SmartSensor Manager™

User Guide

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Introduction

SmartSensor Manager brings increased user-friendliness and improved functionality to the ITS industry's only patented auto-configuration and auto-calibration process. The new features found in SmartSensor Manager 2.2 include a redesigned "New Connection" page, a reorganized menu bar with new options, and expanded help capabilities to assist users in navigating SmartSensor Manager and performing basic operations.

New Connection

Once the user opens the SmartSensor Manager application, the "New Connection" page automatically appears and displays the three connection options available through SmartSensor Manager. Choose the desired method of connection and click **OK**. The **Serial (COM Port)** radio button will be selected by default (see Figure 1).

Figure 1 – New Connection Page

Clicking **OK** opens a connection page unique to each connection option. Each connection page contains three function buttons: **Connect**, **Advanced**, and **Cancel**. The advanced functions for each connection option are specific for each option.

Serial Connection

Connect the SmartSensor directly to a computer's serial Com port and a message will appear near the top of the page that says:

"Click <Connect> to continue using current settings, or click <Advanced> to adjust the settings…" (see Figure 2).

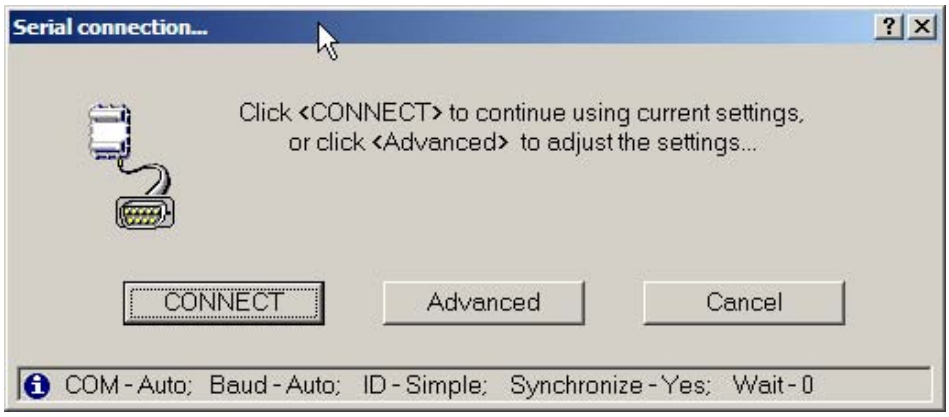

Figure 2 – Serial Connection

The three action buttons appear near the bottom of the page. The **Cancel** button cancels the action and returns the user to the "New Connection" page.

A message bar at the bottom, identified by the icon, displays the serial settings being used for this connection. If the default settings are used, then the message bar will display the following:

COM – Auto; Baud – Auto; ID – Simple; Synchronize Yes; Wait – 0

Advanced Serial Settings

Advanced settings can be found, and changed, by clicking the **Advanced** button (see Figure 3).

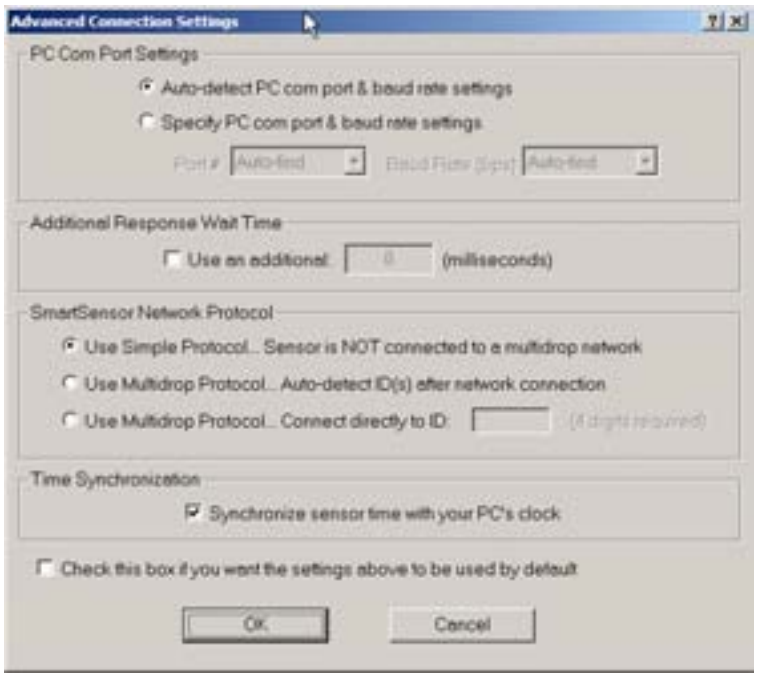

Figure 3 – Advanced Connection Settings

- **PC Com Port Settings** – To manually select com port and baud rate settings, click the **Specify PC com port & baud rate settings** radio button and this will activate the "Port #" and "Baud Rate (bps)" drop down lists.
- **Additional Response Wait Time** – By default, SmartSensor Manager waits a few milliseconds to receive a response from the sensor before timing out and displaying a communication error message. Users can add additional seconds to the response wait time to ensure that the connection to the sensor is properly made. Click the **Use an additional:** check box to activate the "milliseconds" text box and enter the number of additional milliseconds SmartSensor Manager should wait for a response from the sensor.
- **SmartSensor Network Protocol –** Identify sensors that are part of a multidrop network by clicking the appropriate radio button. "Simple Protocol" refers to sensors that are not part of a multidrop environment; if the sensor is part of a multidrop network, SmartSensor Manager can either auto-detect the multidrop ID, or the user can enter the four-digit ID. Clicking the **Use Multidrop Protocol…Connect Directly to ID:** radio button will activate the text box.
- **Time Synchronization** – Click the check box to have SmartSensor automatically synchronize with the PC clock.

Click on the check box at the bottom of the page to use the new settings as default. Click **OK** to save settings or **Cancel** to return to default; both buttons will return the user to the Serial Connection page. The new settings will be reflected in the message bar at the bottom of the page.

Modem Connection

Clicking the **Modem (Phone #)** radio button will connect the user to the SmartSensor using a modem. The "Modem Connection" page has a text box in which users enter the phone number for the sensor's modem (see Figure 4). The phone book icon to the right of this box allows users to browse for numbers previously saved in the SmartSensor Manager Address Book.

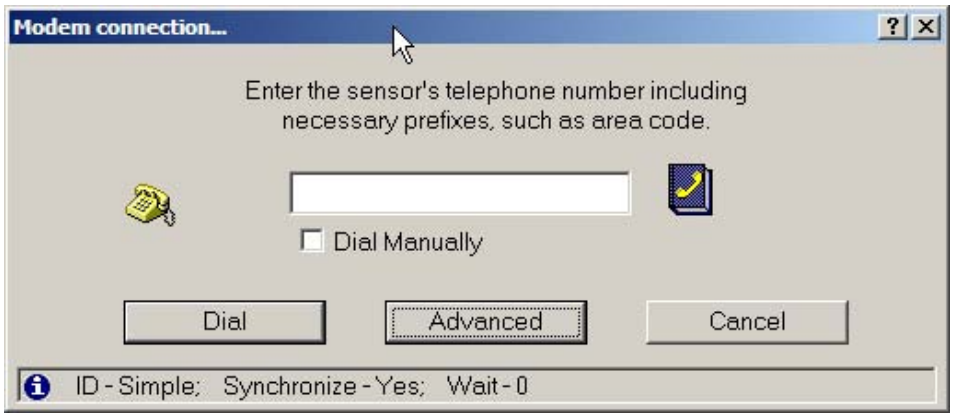

Figure 4 – Modem Connection

Click the **Dial Manually** check box to dial the number manually. Once the number is entered, click **Dial** to make a connection. Click **Cancel** to stop the action and return to the New Connection page.

