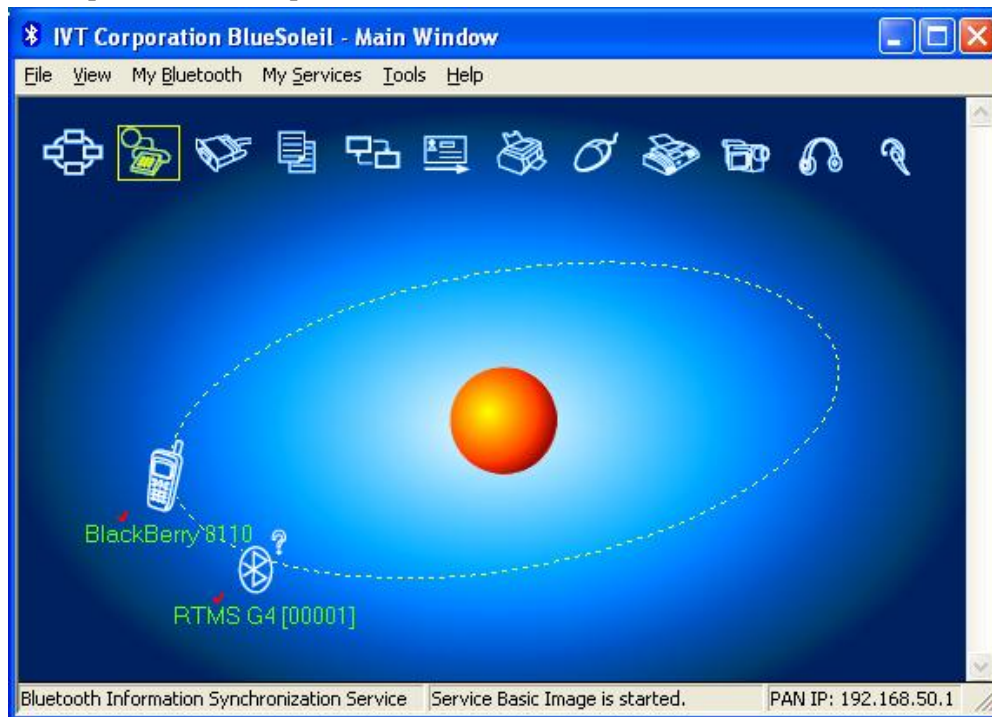
How to Set Up Bluetooth Device Communications

Before you can set up Bluetooth device communications, use the manufacturer's instructions to install Bluetooth device on your personal computer.

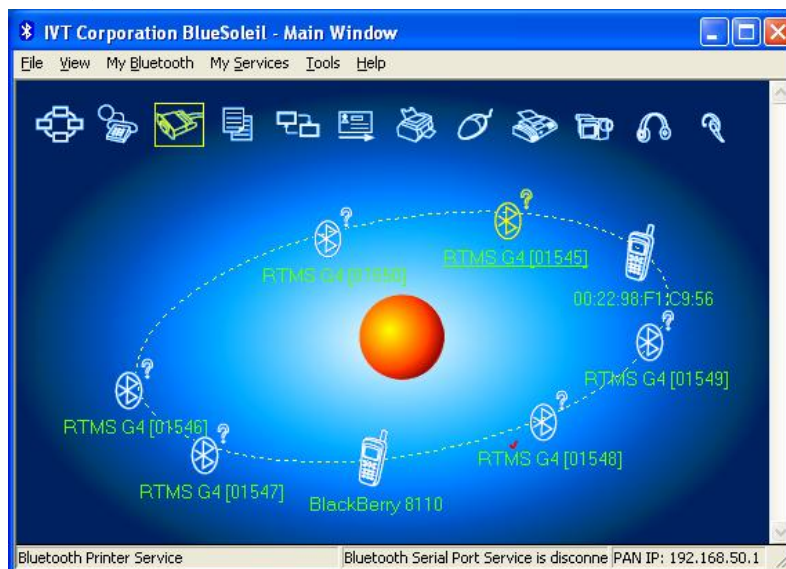
Configuring the Bluetooth Device

Once you have installed the Bluetooth device, configure Bluetooth as follows:

1. Open the Bluetooth utility manager window on your personal computer. The following example uses IVT Corporation BlueSoleil™ software:

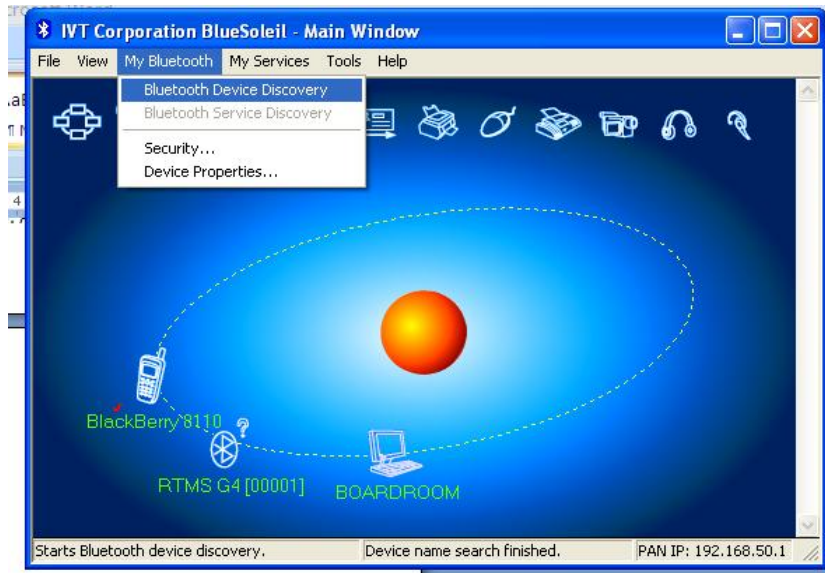


1. To find the G4 Bluetooth device, click on the icon as shown below, or from the **Tools** menu, select **Find Device**:



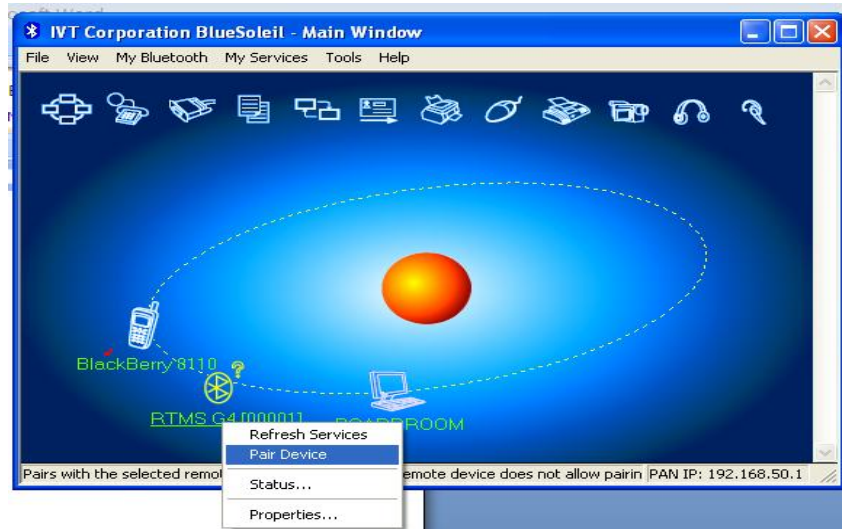
An alternative method for finding the Bluetooth is to select **Bluetooth Device Discovery**

from **My Bluetooth** menu:

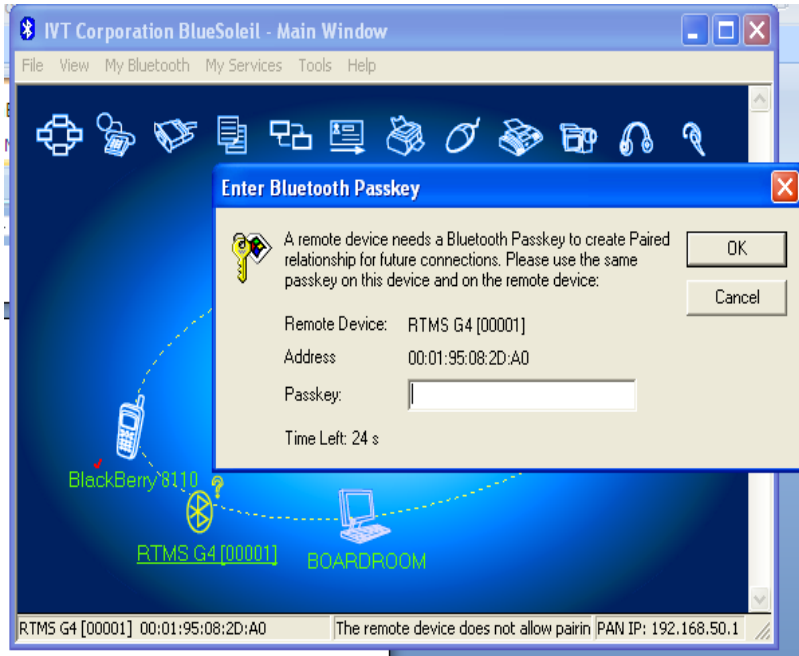


The software then searches automatically for any Bluetooth device within radio range.

2. If the software does not find the attached Bluetooth device, you may search using the device name or MAC address. If the name search failed, type in the MAC address.
3. Once the G4 Bluetooth is found and showing in the utility window, move the mouse pointer over the G4 icon, right click on the icon, and select **Pair Device**:



An Enter Bluetooth Passkey dialog appears. The **Passkey** field supports 16 alphanumeric characters. You may only change this value using a serial connection. The default RTMS G4 Bluetooth passkey is **admin**:



4. Enter the passkey and click **OK**. Move the mouse pointer over the G4 icon. Right click and select **Connect** from the menu. This connects the software to the selected device. In the example used below, the available connection is a serial port:

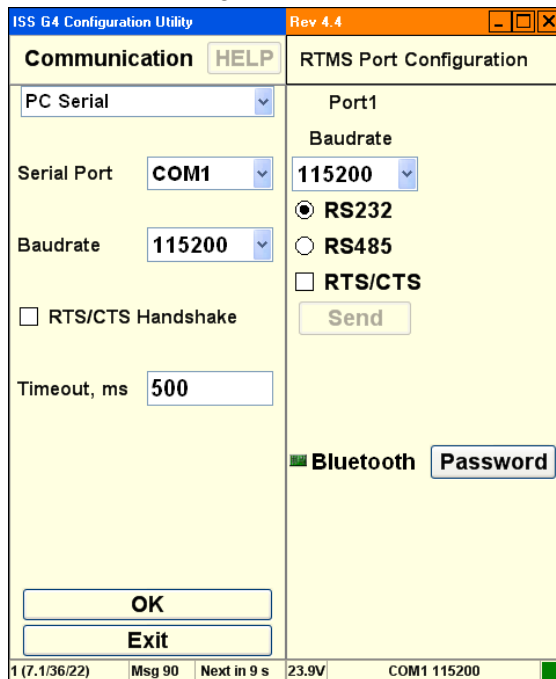


5. After you select the correct service, a link connection appears between the RTMS G4

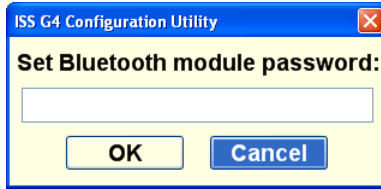
and the USB Bluetooth device connected to your workstation. Signal strength is shown in the utility window. RSSI indication is in terms of signal bars, not in dBm:



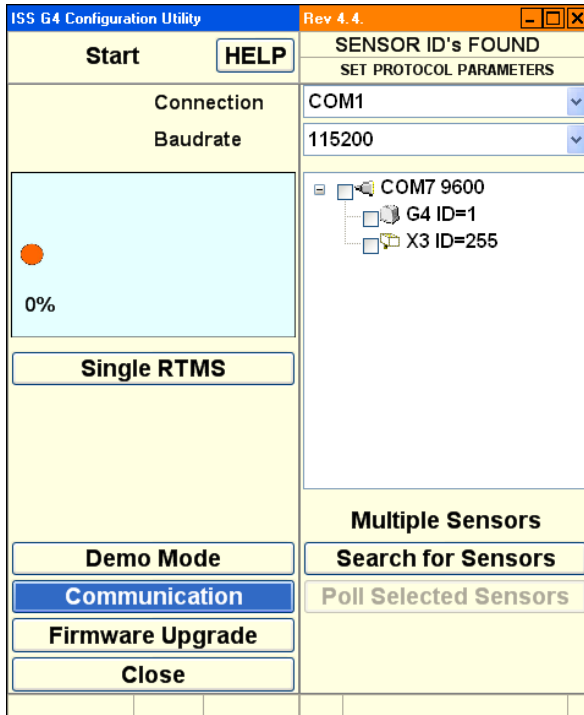
6. With the connection made, run the WinRTMS software.
7. If the COM port used by the Bluetooth device is not set to 115200, set it to this value before continuing.



