WRSN Network Connection

5700-TSCE-CELL PHINE (via cable)

Equipment List:

1 – Trimble 5700 GPS receiver w/2ea. batteries
1 – Trimble TSCe data controller.
1 – Trimble small Zephyr GPS antenna.
1 – Antenna cable.
1 – Trimble TSCe data controller to GPS receiver cable (Cable with LEMO connectors on each end).
1 – Nextel cell phone.
1 – Cell phone bag/clamp.
1 – Cell phone Serial COM port cable.
1 – Fixed height bipod (2.0 meters.)

Equipment Set up:

1. Set up Fixed Height Bipod.

2. Screw small Zephyr antenna to top of Fixed Height Bipod.

3. Attach cell phone bag with cell phone to the Fixed Height Bipod.

4. Attach Trimble TSCe data controller to the bracket on Fixed Height Bipod.

5. Clamp Trimble 5700 GPS receiver to lower part of the Fixed Height Bipod.

6. Connect antenna cable to Zephyr antenna and Trimble 5700 GPS receiver (the antenna port with satellite symbol).


7. Connect cell phone cable to 9 pin serial port on Trimble TSCe data controller.

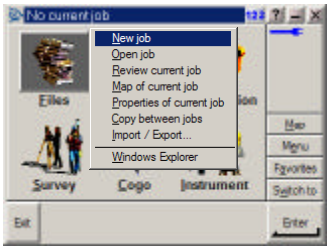
8. Connect Trimble TSCe data controller data cable to the center LEMO port on the TSCe data collector. Connect the other end of the TSCe data controller data cable to the #1 port (with data collector symbol) on the Trimble 5700 GPS receiver.

9. If you want you can tidy up the cables by strapping the cables to the bipod rod with the Velcro straps.

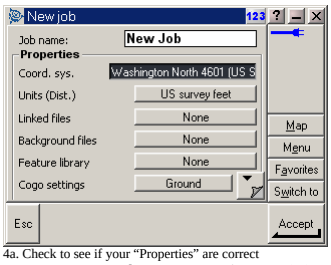
How to Collect Data:

Setting Up A Job File:

1. Double tap the [Survey Controller] icon on the Windows CE desktop which will run the Trimble Survey Controller software.
2. To create a new job tap on the [Files] icon, then tap on the [New Job].



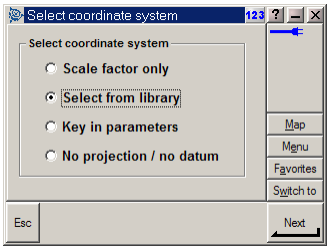
3. Type in the name of your job in the "Job name" window and tap the [Enter] button in the lower right of the screen after each edit.



4a. Check to see if your "Properties" are correct

*****Note: Make sure your units are US Survey Feet and are in the Washington North 4601 Coordinate system, since you will be using this coordinate system for your control *****.

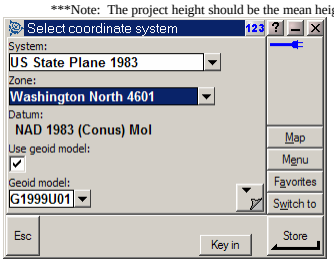
4b. Check to see if your job is using the Geod99 file by tapping on the [Washington North Coord. Sys.]
4c. Tap [Next] after verifying that you have the [Select from library] radio button highlighted.

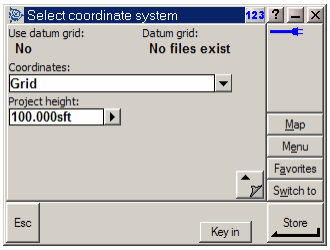


4d. Verify that you have:

US State Plane 83
Washington North 4601
NAD 1983 (Conus) Mol
Use Geoid Model = checked
Geoid Model = G1999U01 (use geoid 03!)
Use datum grid = No
Datum Grid = No files exist
Coordinates = GRID
Project height = 100.00sft.

