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RTC Manufacturing, Inc.

Driver Feedback Sign Set-Up (Without M2M Communication)

To set up an RTC Driver Feedback Sign without M2M communication, you will need to access the third-party direct-connect radar software. You can find a link to the software at RTC-Traffic.com/downloads. Under "Current Software Downloads" click the link for "**Radar Direct-Connect Software (3rd party)**".

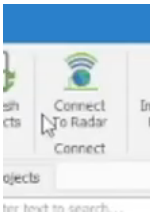
This link will open a new tab to the 3rd party site. Once the page opens, click the "Downloads" tab on the left-hand side. A list of files will appear. Click the green "Download" button beside the link to the latest StatsAnalyzer software version.

Go through the process of downloading the file to your computer and run the Start-Up Wizard.

After the start-up process is complete, click on the Stats Analyzer software icon on your desktop.

At this point, make sure the Driver Feedback Sign is powered on. Use a USB:serial cable to connect the computer running the software to the DB9 port on the back of the radar sign.

Once you are connected and the software is open, click the "**Connect to Radar**" button at the top of the software.



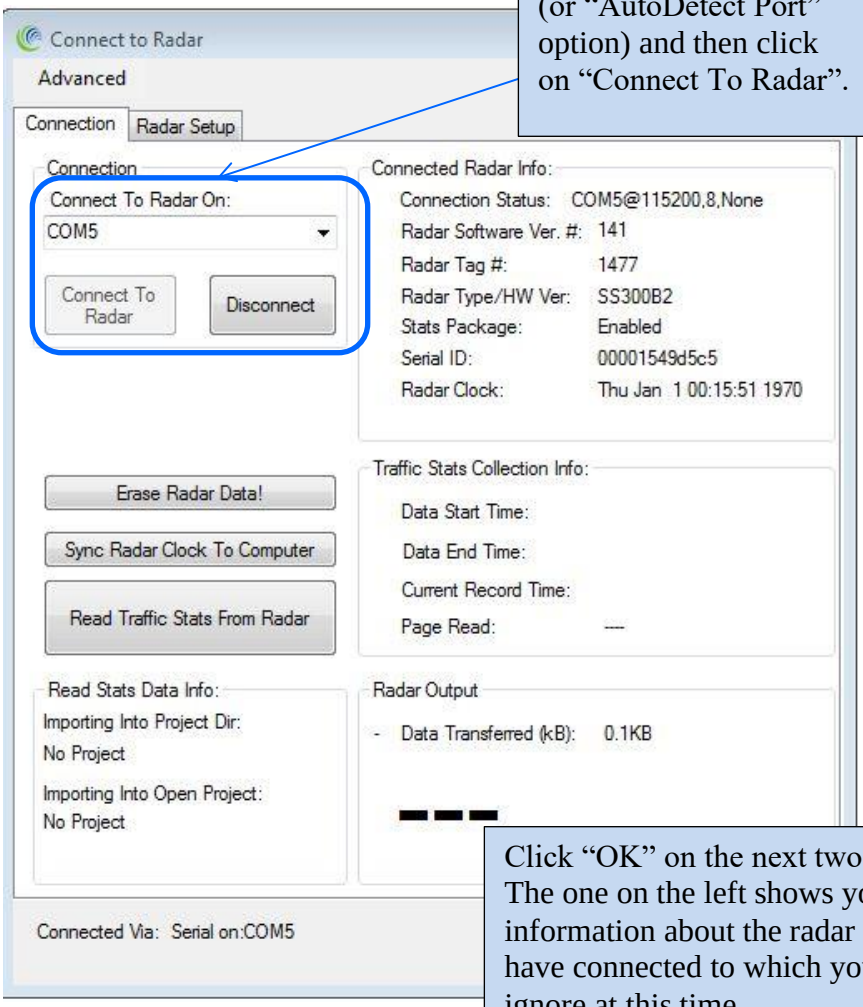
A pop-up will appear. On the pop-up, click "**Advanced**" at the top, then click "**Connection Preferences…**".

On this screen, make sure the **"Try My Preferences First" box is selected**, the **Radar Baud Rate is set to 2400**, **Radar Data Bits is set to 8**, and the **Radar Parity is set to None**. These settings are very important to a successful connection. If at any point you have issues connecting to the radar, check these settings first. Once confirmed, press "**Save"**.

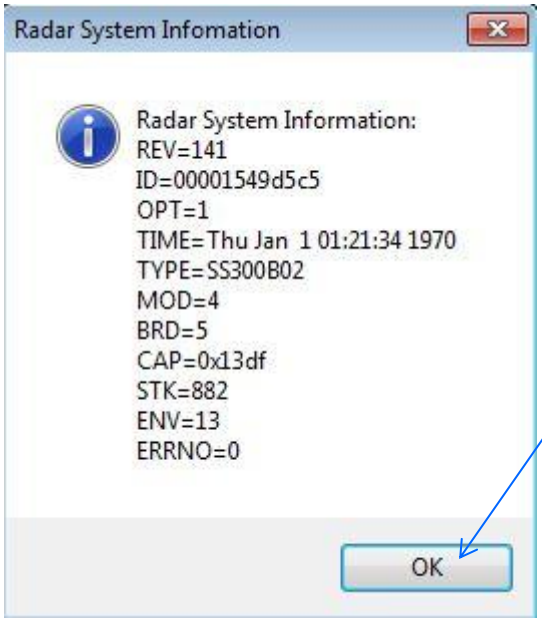
Once the pop-up closes, you can follow the following steps to connect to the radar and adjust the settings:

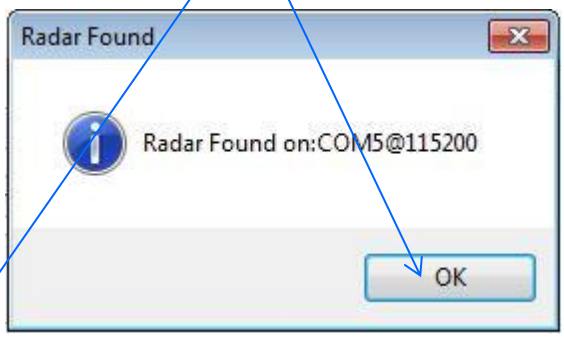
STEP 1: Connect to Radar

Select your COM port (or "AutoDetect Port" option) and then click on "Connect To Radar".

