SupportNote

TerraSync™

MGIS

Advanced Data Collection Techniques

Summary

Advanced data collection methods offer time-saving techniques for efficient field work. Step-by-step instructions are provided for:

- Advanced data collection options
- Recording between feature positions
- Continuing line and area features
- Offsets
- Repeating features
- Segmenting line features
- Recording averaged vertices
- Carrier phase data collection

Advanced Data Collection Options

The TerraSync™ software provides two closely related options for logging GPS data. These options differ in their timing of GPS data collection relative to the start of a feature.

- Log Now – start a feature, and simultaneously start collecting GPS positions.
- Log Later – start a feature, and start collecting GPS positions later.

Log Now

Data / Collect Features / Options / Log Now

When the *Log Now* option is selected, logging of positions for a new feature begins as soon as you select the feature type and tap **Create**. You can enter attribute values while positions are being recorded.

Log Now is the default logging option. When *Log Now* is selected, a bullet (•) appears beside it in the *option* list.

To select *Log Now*, tap **Options** in the *Collect Features* screen, and then select *Log Now* from the *Option* list.

NOTE: *Log Now applies only to new features. When you open an existing feature for update, logging is paused and the pause icon flashes in the Status bar. New positions are logged for an existing feature only after you tap* ***Log*** *in the attribute entry form and select the Update position option.*

Log Later

Data / Collect Features / Options / Log Later

When the *Log Later* option is selected, logging of positions for a new feature begins only after

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you tap **Log** in the *attribute entry* form. Until you begin logging, the pause icon flashes in the Status bar. You can use the Log later option to create a feature and begin entering attributes before you have arrived at the start of the feature.

When *Log Later* is selected, a bullet (•) appears beside it in the *option* list.

To select *Log Later*, tap **Options** in the *Collect Features* screen, then select *Log Later* from the *option* list.

Recording Between Feature Positions

The GPS data that you collect with the TerraSync software is recorded in files. You can collect positions in a file without collecting feature and attribute data. These positions are called *between feature positions*. They appear in their own layer on the Map screen.

Recording GPS positions only is a useful technique when you do not need to record feature and attribute data. For example, you may want to record a trail of the day's activities to track where you have been. In this case, you would not want to collect feature or attribute information, only the positions. You can also use between feature logging to record the route traveled from one feature to the next.

By default, the TerraSync software does not record between feature positions. Use the *Logging Settings* form in the *Setup* section to enable between feature logging. If the *Interval* field contains a time or distance value, then *between feature logging* is enabled. If it is set to *Off*, then *between feature logging* is disabled.

Between feature positions can be spaced by distance or time. For example, you can use the distance option to force the TerraSync software to log a position every three meters you travel, or the time option to log a position every five seconds. To set the logging interval, select the logging style (Distance or Time) from the *Style* field, then enter the rate in the *Interval* field.

If between feature logging is enabled, the TerraSync software logs positions (at the rate you have specified) whenever you are not logging positions to a feature.

Continuing Line and Area Features

Data / Collect Features / Options / Continue
Data / Update Features / Options / Continue

When recording a line or area feature, you could come across another feature that you need to record. The feature may be adjacent to the line/area feature, or it may be some distance away. When collecting a path (line feature), for example, you might encounter a gate (point feature). You do not have to record the entire path and then return to record the gate. Simply end the path feature, collect the gate feature, and then use the *Continue* option to continue the path feature you were collecting.

NOTE: *Some other Trimble GIS data collectors refer to this functionality as nesting.*

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You can continue any line or area feature, not just the last one you collected, provided you have not continued any other features since collecting it.

Once you continue a feature, any line or area features you collected between its two segments become unavailable for continuation, because they are now nested within the continued feature. Any features you collected before the continued feature are also unavailable for continuation.

New features that you collect after the continued segment will be available for continuation, if you have not continued any other feature since they were collected. If you replace an existing feature's positions with new GPS or digitized positions for a feature, the *Continue* function treats it as a new feature, so it can also be continued.

If you close the data file then none of its features will be available for continuation next time it is opened.