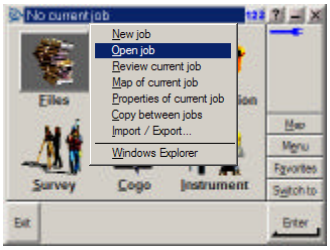
Note: The project height should be the mean height of your project area, within 10-20ft.



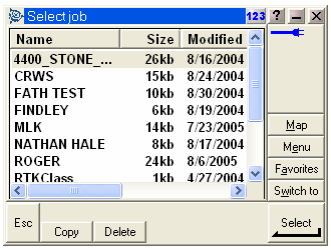


See previous page for note on Project Height.
4e. Tap [Store] once all the coordinate system settings are acceptable.
5. Tap on the [Accept] button in the lower right of the screen if all your "Properties" and "Job name" settings are correct. Your job name should now be in the upper main window title bar.

***** NOTE: The main window title bar at the top of the screen displays the current open job. A job previously created can be opened by going to the same [Files] icon on the main menu and tapping on the [Open job] pull down list and selecting the correct job file. *****



Double click on the job in which you wish to work.



Connecting to the Internet:

1. After setting up the equipment.
2. Turn on the cell phone, Trimble TSCe data controller and Trimble 5700 GPS receiver.

   ***** Note: The Trimble 5700 GPS receiver should come on when you turn on the TSCe data controller if the data controller is attached to the receiver, but check to make sure the receiver is on. *****

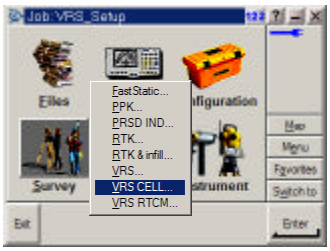
3. Exit any programs you are in to the Windows CE desktop screen.
4. Tap [Ctrl] then [esc] buttons on the keypad to bring up the Windows CE Start Menu
5. Tap on the [Settings] menu on the screen to get the [Settings] pull down menu.
6. Tap the [Networking / Dial-up Connections] listing on the screen.
7. Double tap on the [VRS NEXTEL] icon.
8. Tap on the [Connect] button on the [Dial-up Connection] window to connect the cell phone to the Internet. (It is not necessary to type in a username or password here.)
9. Once connected this small window will tell you that you are connected.

   ***** NOTE: If you do not get connected, a different window will pop up stating that "You have been disconnected from the remote computer you dialed. Retry the connection". If this happens tap [OK] on the upper right-hand corner of the small window on the screen and check to see if you have all your cables connected (mainly the cell phone serial cable) securely, that your cell phone is turned on and that you have signal bars on the phone. Try again.*****

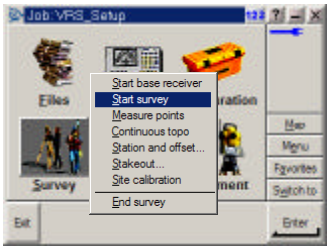
10. Once connected, tap the [Hide] button and close the [Connection] window to get back to the Windows CE desktop. You are now ready to start your survey.

Starting a Survey:

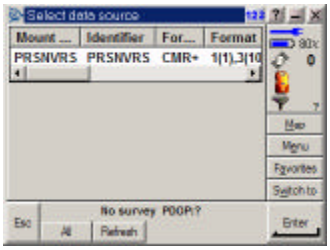
1. In the Trimble Survey Controller software tap on the [Survey] icon in the main menu
2. Select [VRS CELL].



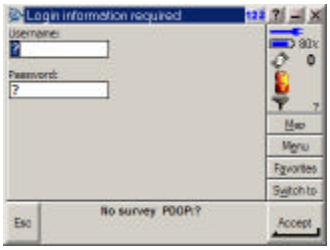
3. Select [Start survey].



4. Tap on the “PRSNVRS” line



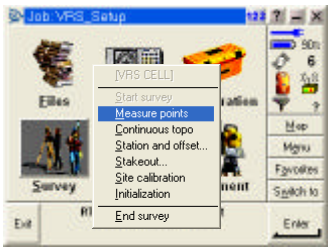
5. Type in your “Username” and ‘Password” in the log in screen. Username is _____ - of data controller being used); password is _____The username & password are NOT case sensitive.