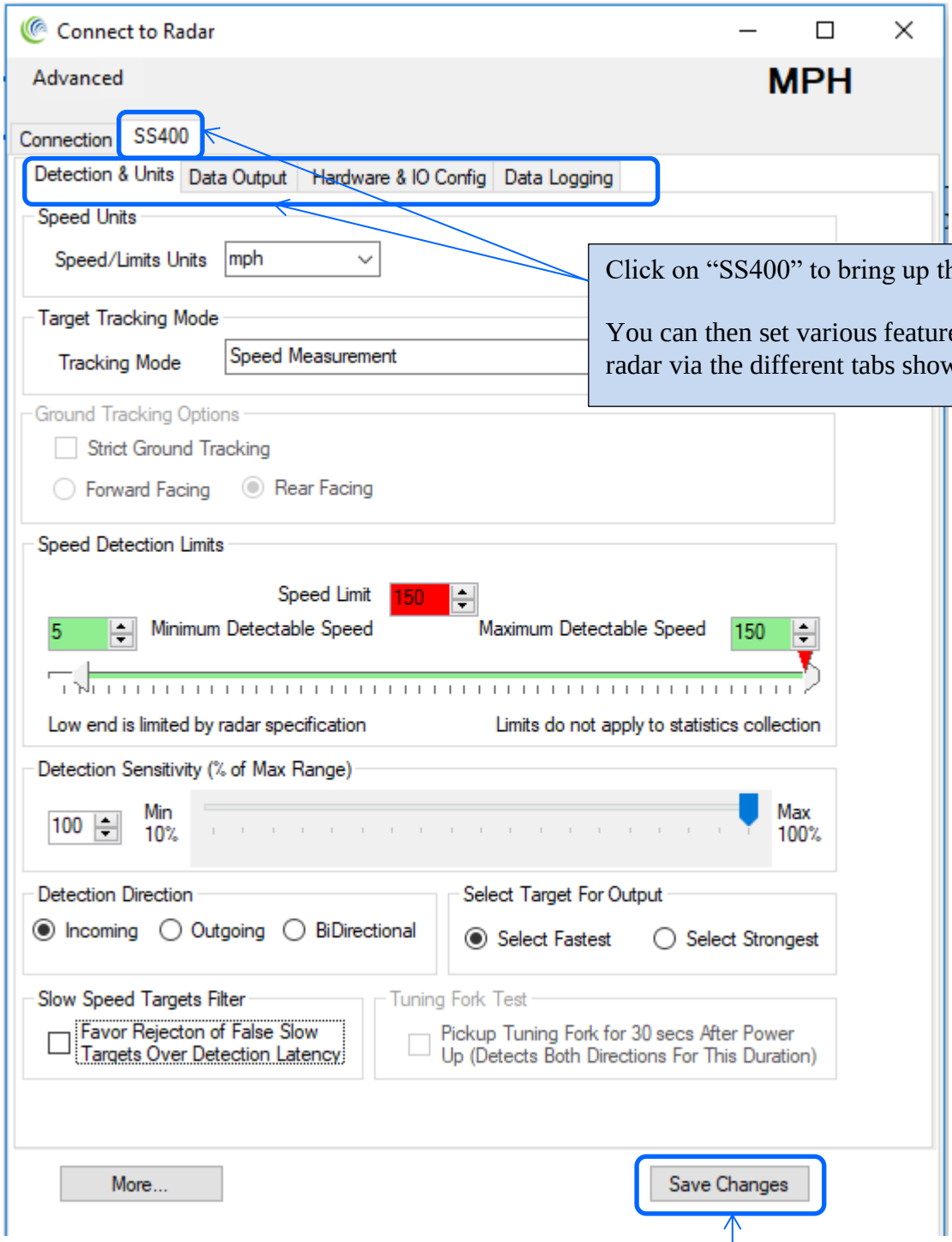


Click "OK" on the next two boxes. The one on the left shows you information about the radar that you have connected to which you may ignore at this time.





STEP 2: Click on Radar Setup to bring up the configuration GUI



Click on "SS400" to bring up the GUI.

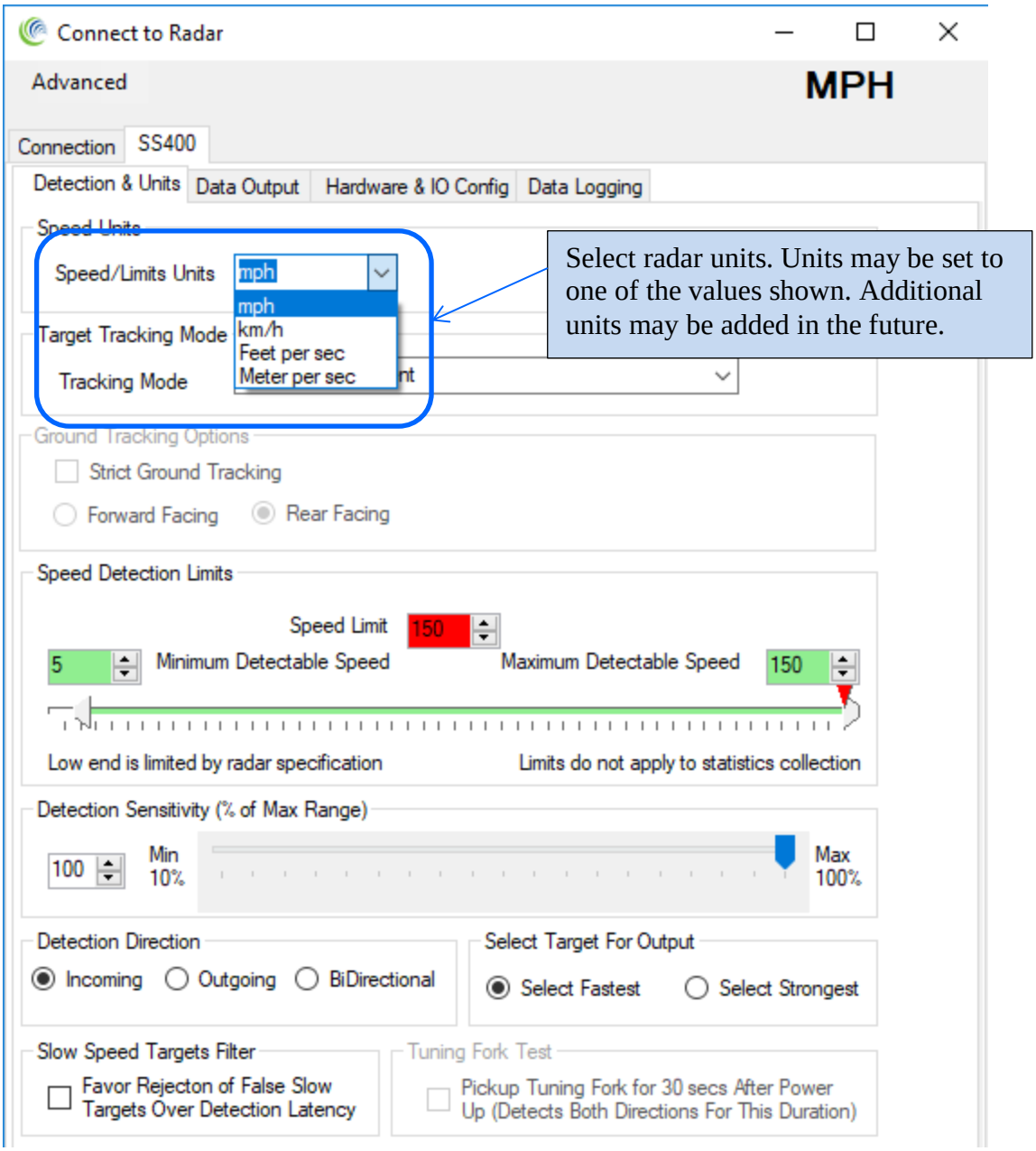
You can then set various features in the radar via the different tabs shown here.

You must click on "Save Changes" button for your changes to be saved to the radar.

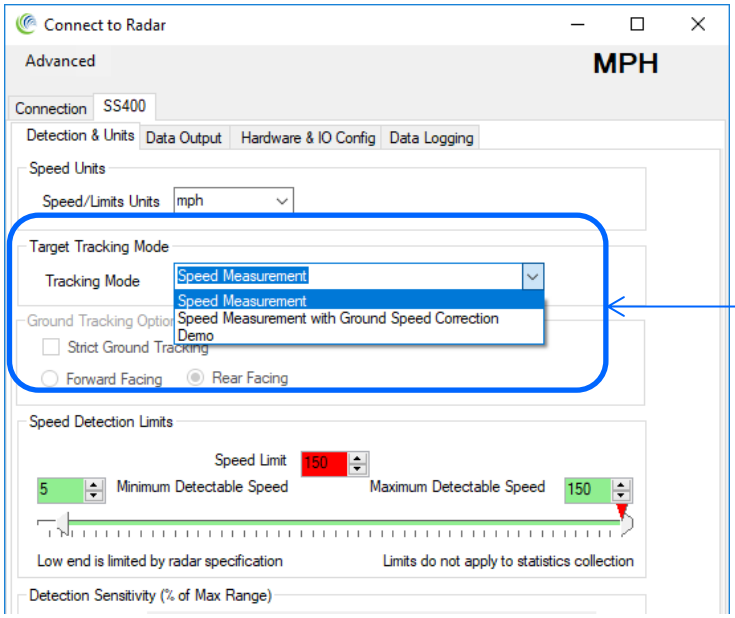
STEP 3: Select the radar units

Radar units apply to the speed output over the RS232 serial port as well the low limit cutoff and high limit cutoff settings.

Additionally, if traffic statistics gathering is enabled, statistics are saved in integer mph boundary speed bins for mph and ft/sec units and in km/h integer boundary speed bins for km/h or m/s units in the radar.



STEP 4: Set the Target Tracking (Operating) Mode of the Radar



Select the target tracking mode of the radar based on your application.

The Radar may be set into one of the following operating modes:

1. **Speed Measurement**
   In this mode the radar operates as a Doppler radar that measures and outputs the speed of targets within its range. The radar measures the speeds of multiple targets and outputs one speed based on the user configuration of "fastest target" or "strongest target" (see later). The radar is expected to be stationary and measure the speed of moving targets.
2. **Speed Measurement With Ground Speed Correction**
   In this mode the radar is expected to be mounted on a moving vehicle (for example in a "Your Speed" sign on the back of a truck) and measure and output the speed of moving targets within its range. However, the output speed is corrected for the speed of the radar itself. Doppler radars always measure the relative speed between itself and the target. So if the radar is moving, a ground speed correction is required if the target speed relative to the ground needs to be measured.
   This allows for the correct speed display of approaching vehicles from the rear and displays their speeds for speed awareness.

Ground speed correction mode only operates when the radar is mounted on the rear of the truck and corrects for the speed of the truck moving forward. However, in this mounting configuration it can correct for speeds of both incoming and outgoing targets.

Speeds of targets that are moving exactly the same speed as the truck itself cannot be measured because there is no relative speed between the radar and the target. Doppler radars require a relative speed between the radar and the target.

