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2.4 – Understanding Bicycle data collection with the Omega X3 or Omega-G

The Omega X3 and Omega-G are specially designed to be bicycle data collectors, while at the same time maintaining the ability to handle regular vehicles driving over the road tubes. There are three basic situations where road tubes are used with the Omega X3/G:

1. **Vehicles Only** – In this situation, road tubes are placed across one or more regular vehicle traffic lanes and you want to collect vehicle traffic counts. The Omega X3/G calls this the "Normal" Axle Collection mode.
2. **Bicycles Only** – This is where road tubes (usually shorter ones than with vehicles) are placed across a single or dual lane bike path and you want the Omega X3/G to record each time a bicycle crosses the tubes. This is the ideal situation for the "Enhanced" Axle Collection mode of the Omega X3/G.
3. **A mixture of Vehicles and Bicycles are crossing the tubes and you want to collect just Vehicles, just Bicycles, or Both/Mixed at the same time** – This situation is the most complex and difficult, both for the Omega X3/G and for the user. The counter has three different Axle Collection Modes for this situation that are called: "All/Mixed" (when you want to collect both vehicle and bicycle data and you want the Omega X3/G to figure out which hits on the tubes are which), "Vehicle Only" (when you want the Omega X3/G to only report those hits on the tubes which come from vehicles), and "Bicycle Only" (when you want the Omega X3/G to only report those hits on the tubes which come from bicycles).

When collecting data in situation #1 (**Vehicles Only**), you have a lot of setup flexibility. The basic process is:

- ❑ Set the counter to "Normal" mode (more on how to do that in the next section below).
- ❑ Connect up standard road tubes (natural or synthetic, usually 9/16" OD/1/4" ID) that can be anywhere from 20' to 100' long, with the ideal around 60' to make sure you don't miss any really light axles.

This configuration works excellent with almost every regular vehicle traffic counting situation. You can use a variety of road tube types and lengths, although you should always use the same length of road tube when using two tubes in a lane (to make sure speed/length accuracy is not compromised). A bicycle crossing the tubes is unlikely to be detected, unless it crosses the tubes close to the Omega X3/G.

Situation #2, **Bicycles Only**, is also fairly simple. The basic process is:

- ❑ Set the counter to "Enhanced" mode. This mode differs from the Normal mode in that it is more sensitive and can detect very light hits on the road tube.
- ❑ Connect up standard road tubes (natural or synthetic, usually 9/16" OD/1/4" ID). The length should be as short as possible. Anything over about 30' when using 9/16" tube will likely miss very light or slow bicycles.
- ❑ Although the Omega X3/G is very sensitive, there are situations where a bicycle axle may be missed. Typically, if someone goes very slowly over the tube or if that person/bike is very light, they may be missed by the Omega X3/G. This situation can be improved by using shorter tubes, narrower tubes (3/8" instead of 9/16"), and even putting a plug in the far end of the tube can help. It is also important to put the tubes over a hard, even, surface for maximum effectiveness. Users are encouraged to experiment with different lengths for their sites.

Situation #3, **where there is a mix of vehicles and bicycles,** and you want the Omega X3/G to determine which hits on the tube are vehicles and which are bicycles is the most complex setup. The basic process is:

- ❑ Set the counter to "All/Mixed", "Bicycle Only", or "Vehicle Only" mode depending on what you want to collect. Each of these modes uses the same improved sensitivity of the "Enhanced" mode, but takes the extra step to analyze the strength and other characteristics of the road tube hit to make a determination of the type of device which made the activation.
- ❑ Road tube length is *very critical*. The goal is to set the length so that a bicycle is not too strong (i.e. a fast moving bicycle hitting a road tube at 15' looks pretty much identical to a car), but is not too weak so the Omega X3/G misses it. Many users will likely need to play around with road tube type & length versus the type of surface versus the speed of the bicycles to come up with an ideal road tube length.
  As a place to start, set a tube at 30' with the bicycles and vehicles all hitting in the ending 10' of the tube.
- ❑ Road tube length can, and likely will, need to be adjusted so that bicycles and vehicles are correctly identified.
- ❑ When in the modes "All/Mixed", "Bicycle Only", and "Vehicle Only" you can tell on the display of the counter or in Centurion which axle hits are bicycles and which are seen as vehicles. On the counter display, bicycles are displayed in inverted characters (white on black), and in Centurion bicycles are displayed in white on green background. This helps to dial in your road tube lengths and make sure you get the counter setup to collect data in the best way for your sites.

Note that it is always best to put the tubes where bicycles and/or vehicles are free flowing and moving quickly. Stop-and-go traffic and very slow traffic is much harder to detect reliably, which makes setting the ideal road tube length more difficult.

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For specific instructions on how to setup the Omega X3/G to collect data in one of the five Axle Collection modes (Normal, Enhanced, All/Mixed, Vehicle Only, and Bicycle Only), refer to the next page. For a more detailed description of each of the modes, see below:

- **Normal Mode** / **O.C. Input** – This mode uses only hardware to detect axles from vehicles striking the tubes, or to accept Open Collector (or "O.C.") inputs from a remote source like a passive Infra-Red sensor. This mode operates the Omega X3/G in exactly the same way other Diamond Traffic counters detect axles, and is especially useful for customers who are only collecting vehicle data and do not care about bicycle detection. Normal mode does not detect bicycles reliably, but is excellent at vehicles and is also very low power in comparison to the other collection methods.
- **Enhanced** – This mode switches the Omega X3/G from a strictly hardware detection of road tube hits to a process called Analog to Digital (or "A/D") conversion to detect axles. The word "Enhanced" means that the counter is using advanced logic and scanning the road tube sensor at more than a thousand times per second to see if there is any activity. When a change is detected in one "sample" of the sensor, the counter records the amount of change in real time to its internal memory (this is referred to as "capturing the signal").

  From there advanced signal processing algorithms take into account the strength, width, average, and other aspects of the captured signal. When it meets certain programmed criteria, the Omega X3/G reports an axle has been detected. This process is much more sensitive than the straight hardware method of the "Normal" mode, and for this reason it is ideal for bicycle only data collection. "Enhanced" does draw more power than "Normal" mode (because it uses active A/D processing), and is slightly less accurate for speed calculations, so it should only be used in situations where it is required.

  There is a small disadvantage of using "Enhanced" mode to collect bicycle data in that the data itself is not specifically marked as "Bicycles". This means that in later processing Centurion does not know this is bicycle data, so it isn't shown in the special way bicycle data is shown with the other modes. However, "Enhanced" mode is easier to use than the other modes for collecting bicycle data and as such many users prefer it despite this difference.
- **All/Mixed** – When this mode is selected, the Omega uses the same improved A/D process that "Enhanced" uses to detect axles. However, it takes it a step further and looks at the captured signal to determine if a particular road tube hit came from the tire of a "Bicycle" or a "Vehicle".

  While in "All/Mixed" mode, 2 bytes of data are added to every hit that is stored in the data file. These extra bytes indicate if the axle was a bicycle or a vehicle, and also store the peak signal received from the strike (or optionally the average signal received, see below).
- **Vehicle Only** – This uses the same improved A/D process that "All/Mixed" uses, except that *only* those activations that are determined to be from a vehicle road tube hits are displayed, counted on the totals screen, and shown in Centurion. This does not actually affect the data storage, ALL the hits (bicycles included) are stored in the data file to preserve the integrity of the data and to give the customer the option of recovering bicycle data later on. When Centurion processes the data, the bicycle hits will be stripped out automatically in "Vehicle Only" mode unless otherwise selected by the user.
- **Bicycle Only** – Just the reverse of "Vehicle Only", *only* the axle hits that are determined to be bicycles are displayed on the counter screen and shown in Centurion when monitoring the counter. All hits are still stored in the data file, with Centurion automatically stripping out the vehicle hits during post processing unless otherwise selected by the user.

As previously mentioned, road tube length selection is important for getting quality data to the Omega X3/G. It is recommended that customers perform some initial testing with various lengths and types of road tubes placed in different situations to determine their ideal requirements before primary data collection begins.