8. If you need to enter a new password for the Bluetooth, select **Password** and enter the new value.



9. To continue, click **OK**.
10. To connect to the selected G4 device, select the detected sensor's COM port number and baud rate, and select **Single RTMS**:

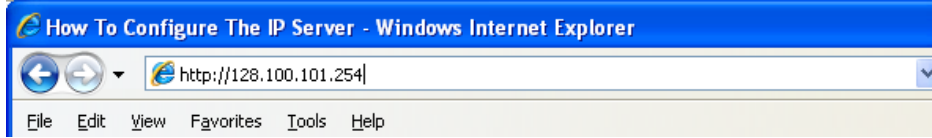


11. Once connected, you can proceed with normal WinRTMS and G4 operation as if you are connected via a serial cable connection. To maintain the connection, you do need to keep your personal computer within the range of the Bluetooth radio.
12. The Bluetooth radio range is dependent on the type of Bluetooth device you are using. Bluetooth devices are rated to 100 meters (Class A) or 10 meters (Class B):
- Office environment: 10 to 15 meters
 - Inside a car with clear, transparent windows: 25 meters.
 - Optical line of sight, no clutter present: 54 meters.

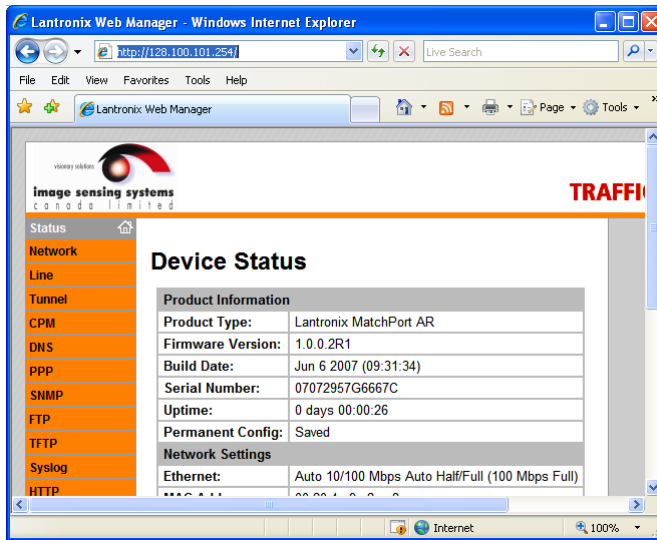
How to Configure the IP Server

To configure the IP server (which includes changing the RTMS sensor IP address):

1. Start Internet Explorer®.
2. Type **http://128.100.101.254** in the address bar and hit **ENTER**.



3. Type **admin** for User name and **PASS** for password.
4. The Lantronix® interface appears:



5. Please consult Lantronix documentation for information on configuring the IP server. Serial baud rate communication internally to RTMS is fixed at 115200 – do not adjust.

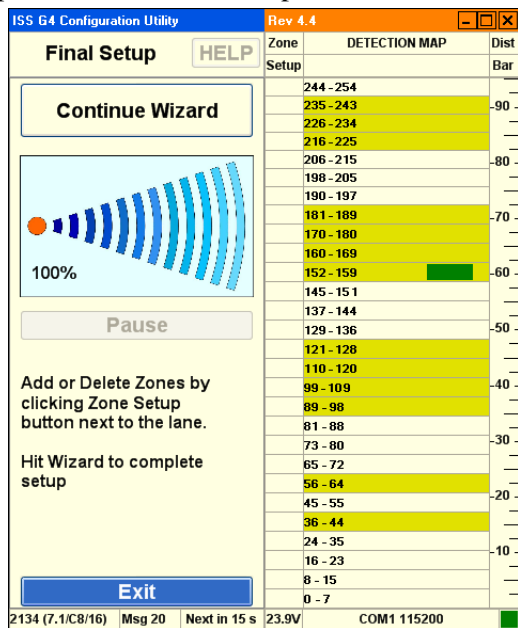
How to Use the Automatic Setup Wizard

The automated zone setup process requires free flowing traffic in all lanes of interest. It scans the range of the RTMS microwave beam and positions up to 12 detection zones—representing lanes where vehicles are detected.

The WinRTMS software automatically detects traffic in its detection area and configures lane parameters accordingly. This is a two-stage process:

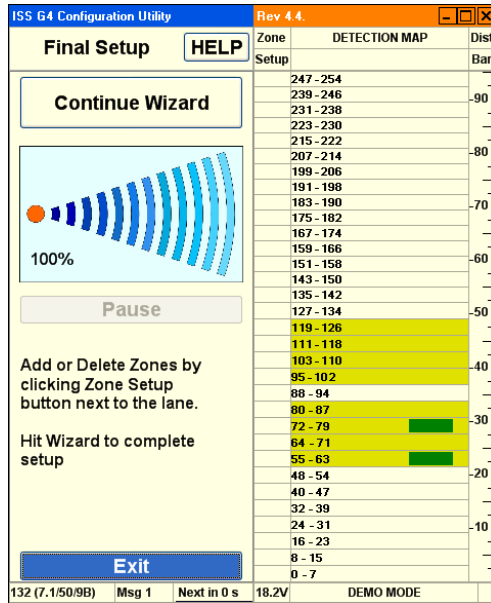
- WinRTMS finds the lanes.
- WinRTMS fine tunes the lane assignment/detection parameters.
- **You may receive warnings while detecting traffic in low-volume lanes.** The warning asks if you would like to continue detection for 1 additional minute. In some cases, such as when the detector overlaps an exit ramp, continuing the wizard provides little benefit.

To perform Automatic Setup:



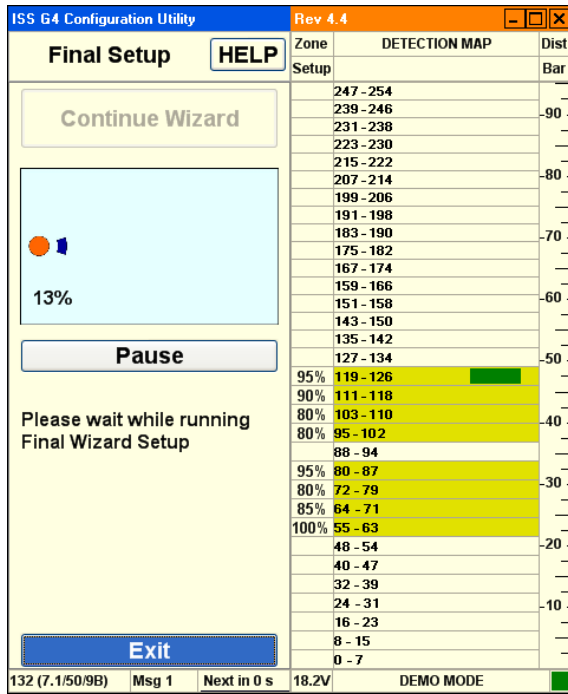
1. Click the button named **Wizard Setup**

- The resulting zone setup is presented for approval on the detection map when the Progress Bar reaches its 100% point. The wizard sets sensitivity and positions detection zones where vehicles are detected.



- Using the blips, confirm visually that the proposed location of lanes corresponds to the lanes you wish to include in the setup.
- Click the **Zone Setup** buttons to add or delete zones until desired number and position are left.
 - Zones can be added or deleted in Fine Tune later as well.
 - Click the **Continue Wizard** button again to complete the setup.

Final Setup:



The Wizard continues the automatic setup to a final Zone Setup unless stopped by clicking the **Pause** button. (You can click the Pause button to avoid contaminating the process if traffic slows down momentarily or there is a large gap in the traffic flow.)

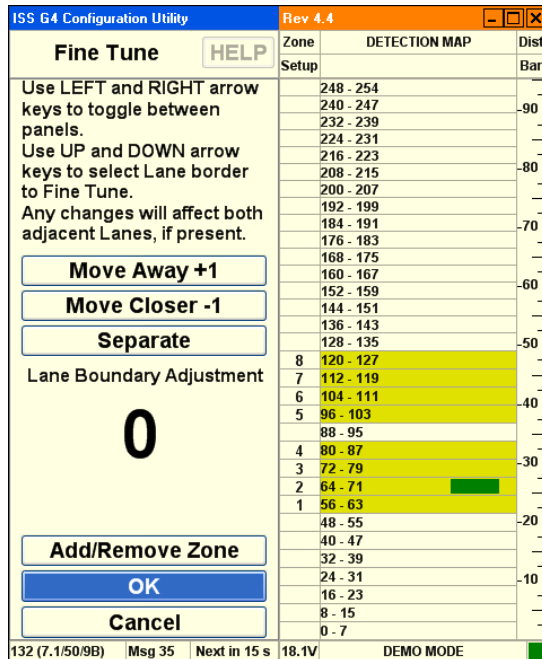
On completion, the final positions of the detection zones will be displayed.

Watch the vehicle icons on the right side of the screen and look for possible "Splashing" of vehicles in one lane into another adjacent lane also. (Trucks are responsible for most "splashing".)

How to Fix Splashing

Splashing occurs when a vehicle from one lane triggers a detection in another lane. Lane changes are one cause of splashing. Narrow lanes or incorrect boundaries are other common causes.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Zones** from the listed options.
4. Select **Fine Tune** from the listed options.

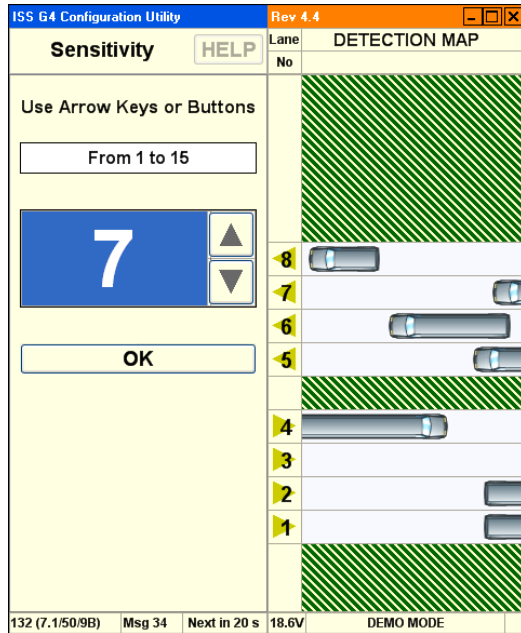


5. To fix splashing, select a Zone No. and boundary between zones by using left click or **SPACE**.
6. Use the **Move Away** and **Move Closer** buttons to change the boundary by a single micro slice at a time. Observe the effect on detection on the Fine Tune or Manual Setup Screen.
 - The boundary move affects the zones on either side, reducing one and enlarging the other.
 - A counter shows the amount of shift at any time. This counter resets when you select the next boundary.
 - By selecting **Add/Remove Zone** button you can change the number of zones and create wider zones spanning more than one lane.
 - The same two mechanisms allow you to perform the entire zone setup process manually, by adding zones and moving their boundaries manually.

How to Adjust Sensitivity

Sensitivity adjustments may be necessary to detect small vehicles, or to reduce splashing.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Sensitivity** from the listed options.