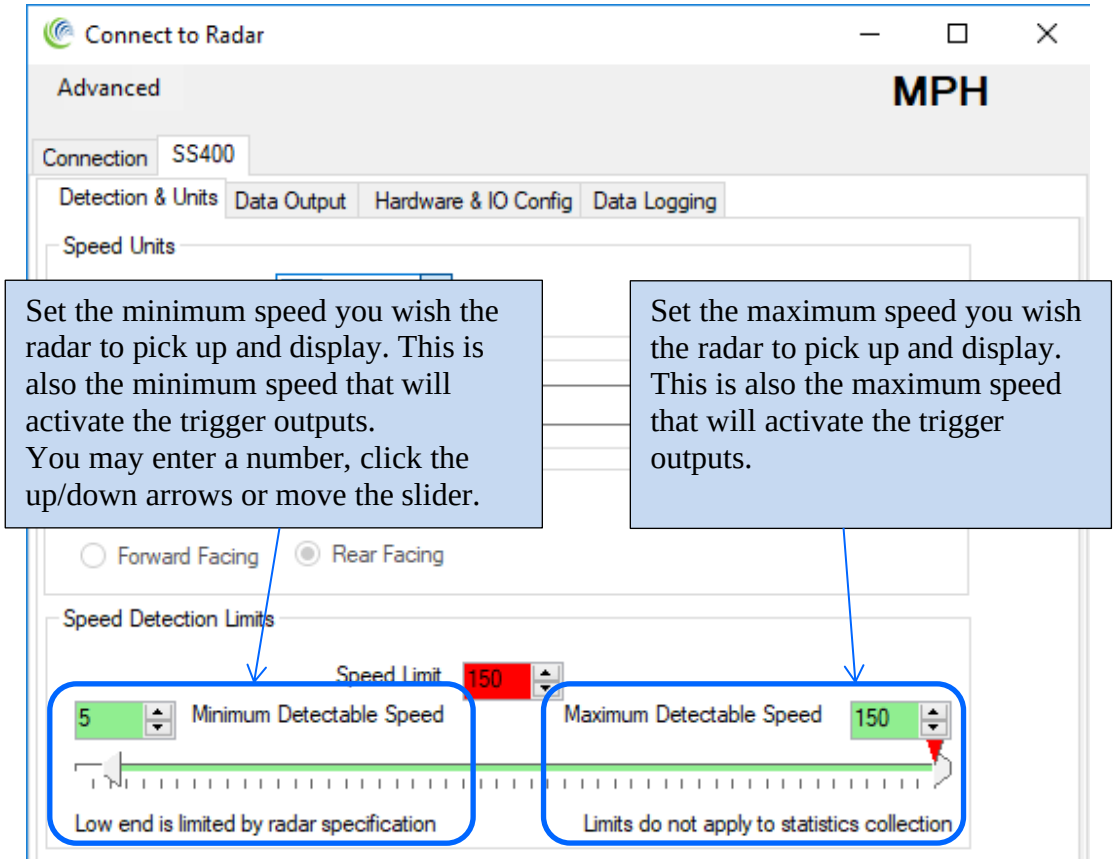
3. **Demo Mode**
   In this mode the radar will simulate detection of different targets and output their speeds. This is a useful mode for demonstration purposes (especially when the radar is connected to a sign), for example at a trade show.

4. **Ground Speed Measurement Mode** (*Future. Contact us for details*)
   In this mode the radar will measure the speed of the ground and output it over the serial port. This is useful to measure the ground speed of the vehicle the radar is mounted on. No other targets are detected and the ground is tracked as the only target.

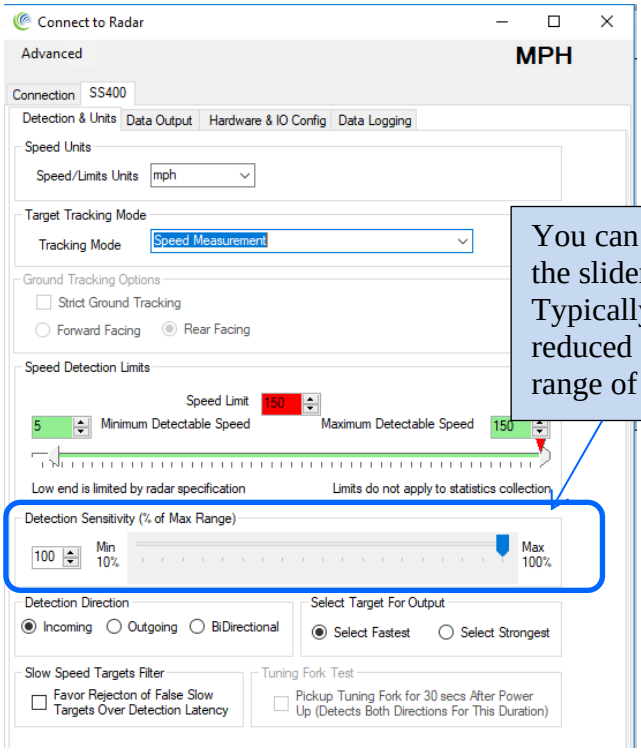
STEP 5: Set the radar cutoff speeds (low and high speed cutoff)

Cutoff speeds affect the measurement range for sending speed out over the serial port and activation of the hardware trigger outputs.

Cutoff speeds do not affect collection of traffic statistics in the radar. Traffic statistics are always collected over the entire measurement range of the radar. Thus you can put the radar (or sign) in "stealth mode" by setting the low and high cutoff speeds to the maximum value. This will prevent the activation of the sign, but still allow the radar to collect and save traffic statistics (stats collection option purchase required. Not available in SS400U ultra-low speed radar). Note: The minimum and maximum speeds the radar will measure are limited by the specifications of the radar.

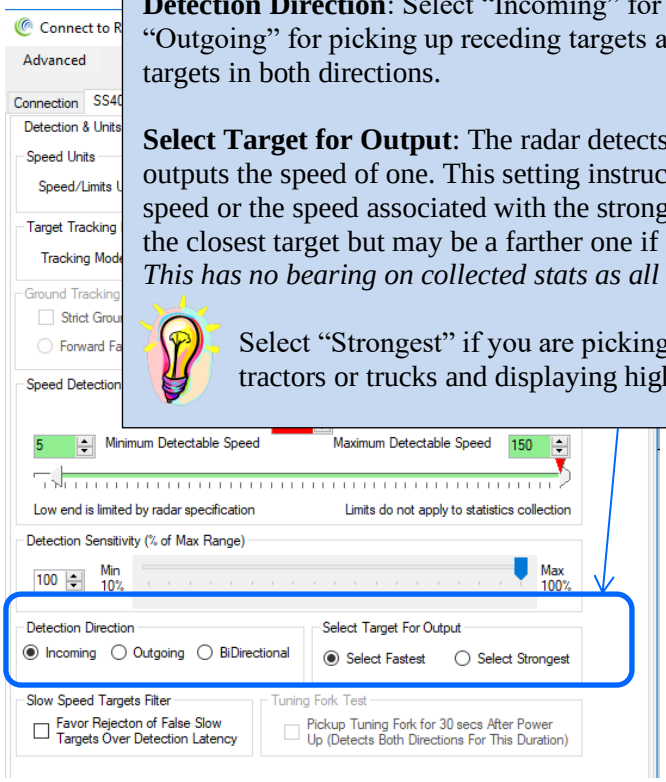


STEP 6: Set Detection Sensitivity



You can adjust the radar sensitivity via the slider or the numeric up/down. Typically the sensitivity may need to be reduced if you need to restrict the pickup range of the radar.