NOTE: *You can collect as many features within a line or area as you need. The number is limited only by storage space on the field computer.*

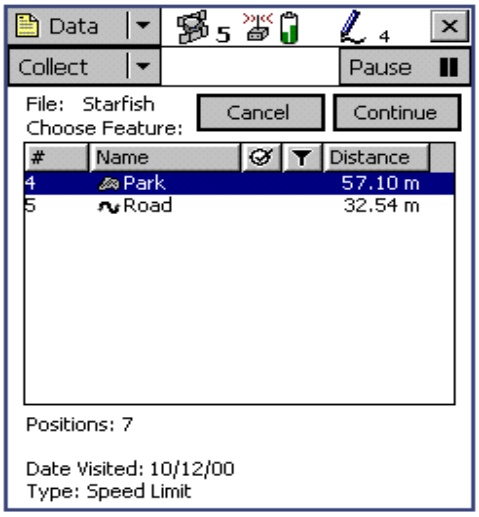
To use *Continue*:

1. In the *attribute entry* form, tap **OK** to close the line or area feature you are collecting. The *Collect Features* screen appears.

2. In the *Choose Feature* list, highlight the next feature type that you want to collect and tap **Create**. The *attribute entry* form appears and logging starts.

3. When you have recorded attributes for this feature and logged sufficient GPS positions, tap **OK** to close the feature. The *Collect Features* screen appears again. You can repeat this step as many times as you need to.

4. To continue the original line or area feature, Tap Options. From the *Option* list, select *Continue*. The *Continue feature* form appears, listing all the line and area features that are available for continuation, in the order they were collected:



5. Select the feature from the list and tap **Continue**. The TerraSync display returns to the *attribute entry* form for the selected line or area feature, and continues to log GPS positions for that feature.

6. When you complete the collection of the line or area perimeter, tap **OK** to store the feature.

TIP: *You can also continue a selected feature from the Update Features subsection, or from the Map section. Do one of the following: highlight the feature in the* Update Features *screen, tap*

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***Options**, and select Continue*; *Open the feature for update from the Update Features section or the Map, then begin logging GPS or digitized positions. A dialog appears, asking you to specify the logging option you want. Select the Continue feature option and tap OK.*

Offsets

Data / Collect Features / Create / Options / Offset or
Data / Update Features / Begin / Options / Offset

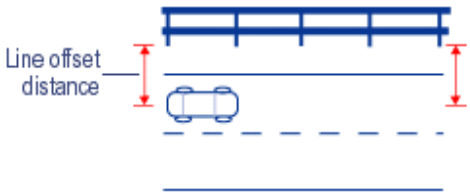
If you cannot travel over the top of, or right next to, a feature, you can enter an offset and record it at the specified distance. When collecting a tree feature, for example, it may be easier to stand some distance (for example, 10 paces to the North) from the tree and record its attributes. This ensures good GPS reception, and lets you see the tree clearly to assess its condition. Specify an offset to the tree of 10 m South. This is an example of an offset point feature. Entering an accurate offset ensures that the feature is positioned correctly in the GIS.

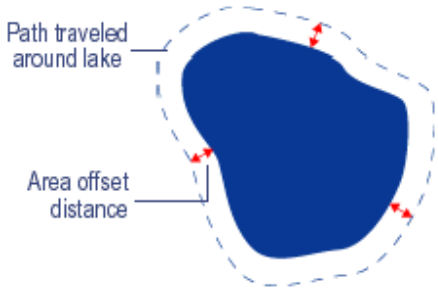
New to TerraSync v2.10 are COGO point offsets. They are Distance-Distance, Triple Distance, Bearing-Bearing, and Triple Bearing point offsets.

These offsets are more complex. For more information about offsets, refer to the *TerraSync Operation Guide*.

To view or enter the offset for the feature being collected or updated, tap **Options** in the *attribute entry* form, then select *Offset*.