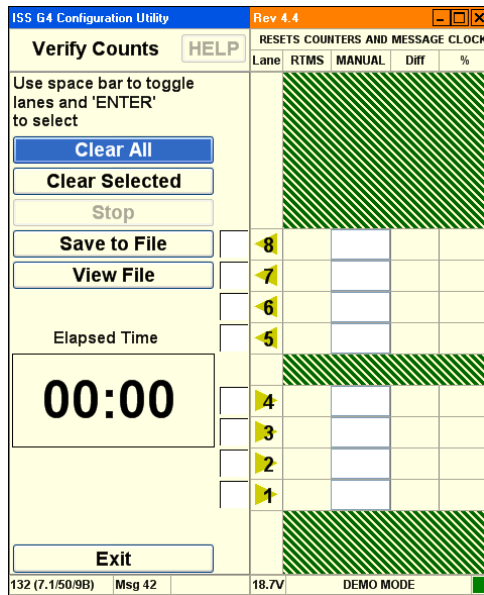


- Increase sensitivity (if needed) to detect small vehicles.
- Reduce sensitivity if the button turns red. (Sensitivity is too high.)
- Adjust sensor aim if small vehicles in close or far lanes are missed. Tilt the sensor towards the zones with poor detection.
- Do not increase sensitivity to compensate for improper aiming.

How to Verify Counts

The verification of a good zone setup is an essential part of the installation. In it we compare RTMS volume measurements over a period of time to a manual (visual) count for the same interval. Use of a hand-held tally counter is recommended.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Verify** from the listed options.

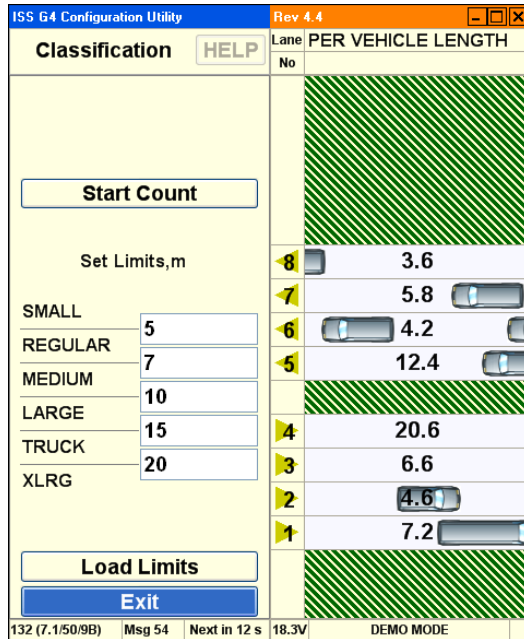


4. Select which lanes you wish to verify by checking their adjacent boxes. Unchecked lanes will remain unchanged.
5. Clear the checked RTMS data counters by clicking the **Clear Selected** button or by clicking **Clear All**.
6. In the selected lanes, count vehicles as they cross the RTMS beam starting immediately after hitting the **Start** button.
7. Several observers may be enlisted in the process, with each observer counting traffic in a different lane. The RTMS Count for each selected lane (zone) will be updated as vehicles pass.
8. Continue counting until each lane has a count of about 50 vehicles; this will usually take several minutes. An **Elapsed Time** counter shows you the interval.
9. Click the **STOP** button when there is a gap in the traffic and immediately stop your manual counting on all lanes.
10. Highlight a **Manual Count** box and enter the manual count for the zone in the corresponding box.
11. The difference between the RTMS and the manual counts in absolute and percent deviation terms is immediately displayed. Deviation of more than 5% requires zone setup correction to improve detection accuracy. The verification process should then be repeated.
12. To save the accumulated results of verification in a text file, click **Save to File**. Use normal Windows procedures to name and save the file using the Save As dialog. Similarly click **View File** to be shown verification results previously saved.

How to Modify Vehicle Classifications

The correct classification of vehicles by length requires good breakpoints.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Advanced** from the listed options.
4. Select **Classification** from the listed options.

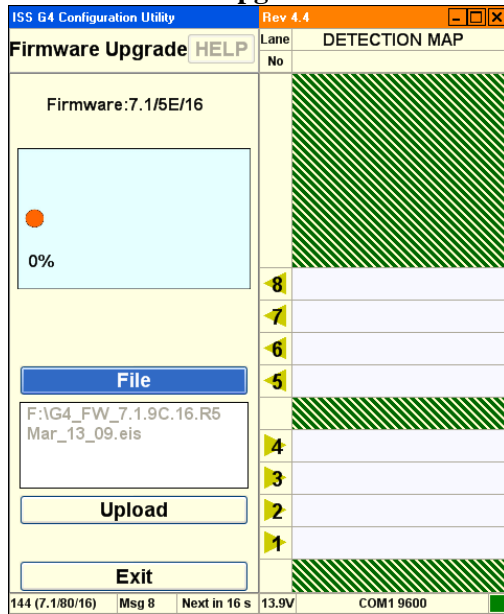


- The Classification screen allows the editing of the five length breakpoints above Small vehicle: Reg, Med, Large, Truck and XLong.
- For best results, ensure that differences between length breakpoints are greater than 10 ft (3 m) especially for larger vehicles. Small separation values increase potential for "merging" of classes (vehicle counting errors are the result).
- To check the correctness of the breakpoints, start the per vehicle class counter and compare the accumulated per vehicle classification counts to manual counts for a period of at least one minute at a time.
- To select the number of classes, go to Message Composition in Manual Setup.

How to Upgrade Firmware

Complete the following procedure to upgrade firmware.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **Advanced** from the listed options.
4. Select **Firmware Upgrade** from the listed options.

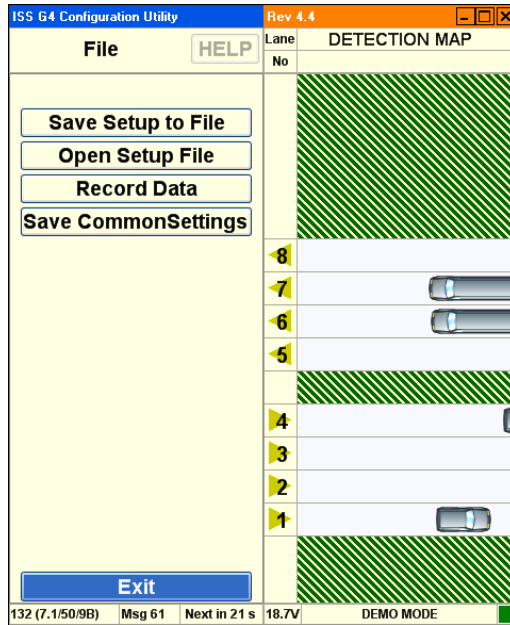


5. Ensure that current firmware version is displayed on screen.
6. Proceed to select the firmware file to upload into the RTMS. During upgrade, the progress bar advances and indicates Percentage Complete. **Do not attempt to upgrade without a solid communication channel.**
7. Wait for the message **Upgrade Succeeded**.

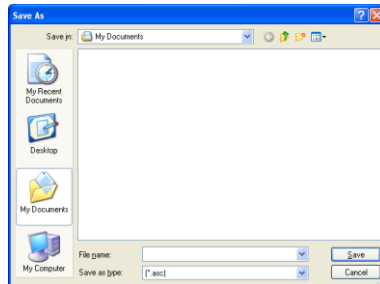
How to Record Data

WinRTMS can record RTMS statistical data to a file on the PC's hard disk.

1. Start the WinRTMS software.
2. Select **Manual Settings** from the listed options.
3. Select **File** from the listed options.



4. Select **Record Data** from the listed options.
5. The software prompts you to choose a filename and location on the hard disk. The data file will have extension .asc.



The software displays a dialog that allows you to stop recording.



6. Click **Stop** when you are finished.

X3 Compatible—Statistical Message

The X3 message format will always display all 8 zones even if a lower number are configured in the setup. The file also provides a voltage reading and a diagnostic indicator in every message.

Figure 3.3 A sample X3 STAT file with 6 length classes reporting.

```

RTMS STAT. MESSAGES  ZONE:  1  2  3  4  5  6  7  8
SPEED IN MPH.  occupancy 6 ft loop normalized.

10 04 2007 15:03:17
MESSAGE NO. 78      VOLUME:  2  3  9  4  0  0  0  0
                   MID SIZE 1:  0  0  2  0  0  0  0  0
                   MID SIZE 2:  1  0  0  0  0  0  0  0
                   LONG VEH:   0  0  0  0  0  0  0  0
                   LONG VEH 2: 0  0  0  0  0  0  0  0
                   XLONG VEH:  0  0  0  0  0  0  0  0
STATION ID. 1      OCCUPANCY:  2  1  5  2  0  0  0  0
FWDLK SPEED ?     SIDEFRD SPD:  57 57 62 66 ?  ?  ?  ?
                                                           Dir. 0 V. 250 H. 48

10 04 2007 15:03:47
MESSAGE NO. 79      VOLUME:  0  3  11 12 0  0  0  0
                   MID SIZE 1:  0  0  0  1  0  0  0  0
                   MID SIZE 2:  0  0  0  0  0  0  0  0
                   LONG VEH:   0  0  0  0  0  0  0  0
                   LONG VEH 2: 0  0  0  0  0  0  0  0
                   XLONG VEH:  0  0  0  0  0  0  0  0
STATION ID. 1      OCCUPANCY:  0  1  5  6  0  0  0  0
FWDLK SPEED ?     SIDEFRD SPD:  ?  58 62 73 ?  ?  ?  ?
                                                           Dir. 0 V. 249 H. 48

```

G4 Statistical Message

Figure 3.4 Sample G4 STAT file with all 12 lanes and 6 length classes reporting.

```

| RTMS STAT. MESSAGES  ZONE:  1  2  3  4  5  6  7  8  9  10 11 12
SPEED IN Km/h.

10 07 2008 14:59:04
MESSAGE NO. 250     VOLUME:  8  8  11  7  20  10  12  14  9  11  13  11
                   REG:      2  0  0  0  1  1  1  1  1  1  3  1
                   MED:      0  0  1  0  1  2  0  0  0  1  1  1
                   LARGE:    0  1  0  0  0  0  1  0  0  0  2  2
                   TRUCK:    0  0  0  0  0  1  0  2  0  1  0  0
                   XLONG:    0  0  2  0  0  0  0  0  0  0  2  0
STATION ID. 2      OCCUPANCY:  5.6 5.1 12.4 4.4 17.5 11.5 9.3 13.0 6.3 8.7 16.6 10.0
FWDLK SPEED 0     SIDEFRD SPD:  85 105 98 93 79 92 89 102 77 106 102 100
                                                           Dir. 0 V. 233 H. 0

10 07 2008 14:59:34
MESSAGE NO. 251     VOLUME:  10 11 18 15  8  12  14  18  8  15  14  13
                   REG:      1  0  0  1  0  2  1  3  0  2  2  1
                   MED:      0  1  0  1  0  1  1  1  1  2  3  2
                   LARGE:    0  0  0  1  0  1  2  1  0  2  0  0
                   TRUCK:    0  0  0  1  0  0  2  0  0  1  0  0
                   XLONG:    1  0  0  0  0  1  0  0  0  0  1  0
STATION ID. 2      OCCUPANCY:  8.4 6.6 9.4 14.8 5.4 14.2 16.3 14.8 6.8 14.8 13.9 8.1
FWDLK SPEED 0     SIDEFRD SPD:  91 104 105 89 81 89 97 101 77 105 97 102
                                                           Dir. 0 V. 233 H. 0

```

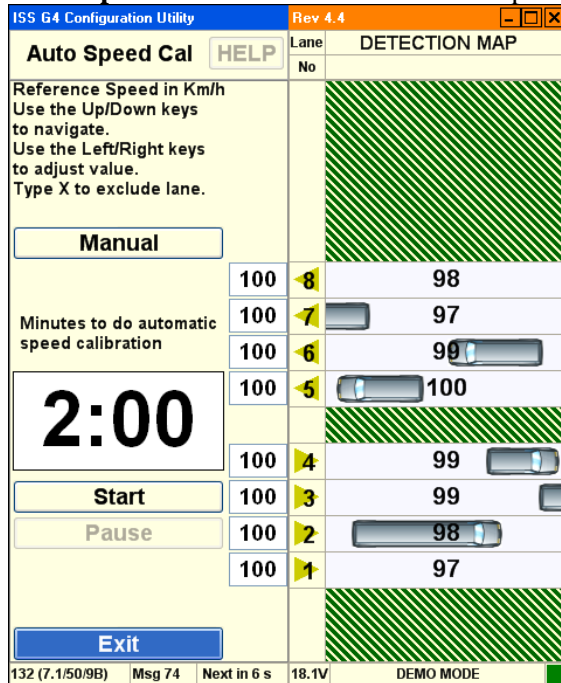
Please note:

- G4 Statistics Message will have a variable length based on how many lanes are configured.
- The designation of vehicle classes will also be the same as shown in the WinRTMS utility.
- If **Per Vehicle** is **ON**, their data will be ahead of each message period's statistics.