STEP 7: Set Detection Direction & Target Selector

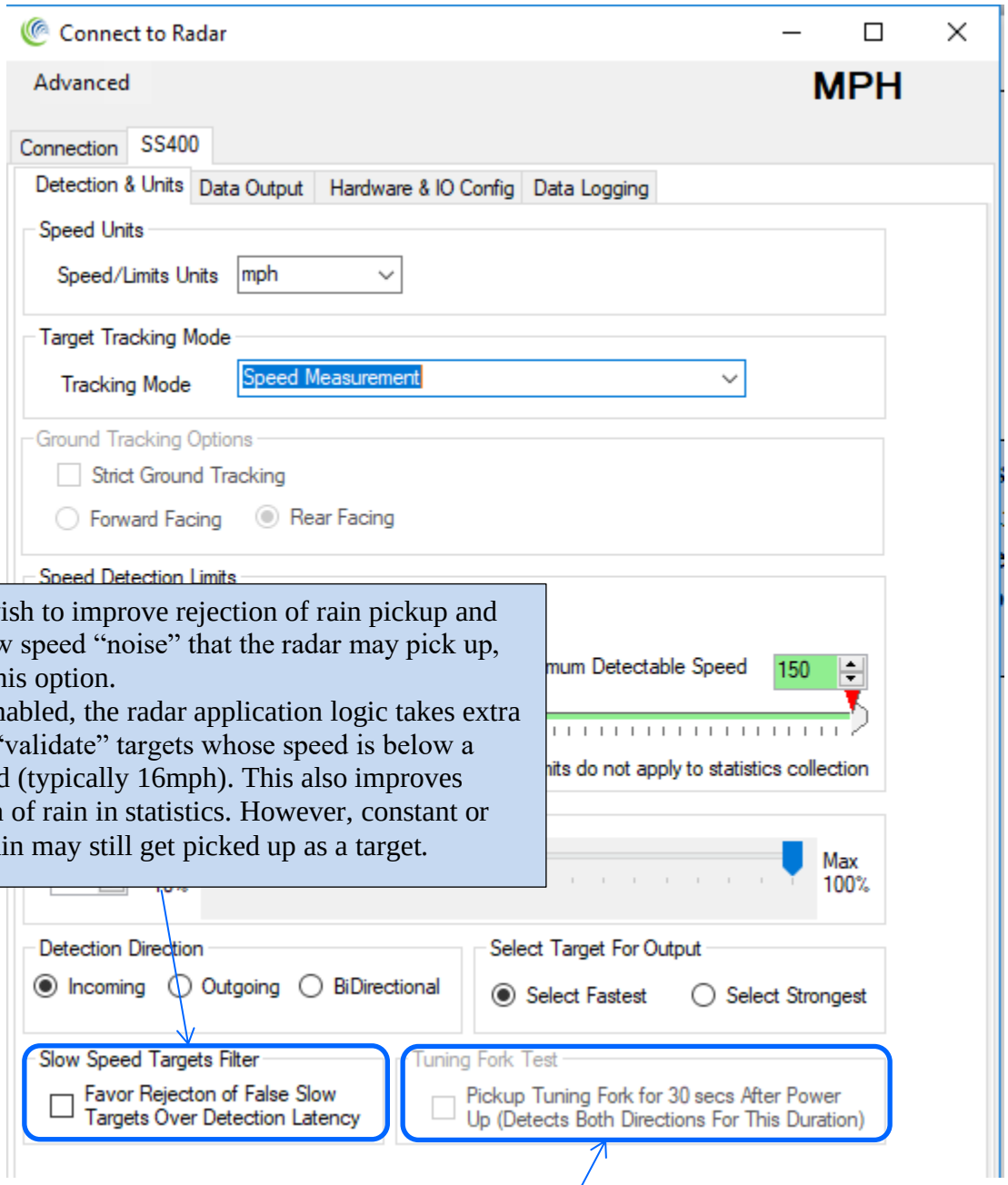


Detection Direction: Select "Incoming" for picking up approaching targets, "Outgoing" for picking up receding targets and "Bi-directional" for picking up targets in both directions.

Select Target for Output: The radar detects multiple targets internally, but only outputs the speed of one. This setting instructs the radar to pick either the fastest speed or the speed associated with the strongest return signal which is typically the closest target but may be a farther one if it is significantly larger (E.g. truck). *This has no bearing on collected stats as all internal targets are used for logging.*

Select "Strongest" if you are picking up the wheels of large vehicles like tractors or trucks and displaying higher speeds than expected.

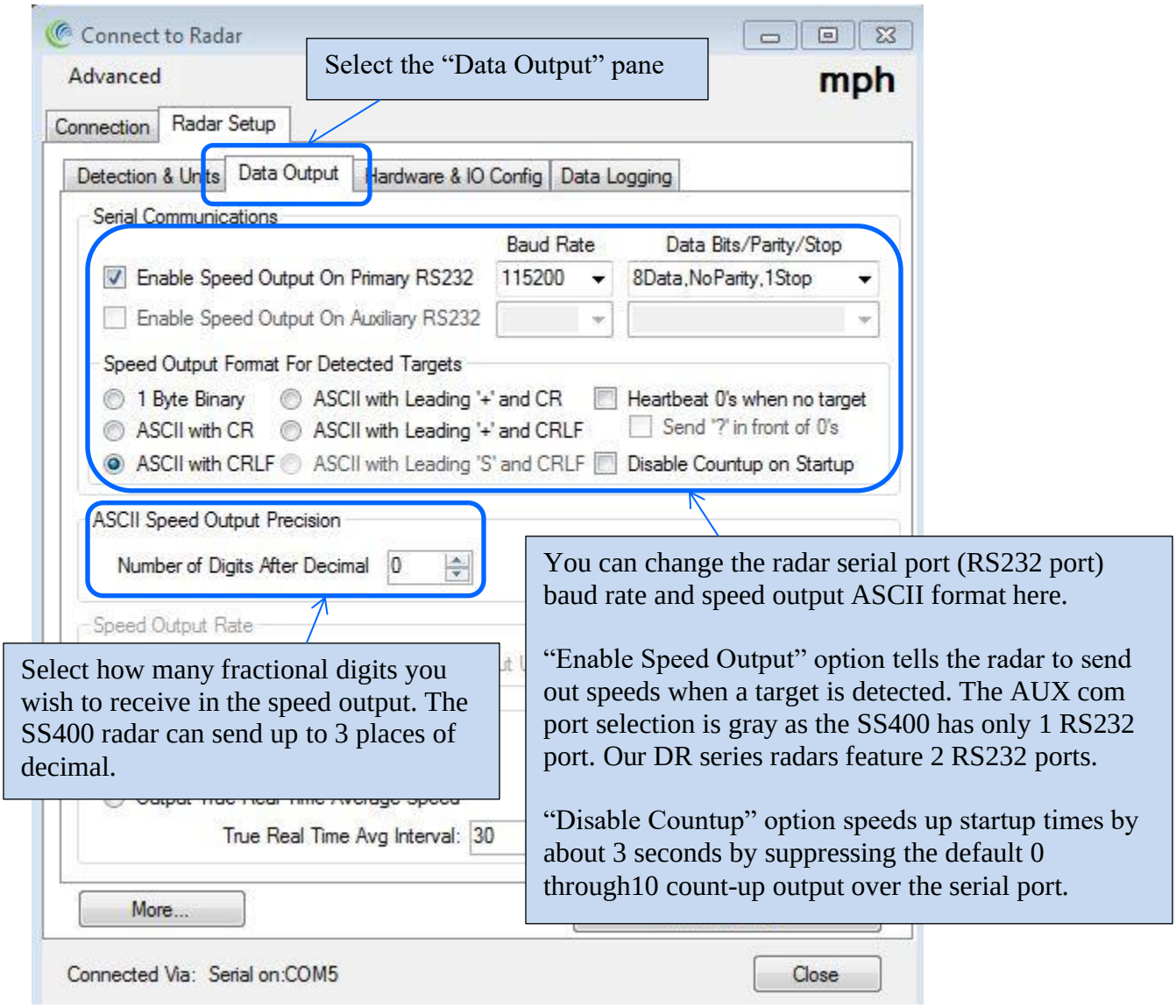
STEP 8: Set "Slow Speed Targets Filter" and "Tuning Fork Mode



If you wish to improve rejection of rain pickup and other low speed "noise" that the radar may pick up, enable this option.
When enabled, the radar application logic takes extra long to "validate" targets whose speed is below a threshold (typically 16mph). This also improves rejection of rain in statistics. However, constant or heavy rain may still get picked up as a target.