You can also use offsets for line and area features. When collecting a line feature such as a fence, it may be easier to drive along the road beside the fence and record the positions of the fence as an offset. Another example is when collecting an area feature such as a lake; you could walk some distance from the lake edge and record its perimeter using an offset. The diagrams below show these examples:





***NOTE:** Any feature (point, line, or area) can have only one offset associated with it. To collect a line or area feature using offsets, the same offset value must apply to the whole feature. This may require a test run around or along an object to make sure that you can remain a consistent distance from it.*

***TIP:** You can use segmenting to record a line feature as a series of joined line segments, each with a different offset. For more information, see Segmenting Line Features.*

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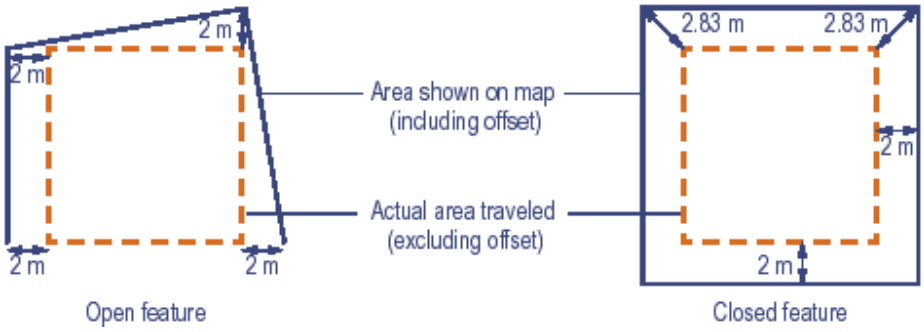
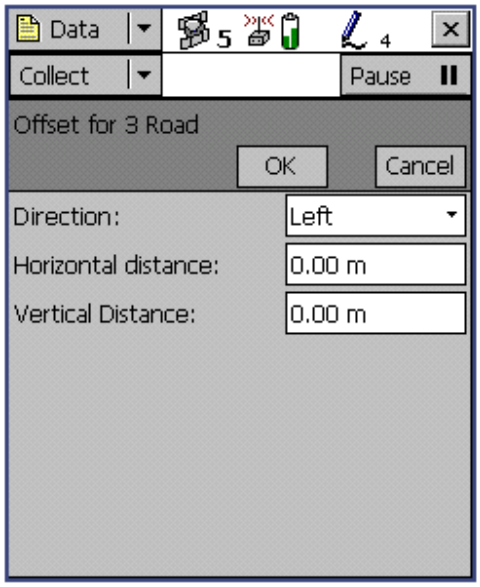
Offsets are added to GPS and digitized positions as they are recorded, and features are displayed in the Map section with their offsets. However, if the currently open line or area feature has an offset, acute angles and corners can appear distorted on the map. This is because exact offset values are not calculated for these positions until the feature is closed. When you close a feature, offsets for these positions are interpolated, and the feature is redrawn more accurately.



To offset a feature:

1. Start the feature.
2. From the attribute entry form, tap **Options** and select *Offset*.
3. If the current feature is a point feature, select the type of offset you want to record, then tap **OK**. The appropriate offset form appears: The fields that appear in the offset form depend on the type of feature you are collecting (point, line, or area) and the type of offset you are collecting.
4. Enter a value in each field as necessary. Alternatively, use data from a laser rangefinder. For more information, see *Using a Laser Rangefinder to Record Offsets.*
5. When the offset form is complete tap **OK**. The attribute entry form reappears.
6. When you have recorded attributes for the feature and logged sufficient GPS positions, tap **OK** to store the feature. The *Collect Features* screen appears.



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Using a Laser Rangefinder to Record Offsets

You can use a laser rangefinder to record accurate offsets for any feature. To use a rangefinder with the TerraSync software, you need to configure the laser. Select *Setup* / *External sensor* and select the *Laser* check box. Click **Properties** to specify which serial (COM) port on the field computer the rangefinder is connected to.

For a list of the laser rangefinders that the TerraSync software supports, visit the Trimble website (www.trimble.com/terrasync.html).

To record an offset from a laser rangefinder, make sure that there is a feature open, and that the feature's attribute entry form, the appropriate offset form, or the Map screen is open. Then fire the laser rangefinder. The TerraSync software automatically enters the distance and, if the laser rangefinder supports it, the bearing, in the appropriate field(s) in the offset form. If the laser does not supply values for these fields, you will need to manually enter the values.