How to Perform Automatic Speed Calibration

Automatic Speed Calibration is intended for use with higher volume traffic, flowing at stable speeds.

1. Start the WinRTMS software.
2. Select **Speed Calibration** from the listed options.



3. Use the Up/Down arrow keys to highlight the per-lane Reference Speeds. The Left/Right arrow keys will decrease or increase the reference in 2 MPH / km/h increments, which may be estimated or measured (For example: using a radar gun).
4. Click the **Time Indicator** and increase or decrease the calibration time with the Right and Left arrow keys. A minimum of 2 minutes is required, although 3 to 5 minutes is better, depending on traffic volume. The internal speed coefficients will not update if traffic is too light.
5. Click the **Start** button and wait as the lane speeds change from their current level towards the Reference Speeds.
6. You can click the **Pause** button to avoid contaminating the process if traffic slows down momentarily or there is a large gap in the traffic flow. You can then **Resume**. This is particularly handy when calibrating mid-block applications. You can also change the Reference Speed during calibration, if more than 2 minutes are remaining. If after sufficient time the difference to the reference speed is still more than 10%, manual adjustment may be necessary.
7. Click on **Manual** if necessary.
8. Click **Exit** when you are finished.

How to Perform Manual Calibration

Manual Speed Calibration is intended for very low-volume traffic (For example: traffic volume of less than 5 vehicles per minute).



Note

To adjust the speeds after Automatic Speed Calibration, DO NOT load defaults.

- ONLY Increase or decrease zone speeds as necessary
- It is always best to use Auto Speed Calibration first.

If Not:

- You can Load Default parameters and then observe the actual reported average speed per lane.
- Compare the displayed speed measurement to your estimated average speed in each lane.

1. Start the WinRTMS software.
2. Select **Speed Calibration** from the listed options.

Lane No	Speed	Adjustment
8	102	-8
7	99	-7
6	99	-6
5	96	-5
4	98	-4
3	99	-3
2	97	-2
1	98	-1

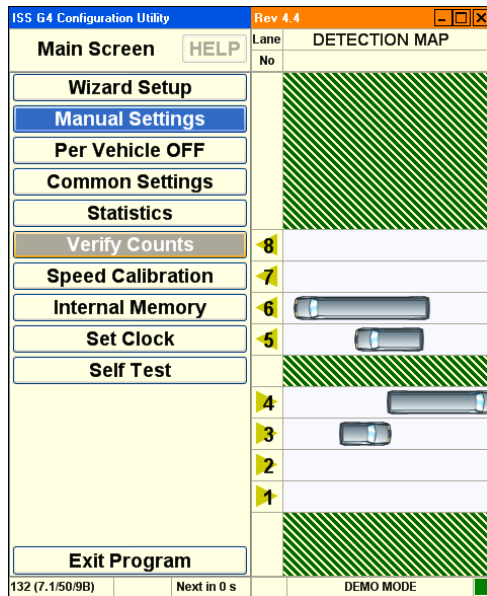
3. Use Up/Down, Left/Right arrow keys to select a zone and adjust up or down in 2 MPH or km/h increments; as an example, if speed readings are 10 MPH too low, increase that lane's speed by 10. The new coefficients take effect immediately.

How to Create Common Settings

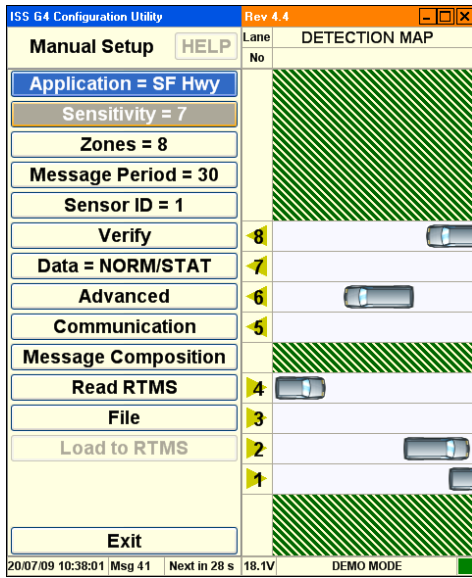
Setup Parameters are often common to all sensors. For example, the sensors in a mid-block deployment or string of detection stations along the same highway. To save the installer time and effort in repeatedly entering the same parameters in each site, a group of settings is defined as common settings. Common settings allow you to specify the basic parameters for an entire group of sensors.

To create common settings:

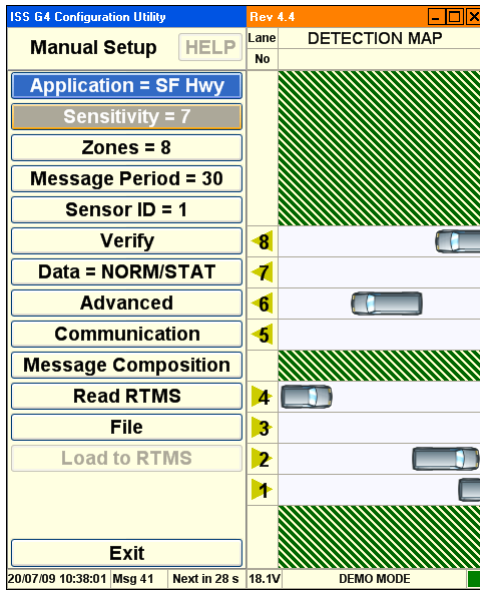
1. Start the WinRTMS software.
2. After the parameters on the current RTMS are set to their desired values, select **Manual Settings**:



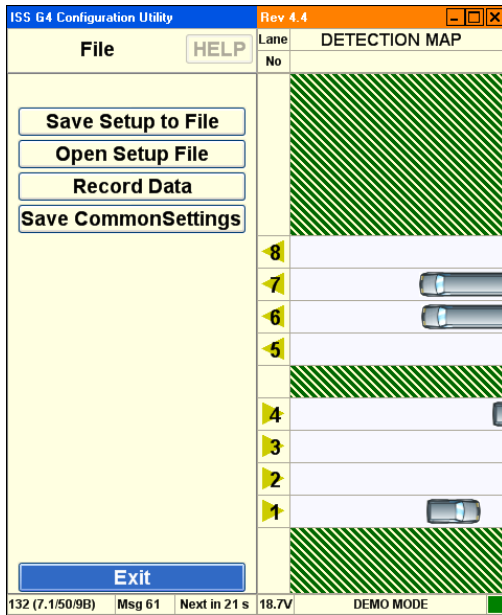
The Manual Setup dialog appears:



- From the Manual Setup dialog, select **File**:



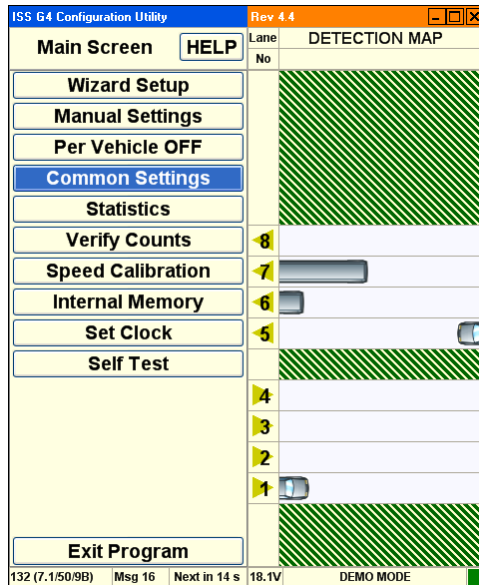
4. From the File dialog that appears, select **Save Common Settings**:



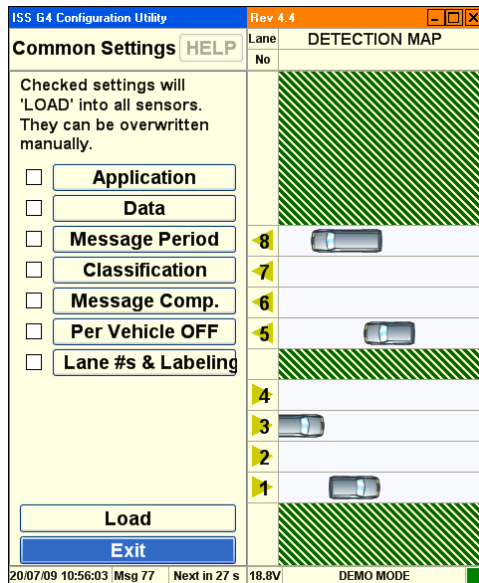
This saves the current settings. They will then be available to be loaded into other RTMS units in whole or in part depending on requirements. WinRTMS maintains a single set of common settings. The settings can be overwritten at any time.

How to Apply Common Settings

1. Start the WinRTMS software.
2. Select **Common Settings** from the listed options:



3. The common settings dialog appears:



4. Check the boxes on the sides of the displayed parameters to define which parameters are defined as common settings.
5. Click **Load** to send the common parameters to the RTMS sensor.
6. Click **Exit** to return to the main screen.

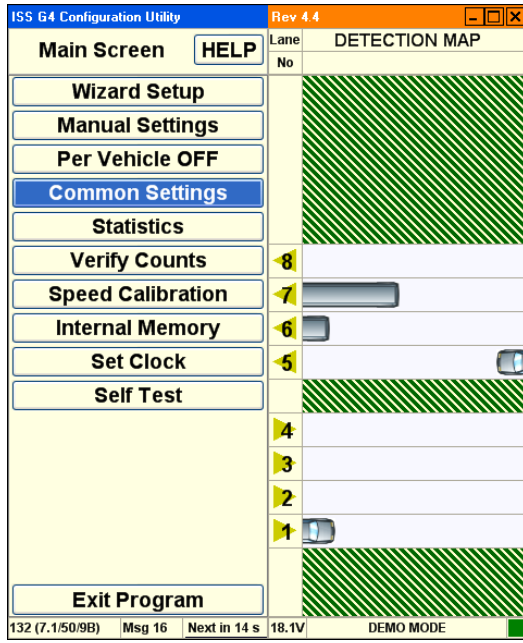
How to Save a Setup File to the Hard Disk

1. Start the WinRTMS software.
2. Select **Manual Settings**.
3. Select **File**.
4. Select **Save Setup To File** and follow standard Windows procedures to save the setup parameters.

RTMS Workspace

The RTMS workspace is vertically divided into two separate panels. The title bar runs horizontally across the top of the workspace. The status bar runs horizontally across the bottom of the workspace.

Figure 3.5. RTMS Workspace



- **WinRTMS Setup Utility.** This contains a variety of controls used to configure the WinRTMS detector functions.
- **WinRTMS Detection Map.** This contains controls that display the active traffic visualization.

RTMS Title Bar

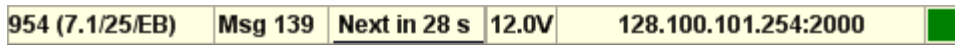
The WinRTMS title bar provides basic application size and position controls.



- **Reposition.** Left click and drag the title bar to reposition the entire workspace.
- **Minimize.** Left click the minimize button to minimize the workspace.
- **Maximize.** Left click the maximize button to maximize the workspace.
- **Exit.** Left click the exit button to close the software. You will be prompted to save the file if the file is unsaved or to save changes if the file has been modified.