The message bar at the bottom of the page, identified by the icon, shows the modem settings being used. If the default settings are used, the message bar will display the following:

ID – Simple; Synchronize Yes; Wait – 0.

Advanced Modem Settings

The following settings are part of the modem connection's advanced functions and can be found by clicking the **Advanced** button (see Figure 5):

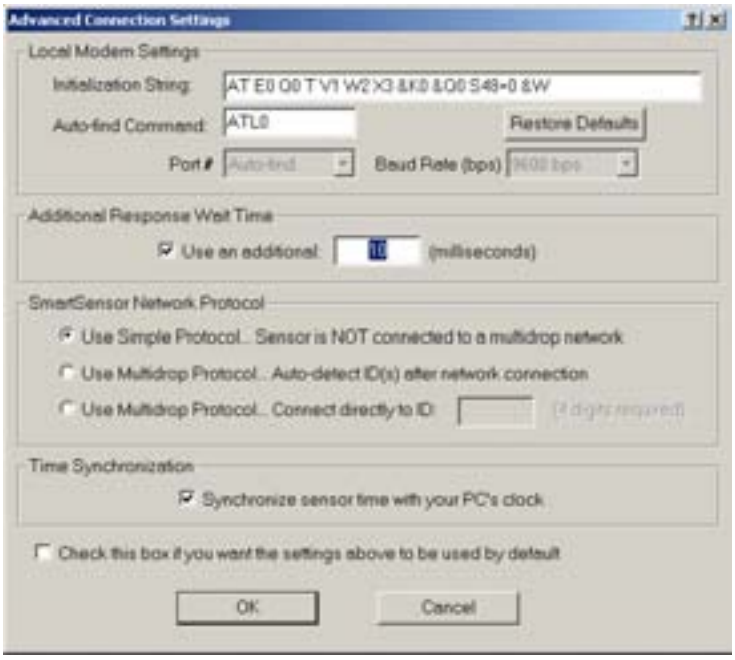

Figure 5 – Advanced Modem Settings

- **Local Modem Settings** – The initialization string and Auto-find command can be entered in the Local Modem Settings section. The **Restore Defaults** button will return the functions to their default settings.
- **Additional Response Wait Time** – By default, SmartSensor Manager waits a few milliseconds to receive a response from the sensor before timing out and displaying a communication error message. Users can add additional seconds to the response wait time to ensure that the connection to the sensor is properly made. Click the **Use an additional:** check box to activate the "milliseconds" text box and enter the number of additional milliseconds SmartSensor Manager should wait for a response from the sensor.
- **SmartSensor Network Protocol** – Identify sensors that are part of a multidrop network by clicking the appropriate radio button. "Simple Protocol" refers to sensors that are not part of a multidrop environment; if the sensor is part of a multidrop network, SmartSensor Manager can either auto-detect the multidrop ID, or the user can enter the four-digit ID. Clicking the **Use Multidrop Protocol…Connect Directly to ID:** radio button will activate the text box.
- **Time Synchronization** – Click the check box to have SmartSensor automatically synchronize with the PC clock.

Click the check box near the bottom of the page to use the new settings as default. The **OK** button saves the new settings and the **Cancel** button cancels the changes; both buttons return the user to the Modem Connection page. The new settings will be displayed in the message bar at the bottom of the page.

Internet Connection

The Internet connection option will connect to the SmartSensor using the sensor's IP address. The "Internet Connection" page has two text boxes in which users enter the sensor IP address and port number (see Figure 6).

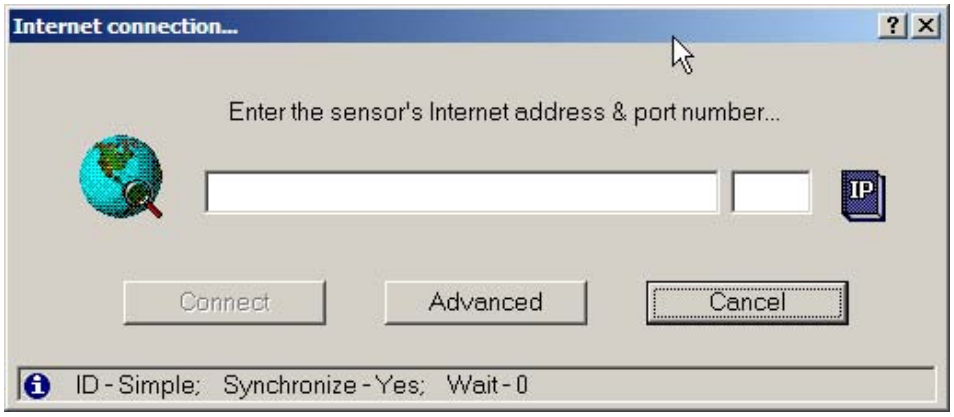

Figure 6 – Internet Connection

The 

icon allows users to browse through previously saved addresses in the SSM address book.

The **Connect** button does not become active until both IP address and Port number boxes are filled. The current settings for the Internet connection will be displayed in the message bar at the bottom. The Internet Connection's advanced functions are identical to the advanced functions of the Modem connection and can be found by clicking the **Advanced** button.

File Menu

The "Menu" bar makes it easier to navigate through SmartSensor Manager and to locate specific SSM functions (see Figure 7).

Figure 7 – Menu Bar

The "File" menu allows you to navigate to each connection page, view connection properties and sensor information, and access the Address Book and Data Logs.

New Connection

The "New Connection" list allows the user to connect to the **Serial**, **Modem** or **Internet** connection pages from any spot in SmartSensor Manager (see Figure 8).

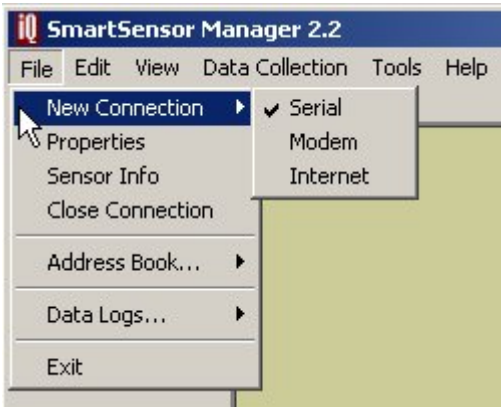

Figure 8 – File Menu

Properties

The "Properties" option displays the following properties of the current connection (see Figure 9):