As a base guide, the following lengths are a good place to start when using 9/16" O.D. synthetic road tube:

Type of Data You Are Collecting	*Best Mode*	*Road Tube Length*
Vehicles on standard roadways	Normal / O.C. Input	60' ideal (20'-100' range)
Bicycles on a bike path	Enhanced Mode	20' ideal (10'-35' range)
A mix of vehicles and bicycles, and you want the counter to identify and separate them into two different datasets	All / Mixed	30' with vehicles and bicycles hitting last 10' (one lane only!). Go shorter if missing bicycles. Go longer if bicycles are being misidentified as vehicles.
A mix of vehicles and bicycles and you only want the data from the vehicles	Vehicles Only	
A mix of vehicles and bicycles and you only want the data from the bicycles	Bicycle Only	

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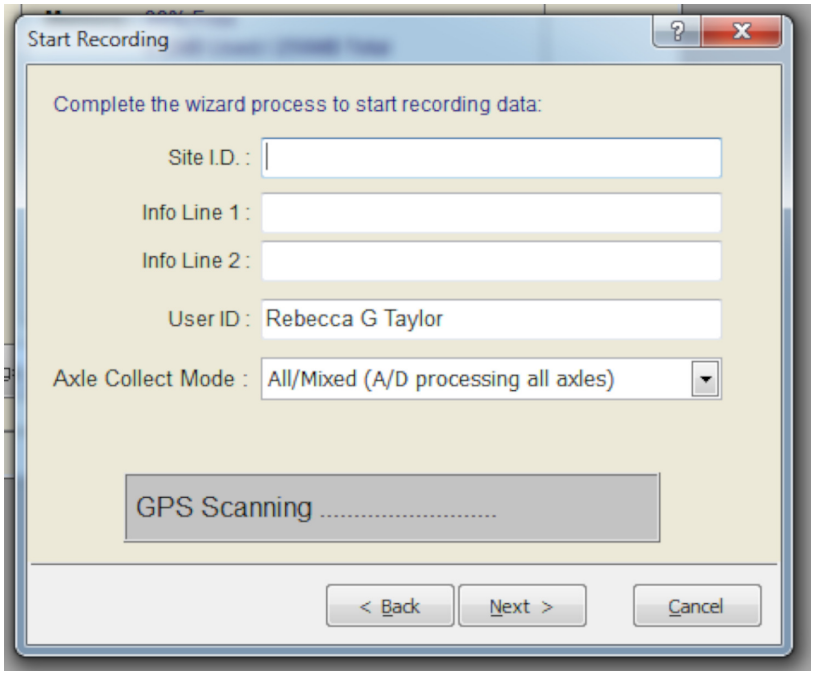
Programming the Omega X3 or Omega-G to collect Bicycle and Vehicle Data:

1. Make sure you are using Centurion V1.42 Build #0015 (or later) before connecting to the Omega X3, or Centurion V1.44 Build #0001 (or later) before connecting to the Omega-G.
2. Plug the Omega X3/G into your computer USB port and connect using Centurion.
3. Make sure your Omega X3 has internal firmware V1.30 (or later) installed. If you have a version less than V1.30, contact Diamond for instructions on how to update it before proceeding. All versions of the Omega-G are fully functional.
4. By default, Centurion will ask if you want the simple or advanced interface the first time it links to an Omega X3/G. Select the advanced interface (which is needed for proper bicycle data setup). If the simple interface has already been selected, you can switch to the advanced version by clicking the "Advanced Setup" button after the simple interface displays. You can also permanently change to the advanced window by going into File->Preferences->General and unchecking the box on the "General" tab that says "Use Omega X3 'Simple' Interface" or "Use Omega-G 'Simple' Interface".
   NOTE: All of the following instructions presume you are using an Omega X3 and the advanced setup screens. Setup is identical for the Omega-G (with the change of only allowing two road tubes).
5. From the factory, the Omega X3/G defaults to not asking the "Axle Collect Mode" and is preset to "Normal/O.C.". To turn on the Axle Collection Mode question so you can change it, you must:
   - Click **Settings** and then click **Collection Opt**.
   - The third question on this window is "Hide asking Axle Collection Mode during Start Collection". Make sure this box is unchecked.
   - Click **Ok** to save the changes.
6. To begin collecting data that is either Enhanced, Bicycle only, Vehicle Only, or a combination of the two (All/Mixed), click the **Start Recording** button. The following screen will appear:



7. Notice the question: **Axle Collect Mode**. For users who don't care about identifying bicycles and vehicles, you can use the "Normal Mode" (if collecting vehicle data) or "Enhanced" mode (if collecting bicycle data). If you want to determine if each hit is a bicycle or a vehicle, set this to "All/Mixed", "Vehicles Only", or "Bicycles Only" depending on what you want to collect.
   For now, set it to "All/Mixed".
8. If you are outdoors and want to wait for a GPS location fix, wait for the "GPS Scanning …" box to change to show "Locked!"
9. Click **Next** to continue to testing step.

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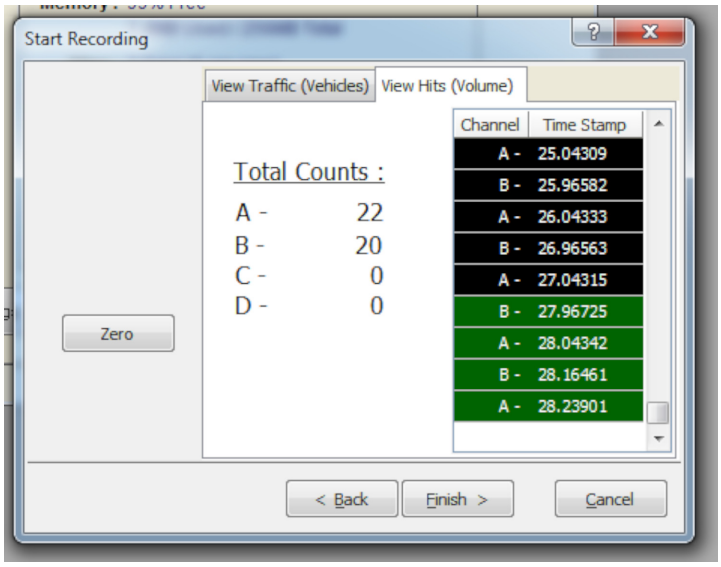
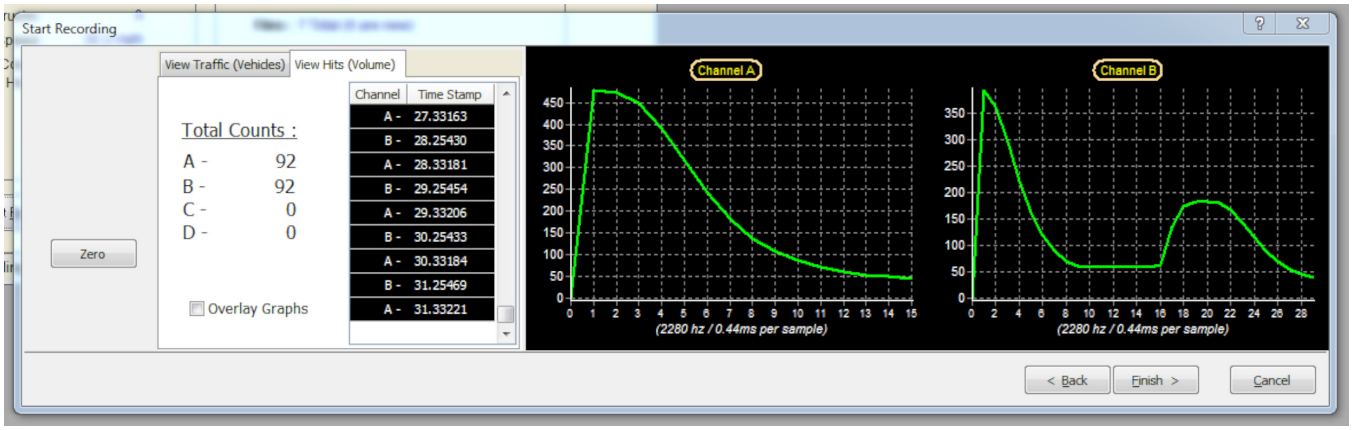
10. Watch as vehicles or hits cross the tubes. Since you are in "All/Mixed" mode, any road tube axle strike that is determined to be a Vehicle will appear in the box as White on Black, any strike that is determined to be a Bicycle will appear as White on Green. For example:

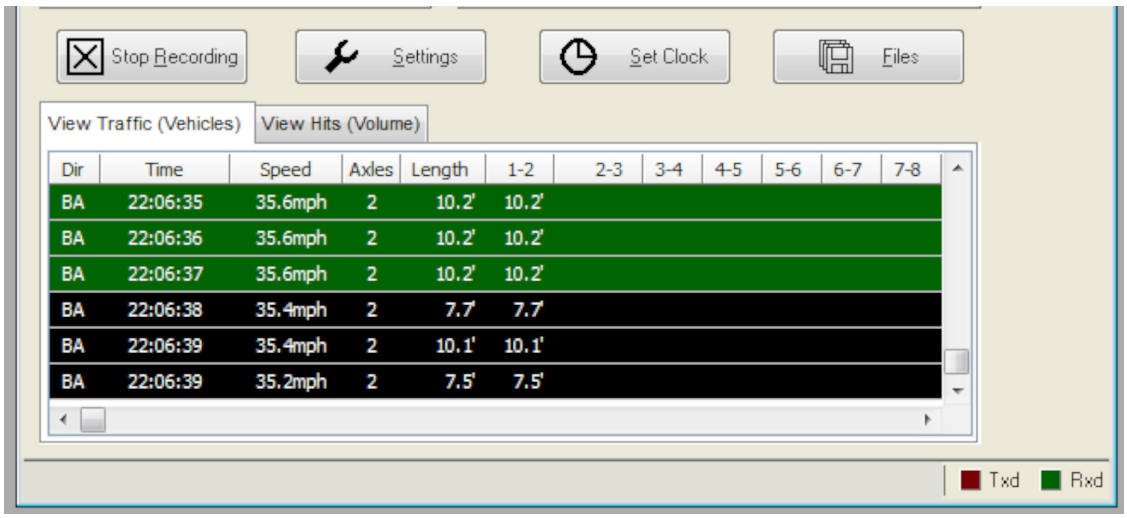


Vehicles are shown as White on Black, Bicycles are shown as White on Green.

The previous image shows the hits were all vehicle until a bicycle hit the tubes (going in the B->A direction). You can also view the actual signals received from the A/D processor by right clicking on any of the "Total Counts" values and selecting individual channels to display or all the channels. If you selected Channel A and B, you would see a screen similar to the following:



Once data collection has started, the bottom of the link screen shows a similar view of data with the same color scheme (Vehicles as White/Black, Bicycles as White/Green):



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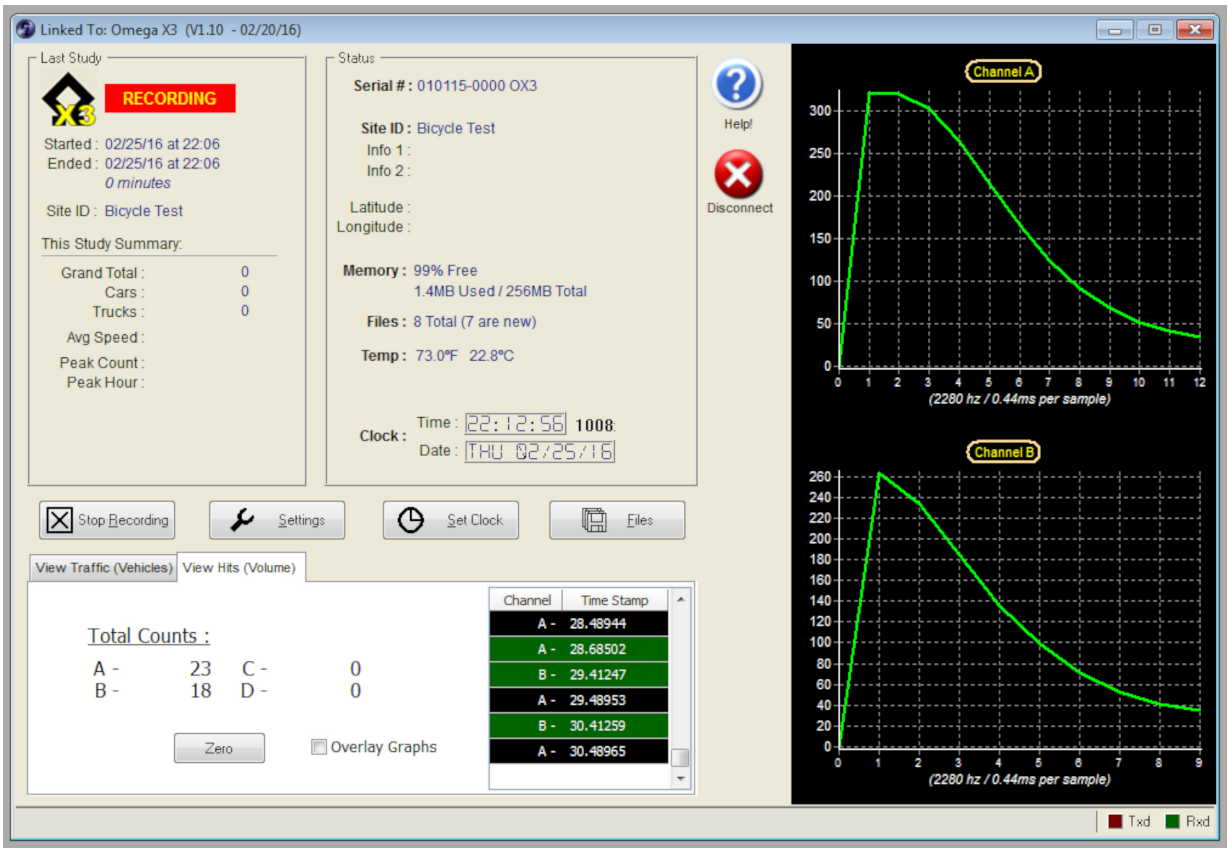
Also while data collection is active, you can click the “View Hits (Volume)” tab and then right click on any of the “Total Count” values to enable/disable viewing the full A/D signature. For example:



11. If the Omega X3/G does not identify bicycles and vehicles correctly, you likely need to adjust your road tube lengths. You may also need to modify some of the parameters in the analysis algorithm (although this is rare). Contact Diamond Traffic for more information on this process.

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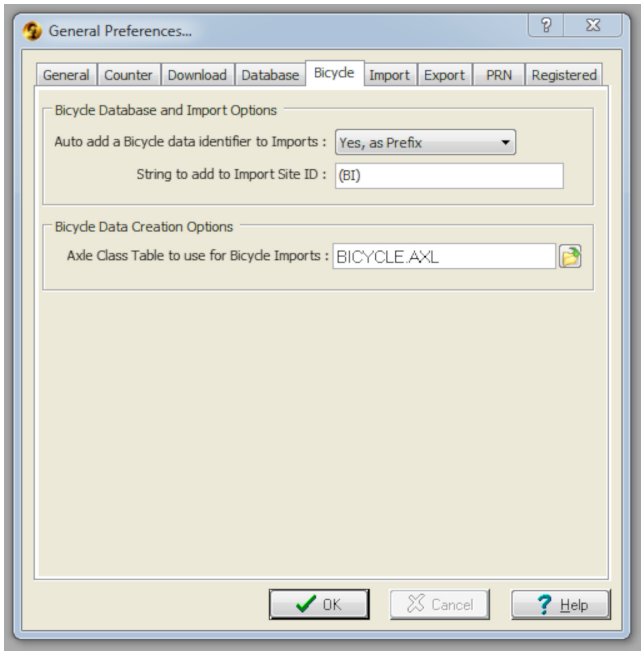
Processing Vehicle/Bicycle Data from the Omega X3 or the Omega-G:

1. Make sure you are using Centurion V1.42 Build #0015 (or later) before trying to process Enhanced, All/Mixed, Vehicle, or Bicycle data from the Omega X3. Use Centurion V1.44 Build #0001 (or later) for the Omega-G.
2. Before processing any data, it is helpful to configure Centurion to process it in the way you want. To do this, select **File**->**Preferences**->**General** and then select the new **Bicycle** tab. The following will be shown:



   The first box selects how (and if) Bicycle data will be imported into Centurion differently than Vehicle data. This is important because if you collect "All/Mixed" data, Centurion will have a single import file which contains two different database types (the Bicycle dataset and the Vehicle dataset) but with only ONE Site ID.