A laser rangefinder can also be used to collect COGO point offsets (e.g., Distance-Distance, Bearing-Bearing). Start the offset then fire the laser each time you are prompted to enter a Distance (or Bearing) value.

Using an External Sensor

You can use an external sensor with the TerraSync software (2.10 or later). The data recorded by the sensor can be stored in an attribute, or it can be stored in the data file as an uninterpreted sensor data record. You can export uninterpreted sensor data from the GPS Pathfinder® Office software to your GIS or processing software.

Depending on the way you want to store the sensor data, and the capabilities of the sensor, you can configure TerraSync to read data from the sensor at specified intervals, or only when you request it.

For more information on configuring an external sensor to work with the TerraSync software, refer to the External Sensors section in the *TerraSync Operation Guide*.

NOTE: *A laser rangefinder can be used either as an external sensor, or to supply data for feature offsets.*

Repeating Features

Data / Collect Features / Options / Repeat

Use Repeat to efficiently record a sequence of similar features. When you use Repeat, attribute values are copied from the last recorded feature of that type. You do not have to re-enter values for all attributes. Just check that each attribute value is correct for the new feature, and change only those that are different.

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To repeat attributes for similar features:

1. In the *Collect Features* screen, tap **Options** and select *Repeat*. When *Repeat* is selected, a check mark appears beside it in the *option* list.

2. Select a feature from the *Choose Feature* list and tap **Create**. The *attribute entry* form appears. The attribute values that appear are those of the last recorded feature of that type. Edit them if necessary. Tap **OK** to save the attribute values and store the feature.

3. Select another feature. Continue until you want to turn off *Repeat* mode.

To turn off *Repeat* mode:

- In the *Collect Features* screen, tap **Options** and select *Repeat*. The check mark disappears.

NOTE: *When Repeat is not selected, the data dictionary determines default attribute values. Where appropriate, the data dictionary specifies a default value for each attribute of a feature.*

If an attribute is set to auto-increment this will take precedence over the repeated value.

Segmenting Line Features

Use segmenting to record a line as several segments that are joined, each with different attribute values. For example, you can record a road feature that has one surface for part of its length, and a different surface for the rest of its length.

When you segment a line feature, the TerraSync software immediately records a position, even if the logging interval does not require a position at that time. This position becomes the last position in the old line and the first position in the new line. Recording a position at the segmentation point ensures that the two line segments join up in the GPS Pathfinder Office software and your GIS.

The offset of the new line segment defaults to the offset of the previous line segment, if there is one. Since the new line feature is treated as a new feature it can have a different offset value from the previous line segment. The new line feature defaults to the same attribute values as the previous line segment, except that any auto-incrementing attributes are incremented to the next value. Since the new line feature is treated as a new feature its attributes can have different values from the previous line segment.

To segment a line feature:

1. While recording a line feature, in the Attribute entry form tap **Options** and select *Segment Line*. The TerraSync software ends the current line feature and immediately starts another line feature of the same type.

2. If necessary, edit the new feature's attributes.

NOTE*: You cannot segment a line while a vertex is open.*

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Recording Averaged Vertices

A line or area feature consists of a number of positions, joined in sequence from the first position logged to the last. Each position represents a vertex of the feature. For more accurate recording of line and area features, you can record several positions at each vertex, then average these positions together to calculate the vertex position.

Logging a line or area feature with averaged vertices is similar to logging a number of point features, each being the average of a number of positions, then joining these point features together in sequence.

To record an averaged vertex for a line or area feature:

1. In the Attribute entry form for the line or area feature, tap **Options** and select *New Vertex*. The *Vertex* form appears. This form contains the same fields as the attribute entry form. Logging of positions for the averaged vertex begins immediately. The logging icon in the status bar changes to an animated circle zooming in 4, and the number beside it shows the number of positions logged for this vertex. Remain stationary while the vertex is open!
2. If necessary, enter or edit attribute values for the feature.
3. When you have logged as many positions as you require for this vertex, close the *Vertex* form. You are returned to the attribute entry form.

