

# Appendix D

## TSC1 - Asset Surveyor Operation

**Main menu screen details:**

- Menu Icons (current choice is highlighted)
- Battery Status
- PC Card (if used)
- Real-Time Status
- Number of Satellites
- Current PDOP
- Number of Fixes in Current Feature
- Softkey Menu
- Corresponding Softkeys

**Keyboard Functionality:**

- use NEXT to: cycle through all open screens ("multitasking")
- use MENU to: open main menu from any screen
- Use ARROW KEYS to: move around on screens
  - key will cycle through choices on text menus
  - key will bring up text menus when ► shows
- use ESC to: back out of menus and screens exit data capture (saves file)
- use ENTER to: select highlighted options save changes to screens save and end current feature

**Keyboard Legend:**

- On-Off Switch (toggle)
- Secondary key functions
- to increase contrast
- to decrease contrast
- Useful help screen

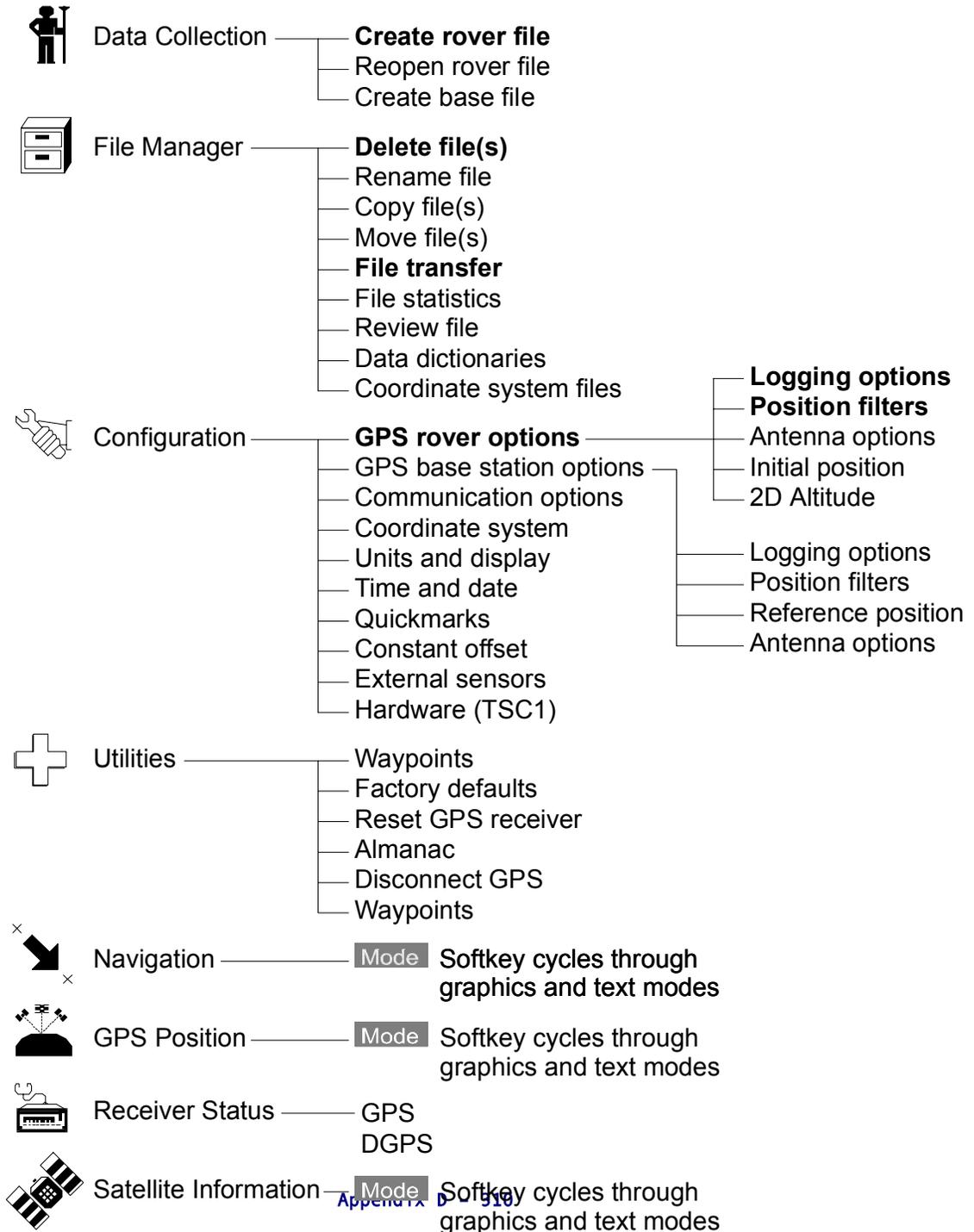
**Unit Lockup Troubleshooting:**

If unit locks up, try (in order of desperation):