   To handle this, Centurion by default assumes you want to put your Bicycle data into one database entry and your Vehicle data into a second database entry. It will import the Vehicle data into a database entry that is labeled the original Site ID and the Bicycle data into a second database entry which has the string "(BI)" added to the front of it. This allows you to quickly and easily locate bicycle data in the database, and keeps it separate from your vehicle data.

   You can disable this feature (by setting the **Auto Add…** option to "No (Disabled") or you can change it so that it adds the string to the end of the Site name (by setting **Auto Add…** option to "Yes, as Suffix"). You can also change what string is used (either at the front or the end of the Site ID).

   NOTE: You do not have to import All/Mixed data into two separate sites (they can be imported into the same site). However, most users will likely want to keep the two datasets separate and Centurion is set up to do it this way by default.

   The **Bicycle Data Creation Options** specifies the axle bin classification table that should be used by Centurion when doing classification of Bicycle data. The default table, BICYCLE.AXL, is setup to identify small bikes, regular bikes, bikes with trailers, and then various bike grouping configurations. Please contact Diamond Traffic for more information on setting up your own bicycle classification table.
3. Click **Ok** when done.
4. Now that Centurion is configured, you are now ready to process data. Start by connecting to the counter and downloading data normally.

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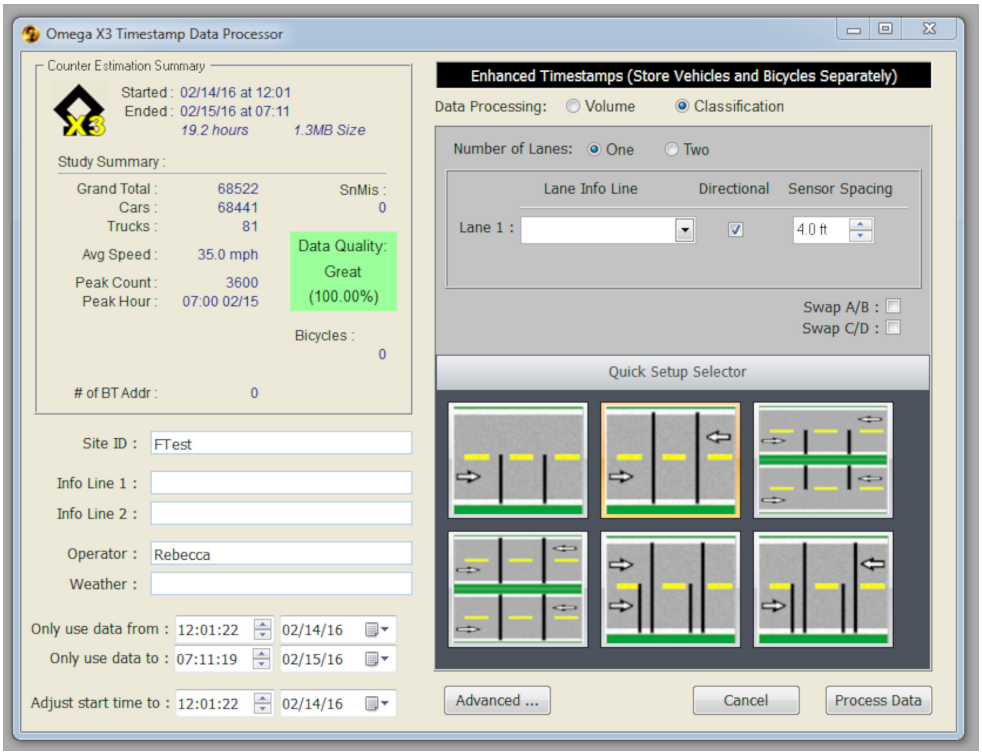
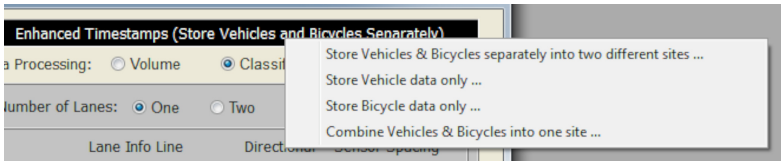
5. Import the downloaded file into the Centurion database (or select Process Omega/RR3/OX3/OMG data from the File menu). When this process starts (regardless of the manner), a screen like the following will appear:



6. This is the standard Timestamp Processor (or TSProcess) part of Centurion. A new feature is the black box with the white letters at the top of the window which will say:
   - **Normal Vehicle Timestamp Records**
     Shown for all timestamp data that was collected in "Normal Mode" (without the A/D system analysis of Vehicles versus Bicycles).
   - **Enhanced Vehicle/Bicycle Timestamp Records**
     Shown for all timestamp data that was collected in "Enhanced Mode" (with the A/D system but without analysis of Vehicles versus Bicycles). This is normally bicycle data, but can be either type.
   - **Enhanced Timestamps (Store Vehicles and Bicycles Separately)**
     Displayed when you have data that was collected with A/D processing using the enhanced "All/Mixed" mode of the counter. When processing, Centurion creates two separate output data files (the Site ID for the bicycle data will be modified according to how Centurion was configured, usually with "(BI)" added to the front of the name).
   - **Enhanced Timestamps (Store Vehicle Type Only)**
     Displayed when you have data that was collected in the enhanced "Vehicle Only" mode of the traffic counter. When processing, Centurion will create one output data file (just the Vehicles).
   - **Enhanced Timestamps (Store Bicycle Type Only)**
     Displayed when you have enhanced data that was collected in the "Bicycle Only" mode of the traffic counter. When processing, Centurion will create one output data files (with the Site ID modified according to how Centurion was configured, usually with "(BI)" added to the name).
   - **Enhanced Timestamps (Combine Vehicles and Bicycles in one Site)**
     You have enhanced data that was collected in the "All/Mixed" mode of the traffic counter. Instead of creating two separate files, Centurion will combine the Bicycle and Vehicle data into a single output file which can then be imported as a single database entry.

   The black box always shows what mode the data was collected in by the counter. However, unless it is "Normal Vehicle Timestamp Records" or "Enhanced Vehicle/Bicycle Timestamp Records", you can right click on the black box and select a different mode for processing if you so desire as shown here:



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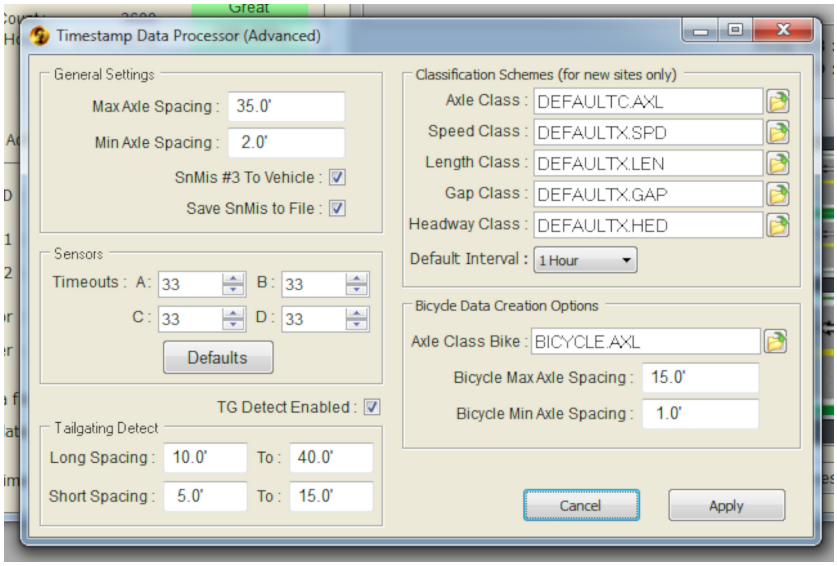
7. Before adjusting the **Data Processing** type (Volume or Classification), **Number of Lanes**, **Sensor Spacing**, and other necessary TSProcess settings, you can verify that the advanced settings are correct by clicking the **Advanced** button as shown here:



Newly shown here are **Bicycle Data Creation Options** which include the **Axle Class Bike** (the classification table for handling bicycle data), **Bicycle Max and Min Axle Spacing**, and the default class tables when importing data for a new site.
Click **Apply** when settings are correct.