6. Tap the [Enter] button in the lower right of the screen or press the return key on the keypad after each edit.
7. Tap on the [Accept] button in the lower right of the screen or press the return key.

*****NOTE: Once the log-in process is finished the screen will switch back to the main menu of the Survey Controller. *****

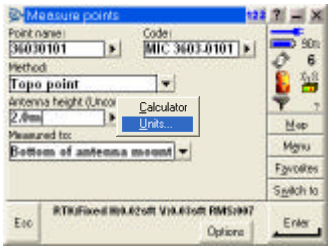
8. Set up and level the bipod over the point.
9. To collect coordinates tap on the [Survey] icon and select [Measure points].

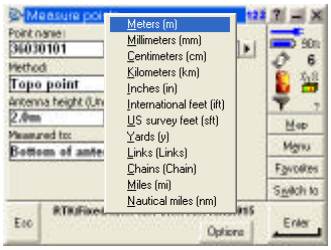


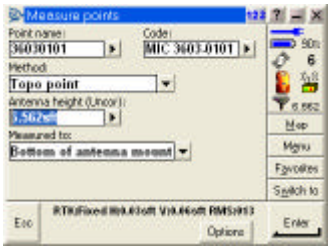
10. Type in the point number [Point name], descriptor [Code] and rod height [Antenna height] in the appropriate boxes.

****** NOTE: Make sure your rod height is in the correct units! ******

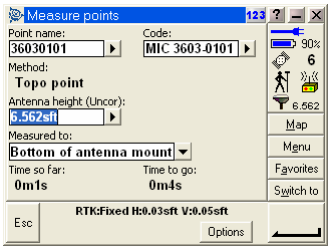
Your rod height will almost always be 2.0m (6.562ft). If you just type in 2.0 the software will think it is 2.0sft. You can type in 2.0 and then use the pull down menu on the side of that box and select [Units] and [Meters], and the software will convert the rod height to the current job units. Another way to convert from meters to your job units is to type 2.0m (m for Meters) and the hit the [Tab] or [Enter] key on the key pad or by tapping on the [Enter] button in the lower right hand corner of the screen.



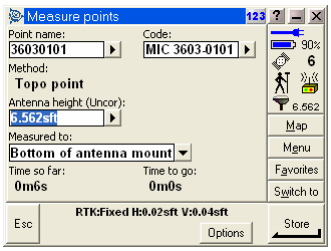




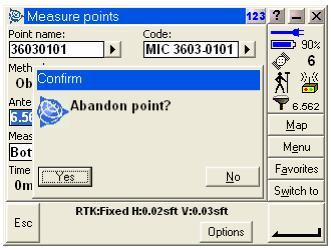
11. After setting up and leveling over the point, getting initialized, and making sure your point #, descriptor, and rod height are correct …
12. Tap on the [Measure] button in the lower right hand corner.
13. This will start collecting the data and start the count down.



14. Once the count down hits 0 (usually 5 sec.) the software will give you the option to store the point. Tap the [Store] button in the lower right hand corner.



***** NOTE: If the count down takes a great amount of time (over 30 secs.) it means the network is having problems solving the solution (RMS is too high, for example). It would be wise to stop the data collection, abandon that point, and start remeasuring the point. To stop the data collection you will need to tap on [Esc] and then click on [Yes] at the 'Abandon Point?' prompt. *****



*****NOTE: It is possible to store a point without or before the [Store] prompt appears. After an appropriate amount of time has elapsed, tap the empty box in the lower right hand corner of the screen where the [Store] icon normally appears. A prompt will appear allowing the user to store the point with less than desirable data. It is a judgment call when to store a point with less than ideal data. This situation might be applied if accuracy is only required to the nearest tenth and/or the time necessary to set up conventional methods or to run a fast-static or static session outweigh the benefits of having better accuracy.**

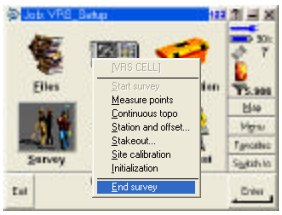
15. Repeat your set up and leveling over each additional point.