An averaged vertex is similar to a point feature, and the same limitations that apply to a point feature apply when the *Vertex* form is open. You cannot segment a line feature while recording an averaged vertex. You can enter or edit the feature's offset, using the line/area *Offset* form. While the *Vertex* form is open, you must remain stationary, as though you were recording a point feature. The messages '*Vertex # open*' and '*Remain stationary*' appear to remind you to stay still. The number of positions recorded for this vertex also appears in the status bar.

A line or area feature can include both averaged vertices and positions logged normally as you travel. If you want to record only averaged vertices, use the *Log Later* function to pause logging before you open the feature. Whenever you open the *Vertex* form, logging starts. When you close the *Vertex* form, logging returns to its former state. This technique ensures that no positions are logged except those you log for averaged vertices.

Carrier Phase Data Collection

When you need to collect a feature with a precision better than 50 cm, you can configure the TerraSync software to log carrier-phase data. When the TerraSync software logs carrier-phase data, positions collected in the field can be postprocessed once you are back at the office to generate positions that are more precise. Because measurements are collected from each individual satellite, the positions generated during postprocessing are more precise than positions logged in the field.

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You require a clear view of the sky at all times when collecting carrier phase data, so avoid obstacles such as trees, bridges, and tall buildings. Choose a time of day when you can expect to track a maximum number of satellites with the best possible geometry.

NOTE: *Carrier phase data collection is not available when you are using the GPS Pathfinder Pocket receiver.*

This section includes the following:

- Collecting sufficient data
- Configuring carrier accuracy features
- Logging carrier phase data
- Logging base data files

Collecting sufficient data

To provide sufficient carrier phase data to achieve the required precision, the TerraSync software needs to log data from at least four satellites for the minimum time specified. “Loss of lock” occurs when the number of available satellites drops below four.

When you are logging carrier phase data, as soon as four or more satellites are available a counter starts. When the minimum time has elapsed, all of the carrier phase data recorded during that period can be used during postprocessing. When the counter reaches the minimum time, a success beep sounds. This indicates that the current “block” contains sufficient useful data.

NOTE: *The minimum time for a “block” of carrier phase data is 10 minutes. You cannot change this value.*

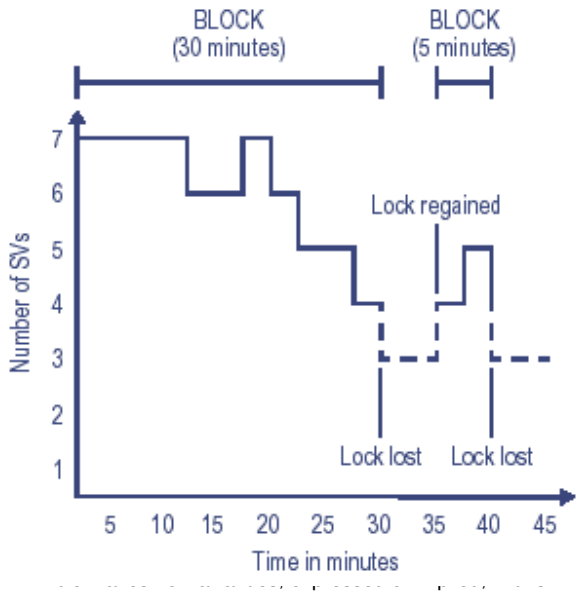
If you lose lock before the end of the minimum time, the data collected until then may not provide the required precision during postprocessing. The counter is automatically reset to zero when loss of lock occurs. It only restarts when lock is regained.

NOTE: *Carrier phase data is not logged from satellites that are below the current Elevation mask. Before logging carrier phase data, check that the elevation mask is set to an appropriate value.*

What is a “block” of data?

When you start a file, the TerraSync software starts to record carrier phase measurements. Useful data is not stored as one continuous stream, however, but as a series of “blocks”.

The number of available satellites determines the beginning and end of each block. As soon as four or more satellites are available, a new block begins. This block continues until lock is lost. When lock is regained, a new block begins.



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The TerraSync software continues to create blocks of data throughout the file.