8. When all other settings are correct, click **Process Data**.

9. When the results appear, you can then **Import** them or **View Output File**. Note that when doing Vehicles AND Bicycles, it is the Vehicles report which will be displayed in the results window. If you do Bicycles Only, then the Bicycles results appear.

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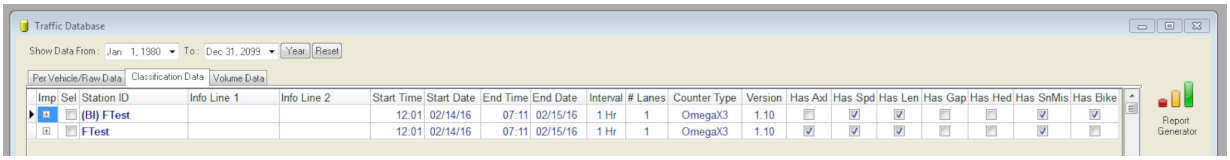
Bicycle data and the Centurion Database:

1. Make sure you are using Centurion V1.42 Build #0015 (or later) before trying to process Enhanced, All/Mixed, Vehicle, or Bicycle data from the Omega X3. Use Centurion V1.44 Build #0001 (or later) with the Omega-G.

2. After processing the data using TSProcess (see previous section), it will normally be imported into the database where it can be viewed. By default, Bicycle data and Vehicle data will be put into two different database entries and the Bicycle data will have the string "(BI)" added to the front of the site ID so it can be distinguished from the Vehicle data. For example:



Imp	Sel	Station ID	Info Line 1	Info Line 2	Start Time	Start Date	End Time	End Date	Interval	# Lanes	Counter Type	Version	Has Axl	Has Spd	Has Len	Has Gap	Has Hed	Has SnMis	Has Bike
		(BI) FTest			12:01	02/14/16	07:11	02/15/16	1 Hr	1	OmegaX3	1.10		✓	✓			✓	✓
		FTest			12:01	02/14/16	07:11	02/15/16	1 Hr	1	OmegaX3	1.10	✓	✓	✓			✓	

In this example, the imported data (with a Site ID of "FTest") contained both Vehicles and Bicycles and it was split into two database entries during the TSProcess import named: "FTest" and "(BI) FTest".

Note that the far right hand column is labeled "Has Bike" and has a check mark under "(BI) FTest" data, but no such checkmark is there for the "FTest" data. The opposite is true under the "Has Axl" column ("FTest" has it but "(BI) FTest" does not). This helps to show what kind of data is present in each database entry.

If you combine the Bicycle and Vehicle data into a single site, then both "Has Axl" and "Has Bike" will be checked. This allows you to directly compare the two types of data using a Vehicle Bin in the Bicycle classification table and a Bicycle category in the Vehicle classification table (see below for more info).

Note that the "Enhanced" mode does NOT add "(BI)" to the site ID or treat the data in any way different than "Normal" mode does. "Enhanced" does not presume the data is bicycle data, even though it is mostly used that way.

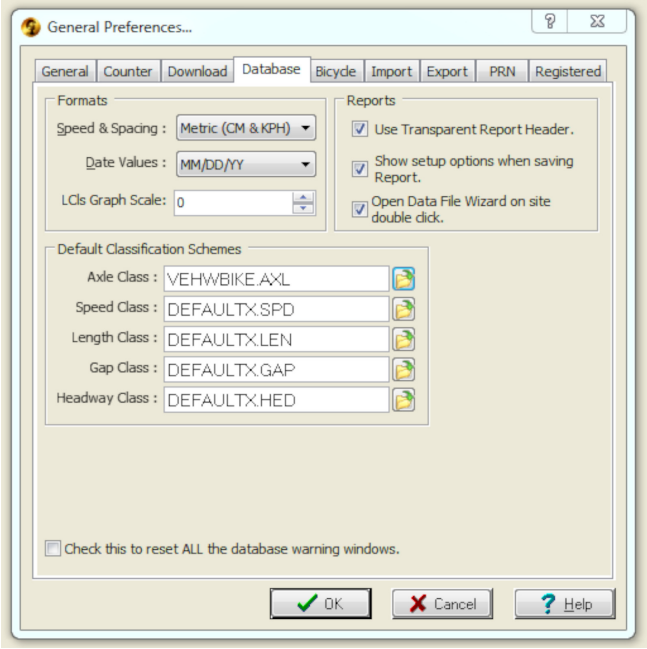
3. If you import data that has both Bicycle and Vehicle data into a single site (which can be done, but is not the default), then both of these columns ("Has Axl" and "Has Bike") will be checked. In that case, before importing the data, it is important to make sure that you choose an axle classification table for your vehicle data that has a separate bin category for bicycles to be placed in.

   This is because data with both Bicycle and Vehicle data combined into a single database classify all the data present into each type of classification table. For the standard Axle Class table, Bicycles will still be added to the table and for the Bicycle Class table, Vehicles are also added in. The BICYCLE.AXL table, by default, places any vehicles it sees into Bin #8 (Bins #1-#7 hold different types of bicycle configurations). You will need to change to a vehicle classification table that handles any bicycles it sees.

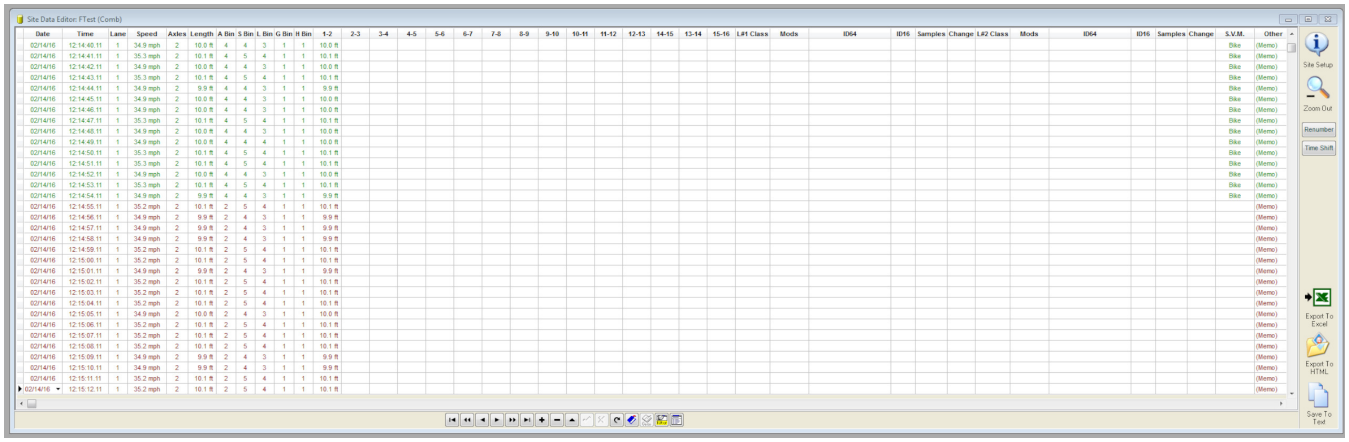
   If using Scheme-F style classification, a sample table named VEHWBIKE.AXL is provided which has the first 13 bins the standard Scheme-F style, Bin #14 holds Bicycles, and Bin #15 is for any unclassified values. To select this as the default classifying scheme for vehicle data, go to:

   Files->**Preferences**->**General Preferences**

   Then select the **Database** tab. Under the "Default Classification Schemes", modify the "Axle Class" value to be VEHWBIKE.AXL as shown here:

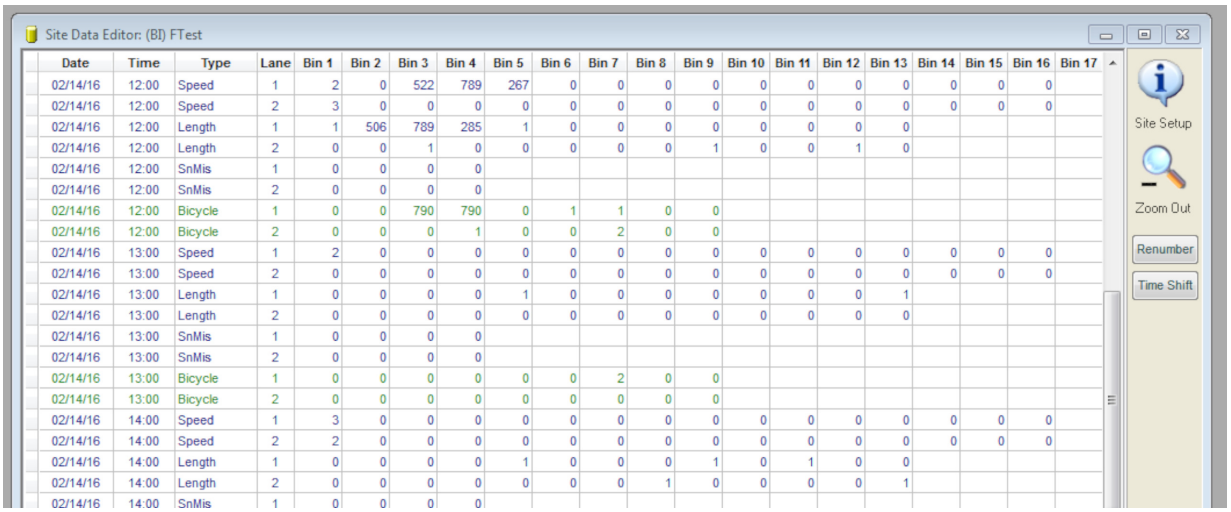


4. When processing vehicle data, you should note that ALL vehicles in the PerVehicle database are marked under the "S.V.M." column (*Special Vehicle Markers*) as "Bike" if they qualify as a bicycle during import. They also appear in green text (instead of red). For example:



This special SVM marker along with the color change makes it easy to see which entries in the database are bicycle entries. If Vehicles and Bicycles are combined into a single database, this is how you tell which entries are bicycles and which are Vehicles.

5. Under the Classification data, you will see a new type of classification data (similar to Axle, Speed, Length, Gap, and Headway) labeled "Bicycle" which contains the classified bicycle records into specified Bicycle Classification table (by default, BICYCLE.AXL). The Bicycle data is shown in green (instead of blue) to help it stand out from other kinds of data. For example:



Site Data Editor: (BI) FTest

Date	Time	Type	Lane	Bin 1	Bin 2	Bin 3	Bin 4	Bin 5	Bin 6	Bin 7	Bin 8	Bin 9	Bin 10	Bin 11	Bin 12	Bin 13	Bin 14	Bin 15	Bin 16	Bin 17
02/14/16	12:00	Speed	1	2	0	522	789	267	0	0	0	0	0	0	0	0	0	0	0	
02/14/16	12:00	Speed	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02/14/16	12:00	Length	1	1	506	789	285	1	0	0	0	0	0	0	0	0				
02/14/16	12:00	Length	2	0	0	1	0	0	0	0	0	1	0	0	1	0				
02/14/16	12:00	SnMis	1	0	0	0	0													
02/14/16	12:00	SnMis	2	0	0	0	0													
02/14/16	12:00	Bicycle	1	0	0	790	790	0	1	1	0	0								
02/14/16	12:00	Bicycle	2	0	0	0	1	0	0	2	0	0								
02/14/16	13:00	Speed	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02/14/16	13:00	Speed	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02/14/16	13:00	Length	1	0	0	0	0	1	0	0	0	0	0	0	0	1				
02/14/16	13:00	Length	2	0	0	0	0	0	0	0	0	0	0	0	0	0				
02/14/16	13:00	SnMis	1	0	0	0	0													
02/14/16	13:00	SnMis	2	0	0	0	0													
02/14/16	13:00	Bicycle	1	0	0	0	0	0	0	2	0	0								
02/14/16	13:00	Bicycle	2	0	0	0	0	0	0	0	0	0								
02/14/16	14:00	Speed	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02/14/16	14:00	Speed	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02/14/16	14:00	Length	1	0	0	0	0	1	0	0	0	1	0	1	0	0				
02/14/16	14:00	Length	2	0	0	0	0	0	0	0	1	0	0	0	0	1				
02/14/16	14:00	SnMis	1	0	0	0	0													

6. The **Data File Wizard** has changed in response to Bicycle data being present. In the PerVehicle database, accessing the **Data File Wizard** when a site that has Bicycle data is selected will change the report to show:

Average Daily Traffic (ADT)

Weekday			Weekend			**Total ADT**		
Bicycles :	3660	(4%)	Bicycles :	2846	(3%)	Bicycles :	**3171**	(3%)
Vehicles :	73974	(96%)	Vehicles :	83370	(97%)	Vehicles :	**79611**	(97%)
Total :	77634		Total :	86216		Total :	**82783**	

And:

Grand Totals

Total Bicycles :	2643 (	3171 ADT)	Average Length : 10.0 ft	Average Headway : 1.0 sec
Total Vehicles :	66343 (	79611 ADT)	Average Axles : 2.0	Average Gap : 0.8 sec
Total Volume :	68986 (	82783 ADT)		

Instead of listing Cars/Trucks, the report now shows Bicycles/Vehicles. This switch is done automatically for any **Data File Wizard** vehicles report that has bicycles as part of the data set. The exact same switch is done in the **Report Generator** "Per-Vehicle Summary" report.

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7. With Classification data, the **Data File Wizard** adds a new section *Bicycle Class Summary* that appears whenever Bicycle class data is present in the data and appears something like this:

Station: (BI) FTest — Data From 13:00 - 02/14/2016 To: 07:59 - 02/15/2016

Classification Summary Report: (BI) FTest

Station ID : (BI) FTest
Info Line 1 :
Info Line 2 :
GPS Lat/Lon :
Source File : (BI) FTest (PerVeh, 1201-021416 To 0711-021516)

Last Connected Device Type : OmegaX3
Version Number : 1.10
Serial Number : 010115-0000 OX3
Number of Lanes : 1
Posted Speed Limit : 0.0 mph

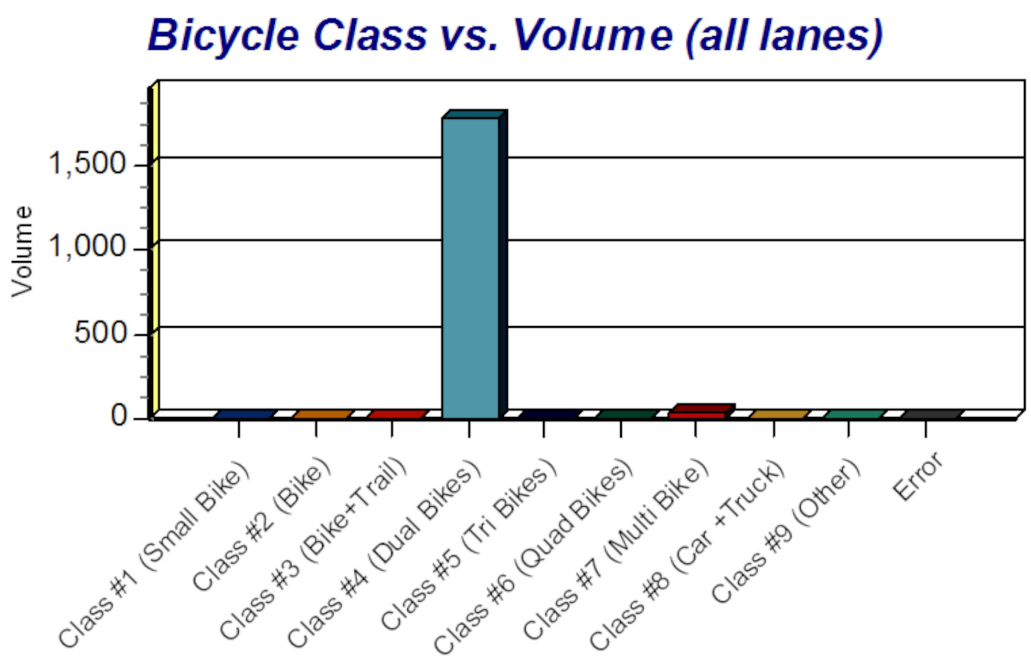
Lane Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length
1.			Axle-Axle	4.0 ft	
2.			Axle-Axle	4.0 ft	