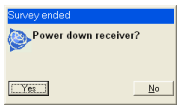
*****NOTE: You will need to make sure you have initialization before you will be able to store each point. *****

*****NOTE: You might need to stop the survey and restart it if you have difficulty getting initialization (you should be able to initialize in a few minutes). *****

Stopping Your Survey:

1. Exit out of the [Measure] screen by tapping on the [Esc] button in the lower left-hand corner of the screen.
2. This will take you back to the main menu screen where you tap on the [Survey] icon.
3. Pick [End survey] in the pull down list.





4. You will probably want to say [No] when it asks if you want to 'Power down receiver,' unless you will be quitting for a long period of time (such as lunch or quitting for the day) to save battery power.

Transferring coordinates:

Creating a text file:

1. In Trimble Survey Controller with the correct job file opened, tap [Files] icon.
2. Pick [Import / Export…].
3. Pick [Send ASCII data]
4. Pick [Comma Delimited (*.CSV, *.TXT)] in the pull down menu under [File Format] box.
5. Pick [Trimble Data] in the pull down menu under [Send to] box.
6. Type the name of the file you would like to create in the [To name:] box.
7. Check to see if you have the correct format.
   [Point Name] = Field1 [Point Code] = Field5
   [Northing] = Field2 [Easting] = Field3
   [Elevation] = Field4
8. Tap on [Send] in the lower right hand corner.
9. Select the points you would like to send to the text file (i.e. All points, Select for List, etc.)

Transferring files from data collector to data collector:

1. If in Trimble Survey Controller software, exit to Windows CE desktop.
2. If TDS Ranger is in TDS, exit it to Windows CE desktop.
3. In each data collector, tap [Ctrl] then [esc] buttons on the keypad to bring up the Windows CE Start Menu.
4. Select [Program], then [Communication], then [File Transfer].
5. Point the Trimble TSCe data logger towards the TDS Range (Top end, to top end).
   ***** Note: They will need to be within ~1ft – 2ft of each other and on the same plane*****
5. On the TDS Ranger, select [Receive…] button in the "File Transfer" window.
6. Make note of the directory that the TDS Ranger is saving the file to.
7. Tap the [Ok] button in the middle. (it should now be waiting for sender).
8. In the Trimble TSCe data logger, select the [Send….] button in the "File Transfer" window
9. Select the file you would like to send (it should be under "Disk\Trimble Data\".
10. Tap [Ok] in the upper right hand corner of the screen. (this should start the transfer of the file).
11. Once done, both data collector will go back to the "File Transfer" window.
12. You can now exit out of the "File Transfer" windows of each data collector and import the newly transferred text file into you TDS job file.

Accessing Coordinates:

Coordinates can be viewed within the active project:

1. tap [Files] on the main menu screen
2. tap [Review current job] A list will appear of the raw data, including all points stored.
3. Single click the point number for which coordinates are desired. All the data on the point stored will appear: coordinates, feature code, the horizontal and vertical precisioning, the method of data collection, date and time, and all the satellite information at the time the point was stored.

***NOTE: It is possible to change the descriptor code in the "Code" box. For example, if a point was stored with an improper description (i.e. wrong INTX), it can be changed in the field.

***SIDE NOTE: The cursor is defaulted to highlight the entire "Code" box -- the descriptor -- when the point screen is first opened. Any key stroke at this point, accidental or otherwise, will overwrite the description stored. I highly recommend tapping within the box to place the cursor, so that the entire feature code box is no longer highlighted to avoid this easily made mistake.

4. Change the coordinate settings, if desired, by tapping the [Options] button at the bottom of the screen on the right: WGS84 = latitude & longitude; Grid = northings & eastings.

Fast Static: when and how to use it ...