Configuring carrier accuracy features

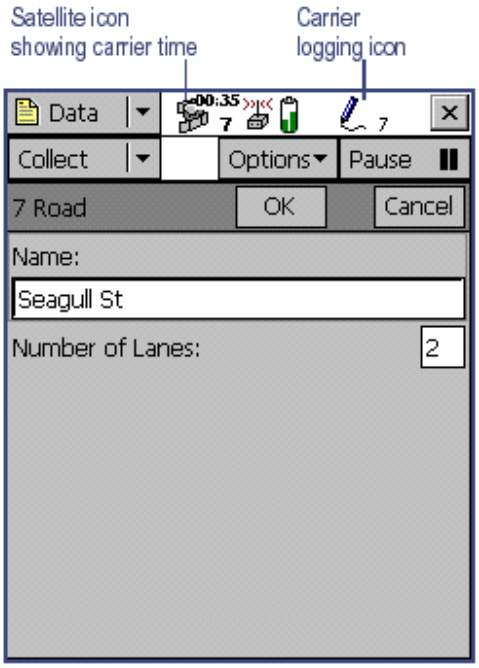
You can configure individual feature types in a data dictionary to use carrier phase data. You can do this when you create the data dictionary in the Data Dictionary Editor utility in the GPS Pathfinder Office software or in the TerraSync software. For more information, refer to the Data Dictionary Editor Help.

Alternatively, you can set any feature type to carrier accuracy in the TerraSync software:

1. In the *Data* section, open the data file that you want to record carrier data to.
2. Tap the **Section** list button and select *Setup* to open the *Setup* section.
3. Tap **Logging Settings**. The *Logging Settings* form appears. At the end of the form, there is a section for each feature type in the open data file.
4. Locate the section for the feature type you want to set to carrier accuracy.
5. Make sure the *Style* field is set to Time.
6. In the *Accuracy* field, select Carrier.
7. Tap **OK** to close this form and confirm the changes you have made.

Carrier phase data logging is now enabled for all features of this type in this file.

Logging Carrier Phase Data



When you open a new data file, the TerraSync software checks whether any features in the data dictionary are set to carrier accuracy. If any are, the TerraSync software starts to log carrier data in the background. This allows the carrier block to start as soon as you open the file, not just when you begin to log a feature. When you start a new feature that is set to carrier accuracy, the software logs carrier data in the foreground so that this feature can be processed with carrier phase accuracy. The carrier logging icon appears in the Status bar, and the satellite icon shows the carrier time.

When you open an existing file with carrier features, the TerraSync software does not automatically log background carrier data. Carrier logging only begins when you start logging positions to the file. These may be not-in-feature positions, position records for a new feature, or updated positions for an existing feature.

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As you log carrier phase data, the satellite icon shows the time elapsed, in minutes and seconds, since the current block of data started. This is referred to as carrier time. This time also appears in the Carrier time field in the Receiver screen. When the TerraSync software has logged carrier phase data continuously for the minimum time (10 minutes), the success beep sounds.

If you try to close a file before the minimum time is up, the TerraSync software asks you to confirm that you want to close the file. If you do close the file, you may lose carrier accuracy for some features.

Once the counter is running, you can choose to end the current feature and stay where you are until the minimum time is up. When the success beep sounds, move to the next feature. Using this method, you can be sure that you have sufficient data to generate precise positions.

Alternatively, if you think you are unlikely to lose lock, you can move to the next feature before sufficient carrier phase data has been collected. This is possible because all features recorded during a block achieve the precision associated with that block. Provided that a block eventually contains enough useful data, you can generate precise positions for any feature recorded within it.

WARNING: *Only move to the next feature before the minimum time is up if loss of lock is unlikely.*

Logging Base Data Files

The TerraSync software does not have a Base Station mode. However, you can log a data file that can be used as a base file. To do this, open a new data file and log a single point feature with carrier accuracy and a logging interval that matches the one set in the rover files. After you transfer this file to the GPS Pathfinder Office software, you can use it as a base data file in the Differential Correction utility.

TIP: *If you name these base files using the filename prefix "B", then the Differential Correction utility can easily locate and correctly identify these files when it searches for base files.*

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