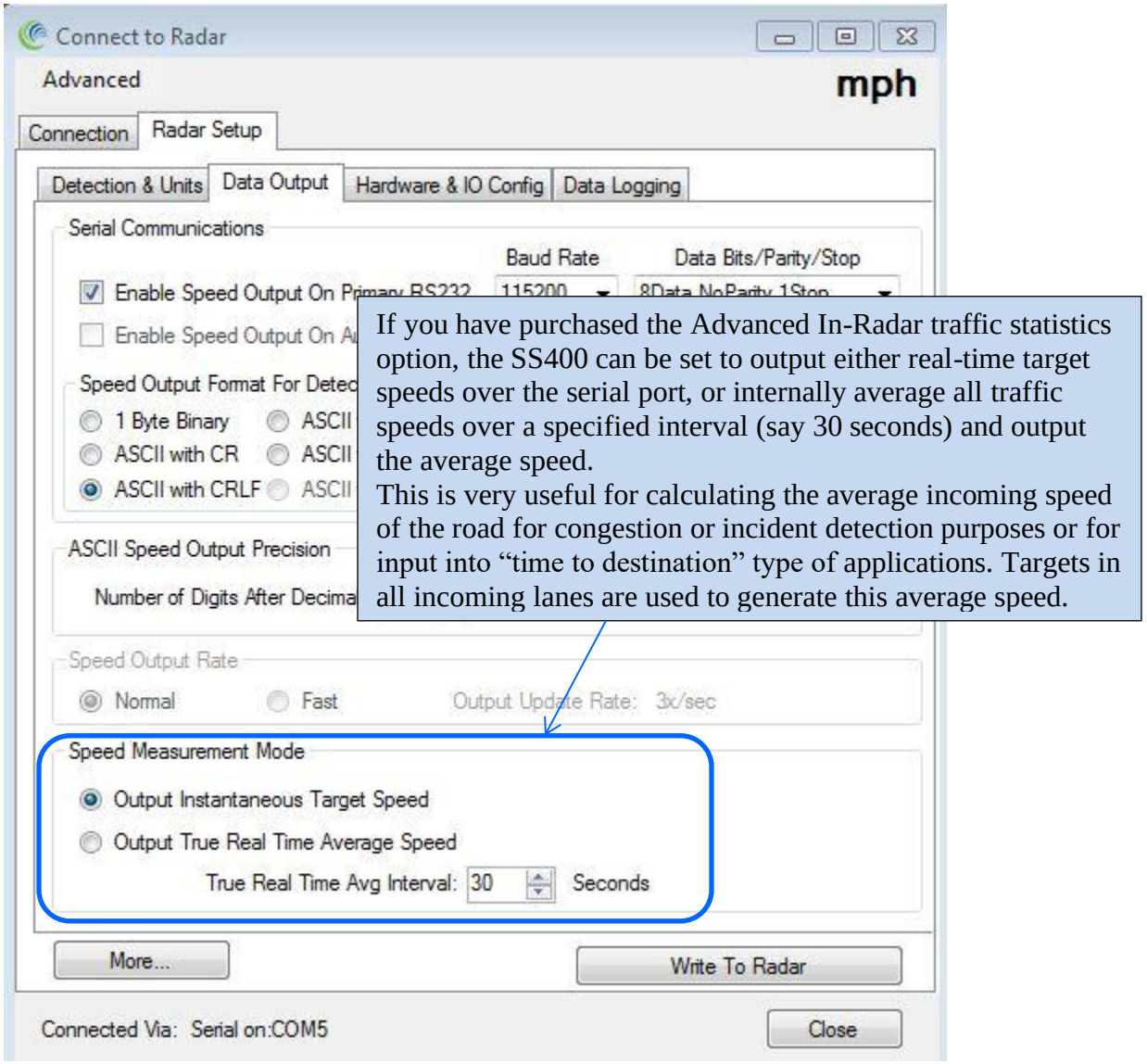
Directional Doppler radars typically reject tuning forks as they do not appear like a true moving target.
If you wish to use a tuning fork to activate the radar for testing purposes, enable this option (if available in the firmware). This will disable direction selectivity for the first 30 seconds after a power up making tuning fork pickup possible.
The radar will automatically revert to normal operation after this time. To renter tuning fork mode, power-cycle the radar again.

STEP 9: Setup Baud Rate, ASCII Format and Output Precision



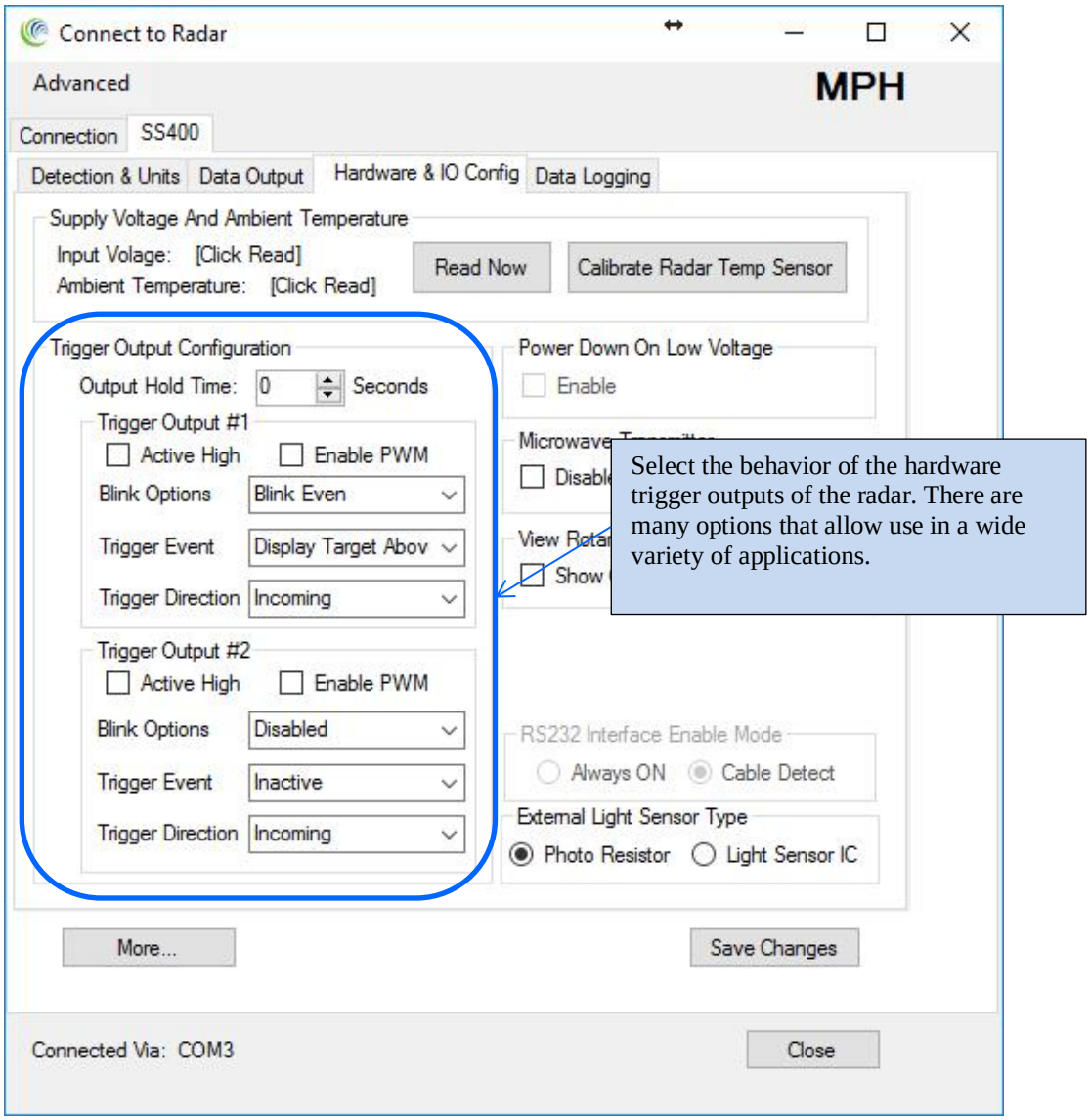
STEP 10: Select Speed Measurement Mode

This configuration is only available if you have purchased the 'Advanced In-Radar Traffic Statistics' option in the radar. This option may be purchased and activated at any time. Contact us for more details.



STEP 11: Configure the trigger outputs

Start by clicking on “Hardware & IO Config” Tab.



The SS400 has two hardware “open drain” trigger outputs that may be used to trigger an external device or turn on 1 or 2 LED lamps to make a stand-alone speed enabled flasher or VATCS (Vehicle Activated Traffic Calming Sign). Enable one or both the outputs and they will be activated if a speed is detected between the low and high speed cutoff values (set on the “Detection & Units” tab).

Output Hold Time: Set a value here if you want to hold or extend the trigger when it’s activated. This is useful to turn ON an external device for a minimum amount of time when triggered by the radar.

Active High: When “checked” trigger output will be released. Use ~4K to 10K external pull up resistor to pull up to whatever voltage you desire (max 28 VDC). When unchecked, trigger output will pull this external resistor down to GND (supply voltage negative/return wire).

Enable PWM: Check this box if you have a LED lamp connected to the output and wish the radar to adjust the brightness based on ambient light. You will also need to connect a light sensor to the SS400 to measure the light.

Blink Options: Check this box if you want to make a flasher. The lamp connected to the trigger output will blink when measured speed exceeds the "speed limit" setting. When this box is checked, you can set this limit on the "Detection & Units" tab.