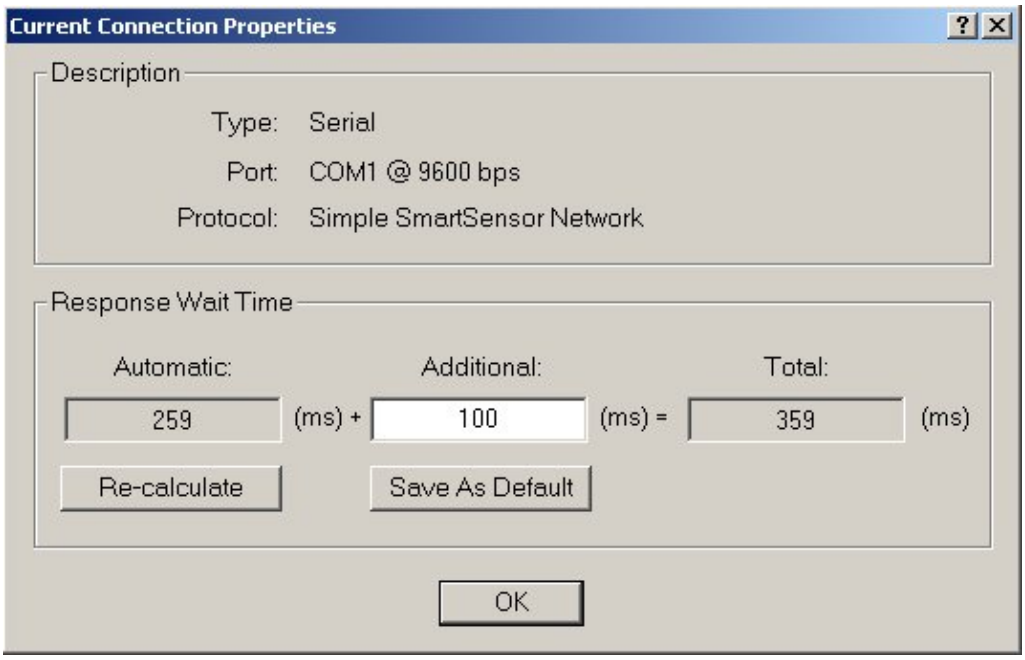

Figure 9 – Current Connection Properties

- The type of connection (Serial, Modem, or Internet). This will say, "Disconnected" if SmartSensor Manager is not currently connected.
- The "Port" displays the Com port and baud rate settings.
- The "Protocol" displays whether this is a multidrop network sensor or a simple sensor network.
- The "Response Wait Time" shows the wait time information for each sensor. The first box shows the number of milliseconds SmartSensor Manager will automatically wait for a response from a specific sensor. SmartSensor Manager determines this number by averaging recent sensor response times, so this number may fluctuate slightly when the **Re-calculate** button is clicked.
- The second box shows the number of additional seconds the user has added, and the third box shows the total number of seconds SSM will wait for a response. Click the **Save as Default** button to save the new settings as default.

Click **OK** to close the window.

Sensor Info

The "Sensor Info" option opens the Sensor Information page, which displays the properties unique to each sensor (see Figure 10). Although the information cannot be edited, there must be an active connection to view the "Sensor Info" page. The "Identification" section shows the sensor's Serial Number, Description, Location, Sensor ID and Serial Interface; the "Firmware Versions" section shows which versions of "DSP" (Digital Field Processing) and "FPGA" (Field Programmable Gain Amplifier) on which the sensor is operating.

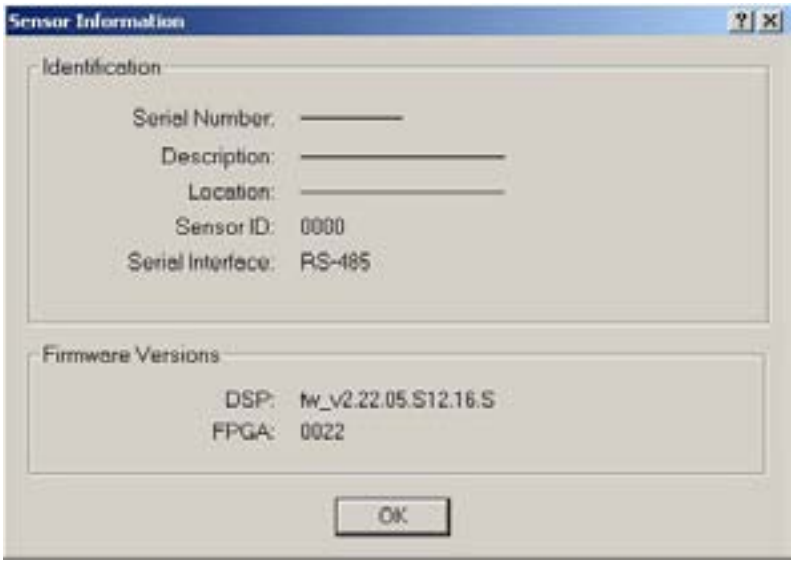

Figure 10 – Sensor Information

Close Connection

The "Close Connection" option closes the connection to the sensor.

Address Book

The "Address Book" allows the user to create a new address book file or open an existing file. The "Open" option is divided into separate "Modem" and "Internet" entries. Both "New" and "Open" options display a directory box to either save the file in a specific location or locate an existing file (see Figure 11).

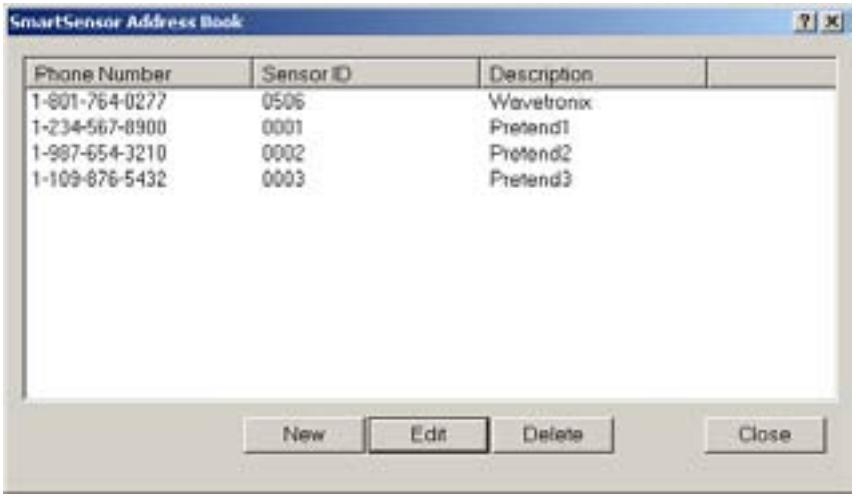

Figure 11 – Address Book

Data Logs

The “Data Logs” option allows users to create new “Download,” “Event” or “Interval” logs, or open existing logs. “Event” and “Interval” logs are identical to the logs generated by earlier versions of SmartSensor Manager. Download logs are similar to Interval logs, but Interval logs are generated in real time through an active sensor connection while Download logs are generated when data stored in the sensor’s Flash memory is downloaded to SmartSensor Manager.

Exit

The “Exit” option closes SmartSensor Manager.

Edit Menu

The Edit menu allows the user to configure the sensor, edit sensor settings and the sensor date and time, and change the operating mode (see Figure 12).

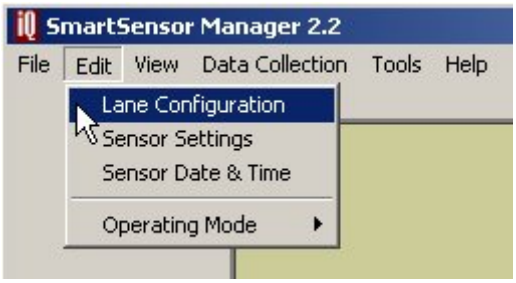

Figure 12 – Edit Menu

Lane Configuration

The "Lane Configuration" option opens the LaneSmart function of SmartSensor Manager. This allows the user to perform automatic configuration and provides all the tools necessary to perform manual, customized configurations.

AUTOMATIC CONFIGURATION

Follow the steps below to automatically configure the SmartSensor:

1. Select **Lane Configuration** from the "Edit" menu.
2. Once the "Lane Configuration" page opens, click on the **Automatic** button.
3. Confirm the configuration restart by clicking **Yes**. SmartSensor Manager will automatically begin detecting and configuring lanes, and the screen will show a visual depiction of the lanes and vehicle detections in real-time.
4. After the lanes have been detected and configured correctly, save the configuration by clicking the **Finished** button. The time required for configuration depends on the volume of traffic present in the lanes, but is typically only a few minutes.

If SmartSensor Manager is unable to correctly configure due to extraneous or missing lanes, use "Manual Configuration" to adjust.

NOTE: Free-flowing traffic is required for proper configuration.