There will be certain situations in which is will be more practical to "fast static" a point than to continue fighting for a VRS solution.

It's really a judgment call on when to fast static vs. VRS. Fast static is a short static session, lasting anywhere from 8 to 20 minutes (or more) and it requires post-processing in the office. Coordinates will not be immediately available. The length of time for a fast static is dependent upon the number of satellites continuously available. While doing a fast static with the data controller you may see the length of time required change from 7 minutes up to 14 and then back down to 6 within a matter of seconds. This is because a satellite has somehow dropped out of the solution (passed behind a building or tree, or dropped off the horizon) and then was regained, or another one was gained. Since static sessions take longer than VRS sessions and require additional office time, it will be up to the individual user to decide the best use of time for any given project. Is there room in the budget for post processing? Conversely, is there time to return to that point the following day at a different time when the satellite configuration would be better? Is it a point best shot with conventional methods?

That having been said… Fast static is more forgiving than VRS and can be performed in the following situations:

- you are in an area that has no cel phone coverage;
- there are problems with the server; †
- you don't have the data collector

***Note: Fast static is still subject to the same restrictions as VRS regarding satellite coverage. So, points or monuments right up against buildings or under heavy tree canopy would best be shot with conventional methods. If there are not enough satellites above the horizon or their configuration is poor (i.e. five satellites all in a straight line) fast static data *may* be no better than data gathered via VRS methods. ***

† When deciding to fast static because of problems with the server, call office staff first to ensure that the base stations are downloading the RINEX files. Without that data, any static session will be useless.

Fast-static operating procedures:

- no need to log onto the internet or use the phone,
- set the rod up over the point,
- with the data controller: create a job for the point/s to be fast-static'd if there isn't one already created.
- tap [Survey] on the main menu;
- tap [Fast Static];
- fill out the point #, descriptor, antenna height as you would otherwise;
- hit [measure] – there is no "fixed" solution, because there are no radioed corrections to receive
- The data controller will count down the time required for the static session dependent upon the number of satellites being received.
- Hit [Store] when the countdown is finished and the "store" button appears in the lower right hand corner.

A fast-static session can also be performed without the data controller:

- manually turn on the receiver (press the power button.)

When the receiver is first turned on and is searching for satellites, the satellite button will flash rapidly. Once it begins tracking enough satellites for a solution, the satellite button will flash once every second. At that point it is possible to begin recording data. ***Note: There must be a memory chip inside the receiver. (Open up the bottom compartment just above the battery bays to find the chip.)***

- record data by pressing the blue record button (last button on the left of the receiver.)

An amber light below the blue record button will illuminate when enough data has been collected for a solution to be post-processed. It's best to let a fast-static session run for at *least* 15-20 minutes (even if the amber light has been illuminated.) Generally, the more data the better. Therefore, the less ideal the sky conditions, the more time necessary for data collection.

- To end the fast-static survey, press the blue record button, then power off the receiver by holding down the green power button.

Trouble-Shooting

This thing just isn't working:
- Are all the cables connected?
- Are there batteries in the receiver?
- Is the cel phone turned on and are you receiving cel coverage?
- Are the batteries for the phone, data controller, receiver fully charged (enough so they will work, anyway)?

Double-check:
- Are you level and over the point?
- Are you initialized? (You must have a "Fixed" solution, not "Float," in order to store a point accurately.)
- Do you have the correct rod height entered? Is it in the correct unit?!!!
- The points on the end of the bipod legs have routinely worked their way loose. Regularly check to see that they are screwed on tightly.

Trouble Connecting to Internet:
On occasion, people have had trouble logging into the internet using the [Ctrl], [Esc] keys. If this should happen, close the Survey Controller program (the one with the "Survey," "Files," "Instrument," etc. menu) so that you are at the main Trimble screen (where the "Survey Controller" and "My Computer" icons are located.) Then try the connection again using [Ctrl], [Esc].