- 1) Turn off, then on.
- 2) Hold key for five seconds, then turn on.
- 3) Warm boot (don't loose data):
  - a) turn unit off
  - b) hold backspace key
  - c) press key while holding
  - d) unit should re-boot after a few seconds.
- 4) Cold boot (loose **all** data):
  - a) ask for directions!!

# TSCI - Asset Surveyor Operation

## TSC1 Menu Structure (most common functions are in **bold**)



## TSC 1 Asset Surveyor Configuration

The GPS receiver must be configured to comply with the project specifications – these are critical settings which must be followed to achieve the desired accuracy and production. It is *essential* that prior to every survey, these settings are confirmed. In addition, there are configuration settings which affect how the receiver communicates with other devices, and how it interacts with the operator. These will be set according to specific needs and do not affect the collection of data.

### *Rover Options*

The *Logging options* screen contains mostly non-critical settings:

<b>Setting</b>	<b>Explanation</b>
Logging intervals	Refers to the interval (in seconds) at which position fixes will be recorded.
Point feature	Static (averaged) point features. For rapid data collection at a single point, a one second interval is usually used. If the time for the point will be longer (for example 10 minutes at a sample plot), a larger interval such as 15 seconds should be used.
Line/area	Interval setting for lines and areas – Set at a short interval if moving quickly, in an irregular manner or if there is a lot of blockage to the sky in the survey environment. Use a longer interval when moving slowly in a regular manner.
Not in feature	Interval when logging position fixes not in a line, area or point feature. Many people prefer to survey line features using this mode.
Velocity	This option will store the velocity of the user (relative to the satellites) using the doppler observable. Then in post-processing, impossible “zingers” such as a 100 metre jump in 5 seconds can be filtered out. This may improve accuracy slightly when doing dynamic surveys under forest cover. However,

<b>Setting</b>	<b>Explanation</b>
Confirm end feature	Setting this option to <b>YES</b> will bring up a confirmation message each time a feature is ended (by pressing the Enter key). This will help ensure that features are not ended accidentally - for example when walking through heavy brush. Note that the receiver will suspend (pause) logging while the confirmation message is up. The default is <b>NO</b> .
Minimum posns	The receiver will issue an audible prompt after the minimum positions when doing a static (averaged) point feature. A warning appears if you have tried to store a point feature before you have sufficient positions logged. This can be overridden in the field (either fewer or more positions), so is a setting of convenience.
Carrier Phase	This option will enable "carrier phase" logging. Using the carrier phase may increase the accuracy of positions taken in totally open conditions. However, the data logger's capacity will be greatly reduced (over 10 times), and carrier phase methods usually <b>do not work</b> in the forest - indeed carrier phase positions are often much worse in the forest. Carrier phase should be turned on only under special circumstances. The default is <b>OFF</b> .
Minimum positions	The receiver will issue an audible prompt after the minimum positions when doing a static (averaged) point feature. A warning appears if you have tried to store a point feature before you have sufficient positions logged. This can be overridden in the field (either fewer or more positions), so is a setting of convenience.
Dynamics code	The dynamics code affects the tracking characteristics at different speeds and in different environments. For most low-speed (<200 km/h) situations, especially where signals may be obstructed occasionally, the <b>Land</b> setting should be used.
Audible click	Setting the audible click <b>ON</b> allows the operator to hear a beep when position fixes are being logged. The operator can hear when data is being logged without visually checking the screen which is inconvenient or unsafe in many dynamic surveys.
Log DOP data	Setting this to <b>YES</b> will cause the receiver to log the DOP values for each position fix. Positions recorded with a lower DOP should be more precise than those with high DOPs. This can be used as a quality control feature, but is not required.
Log PPRT data	When real-time corrections are used (for example using the built-in Coast Guard beacon receiver), setting this option to <b>YES</b> will save additional data so that the positions can also be post-processed later if there are any problems. It will approximately half the data logger's capacity.
Log QA/QC data	This option does not apply to Pathfinder series receivers.