Edit Range Blinders

Using Range Blinders will narrow the search area of the automatic lane configuration process (range blinders have no effect in Manual Configuration mode). Use the steps below to successfully edit the range blinders:

1. Click the **Range Blinders** button. Red bars (range blinders) will appear at the top and bottom of the roadway display and any previously displayed roadways will be cleared.
2. Left-click on one of the range blinders and drag its edge to the desired range (refer to the range markers on the left side of the screen).
3. Repeat Step 2 for the other range blinder if necessary.
4. Click the **Restart** button to apply the range blinders; otherwise, click the **Range Blinders** button again to disable the range blinders and use the default ranges. When the range blinders are applied, they will turn from a red color to a dark khaki color.
5. After the lanes are detected and configured correctly, save the configuration by clicking the **Finished** button. After clicking the **Finished** button, the SmartSensor will begin storing vehicle data. The time required for configuration depends on the volume of traffic present in the lanes, but is typically only a few minutes.

NOTE: After clicking the **Restart** button, detected vehicles (represented by moving blue rectangles) will be displayed only if a range blinder does not cover the lane center. If the edge of a range blinder lies between two lanes of the same road, some manual adjustment of the gray line (usually reserved to indicate a road shoulder) may need to be made. The edge of the road shown in the display is really a lane divider.

NOTE: Free-flowing traffic is required for proper configuration.

If SmartSensor Manager is unable to correctly configure, due to extraneous or missing lanes, use “Manual Mode” to make the necessary adjustments.

NOTE: After clicking the **Finished** button, wait for one minute before turning off the sensor. During this time the sensor is completing adjustments of the configuration thresholds. Typically this is not a problem because verification may be needed in “Traffic View” after clicking **Finished**. The verification process will normally be longer than one minute.

Manage Gain

During the automatic configuration process, the sensor’s gain is automatically adjusted in order to best process the radar signal at that particular installation site. In some locations, the reflections from vehicles may be stronger than in other locations and the gain will need to be lowered in order to optimize detection accuracy.

For the gain to be optimally adjusted by the automatic process, the sensor needs to be:

- Aligned almost exactly perpendicular to all the lanes of the roadway.
- Still configuring while several large vehicles (that return strong reflections) pass through the beam in the lanes closest to the sensor.

In some locations, and at particular times of the day, it may be difficult to meet both of these requirements. In these cases, click the **Manage Gain** button to change the starting point of the automatic gain adjustment process. The default starting point is a gain value of "5." The adjustment process never increases the gain value; it only decreases it. So the starting point is also the "Maximum Gain Value."

A new starting point will only be applied after clicking the **Restart** button. During the automatic configuration process, the sensor's current gain value is displayed in the status bar at the bottom of the screen.

No adjustments to the gain can be made once the configuration is saved to the sensor. However, the detection thresholds configured for the sensor during the automatic configuration process are based upon the current level of the gain and will continue to adapt for up to one minute after clicking the **Finished** button.

NOTE: The default starting point of "5" is also the largest starting point allowed. If the user enters a value larger than "5," the default starting point of "5" will be used. If the user is managing the gain, they will typically change the starting point to a "3" or "4."

MANUAL CONFIGURATION

If the sensor is unable to automatically configure to satisfaction, it can be manually configured by drawing roads, lane dividers and barriers. With the "Lane Configuration" page open, select the **Manual** button and the tool buttons in the toolbar on the right of the screen will be activated (see Figure 13). To change the configuration, click the appropriate button, move the cursor over the window showing roads and vehicles, and make the changes.

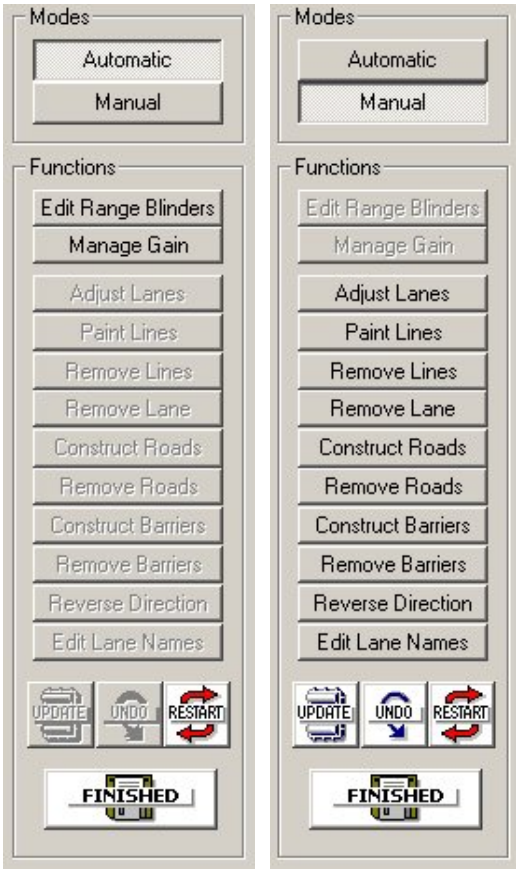

Figure 13 – Automatic (L) and Manual (R) Configuration Modes

Adjust Lanes

The **Adjust Lanes** button allows the user to click and hold the mouse cursor on a shoulder (gray line), lane divider (white line), or lane center (pink line) and drag it to a desired position (see Figure 14). When the cursor is positioned over a draggable line, it will change from an arrow to a hand.

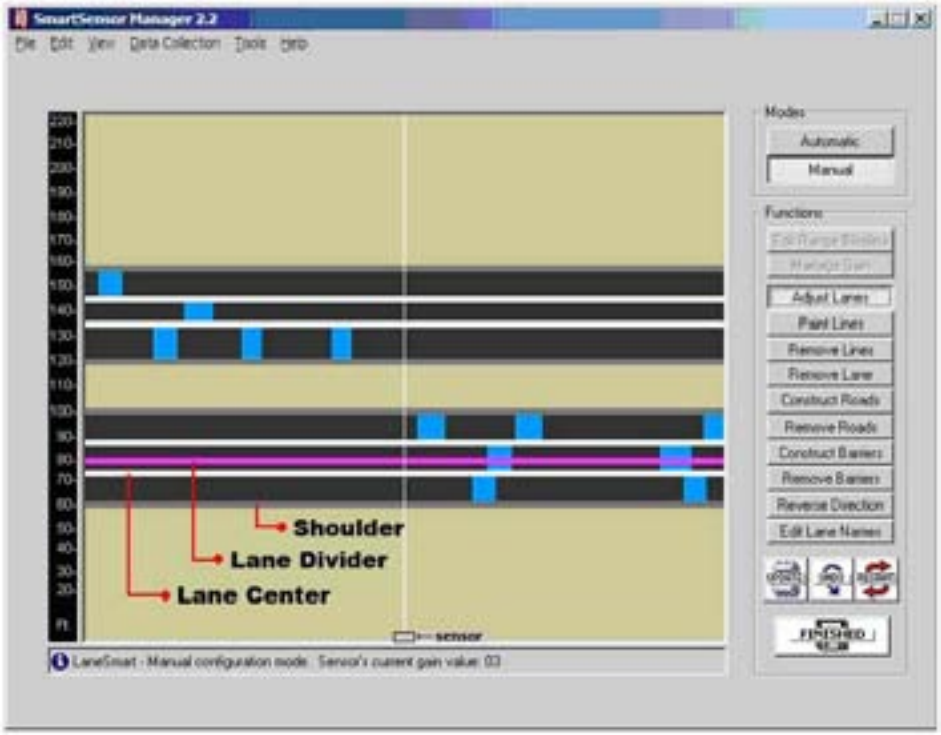

Figure 14 – Manual Configuration Tools

Lane centers (pink lines) only appear when the cursor is directly over a lane. To adjust this lane center, click and hold the left mouse button and move the line up or down on the screen within the area between the shoulders. Shoulders, dividers, and centers cannot be dragged past each other.