Error Messages:
"**Could not start streamed corrections**" – Most often this message occurs when the user tries to begin a survey before the data controller is fully connected to the server. (It will appear as though there is a connection.) The first thing to do is simply click OK to close the box, wait a few moments, and then try again. Nine times out of ten, the connection will be gained on the second attempt.

If not: hard reset the data controller by depressing and holding the power button until it counts down to 0 and resets. (You will need to reset to ALL CAPS – hold down the blue shift key, [Alt], and the power button to pull up the keypad on the screen; select caps; blue shift, [Alt], and power to make the keypad disappear.) You will also need to reopen your job. All the other defaults, datum, units, etc. will remain the same.

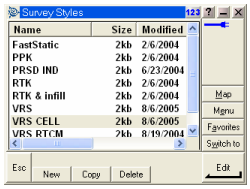
"**You have been disconnected from the remote computer you dialed. Retry the connection**." – This means there is no connection from the phone to the internet. First check that the phone cables are securely connected, the cel phone is turned on, and that it is receiving cel coverage. If that doesn't work, disconnect all cables from the data controller and do a hard reset (holding down the power button until resetting.) If the problem persists, try another cel phone if one is available. This message is a result of interference with cel coverage so that it is not conducive to internet use. It is usually a localized problem, so that moving to another spot a short ways away may provide results. It also may be limited to a short period of time, so that returning at a later time (after storing other nearby points, or after lunch) may produce results. Basically, this is a problem with the nearby cel tower and is out of the hands of the user.

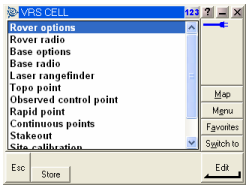
"The port is not available; it is either configured incorrectly or another program is using it." – This message can result from disconnecting the phone improperly during previous use. The proper way to disconnect the phone after a VRS session is via the same method it was connected: press the [Ctrl] and then [Esc] keys, [Settings], [Network / Dial-up Connections], double tap the [VRS Nextel], and tap [Disconnect.] If the phone is simply unplugged after a VRS session while the phone is still connected to the internet, the port may remain open as if it were still in use. When the user tries to access the port later, it is unavailable. At that point the port must be disconnected by performing a hard reset of the data controller. (Hold down the power button until the data controller resets.)

"Invalid Antenna Selection" -- The small (approx. 0.5') antennas are "zephyr" antennas. The large pizza pie sized antennas are "zephyr geodetic" antennas. The zephyr geodetic antennas are usually used for static sessions of 45 minute length or longer, and are used to help reduce multi-pathing. For VRSing, you will almost always be using a zephyr antenna.

· Select the correct antenna by returning to the main menu and clicking [configuration], [Survey styles]. (The survey style you select from the long list of styles reflects the type of survey you are performing. So if you are intending to do a fast static and need to change the antenna, [Fast Static] should be selected.) If you are VRSing …

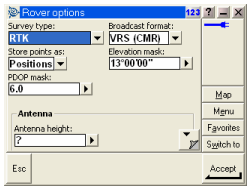
· Select [VRS CELL] (since you are using VRS with cel phone.)
· Select [Rover options] – The unit you are using is referred to in Trimble jargon as a "rover." (This list gives the user access to all the default settings of the various attributes listed.)

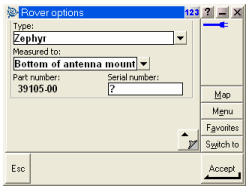




· Under [Rover options] the "survey type" field should by [RTK]; "Broadcast format" should be [VRS (CMR)]; the other fields should stay the same.
· In the "Antenna" box there are three important fields:

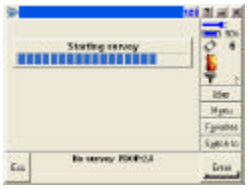
1.) [Antenna height] – leave this as a question mark. That way the default setting prompts the user to manually enter a rod height, hopefully reducing rod height errors.
2.) [Type] – Select the type of antenna being used (usually Zephyr) from the pull-down menu.
3.) [Measured to] – "Bottom of antenna mount" This allows the rod height to be taken into consideration.