Most of the critical settings are in the *Position filter* screen. They are indicated by **bold** letters:

Setting	Explanation
Pos mode	<p>This controls the minimum number of satellites used to compute a position, as well as the fixed-elevation feature. The choices are:</p> <p><b>Manual 3D</b> (min. 4 satellites)  <b>Overdetermined 3D</b> (min. 5 satellites)  <b>Manual 2D</b> (height fixed always, min. 3 satellites)  <b>Auto 2D/3D</b> (height fixed if PDOP high, min. 3 satellites)</p> <p>One of the two “3D”-only modes <b>must</b> always be used for data collection. The overdetermined mode may be used in cases where higher accuracy is required, although productivity will suffer. “2D” modes will assume a known elevation and will give poor horizontal positions in almost all cases. For emergency navigation <b>only</b>, a 2D mode may be used.</p>
Elev. mask	Satellites below the elevation mask (angle above the horizon) will not be used to compute position fixes, and the measurements to them will not be stored.
SNR mask	Signals below a certain SNR (a measure of relative signal strength) will not be used to compute position fixes, and the measurements to them will not be stored. (see note below)
PDOP mask	Sets the maximum acceptable PDOP level of the current satellite constellation being used. The receiver will not log positions if the PDOP level is above the maximum setting.
PDOP switch	The switch only applies when using the <b>Auto 2D/3D</b> positioning mode. It is the PDOP level at which the receiver will switch from 2D mode to 3D mode. This should not apply as “3D” modes only are used for data collection.
Apply real-time	This option controls how the receiver handles real-time corrections (if available). <b>Auto</b> means that corrected positions are stored if corrections are available, otherwise uncorrected positions for later post-processing. <b>No</b> means that no positions are corrected. <b>Yes</b> means that only real-time corrected positions are stored (uncorrected positions are not stored). The default is Auto.
RTK mode	This option does not apply to Pathfinder series receivers.

## *Signal to Noise Ratio*

Signal to Noise Ratio (SNR) is a measure of the relative strength of a satellite's signal. Signals with a lower SNR (i.e. weaker signals) will likely be noisier and may result in a less accurate position.

However, when working in difficult conditions such as under tree canopy, it is often necessary to reduce the SNR mask for productivity. Paradoxically, this may actually increase the accuracy of the final interpreted line for a dynamic traverse, since there will be much more data available for interpretation. Although there may be some individual positions which are not accurate, the errors are likely to be random and thus easy to eliminate.

For these reasons (increased productivity and reliability of the final product), current BC Provincial GPS Standards (MoF, DFO and others) do not require the use of SNR masks at any level.

The Trimble receivers have a selectable SNR mask. They appear to be the only receivers commonly used for resource GPS surveying with that feature. Demonstrations of the relative tracking efficiency of different brands of receivers may give unrealistic and unfair conclusions unless differences in tracking settings (e.g. SNR masks) are accounted for.

Setting the SNR mask to 2 or 3 under forest canopy does not seem to degrade accuracy beyond acceptable limits. In fact, recent extensive testing has shown that, even with an SNR of 0, the Trimble Pathfinder ProXR receiver was perhaps the most accurate under forest canopy. GPS operators should experiment to find the optimum SNR mask for their application, keeping in mind that an SNR mask of 0 still produces perfectly acceptable results in most cases.

## Trimble Pathfinder Pro Receivers Asset Surveyor Configuration

The following table shows example values for the Asset Surveyor Configuration Screen. These values are based on a typical GPS survey to meet Ministry of Forests GPS standards. Critical settings are in bold.

Configuration Option	Recommended Value	Notes
Logging intervals		
point Feature:	1 s	usually more data is better
Line/area:	1–3 s	
Not in feature:	None	
Velocity:	None	
Confirm end feature:	No	can be a “hassle”
Minimum positions:	30	user preference
Carrier phase		not
Carrier mode:	Off	recommended
Minimum time:	10 mins	for most work
Dynamics code:	Land	all applications
Audible click:	Yes	
Log DOP data:	Yes	good for QC
Log PPRT data:	Yes	storage issues
Log QA/QC data	Yes	not applicable
<b><i>Position mode:</i></b>	<b>3D Manual</b>	min 4 SVs
<b><i>Elevation mask:</i></b>	<b>15°</b>	not lower
SNR mask:	0	user preference
<b><i>PDOP mask:</i></b>	<b>8</b>	not higher
PDOP switch:	8	or 99
Apply real-time:	Auto	On if RT <b><i>only</i></b>
RTK mode	Off	not applicable