Paint Lines

The **Paint Lines** button allows the user to insert lane dividers in paved (black) areas. The mouse cursor will change from an arrow to a hand when it is directly over a location where it is possible to paint a lane divider. Once the cursor changes to a hand, click the left mouse button and a white line will appear.

Remove Lines

To remove a lane divider, click on the **Remove Lines** button, select the white line to be removed (the cursor will change to a hand) and click the left mouse button.

Remove Lane

To remove a lane, click on the **Remove Lane** button and the hand icon will appear as the user moves the mouse over the lane to be removed. When the hand icon is in position, click on the left mouse button. If the wrong lane was selected, or if the lane needs to be reinserted, simply click the **Undo** button.

Construct Roads

To insert a new road consisting of a shoulder-center-shoulder, click on the **Construct Roads** button and select a location anywhere in the background (khaki colored) area. The hand icon will appear if the cursor is positioned directly over a location where a road can be constructed. Click the left mouse button to draw the road.

Because new roads are initially drawn with an upper-shoulder line, a centerline, and a lower-shoulder line, it is usually necessary that the user adjust the road to the desired width using the "Adjust Lanes" function.

Remove Roads

The **Remove Roads** button allows the user to remove an entire road. To remove a road, including all lanes, click on the **Remove Roads** button, select the road to be removed and click the left mouse button.

Construct Barriers

A "barrier" or "median" is defined as two adjacent shoulders or two shoulders with only background area in between them. Constructing a barrier is essentially the act of dividing a single road into two separate roads.

To construct a barrier or median, click on the **Construct Barriers** button and select the paved area where a barrier is desired. Click on the left mouse button and the barrier will appear. Initially, the new barrier will only be two shoulder lines wide; to widen the barrier, use the "Adjust Lanes" feature.

Remove Barriers

Removing a barrier will convert two roads into a single road. To remove a barrier, click on the **Remove Barrier** button and select the area between two roads.

Reverse Direction

The current version of SmartSensor does not determine the direction traffic travels in each lane. However, it is useful to have the direction of the events in SmartSensor Manager reflect the actual direction of travel. Changing the lane direction only affects the SmartSensor Manager display and is beneficial for verifying performance.

The **Reverse Direction** button enables the user to change the direction the vehicle events travel across the screen in each lane. To change the direction of travel across the screen, click the **Reverse Direction** button, move the cursor over the lane of interest and click the left mouse button. While the cursor is over a lane, a tiny arrow will appear below the

hand to indicate the current direction. When changing the direction, the tiny arrow reverses direction to verify that the change occurred (see Figure 15).

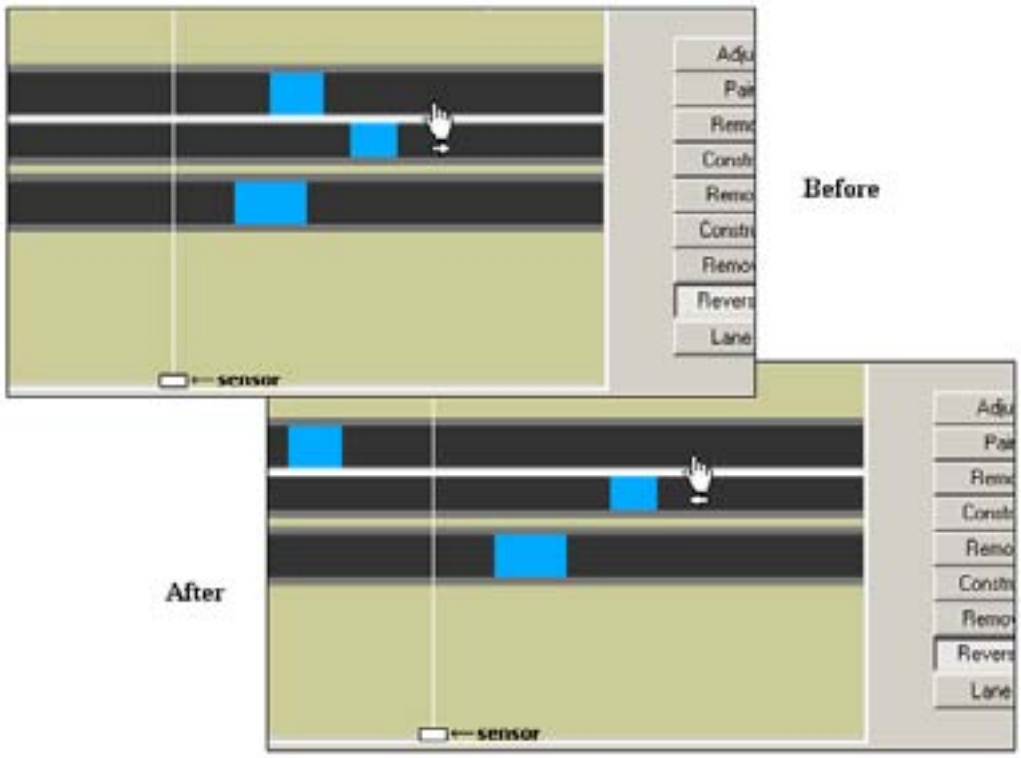

Figure 15 – Reverse Direction Tool

Edit Lane Names

By default, the SmartSensor labels the lanes it configures from "Lane1" up to "Lane8," where "Lane1" is the lane located closest to the sensor. The user can assign different lane numbers by clicking the **Edit Lane Names** button, which causes an "Edit Lane Names" window to appear (see Figure 16). The user will now be able to enter up to eight (8) alphanumeric characters for each lane configured. SmartSensor reports data per lane according to their labels.

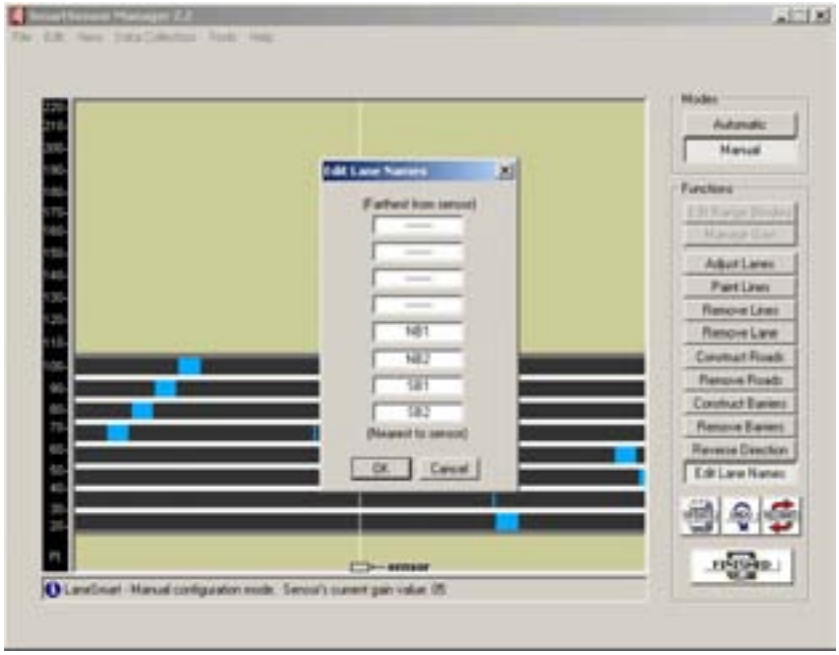

Figure 16 – Edit Lane Names

Saving the Configuration

To retain the changes to the configuration, the user must save it to SmartSensor's flash memory, which is done by clicking the **Update** button located below the manual configuration tools (see Figure 17). After saving the configuration, the user will remain in the "Lane Configuration" page so that any manual changes made may be viewed and easily changed if necessary.