Triggers can be configured to blink on alternating cycles by selecting "Blink Even" and "Blink Odd"

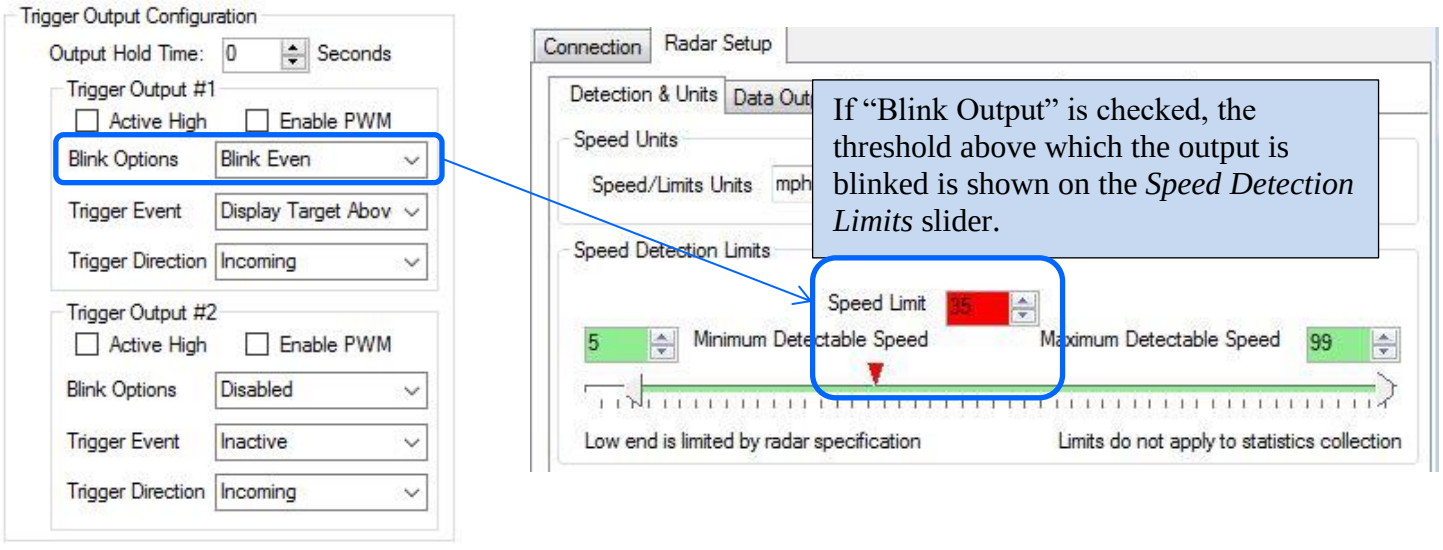
Trigger Event: Select what event triggers the output

Inactive: Output is not triggered
Display Target Above Speed Limit: Target Speed is greater than SP variable value ("Speed Limit" on Detection tab).
Display Target Below Speed Limit: Target Speed is less than "Speed Limit".
Any Display Target: Any target is detected.

Trigger Direction: Select what direction target triggers the output

Incoming: Only an incoming target triggers this output
Outgoing: Only an outgoing target triggers this output
Bidirectional: Any direction target triggers this output

"Blink" Output Details:

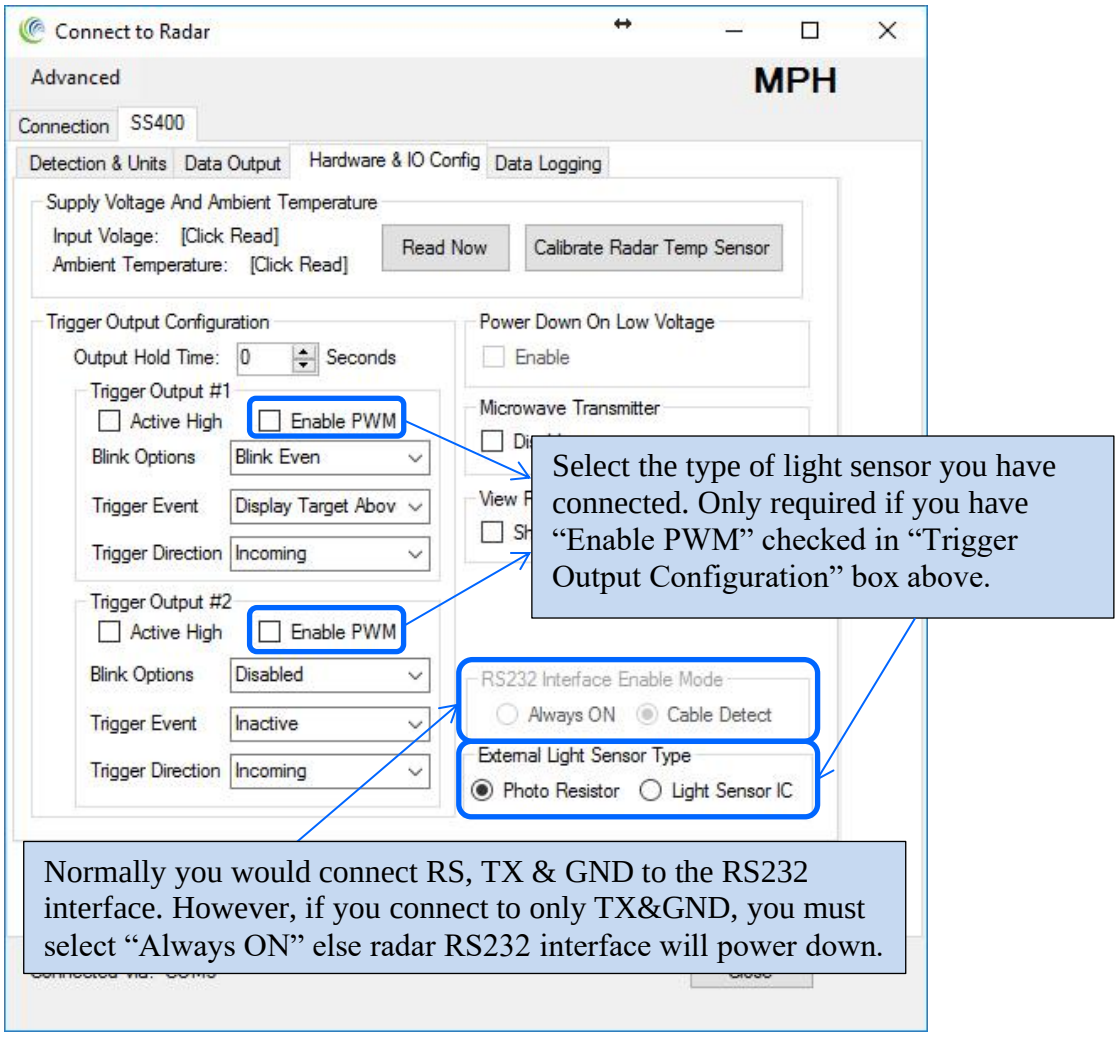


STEP 12: Select the light sensor type

If you selected to have the radar control your attached LED lamp's brightness, you must attached an external light sensor. The radar will then measure the ambient light via this sensor and adjust the "ON" duty cycle via PWM (pulse width modulation). This is done with a frequency of 180Hz so that the attached lamp does not appear to be flickering. There are two types of sensors that may be used, LDR (light dependent resistor) or "IC". The LDR is much easier to use and mount and available as a flange mounted weatherproof unit from us. The IC type sensor is more linear and calibrated to the human eye, but requires you to place it on an external PCB as it is a fine pitched SMT IC.

STEP 13: Select RS232 (serial data output) mode

The SS400 radar turns off the internal RS232 serial driver if it does not detect any RS232 voltage level on the RX pin. It automatically powers this chip back up once you plug in a RS232 cable. This saves about 5 to 10% power when you are not connected to the device. However, if you must use the RS232 interface in TX only mode (e.g. connected only RS232 TX and GND to your microcontroller), you must configure the RS232 interface to be "always ON".