Bicycle Class Summary:

(BICYCLE) Description	Lane	#1 Small Bike	#2 Bike	#3 Bike+ Trail	#4 Dual Bikes	#5 Tri Bikes	#6 Quad Bikes	#7 Multi Bike	#8 Car +Truck	#9 Other	Error	Total
Total Count :	#1.	0	2	0	1787	0	1	25	0	0	0	1815
	#2.	0	0	1	0	2	2	19	0	0	2	26
		0	2	1	1787	2	3	44	0	0	2	1841
Percents :	#1.	0%	0%	0%	98%	0%	0%	1%	0%	0%	0%	99%
	#2.	0%	0%	4%	0%	8%	8%	73%	0%	0%	8%	1%
		0%	0%	0%	97%	0%	0%	2%	0%	0%	0%	

And a new graphic on the last page showing the relationship among the different classes of Bicycle data:



IMPORTANT NOTE: The data shown in the above examples (as well as the examples that follow) is factory test data. It is not representative of what actual customers will see in their reports, but is shown simply to show the format of the reports and graphs that are part of the Bicycle data analysis software.

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8. The **Report Generator** also has several other changes to support Bicycle data. The “Per-Vehicle Data Dump” report and the “Classification Data Dump” report will print with all Bicycle entries having a gray background as follows:

02/14/16	12:01:44.07	# 1	35.3	2	10.1'	4	5	4	1	1	10.1'
02/14/16	12:01:45.07	# 1	34.9	2	9.9'	4	4	3	1	1	9.9'
02/14/16	12:01:46.07	# 1	34.9	2	10.0'	4	4	4	1	1	10.0'
02/14/16	12:01:47.07	# 1	35.3	2	10.1'	2	5	4	1	1	10.1'
02/14/16	12:01:48.07	# 1	34.9	2	9.9'	2	4	3	1	1	9.9'
02/14/16	12:01:49.07	# 1	34.9	2	10.0'	2	4	3	1	1	10.0'
02/14/16	12:01:50.07	# 1	35.3	2	10.1'	4	5	4	1	1	10.1'
02/14/16	12:01:51.07	# 1	34.9	2	9.9'	4	4	3	1	1	9.9'

This shows three Vehicles in the middle, with Bicycles before and after. The “Basic Class Report” has also changed which adds a whole new section labeled *Basic Bicycle Classification Report* (similar to the separate sections for Axle Class, Speed Class, Length Class, etc) that will generate a report of the collected Bicycle data such as this:

Basic Bicycle Classification Report: (BI) FTest

Lane #1 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
1.			Ax-Ax	4.0 ft	6.0 ft	

Lane #1 Basic Bicycle Classification Data From: 13:00 - 02/14/2016 To: 07:59 - 02/15/2016

(BICYCLE) Date	Time	#1 Small Bike	#2 Bike	#3 Bike+ Trail	#4 Dual Bikes	#5 Tri Bikes	#6 Quad Bikes	#7 Multi Bike	#8 Car +Truck	#9 Other	Error	Total
02/14/16	13:00	0	0	0	0	0	0	0	0	0	0	0
Sun	14:00	0	0	0	0	0	0	2	0	0	0	2
	15:00	0	1	0	0	0	0	2	0	0	0	3
	16:00	0	0	0	0	0	0	2	0	0	0	2
	17:00	0	0	0	0	0	0	2	0	0	0	2
	18:00	0	0	0	0	0	0	1	0	0	0	1
	19:00	0	0	0	599	0	0	1	0	0	0	600
	20:00	0	0	0	0	0	0	1	0	0	0	1
	21:00	0	0	0	0	0	0	1	0	0	0	1
	22:00	0	0	0	0	0	0	1	0	0	0	1
	23:00	0	0	0	0	0	0	1	0	0	0	1
Daily Total :		0	1	0	599	0	0	14	0	0	0	614
Percent :		0%	0%	0%	98%	0%	0%	2%	0%	0%	0%	
Average :		0	0	0	54	0	0	1	0	0	0	55

In addition to a summary page:

Station: (BI) FTest — Bicycle Data Summary From: 13:00 - 02/14/2016 To: 07:59 - 02/15/2016

Basic Bicycle Class Summary: (BI) FTest

(VEH WBIKE) Description	Lane	#1 Small Bike	#2 Bike	#3 Bike+ Trail	#4 Dual Bikes	#5 Tri Bikes	#6 Quad Bikes	#7 Multi Bike	#8 Car +Truck	#9 Other	Error	Total
TOTAL COUNT :	#1.	0	2	0	1783	0	1	25	0	0	0	1811
	#2.	0	0	1	0	2	1	19	0	0	2	25
		0	2	1	1783	2	2	44	0	0	2	1836
Percents :	#1.	0%	0%	0%	98%	0%	0%	1%	0%	0%	0%	99%
	#2.	0%	0%	4%	0%	8%	4%	76%	0%	0%	8%	1%
		0%	0%	0%	97%	0%	0%	2%	0%	0%	0%	
Average :	#1.	0	0	0	94	0	0	1	0	0	0	95
	#2.	0	0	0	0	0	0	1	0	0	0	1
		0	0	0	94	0	0	2	0	0	0	96
Days & ADT :	#1.	0.7	2287									
	#2.	0.7	31									
		0.7	2319									

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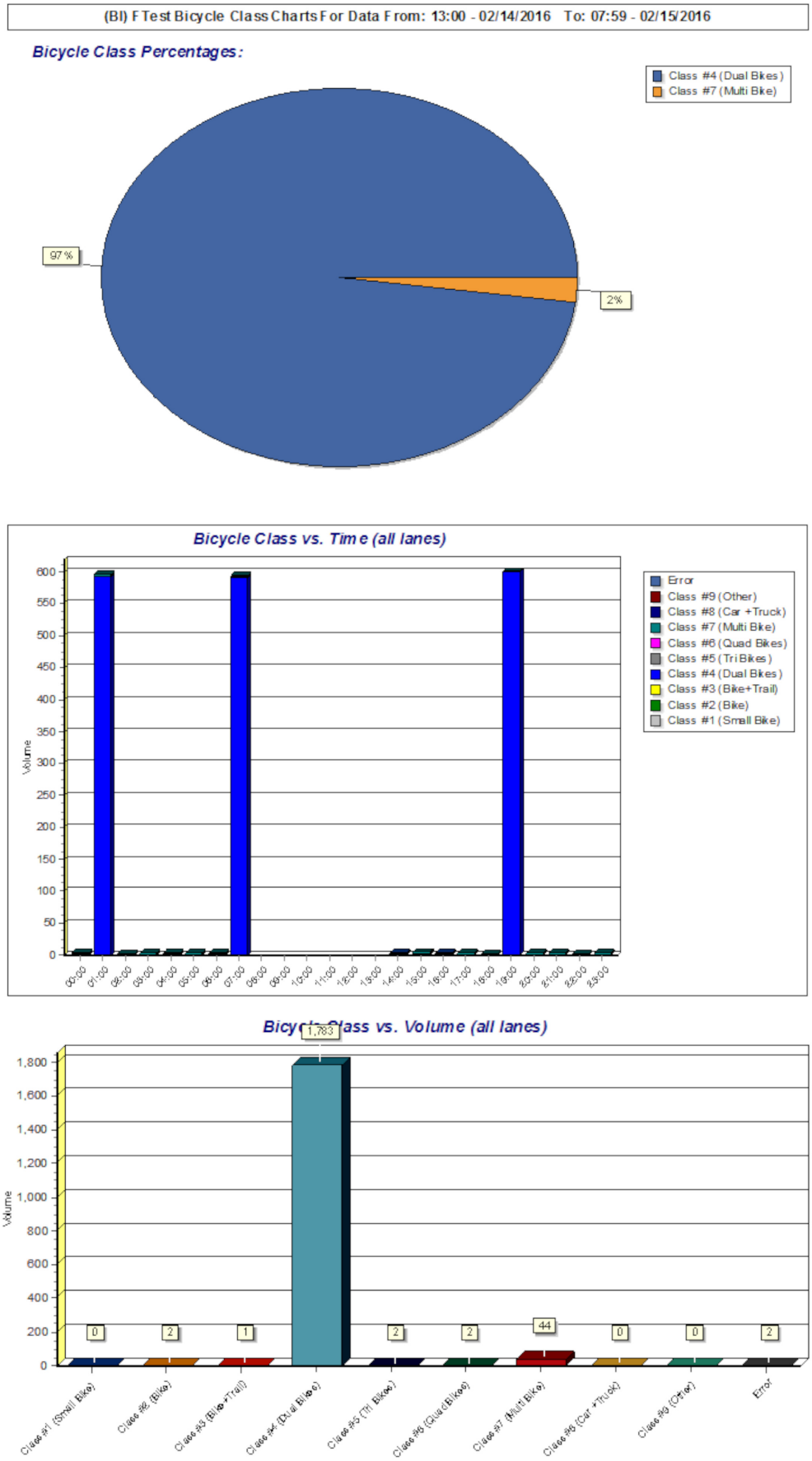
And finally, two pages containing graphic representations of the data collected such as:



9. The **Export** function has also been expanded to include Bicycle data in the following export formats:
   - `New ASCII Format`
   - `Binary Format`
   - `CSV ASCII Diamond`
   - `CSV ASCII Static TV`
   - `CSV ASCII Static TP`

   All of these formats now automatically include Bicycle data if it is found in the PerVehicle dataset or in the Classification datasets.

10. In addition to the above formats, the `Direct To Excel` format has been expanded to include the "Special Vehicle Markers" (SVM) at the end of all PerVehicle exports (if Bicycle data is present), and to also include Bicycle binned data such as this:

A1 | Data For Station: (BI) FTest

Data For Station: (BI) FTest

Date	Time	Type	Lane	Bin 1	Bin 2	Bin 3	Bin 4	Bin 5	Bin 6	Bin 7	Bin 8	Bin 9	Bin 10	Bin 11	Bin 12	Bin 13	Bin 14	Bin 15	Bin 16
02/14/16	13:00	Speed	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/14/16	13:00	Speed	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/14/16	13:00	Length	1	0	0	0	0	1	0	0	0	0	0	0	0	1			
02/14/16	13:00	Length	2	0	0	0	0	0	0	0	0	0	0	0	0	0			
02/14/16	13:00	SnMis	1	0	0	0	0												
02/14/16	13:00	SnMis	2	0	0	0	0												
02/14/16	13:00	Bicycle	1	0	0	0	0	0	0	2	0	0							
02/14/16	13:00	Bicycle	2	0	0	0	0	0	0	0	0	0							
02/14/16	14:00	Speed	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/14/16	14:00	Speed	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02/14/16	14:00	Length	1	0	0	0	0	1	0	0	0	1	0	1	0	0			
02/14/16	14:00	Length	2	0	0	0	0	0	0	0	1	0	0	0	0	1			
02/14/16	14:00	SnMis	1	0	0	0	0												
02/14/16	14:00	SnMis	2	0	1	0	0												
02/14/16	14:00	Bicycle	1	0	1	0	0	0	0	2	0	0							
02/14/16	14:00	Bicycle	2	0	0	1	0	0	0	1	0	0							

11. There are many other changes to Centurion to support Bicycle data. In general, the following applies:
    - With PerVehicle data, all Bicycles will have the "Bike" indicator present at the end of the record under the "Special Vehicle Markers" (or "SVM") column. When this indicator is seen by Centurion, it makes multiple adjustments to reports, exports, editors, and other functions to support the presence of Bicycle data in the dataset.
    - With Classification data, Bicycles are imported and sent to their own custom bin table which is defined in the "Axle Classification" editor. By default, the BICYCLE.AXL table specifies seven different types of bicycles, one bin for vehicles, and one unclassified bin.
      Bicycle binned data can been seen and used in the same way Axle Bins, Speed Bins, Length Bins, Gap Bins, and Headway Bins have been used. All reports, editors, and export functions treat Bicycle Bins in this same fashion.

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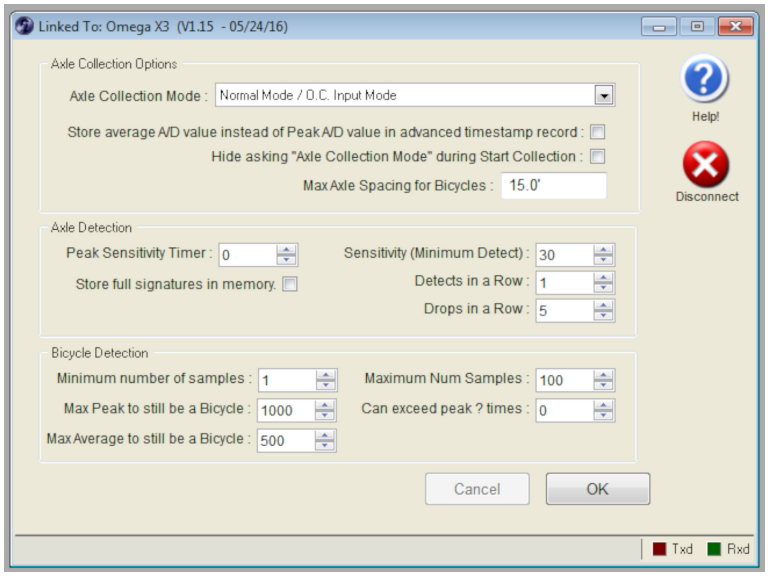
Advanced Omega X3 or Omega-G options with Bicycle and Vehicle Data:

There are several advanced settings and options available to users who want to use them. They don't normally affect the regular process of collecting data, but some users may want to utilize them in certain circumstances. They are described below:

1. To setup advanced options, first make sure you are using Centurion V1.42 Build #0011 (or later) before connecting to the Omega X3. Use Centurion V1.44 Build #0001 (or later) for the Omega-G.
2. Plug the Omega X3/G into your computer USB port and connect to using Centurion.
3. Access the Collecting Options screen by clicking **Settings** then the **Collection Opt…** button. The following screen will appear:



4. The advanced options are as follows:

   Axle Collection Options:

   - **Store average A/D value instead of Peak A/D value in advanced timestamp record**
     Whenever an A/D mode of data collection is enabled (All/Mixed, Vehicle Only, or Bicycle Only), the Omega X3/G stores an extra two bytes of information with each axle hit. These two bytes contain the following information:

First extra byte	.7 .6	Unused, future enhancement.
	.5	When set (=1), this sensor activation qualified as a "Bicycle" level hit according to Bicycle rules.
	.4	Peak/Average from A/D sampling: When set (=1), the value below will be the average A/D value for the entire sensor hit, when reset (=0) the value below will be the peak value received from the A/D for the sensor hit..
	.3 .2 .1 .0	Value: This is peak or average value from the A/D (see above).
Second extra byte	.7 .6 .5 .4 .3 .2 .1 .0	

When processing A/D data, it is mostly Bit 5 of the first extra byte which is checked. This bit is set if the sensor hit qualifies as a bicycle, it is reset if it is a vehicle. The "Value" part will be set by default to be the highest A/D reading the counter received for this hit.

If you check the "Store Average A/D value …", then the system stores the average value of all the A/D values received instead.