Figure 17 – Update, Undo and Restart Buttons

Undoing Manual Changes

The user can undo changes that have not been updated to the SmartSensor by clicking the **Undo** button at the bottom of the "Lane Configuration" window. This feature brings back the last saved configuration from the sensor, effectively undoing any unsaved changes that were made.

Restarting Lane Configuration

To completely erase the SmartSensor's current configuration and restart the "Lane Configuration" routine, click the **Restart** button (the user can be in either Manual or Automatic mode to do this).

By clicking **Restart** while in Manual Mode, the changes made will be undone and SmartSensor Manager will change to Automatic Mode; by clicking **Restart** while in Automatic Mode, changes made will be undone, but SmartSensor Manager will stay in Automatic Mode. Clicking the **Restart** button will cause the window below to appear; click **Yes** to continue or **No** to return to the previous configuration (see Figure 18).

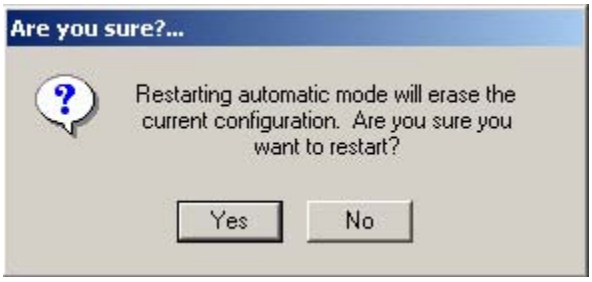

Figure 18 – Restart Confirmation Dialogue Box

Exiting Lane Configuration

After all the changes have been made in Lane Configuration, and you are ready to save and exit the "Lane Configuration" screen, click the **Finished** button located at the bottom right of the screen. Clicking on the **Finished** button will cause a window to appear indicating that the changes are being saved to the SmartSensor. After the changes have been saved, SmartSensor Manager will automatically change from "Lane Configuration" to the "Traffic/Event Data" mode.

Sensor Settings

The "Sensor Settings" option allows the user to change the sensor settings. If no sensor connection is active, selecting this will open a directory box allowing users to find settings that are saved on the computer.

The Sensor Settings page is divided into three sections: "General," "Communication" and "Data Collection."

The General tab allows the user to edit the following settings (see Figure 19):

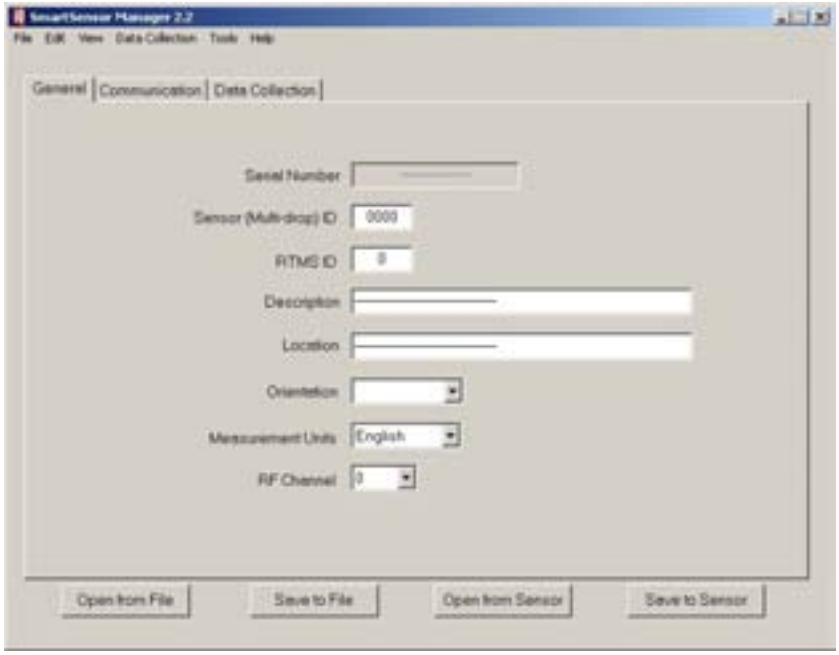

Figure 19 – General Tab

- **SmartSensor (Multidrop) ID**
- **RTMS ID**
- Sensor **Description** – (see the "Sensor Info" screen)
- Sensor **Location** – (see the "Sensor Info" screen)
- Sensor **Orientation** – Use the drop down list to select the direction the sensor is facing.
- **Measurement Units** – This allows users to select between English and Metric measurements. Metric units are entered in decimeters so that the Metric and English units can be converted more accurately.
- **RF Channel** – This allows users to assign specific RF channels to sensors that are located in close proximity to prevent the sensors from interfering with each other.

The “Communication” tab allow users to change the following settings (see Figure 20):

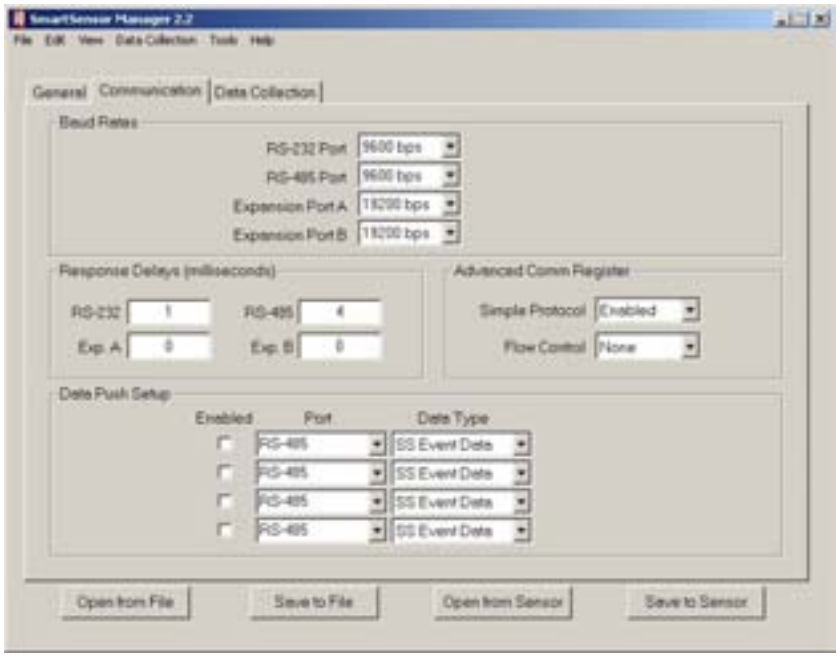

Figure 20 – Communications Tab

- **Baud Rates**
- Sensor communication **Response Delays** in milliseconds.

  NOTE: This is especially important when the sensor is connected to communication equipment that cannot handle the speed with which the sensor responds to messages.
- **Advanced Communication Registers** – Select **Enable** from the Simple Protocol drop down list for sensors that are not part of multidrop networks.
- **Flow Control** – Enable Flow Control for communication equipment that requires handshaking by selecting **RTS/CTS** from the drop down list.
- **Data Pushing** for data collection.