RTMS Status Bar

The WinRTMS status bar provides information about the current mode and traffic detection parameters.



Options are:

- The Serial Number and firmware version of the RTMS.
- The number of the currently received statistical message.
- The countdown timer (in seconds) to the next statistical message.
- The current input voltage reading.
- The active Communications port and its speed or the current IP address.
- The Communications indicator flashes every time there is communication.

About RTMS Main Screen

The RTMS main screen is displayed following a successful connection and is the starting point for accessing other functions.

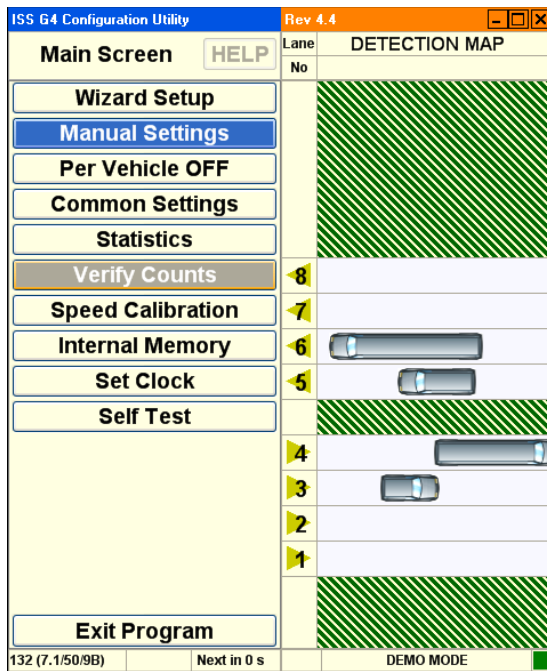
**Note**

If WinRTMS determines that the RTMS is of earlier firmware revision than 7.1, it will automatically launch WinRTMS version 3.6 if installed on the computer. Please refer to RTMS User Manual Issue 4.0 for this setup and operation.

Once communication with the RTMS is established, the Main Screen appears. The RTMS is now ready to be calibrated.

- The left panel consists of a list of function buttons.
- The right panel displays the detection map with the current detection zones and real time detections indicated by moving vehicle icons.
- Options you can click are displayed inside buttons.
- Plain text, such as **Main Screen** and **Detection Map** are used to indicate the current screen.
- You cannot click these text descriptions.
- Always click buttons to change the screen or modify settings.
- **The Factory setting may not show zones and/or vehicles.**

RTMS Main Screen

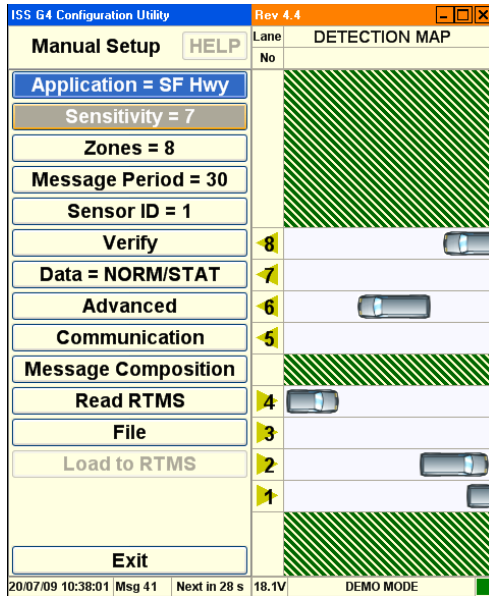


Options are:

- **Help.** Opens a second screen with link to online manual pages.
- **Wizard Setup.** Starts the wizard setup process.
- **Manual Settings.** Displays the manual setup screen.
- **Per Vehicle OFF.** Turning On per vehicle adds the Time stamp, Lane Number, Classification, Speed and Dwell Time of every vehicle in real time. This added information can create a huge file in a short time if saving Statistical information to memory. It will also stream per vehicle information when Data Mode is set to Stat, and you expect to receive data only every Message Period.
- **Common Settings.** Displays the common settings screen.
- **Statistics.** Displays the statistic screen.
- **Verify Counts.** Displays the verify counts screen.
- **Speed Calibration.** Displays the speed calibration screen.
- **Internal Memory.** Displays the internal memory screen.
- **Set Clock.** Synchronizes the RTMS clock with your computer clock.
- **Self Test.** Displays the self test screen.
- **Exit.** Closes the software. You will be prompted to save the file if the file is unsaved or to save changes if the file has been modified.

RTMS Manual Setup

The WinRTMS manual setup screen displays options that allow you to manually configure the G4 or RTMS software.



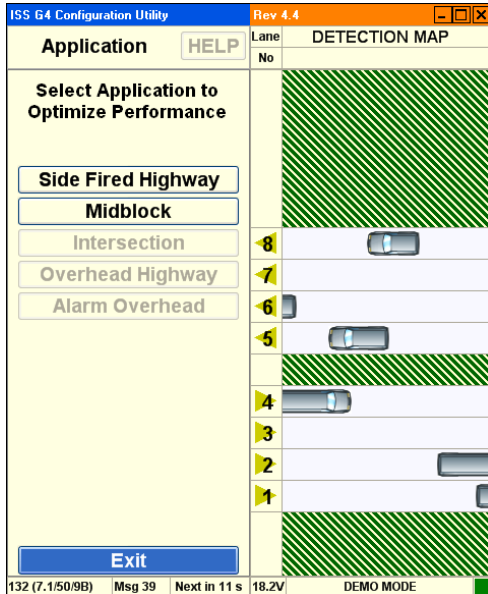
Options are:

- **Application.** This option displays a list of different sensing modes such as a side-fired, intersection, and forward looking. Select the mode that best matches your hardware configuration and detection requirements.
- **Sensitivity.** This option displays sensitivity adjustment parameters used to calibrate the sensitivity for a variety of vehicle sizes and sensing applications.
- **Zones.** This option allows you to alter lane numbers, labeling, and to manually adjust zone position and width.
- **Message Period.** This option allows you to configure the message period for which statistical reports are generated.
- **Sensor ID.** This option allows you to set the **Sensor ID** parameter.
- **Verify.** This option allows you to manually verify traffic count results and determine the percentage error.
- **Data.** This option allows you to control the basic data mode for a single RTMS device.
- **Advanced.** This option accesses advanced features such as traffic classification options and firmware upgrade management.
- **Communication.** This option allows you to specify communication parameters such as **Port** and **Baud Rate**.
- **Message Composition.** This option allows you to configure the content and format of each statistical message.
- **Read RTMS.** This option transfers the current setup parameters from the RTMS sensor to the software.
- **File.** This option allows you to save and load configuration files.

- **Load To RTMS.** Clicking this button loads the current configuration (running on the WinRTMS software) to the RTMS.
- **Exit.** Returns to the main screen.

RTMS Application Options

This screen displays a list of different sensing modes such a side-fired, intersection, and forward looking. Select the mode that best matches your hardware configuration and detection requirements.

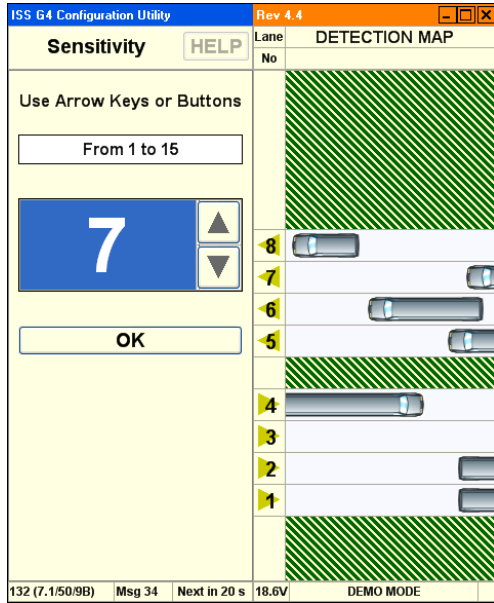


Options are:

- **Side Fired Highway.** The RTMS detects presence and generates traffic data in up to 12 zones. (Use this option for highway and counting applications where traffic is generally moving.)
- **Mid-Block.** Similar to Side Fired Highway mode. Use this option for urban areas where traffic is generally moving but gets congested.
- **Intersection.** The RTMS detects presence only in multiple zones. (No traffic data is generated) Use this option for Stop-bar detection where traffic is generally stopped.
- **Forward Looking Highway.** The RTMS provides very high presence and per vehicle Doppler speed accuracy. Volume data in up to 7 speed bins is available. Use this option for per vehicle speed, speed Enforcement, or red light enforcement.
- **Alarm Forward Looking.** Similar to **Forward Looking Highway** with programmable Speed Threshold and real time contact closure when a vehicle exceeds threshold. Use this option for speed enforcement and warning applications.
- **Exit.** Returns to the main screen.

RTMS Sensitivity Options

This option displays sensitivity adjustment parameters used to calibrate the sensitivity for a variety of vehicle sizes and sensing applications.

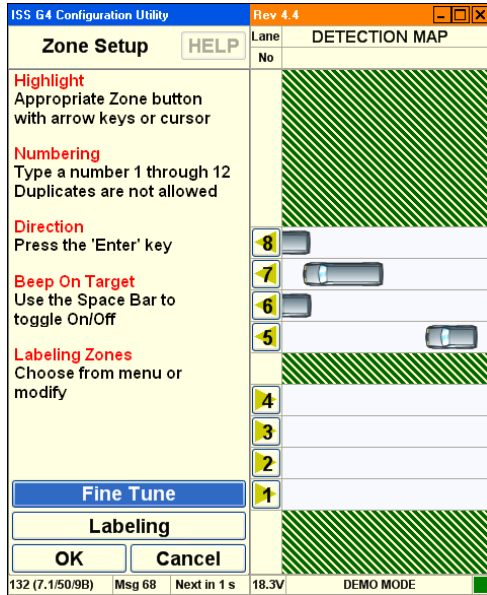


Options are:

- **Arrows.** Click **UP** and **DOWN** arrows on screen or use arrow keys to set **Sensitivity**. Initial starting level set to **7**, and adjust up or down as necessary.
- **OK.** Activates the new value and returns to the main screen.

RTMS Zone Options

This screen allows you to alter lane number and other related parameters such as beeping and traffic direction. See How to Fix Splashing.

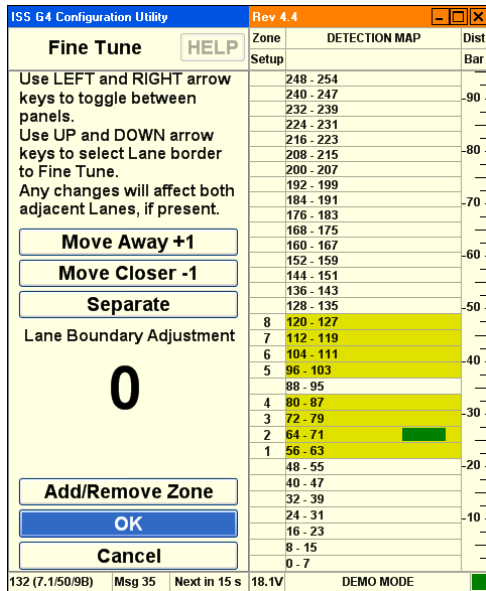


Options are:

- **Lane Numbers.** A list of lane numbers is displayed.
 - Once a Lane Number is selected (highlighted), you can:
 - Re-number the lanes.
 - Change vehicle icon direction
 - Turn on a Beep upon detection in that lane (Zone).
 - The beep is an additional aid in verifying that vehicles you see on the road are detected properly by the RTMS and reported in the correct Zones.
- **Fine Tune.** If you observe "Splashing" where a single vehicle also shows detection in an adjacent zone or if vehicles are shown in the wrong lane, this may indicate that the zone boundary positions do not line up with the lanes. Make sure that the splashing was not caused by a vehicle changing lanes before using the **Fine Tune** option.
- **Labeling.** Rename lanes with this option.
- **OK.** Saves changes and returns to the main screen.
- **Cancel.** Returns to the main screen without saving changes.