STEP 14: Disable microwave transmitter (testing only)

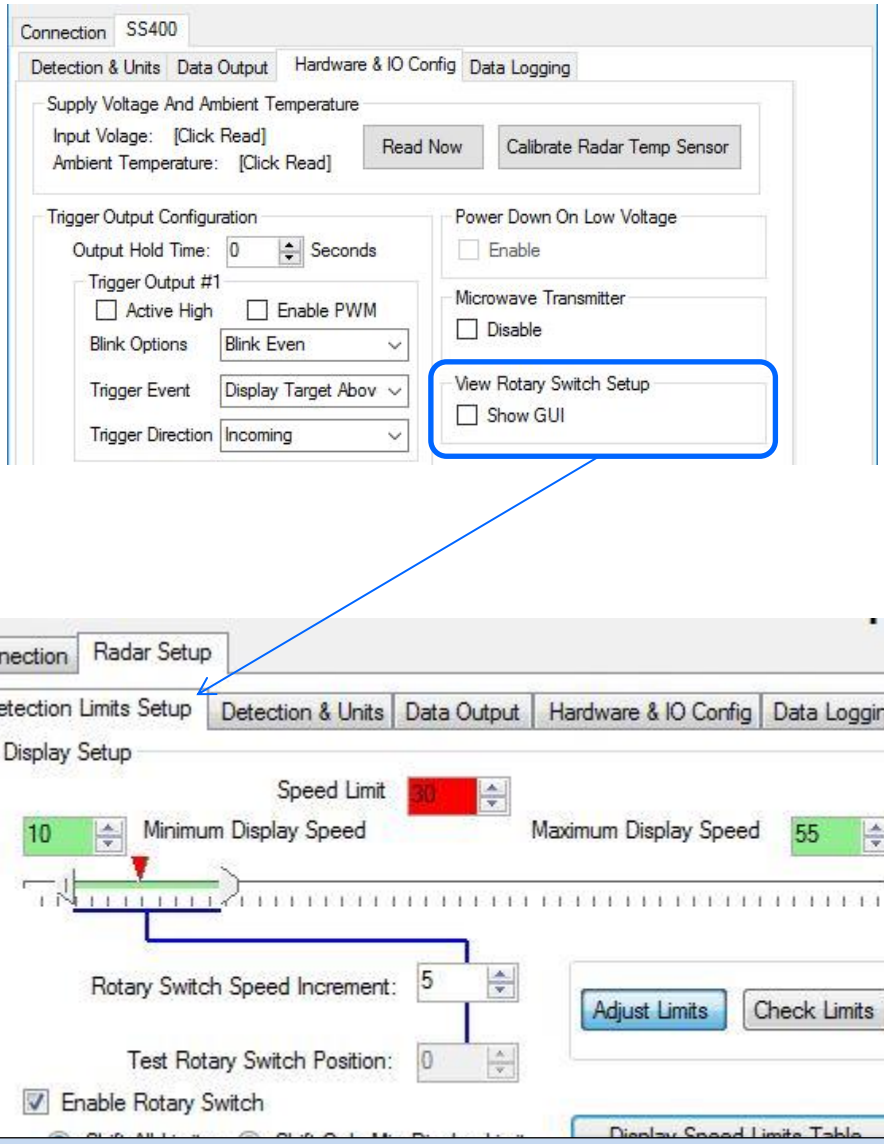
Check this box in case you wish to turn off the microwave transmitter. This will prevent normal operation of the radar and is provided only for testing purposes.

STEP 15: Show Rotary Switch GUI (if rotary switch connected)

The SS400 radar measurement speed limits (including the blinking speed limit) may be set/changed in the field via a convenient rotary switch. This avoids having to connect a computer to the radar/sign to make this change.

This rotary switch is present on the optional IO Breakout board or you may use your own switch.

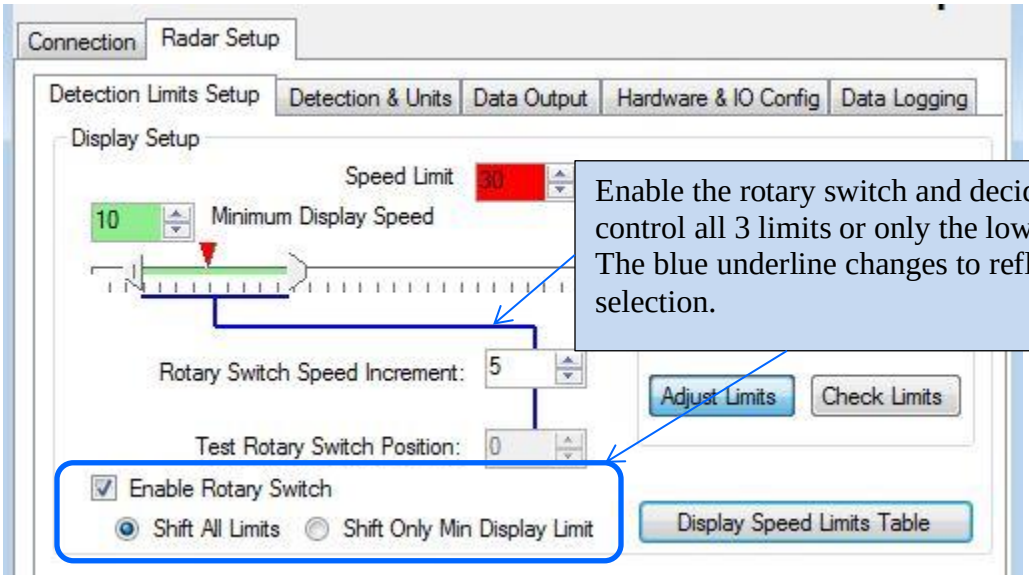
However, you must first setup the radar to use this rotary switch. If you wish to use this feature, check the "Show Rotary Switch GUI" to bring this interface up.

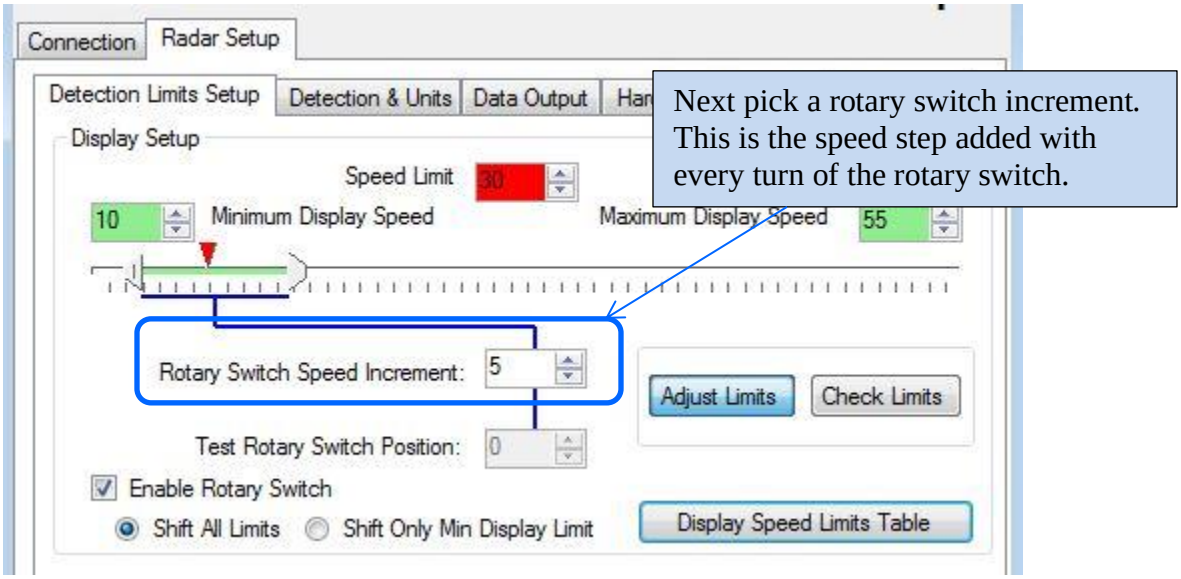


The above GUI interface is shown when you check the "Show Rotary Switch GUI" checkbox. You can now enable the rotary switch and set the limits as explained below.

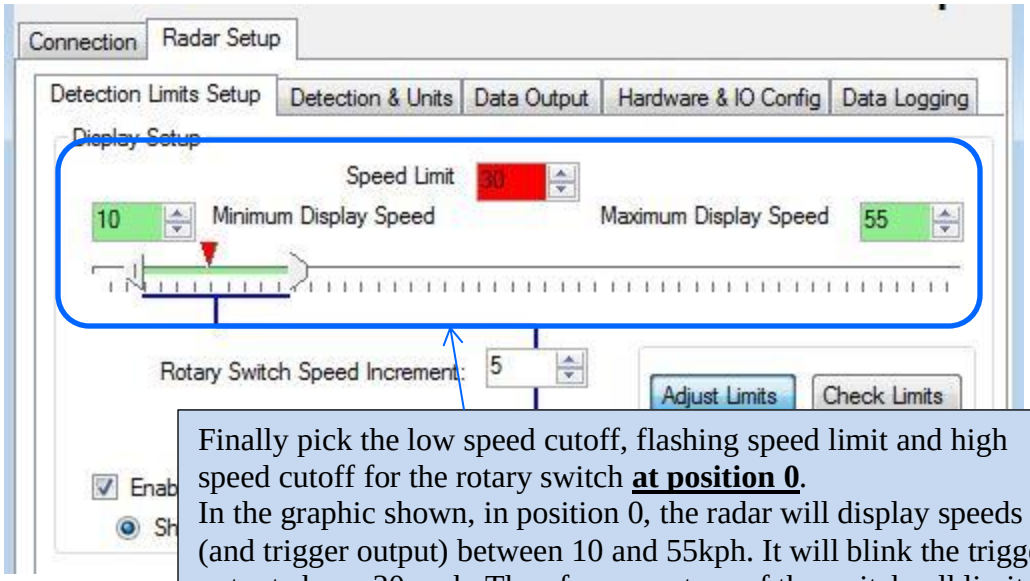
STEP 16: Using the Optional Rotary Switch GUI

(Applicable only if you wish to use a rotary switch on the optional "breakout board").