The "Data Collection" tab allows users to change the following settings (see Figure 21):

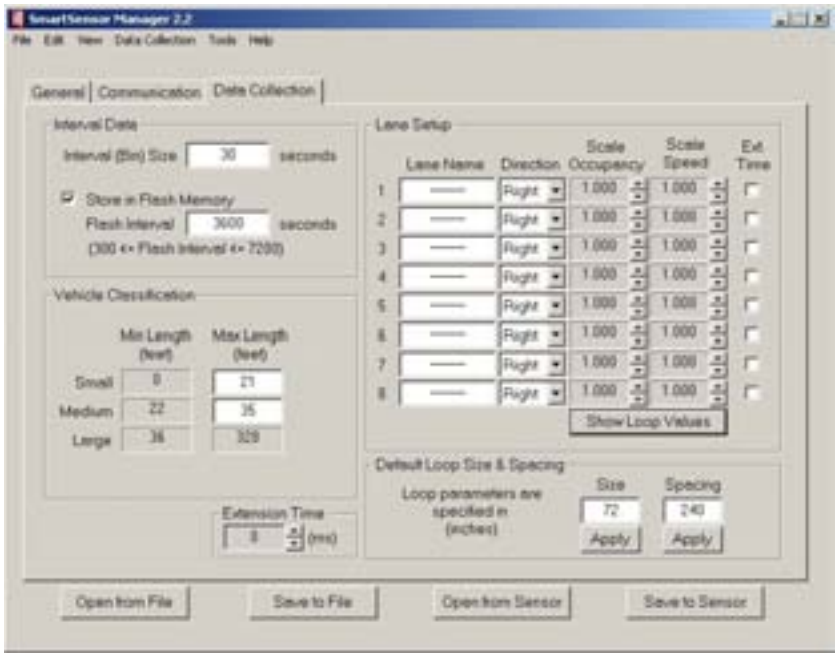

Figure 21 – Data Collection Tab

- **Interval Data** – The interval of time (in seconds) that traffic data is aggregated (minimum interval is "5" seconds).

  Interval data is stored directly into the sensor's SRAM memory, which is extremely volatile and will not persist after a power-cycle. The number of intervals is limited to "246."

  Users can also tell the sensor to move the interval from SRAM to the sensor's Flash memory by clicking the **Store in Flash Memory** check box. This protects the data because Flash memory persists after power cycles. The capacity in Flash is ten times greater than SRAM and once buffer is filled, the data won't be overwritten because SmartSensor's Flash storage is now a front-loading memory bin versus a cyclical bin. Once the Flash memory is full, no more data can be written to it until the data is downloaded or erased.

  If the "Store in Flash Memory" box is not checked, the Interval data will remain in SRAM until it is overwritten.

- **Vehicle Classification** – Users can customize vehicle classifications by length. Enter the maximum length amounts for "Small" and "Medium" class vehicles in the active text boxes and SmartSensor Manager will automatically determine the minimum lengths.

- **Lane Setup** – The Lane Setup section allows you to change specific lane information such as lane name, direction of travel, scale occupancy (loop size), and scale speed (loop spacing) for tuning the sensor. These boxes feature scroll arrows that enable the user to change the values incrementally. Also, the **Show**

Loop Values button allows users to toggle quickly between the Loop Values and the data affected by each loop function.

- **Default Loop Size & Spacing** – Users may enter default values which, when applied, will automatically update the information for each lane.

Sensor Date & Time

The "Sensor Date & Time" option will open a screen allowing the user to change the SmartSensor's date and time (see Figure 22).

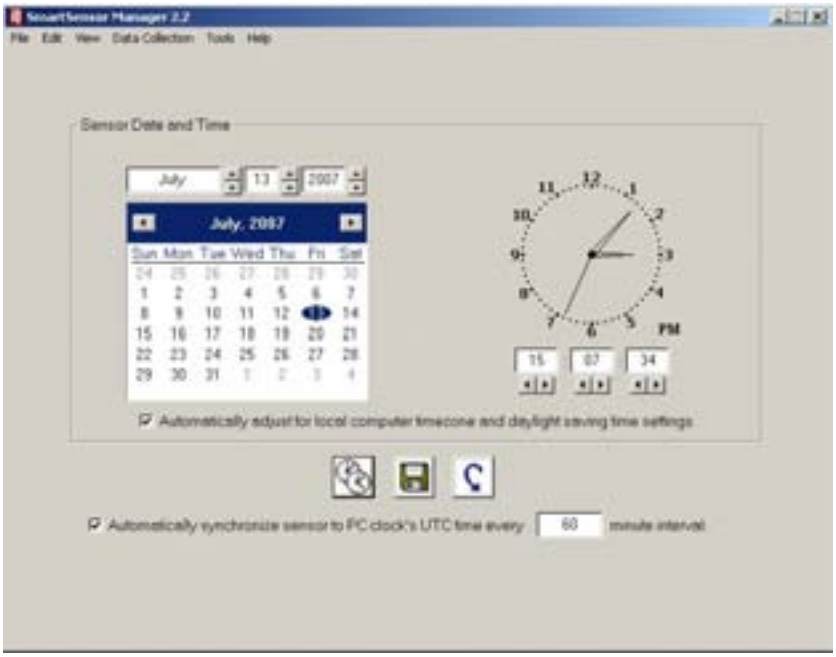

Figure 22 – Sensor Date and Time

Change the date by selecting the correct date from the drop down lists (month, day, and year) or use the calendar to scroll to the correct date. Change the time by selecting the correct time (hour, minutes, and seconds) from the drop down lists.

Click the check box below the calendar to automatically adjust for local computer time and daylight savings time settings; click the check box at the bottom of the page to automatically synchronize sensor to PC UTC time every <user defined> minutes.

The "Sensor Date & Time" page includes the following three function buttons:

- The button performs a one-time synch of the sensor to the PC's UTC time.
- The button saves the new settings.
- The button undoes the changes.

Operating Mode

The “Operating Mode” option allows the user to switch between “Side Fire” and “Forward Fire” operation modes. SmartSensor must be installed in a forward fire position for the forward fire configuration tools to work properly.

View Menu

The "View" menu allows the user to view sensor data (see Figure 23).

Figure 23 – View Menu

Traffic (Event Data) and Interval Data

The "Traffic (Event Data)" and "Interval Data" allows the user to select a real-time view of collected data. The **Traffic (Event Data)** option opens the "Traffic View" screen, which shows the saved lane configuration with detected vehicle representations; the **Interval Data** option shows the numerical data gathered per lane by that sensor.

Both screens feature a toggle button in the lower-right corner. On the "Traffic (Event Data)" screen, this button is marked **Interval Data** and allows users to go directly to "Interval Data" without using the menu. On the "Interval Data" screen, this button is marked **Event Data** and takes the user to "Traffic View."

Data Collection Menu

The Data Collection menu allows the user to collect and analyze data (see Figure 24).

Figure 24 – Data Collection Menu

Setup

The user can easily set-up the SmartSensor for use in studies. The screen below shows the two-step process for setting up the sensor (see Figure 25):

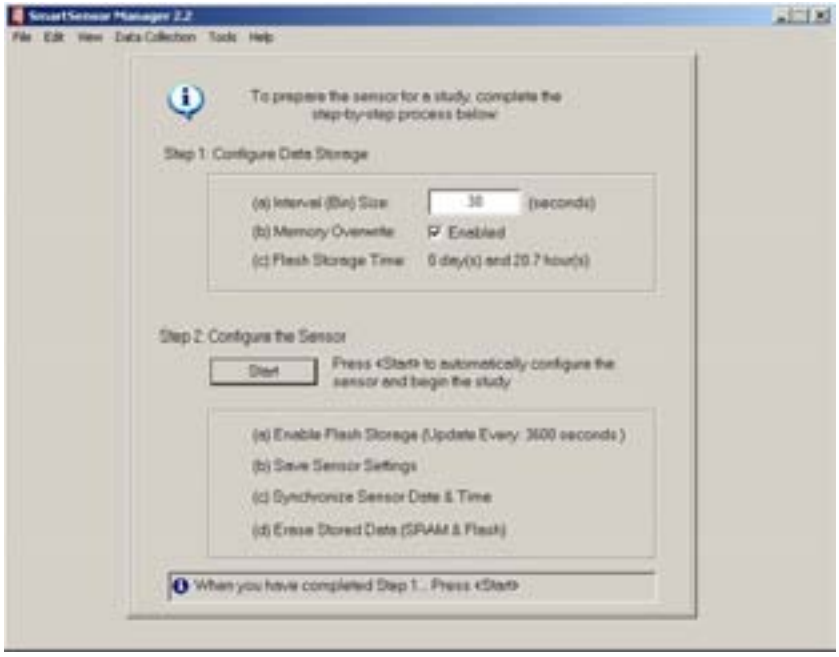

Figure 25 – Data Collection Setup

- **Step 1** verifies the interval (bin) size, which the user can determine by entering the interval in seconds in the text box causing a new "Flash Storage Time" to be displayed.
- **Step 2** asks the user to click the **Start** button to begin the study. Check marks will automatically appear in the boxes as each set-up task in the list is completed.