RTMS Fine Tune Options

This screen allows you to fine tune zone boundary parameters.

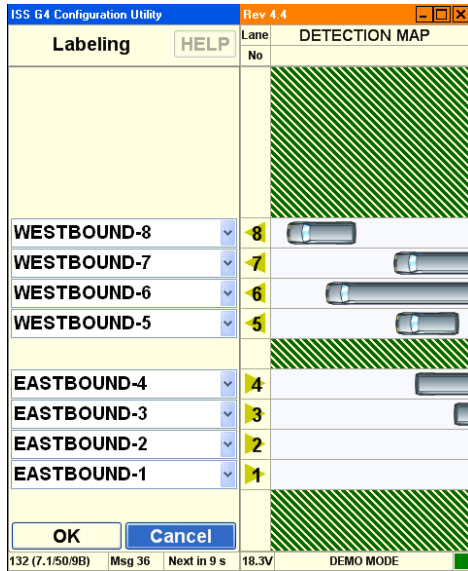


Options are:

- **Move Away +1.** Shifts lane boundaries further away.
- **Move Closer -1.** Shifts lane boundaries closer.
- **Separate.** Inserts a space between lanes (for medians, curbs).
- **Layer Boundary Adjustment.** Displays the amount of adjustment made for the current iteration. For example: 4.
- **Add/Remove Zone.** Adds a new lane or removes an existing lane.
- **OK.** Saves changes and returns to the main screen.
- **Cancel.** Returns to the main screen without saving changes.

RTMS Labeling Options

This screen allows you to customize zone names. (The labeling is stored within the RTMS sensor and is not transmitted in the statistical message.)

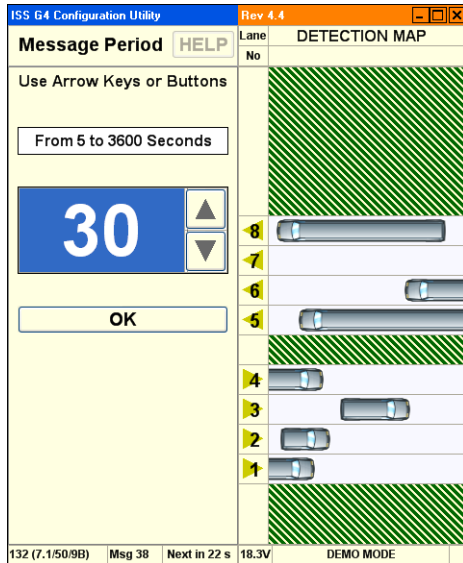


Options are:

- **Lane Name.** Type a new name for the indicated lane.
- **OK.** Saves changes and returns to the main screen.
- **Cancel.** Returns to the main screen without saving changes.

RTMS Message Period Options

This screen allows you to configure the message period for which statistical reports are generated. A 30 second message period is generally used for Real-Time traffic data and 300 to 900 sec (5 to 15 min) for counting applications.



Options are:

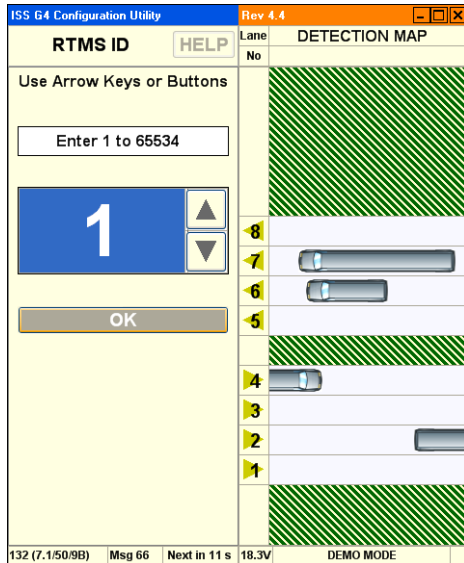
- **Arrows.** Click **UP** and **DOWN** arrows on screen or use arrow keys to set **Message Period** to the desired interval.
- **OK.** Activates the new value and returns to the main screen.

RTMS Sensor ID Options

This screen allows you to set the **Sensor ID** parameter. (Please consult ISS Canada for assistance designing large serial networks.)

- **X3 Stat Mode.** The Sensor ID range is between 1-254.
- **G4 Mode.** The Sensor ID range is between 1 and 65534.

The Sensor ID must be set only if Polled data mode is used. Units should be assigned unique ID numbers to avoid data corruption.

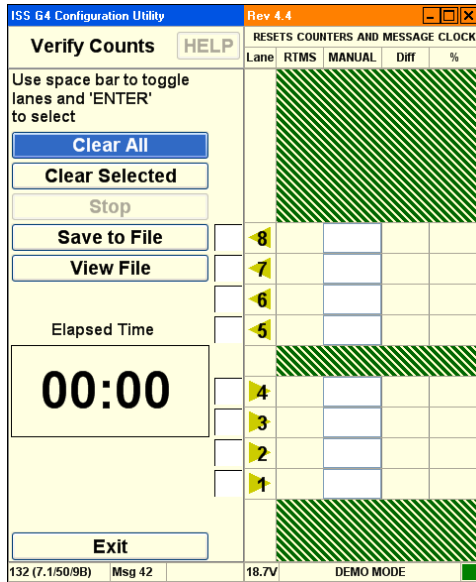


Options are:

- **Text Entry.** Use the keyboard to enter an integer to set the **Sensor ID** to the desired value.
- **Arrows.** Click **UP** and **DOWN** arrows on screen or use arrow keys to set **Sensor ID** to the desired value.
- **OK.** Activates the new value and returns to the main screen.

RTMS Verify Counts

The verification of a good zone placement is an essential part of the setup. In it we compare RTMS volume measurements over a period of time to a manual (visual) count for the same interval. Use of a hand-held tally counter is recommended. See How To Verify Counts.

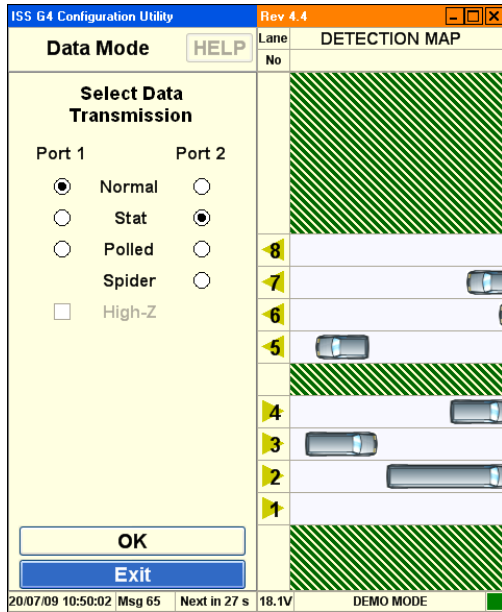


Options are:

- **Clear All.** This option clears the current values from all the traffic lanes.
- **Clear Selected.** This option clears the current values from the selected traffic lanes.
- **Stop.** This option terminates the counting process.
- **Save To File.** This option allows you to save a count file to the hard disk.
- **View File.** This option allows you to load a count file from the hard disk for review.
- **Elapsed Time.** This option displays the amount of time since count verification started.
- **Exit.** Returns to the main screen.

RTMS Data Options

The Data Mode determines whether data is Pushed or Pulled from the RTMS unit.

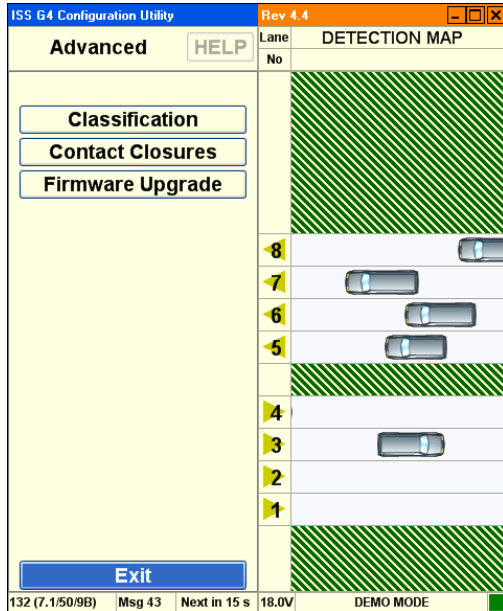


Options are:

- **Normal.** Normal mode sends statistic messages at the end of every Message Period and all per vehicle information to display vehicle icons, speeds etc.
- **Stat.** Stat mode allows only the statistical messages to be sent at the end of every Message Period.
- **Polled.** Polled mode only allows the RTMS to upload the statistical data that is currently stored in its buffer when a specific Sensor ID request is received from an outside source.
- **Spider.** Spider mode configures the RTMS to send data, via the SPIDER protocol, through port 2. This option only works with SPIDER systems.
- **High-Z.** This option leaves the transmit pin in high-impedance mode. This is only available in **Polled** mode.

RTMS Advanced Options

This screen accesses advanced features such as traffic classification options and firmware upgrade management.

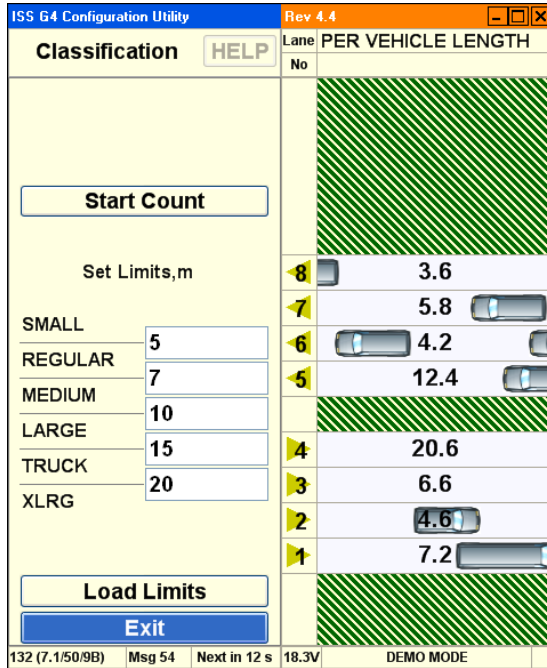


Options are:

- **Classification.** This option allows you to modify traffic classification options.
- **Contact Closures.** This option allows you to implement real time presence indication in each detection zone on units with the Contact Closure option installed.
- **Firmware Upgrade.** This option allows you to upgrade to the latest version of ISS Canada firmware.

RTMS Advanced Classification Options

This screen allows you to specify traffic classification options for vehicles being counted. You may specify the length of each vehicle type detected in the monitoring period.

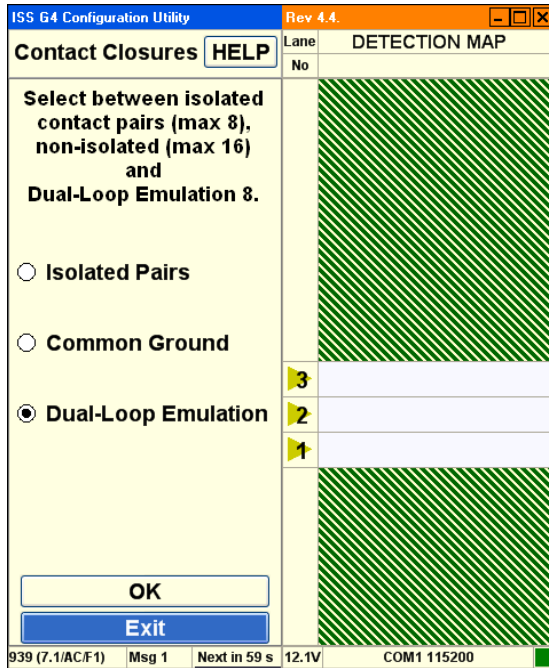


Options are:

- **Start Count.** This option starts the count, displaying the number of vehicles of each type that are detected.
- **Set Limits.** These options allow you to set the maximum length for a category of vehicles.
 - Depending on the number of classifications selected in Message Composition, either 2, 4 or 6 classes will display.
 - The number between the two classes (example between Small and Regular) reflects the break point between the 2 classes.
- **Load Limits.** This option sends the current size parameters to the RTMS sensor.
- **Exit.** Returns to the main screen.