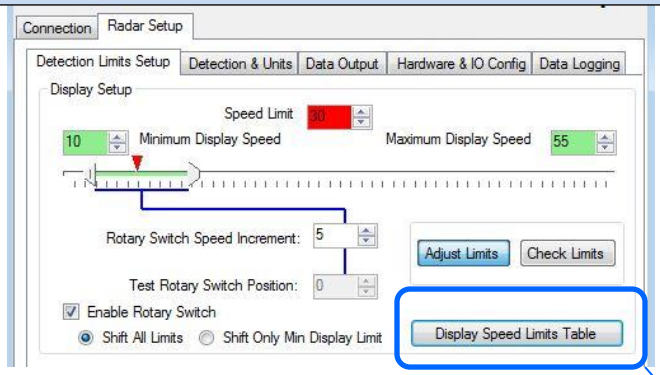


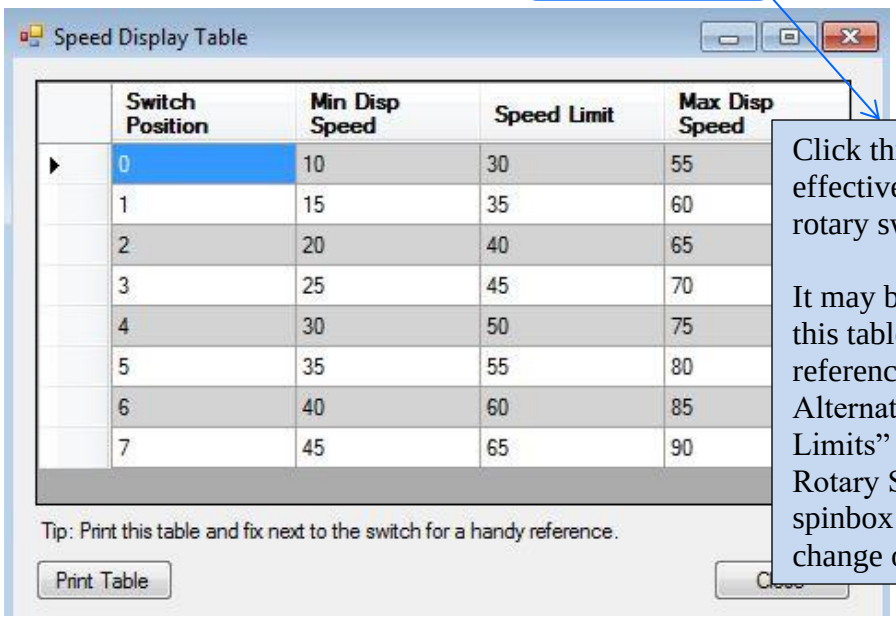


Rotary switch GUI setup continued…



Finally pick the low speed cutoff, flashing speed limit and high speed cutoff for the rotary switch **<u>at position 0</u>**.
In the graphic shown, in position 0, the radar will display speeds (and trigger output) between 10 and 55kph. It will blink the trigger output above 30 mph. Then for every turn of the switch, all limits will be shifted up by 5mph (the increment value).

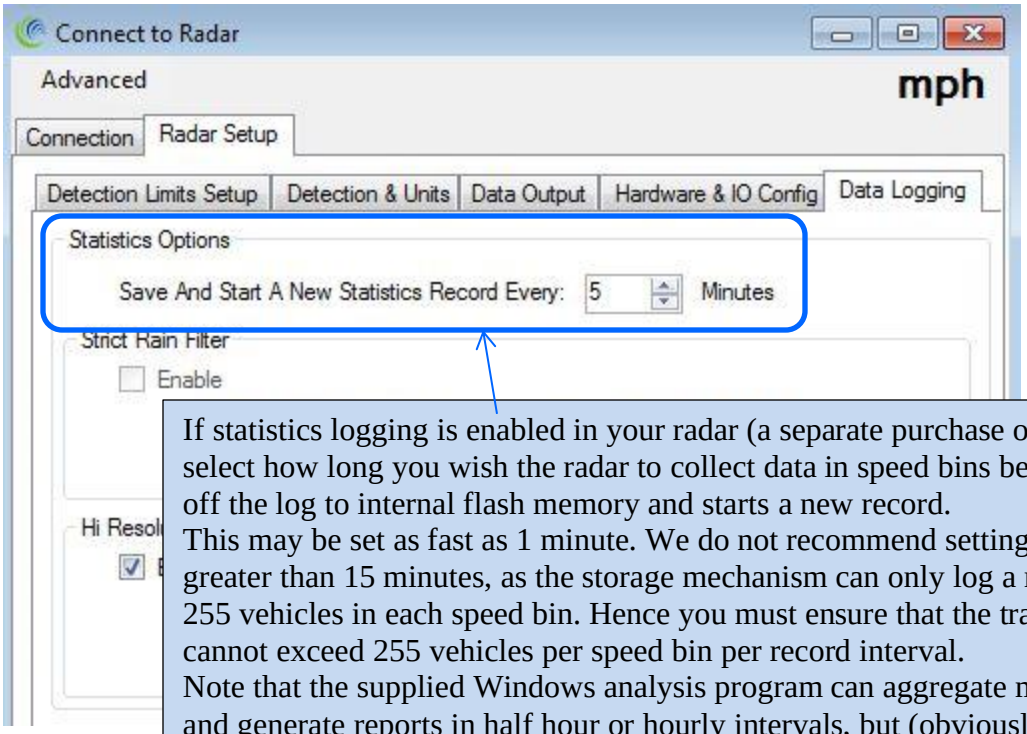




Click this button to display the effective limit values when the rotary switch it turned.

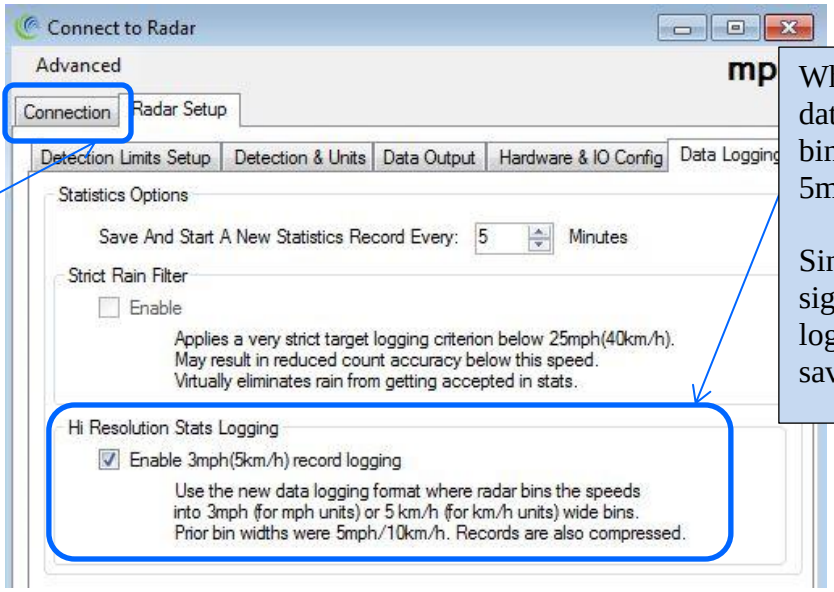
It may be convenient to print this table and use it as a handy reference in the field. Alternatively, click “Check Limits” and turn the “Test Rotary Switch Position” spinbox and see the limits change on the GUI.

STEP 17: Optional Advanced In-Radar Traffic Statistics logging



If statistics logging is enabled in your radar (a separate purchase option), select how long you wish the radar to collect data in speed bins before it saves off the log to internal flash memory and starts a new record.
This may be set as fast as 1 minute. We do not recommend setting this to greater than 15 minutes, as the storage mechanism can only log a maximum of 255 vehicles in each speed bin. Hence you must ensure that the traffic density cannot exceed 255 vehicles per speed bin per record interval.
Note that the supplied Windows analysis program can aggregate multiple bins and generate reports in half hour or hourly intervals, but (obviously) it cannot disaggregate longer bins into finer resolutions once the data has been saved in the radar. The table shows the tradeoff between logging interval and storage space.

Record Interval (min)	Number of Days Before Rollover
1	12
5	60
10	120
15	180
30	360



Stored records may be read by clicking on the "Read Traffic Stats From Radar" button location on the "Connection" tab

When this option is enabled, data is binned in 3mph/5km/h bins rather than 5mph/10km/h bins.

Since, this generates significantly more data; the logs are also compressed to save space in flash memory.