· [Accept] – After all edits have been made click "Accept" in the lower right corner.
· [Store] – You must click the "Store" button in the lower left corner in order for all edits to be stored!
· [Escape] – You're done! And ready to survey.

Server down – While beginning a survey, if the data controller gets hung up at the "starting survey" screen, there is a problem connecting to the server. Close all programs, and turn everything off; then retry. Lastly, try a hard reset of the data controller. If all the above fails, it might be worthwhile to call the office to verify that the server is up and running. (See list of phone numbers under "More resources" below.)

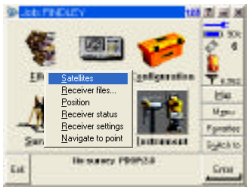


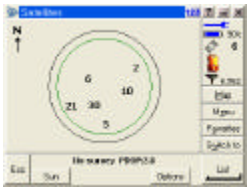
Things to think about:
Open sky (little to nothing above 13 degrees off the horizon), initializing within seconds, low RMS, and accuracy reading in the hundredth foot (RTK: Fixed H: 0.02sft V:0.03sft) are the ideal. Most of the satellites are to the south of us, so big trees to the north of a point will not be as problematic as big trees to the south.

· If it takes a long time to initialize:

Satellite geometry – You will need at least 5 satellites tracking both L1 & L2 data in order to get a fixed solution. To view your satellites, go to the menu screen, tap [Instrument], and select [satellites] from the list. You can toggle back and forth between viewing the satellites you're tracking as a list or plotted out as a diagram by tapping the [plot] / [list] key in the lower right hand corner of the screen. Discovering all the satellites you're tracking are in a single row may explain why your PDOP is high, your accuracy is low, and/or why you can't get initialized. The list screen shows which satellites are being tracked, whether they are receiving L1 & L2, and what their angle is off the horizon.

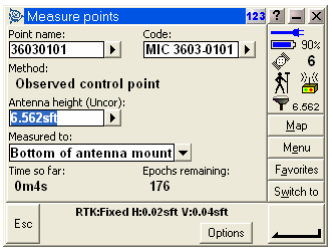
Poor location – It will take a long time to initialize if satellites are being blocked by nearby buildings, trees with thick canopy, etc.





Procedures:
There are two main methods for collecting points with the VRS: **observed control point** and **topo point**.

Topo point collects data on a point within 5 seconds if all conditions are satisfactory. **Observed control point** collects a fixed number of epochs of data from the satellites and varies in time depending on how many cycle slips interrupt the receival of data. Points stored using **observed control point** seem to have better vertical accuracy, but not necessarily better horizontal accuracy despite the additional data.



· All control points should be collected using the **observed control point** option. After being shot the first time, rotate the rod 180 degrees **AND** dump the initialization that you had for the first shot. (This can be done by turning the whole rod upside down or even horizontally, or by covering the antenna until you hear or see "Initialization has been lost" from the data controller.) Wait until initialization has been regained, then store the second point. The idea behind this is the same principle as using direct and reverse on the instrument – to average out any errors. Dumping the initialization in between points ensures using two separate sets of satellite data.
Use the average of the two points – Shoot a point twice, and then take the average of the northings, eastings, and elevations. The data collector accepts alpha-numeric entries, therefore, it is suggested to store a point number with "A" and "B" (ex. – 101A, 101B), take the average and enter it in the Ranger or subsequent data as point # 101.

· Points collected that are not to be used as control points (ex. – locations of MHs, inlets, etc.) can be collected as **topo points** and do not need to be shot twice.

More Resources (for inquiring minds):
I: / Equipment / GPS / Trimble 5700 GPS receivers / 5700-5800 V2 User Guide.pdf
I: / Equipment / GPS / Trimble TSCe / v10.70-Survey Controller-Getting Started Guide-English.pdf
I: / Equipment / GPS / Trimble TSCe / Trimble_TSCe_Combine_0112003_lr.pdf

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Joyce 615-1478 (office)
Gavin 684-5631 (office); 423-4765 (cel)
Dean N. 684-5137 (office)