RTMS Contact Closures

This screen allows you to select or configure the type of contact closure to be used.



Options are:

- **Isolated Pairs.** This option allows you to isolate contacts from each other. This option provides 8 zones of detection, and uses two wires per zone. The zones operate completely independent of each other.
- **Common Ground.** This option allows contacts to share a common ground. This option provides 12 zones of detection using a common ground.
- **Dual-Loop Emulation.** Double click the "text" to configure dual loop detection parameters. This option provides 8 zones of detection. This option also provides 8 secondary outputs that can be used to simulate the closure information that is collected from a dual loop station. Changing the time delay between the first and second loop outputs is used to adjust the speed information that the controller produces.

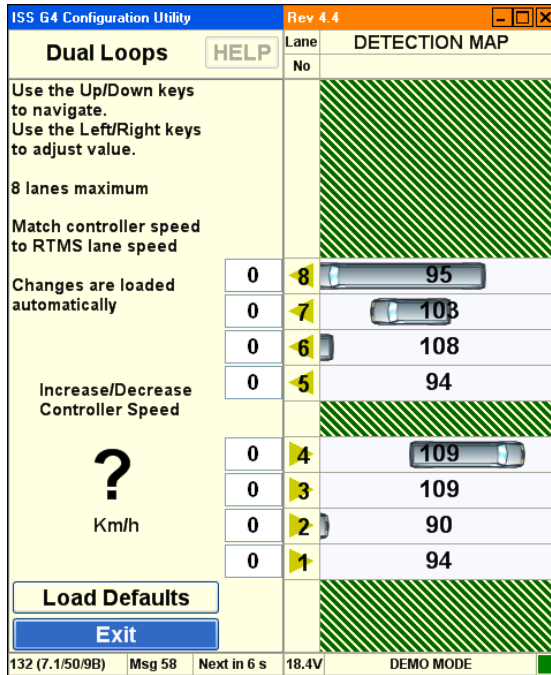


Note

Contact closure numbering can be different from the zone numbering. The closest zone will always associate with contact closure number 1 irrespective of its zone number. Contact closure numbering will increase sequentially as they get further away from the RTMS.

RTMS Dual Loop Options

This screen allows you to adjust the controller speed output to match the RTMS speed.

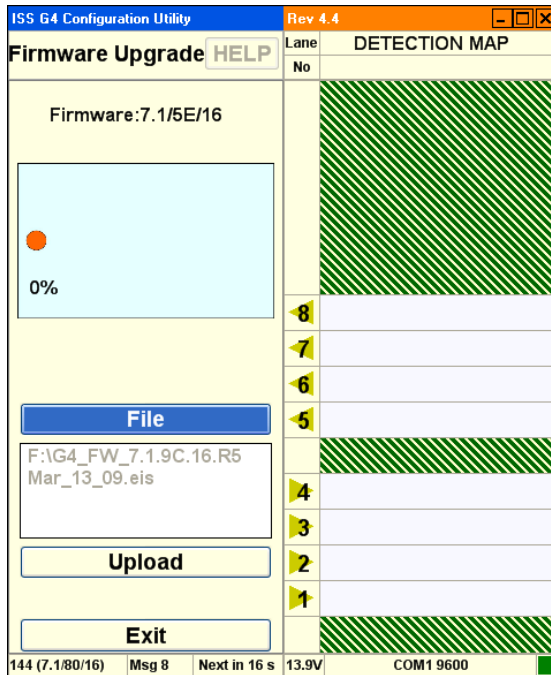


Options are:

- **Increase/Decrease Controller Speed.** This option allows you to synchronize average vehicle speed at the controller with average vehicle speed at the RTMS sensor.
- **Load Defaults.** Loads factory default settings for speed coefficients.
- **Exit.** Returns to the contact closures screen.

RTMS Firmware Upgrade Options

This screen allows you to upgrade firmware.



Options are:

- **Progress / Message Indicator.** Displays current progress and status messages.
- **File.** This option allows you to specify a new firmware file.
- **Upload.** This uploads the firmware file to the sensor.
- **Exit.** Returns to the previous screen.

RTMS Communication Options

This screen allows you to configure communication protocols and specific parameters.

PC Serial Communication Options

Options are:

- **Mode.** This drop-down allows you to select the communication mode. Options are:
 - PC Serial. This option selects PC Serial communication.
 - TCP/IP. This option selects TCP/IP communication.
- **Baud Rate.** This drop-down allows you to select the data rate in bits per second. Available baud rates differ by connection mode.
- **RTS/CTS.** This enables handshake functionality between two modems.
- **Timeout, ms.** This option allows you to specify the timeout period. If communication is not established during this timeout period, the software returns to this screen and allows you to try again.
- **Port 1.** Allows you to specify communication parameters for Port 1.
 - Baud Rate. This drop-down allows you to select the data rate in bits per second.
 - RS232. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
 - RS485. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
 - RTS/CTS Handshake. This uses handshake functionality between the PC and RTMS.
- **Send.** Sends the communication parameters to the RTMS sensor.

RTMS Communication Options...

This screen allows you to configure communication protocols and specific parameters.

PC TCP/IP Communication Options

Options are:

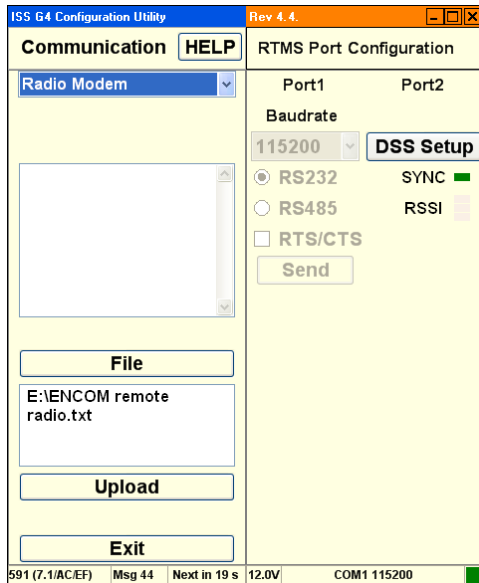
- **Mode.** This drop-down allows to you to select the communication mode. Options are:
 - PC Serial. This option selects PC Serial communication.
 - TCP/IP. This option selects TCP/IP communication.
- **Existing Addresses.** Provides a list of previous IP addresses.
- **Remote Server.** Allows you to specify the name of the remote server by IP address or name.
- **Remote Port.** Allows you to specify the address of the remote port.
- **Local Port.** Allows you to specify the address of the local port.
- **Timeout, ms.** This option allows you to specify the timeout period. If communication is not established during this timeout period, the software returns to this screen and allows you to try again.
- **Port 1.** Allows you to specify communication parameters for Port 1.
 - Baud Rate. This drop-down allows to you to select the baud rate in bits per second.
 - RS232. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
 - RS485. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
 - RTS/CTS. This enables handshake functionality between two modems.
- **Send.** Sends the communication parameters to the RTMS sensor.

- **TCP/IP.** Indicates that TCP/IP communication is selected.

RTMS Communication Options...

This screen allows you to configure communication protocols and specific parameters.

Radio Modem Communication Options



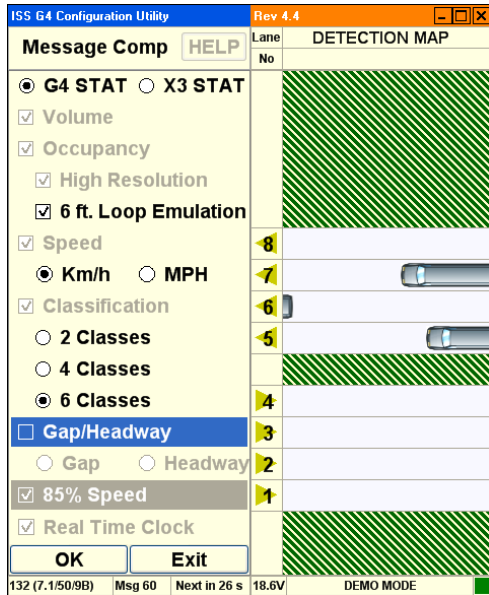
Options are:

- **Mode.** This drop-down allows you to select the communication mode. Options are:
 - PC Serial. This option selects PC Serial communication.
 - TCP/IP. This option selects TCP/IP communication.
- **Window.** Displays status messages during configuration. (For example: you might see configuration instructions listed here as the instructions are sent to the mode. Success and failure messages are displayed here.)
- **File.** This option specifies an ASCII file containing modem instructions.
- **Window.** Displays the filename currently used to configure the modem.
- **Upload.** Sends the ASCII file instructions to the modem.
- **Exit.** Returns to the previous screen.
- **Port 1.** Allows you to specify communication parameters for Port 1.
 - Baud Rate. This drop-down allows to you to select the baud rate in Bits Per Second.
 - RS232. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
 - RS485. Allows you to specify the type of cable connection between the computer and the RTMS sensor.
 - RTS/CTS. This enables handshake functionality between two modems.
- **Port 2.** Allows you to specify communication parameters for Port 2.
 - DSS Setup. Allows you configure DSS radio communications.
 - Sync. A green light appears when WinRTMS is connected to the sensor via a radio link.

- RSSI. 1-3 bars indicate radio signal strength.
- **Send**. Sends the communication parameters to the RTMS sensor.

RTMS Message Composition Options

The Message Composition governs the content and format of each statistical message.

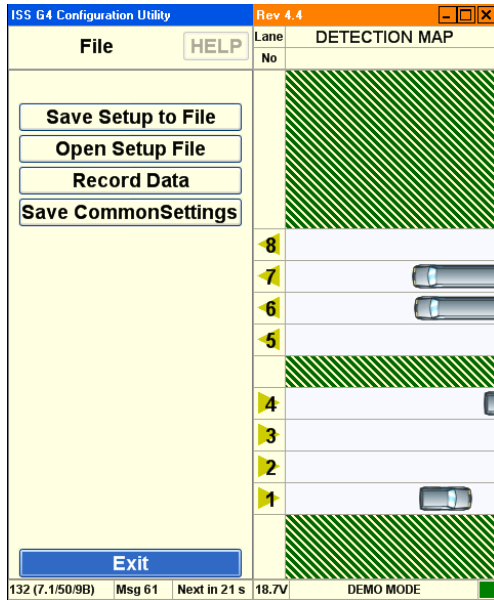


Options are:

- **G4 STAT.** Transmit the data using the G4 protocol.
- **X3 STAT.** Transmit the data using the X3 protocol.
- **Volume.** The total number of vehicles in each message period.
- **Occupancy.** The percentage of time a lane is occupied by a vehicle during the message period.
 - High Resolution. Uses decimal place in the output results.
 - 6 ft. Loop. Adds the loop length to the vehicle length for occupancy calculation.
- **Speed.** Average vehicle speed during the message period. (X3 Stat mode only transmits data in kilometers per hour.)
 - Km/h. Transmits speed data in kilometers per hour.
 - MPH. Transmits speed data in miles per hour.
- **Classification.** The class lengths are set in **Classification Options**.
 - 2 Classes. Determines how many classes to display in the **Classification Options**.
 - 4 Classes. Determines how many classes to display in the **Classification Options**.
 - 6 Classes. Determines how many classes to display in the **Classification Options**.
- **Gap Time Interval.** Gap Time Interval is the average time between vehicles during a Message Period.
- **Real Time Clock.** Specifies that the software uses the RTMS internal clock for the real-time clock when this option is selected.
- **Exit.** Returns to the main screen.

RTMS File Options

The Message Composition allows you to open configuration files, configure, save, and batch apply your RTMS setup data, including statistical data to more than one sensor.