Download

To download interval data stored on the sensor, click the **Browse** button to either create a new data Download file log or locate an existing Download file log (see Figure 26). Select the type of download to perform (an incremental download of all data stored since the last download, which will be displayed in format “yyyy-mm-dd hh:mm:ss”; or a full download of all the data on the sensor) and click the **Download** button.

Figure 26 – Data Collection Download

The Download section also allows the user to manage the sensor’s “Interval Data Storage.” Click on **View Storage Space** to see how much space is used or available; click on **Erase Stored Data** to clear the sensor’s memory and start fresh. If the storage space is full, data must be downloaded or erased in order for the study to continue.

Tools Menu

The "Tools" menu allows the user to view and send messages, as well as upload firmware (see Figure 27).

Figure 27 – Tools Menu

Hyperterminal

Hyperterminal allows the user to send message requests and view message responses for any commands in either "Simple" or "Multidrop" protocols. Enter the request in the "Command Line" located near the top of the screen. Click on the appropriate radio button to either transmit information all at once after the **Enter** key on the computer keyboard is pressed or to auto transmit each character as they are typed. The user may also use binary mode to verify operation of binary protocols supported by SmartSensor by clicking the **Binary Mode** button.

Firmware Upload

The user can perform a firmware upload by clicking the appropriate radio button for either "DSP" or "FPGA" firmware. Click the **Browse** button to locate the firmware stored on your computer; click the **UPLOAD** button to transfer the firmware to the sensor.

Help Menu

The "Help" menu contains a Table of Contents as well as additional information about SmartSensor Manager (see Figure 28).

Figure 28 – Help Menu

Table of Contents

The "Table of Contents" option opens SmartSensor Manager's Table of Contents to find information on performing different SSM functions and operations.

SmartSensor Manager has the following help capabilities to assist users with information about different SSM functions and operations:

- Many pages in SmartSensor Manager have a ? button in the top right corner of the page, which opens a help page with information specific to that page.
- The user can get simple text information by placing the cursor arrow over different buttons. After a few seconds, a small yellow text box will appear that gives a brief description of the functions of that button.
- The user can get detailed help by going to **Help** > **Table of Contents** and finding the desired topic from the list. The list is divided into the following three columns (see Figure 29):

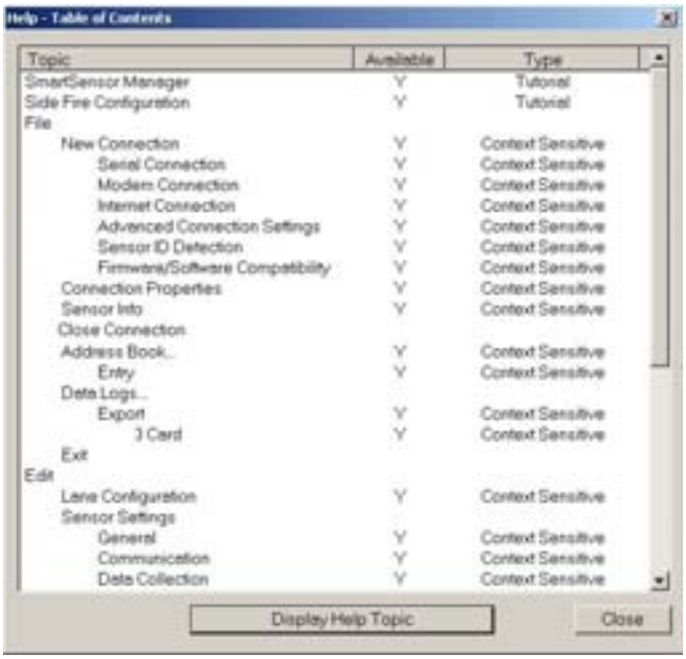

Figure 29 – Table of Contents Page

1. **Topic** – Lists the available topics in order of importance.
2. **Availability** – Shows whether the information is available or not.
3. **Type** – Shows the type of information contained on the "Help" page. **Tutorial** provides overview information; **Context Sensitive** is information specific to a particular function or operation.

Open the desired information from the Table of Contents by either double clicking on the subject in the list, or by highlighting the item and clicking the **Display Help Topic** button (see Figure 30).

Figure 30 – Help Information

Users can access the "Table of Contents" page from anywhere in SmartSensor Manager; an active sensor connection is not needed. This enables the user to get help information at any time, especially if information about connecting to a sensor is needed.

About SmartSensor Manager

The "About SmartSensor Manager" option opens the "About" page which contains the SmartSensor Manager version name and copyright information (see Figure 31).

Figure 31 – About SmartSensor Manager

Communication Error

The "Communication Error" screen will appear if there is a communication error between the sensor and SmartSensor Manager. If an error occurs, the "Communication Error" screen will give the user the following options (see Figure 32):

- **Retry** – Tells SSM to try and communicate with the sensor again.
- **Cancel** – Stops the current operation as well as other operations that may be in process.
- **Details** – Shows error details.

Figure 32 – Communication Error

If the user retries two or more times to communicate with the sensor and it still doesn't work, the problem can often be fixed by editing the "Additional Response Wait Time." Click the **Details** button and this will open an additional page that shows the following information specific to this problem (see Figure 33):

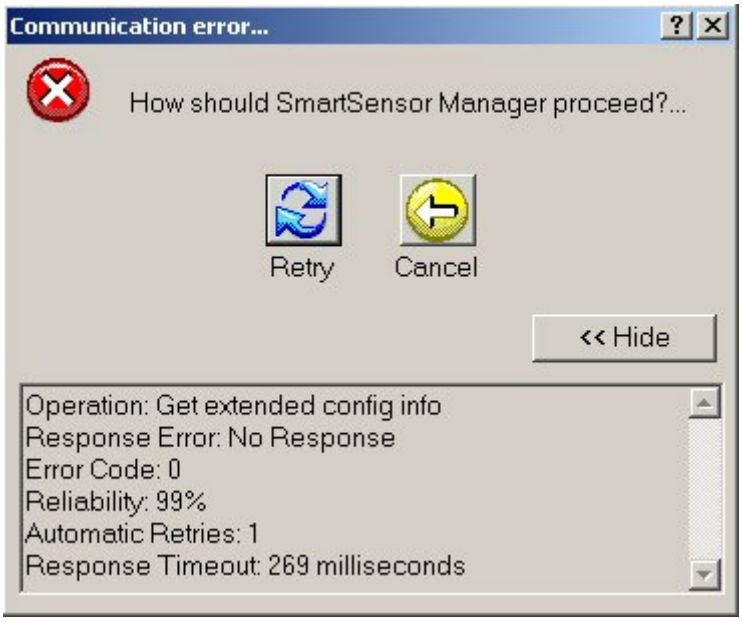

Figure 33 – Communication Error with Details screen

- **Operation** – The operation the user is trying to accomplish.
- **Response Error** – The response error the user has encountered.
- **Error Code** – The error code related to the specific error.
- **Reliability** – The percentage of communication attempts that were successfully completed.
- **Automatic Retries** – The number of retries the SSM automatically attempts before showing the communication error screen.
- **Response Timeout** – The total number of milliseconds that SSM waited before timing out the requested operation.