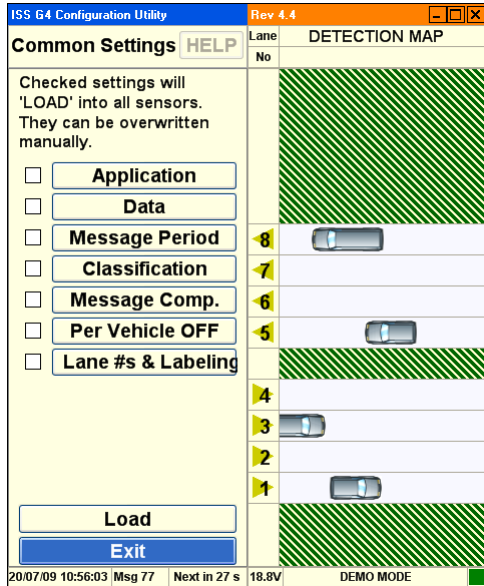


Options are:

- **Save Setup To File.** This option saves the current configuration to a file on the hard disk.
- **Open Setup File.** This option loads a configuration file from the hard disk.
- **Record Data.** This option records RTMS statistical data to a file on the PC's hard disk. See How to Record Data.
- **Save Common Settings.** Save all the common configuration settings from your current RTMS setup to the WinRTMS utility. These settings are applied to other RTMS sensors in a single batch.
- **Exit.** Returns to the previous screen.

RTMS Common Settings

The WinRTMS common settings screen displays options that allow you to specify the basic parameters for an entire group of sensors. See also, [How to Configure Common Settings](#).

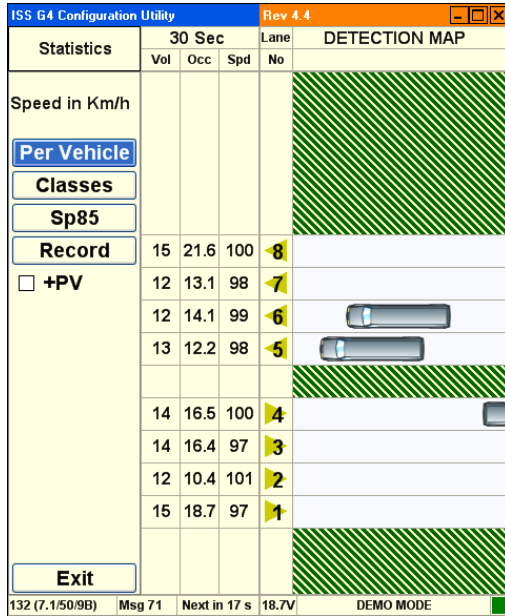


Options are:

- **Application.** Select this option to use common **Application** settings for a group of RTMS sensors.
- **Data.** Select this option to use common **Data** settings for a group of RTMS sensors.
- **Message Period.** Select this option to use common **Message Period** settings for a group of RTMS sensors.
- **Classification.** Select this option to use common **Classification** settings for a group of RTMS sensors.
- **Message Comp.** Select this option to use common **Message Composition** settings for a group of RTMS sensors.
- **Per Vehicle Off.** Select this option to use common **Per Vehicle** settings for a group of RTMS sensors.
- **Lanes Labeling.** Select this option to use common **Lane Numbering** and **Labeling** settings for a group of RTMS sensors.

RTMS Statistics

The WinRTMS statistics screen displays traffic count information. Statistics are displayed for Volume, Occupancy and Average Speed per lane, over the message period as shown.

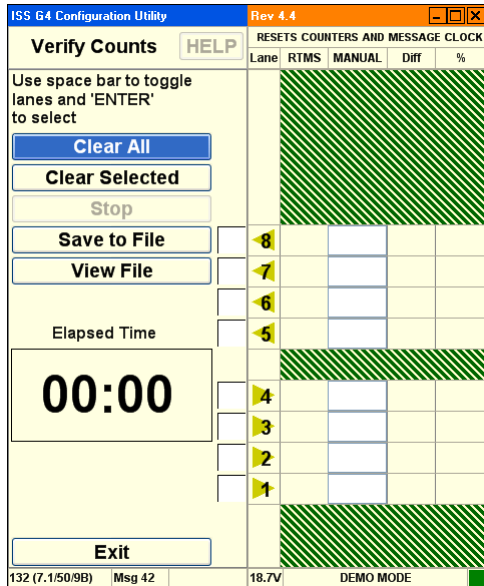


Options are:

- **Per Vehicle.** Provides individual vehicle information for each vehicle as the vehicles are detected.
- **Classes.** Displays the number of vehicles from each class that are detected during the message period.
- **Sp85.** Displays the 85th percentile speed for the most recent message period.
- **Record.** Records a stream of human-readable ASCII from the RTMS sensor. This data is typically used for troubleshooting.
- **Exit.** Returns to the main screen.
- **Message Period (30 seconds in this example).** Displays in seconds the message period.
- **Vol.** Displays the total number of vehicles per lane.
- **Occ.** % of lane occupancy for the message period.
- **Spd.** Displays the average speed of traffic in the lane in km/h or MPH.
- **Lane No.** Displays the lane number.
- **Detection Map.** Displays a real-time visualization of traffic.

RTMS Verify Counts

The verification of a good zone setup is an essential part of the installation. In it we compare RTMS volume measurements over a period of time with a manual (visual) count for the same interval. Use of a hand-held tally counter is recommended.



Options are:

- **Clear All.** This option clears the current values from all the traffic lanes.
- **Clear Selected.** This option clears the current values from the selected traffic lanes.
- **Stop.** This option terminates the counting process.
- **Save To File.** This option allows you to save a count file to the hard disk.
- **View File.** This option allows you to load a count file from the hard disk for review.
- **Elapsed Time.** This option displays the amount of time since count verification started.
- **Exit.** Returns to the main screen.

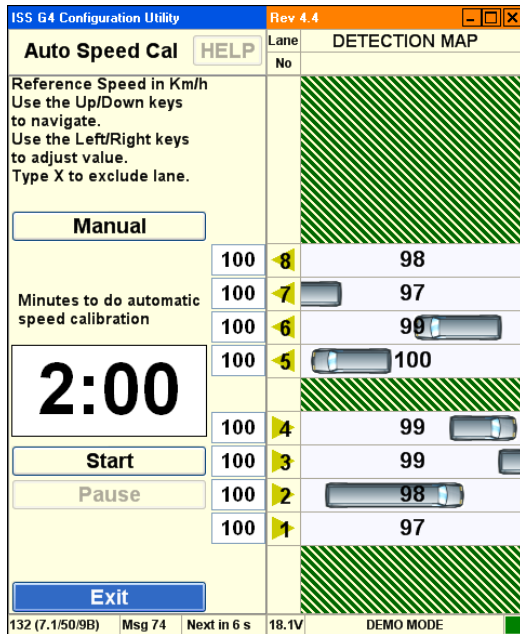
RTMS Automatic Speed Calibration

The speed calibration process sets the internal speed coefficients used to calculate the average speed of traffic in each zone. The calibration procedure used depends on traffic conditions.



Note

When setting up relocated units at their new locations, all speed coefficients should be first reset to their default values using the Manual Speed Calibration window.

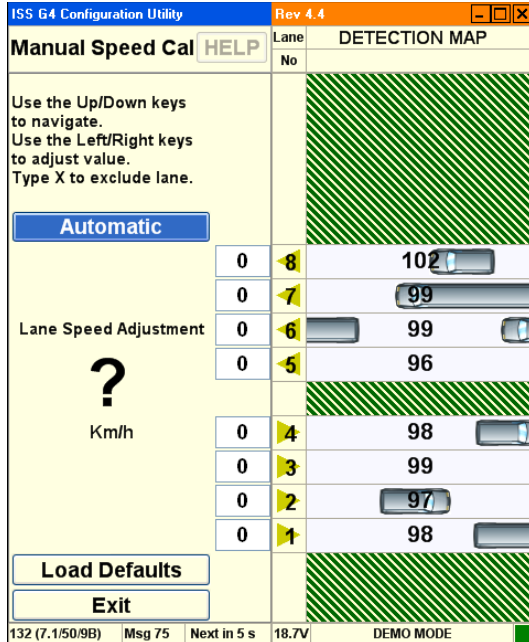


Options are:

- **Manual.** Displays manual calibration options.
- **Start.** Starts the calibration process.
- **Pause.** Pauses the calibration process.
- **Exit.** Returns to the main screen.

RTMS Manual Speed Calibration

The speed calibration process sets the internal speed coefficients used to calculate the average speed of traffic in each zone. The calibration procedure used depends on traffic conditions.



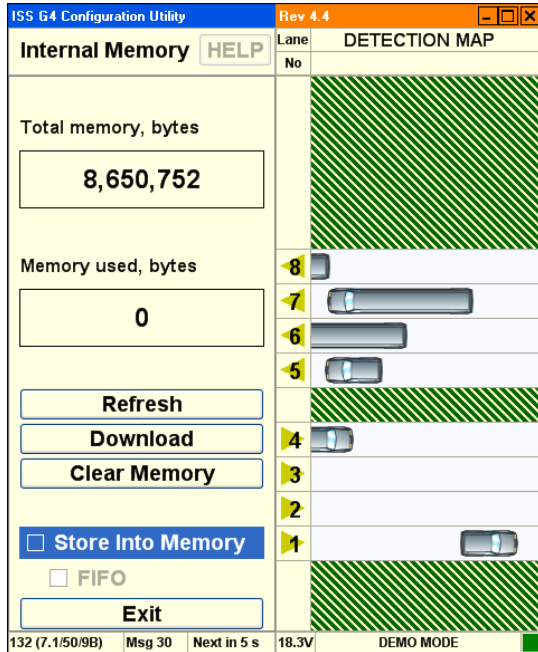
Options are:

- **Automatic.** Displays automatic calibration options.
- **Load Defaults.** Loads the factory default coefficients.
- **Exit.** Returns to the main screen.

RTMS Internal Memory

The RTMS G4 includes internal memory. Please note:

- Uncheck the **Store Into Memory** option prior to Downloading large volumes of data.
- Download at the highest connection speed available when directly connected to the RTMS sensor. A full memory will take just over 12 minutes to download at 115200 bps.



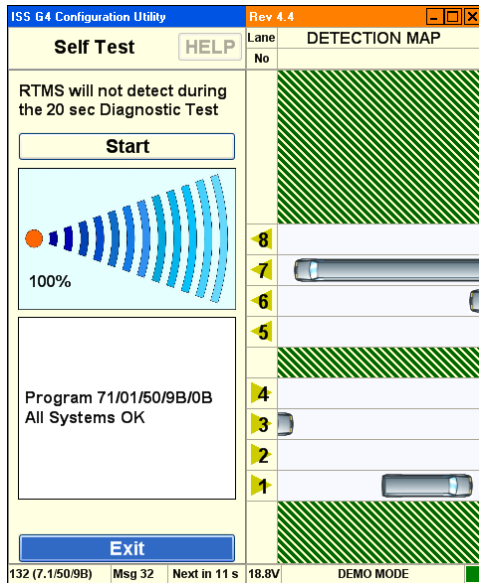
Options are:

- **Refresh.** Updates the Memory Used parameter. Verifies data is being stored.
- **Download.** Downloads the internal memory from the RTMS to the software.
- **Clear Memory.** Clears the memory on the RTMS sensor.
- **Store Into Memory.** This enables storage of RTMS data in the RTMS sensor's onboard memory.
- **FIFO.** (First In, First Out.) When memory is full, selecting this option instructs the RTMS to overwrite the earliest stored message.
- **Exit.** Returns to the main screen and saves changes. Activation of memory automatically selects Real Time Clock in message composition for X3STAT.

RTMS Self Test

The RTMS provides a diagnostic test of its internal functions. The test checks internal functions and locates hardware faults. Please note:

- The **All System OK** message is displayed on the screen if no faults are found.
- The Self-Test will also close the (Optional) zone contacts for one second each in sequence. Operation of the contacts can then be verified using the controller display, ohm-meter or any other suitable device showing continuity.



The following is a list of Self-Test messages describing a fault:

- Power supply fault.
- Power supply fault.
- Modulator signal fault.
- Microwave module fault.
- Modulator memory fault.
- Program memory fault.
- DSP fault.
- Gain too low or ADC fault.
- Logic failure.
- No signal.
- Saturation signal level.

