Ashtech Z-Xtreme RTK / TDS Ranger - Survey Pro CE Version 3.2.1 - Sales Support Document

RTK Demo - TDS Mapping Plane with known WGS84/NAD83 – State Plane Coordinates & Geoid Model

Pre-load all the project's NAD83 control point's coordinates, create and transfer the necessary Geoid model over to the Ranger.

Setup RTK Base Station on known WGS84 / NAD83 Control Point
Measure the HI of the RTK Base Station.

On the TDS Ranger, start the TDS Survey Pro CE software by double-tapping on the Survey Pro icon, or from the **Start | Programs | Survey Pro menu…**

The TDS Survey Pro CE logo / splash screen will be displayed…

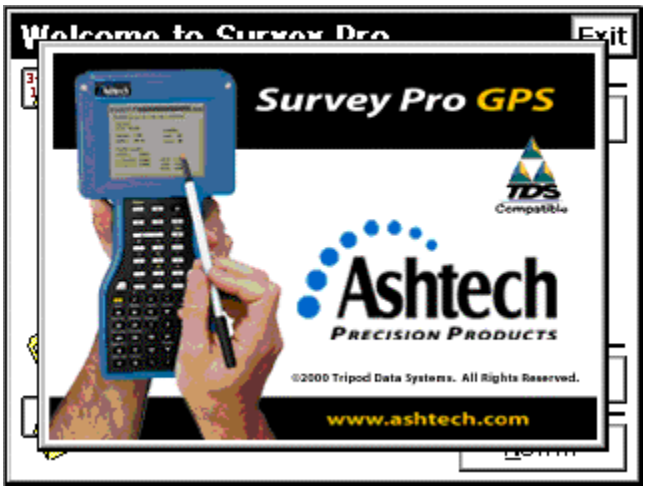

Figure 1

After a few seconds, the Logo / Splash screen will close automatically.

To manually close the Logo / Splash screen, simply tap anywhere on the screen.

The next screen…

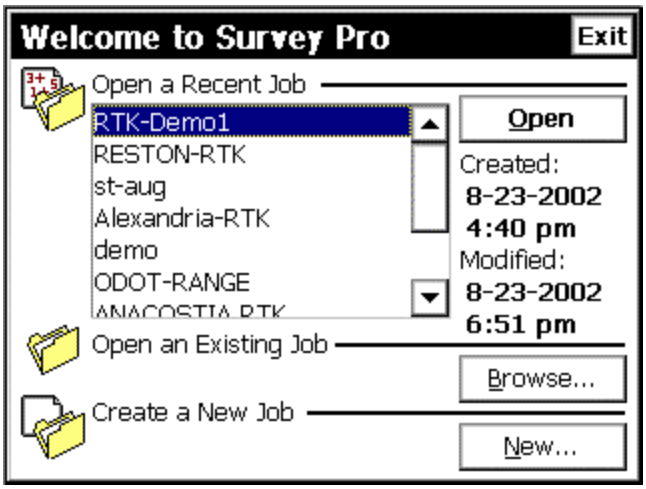

Figure 2

The Welcome to Survey Pro dialog menu…

Select the "**Create a New Job"** menu, tap the **New…** button,

The next screen…

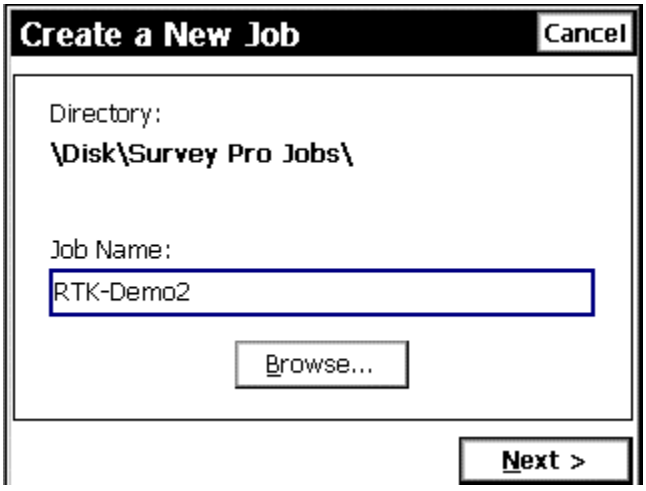

Figure 3

Input a name for the New Job: **RTK-Demo2**

Next, Tap the **Next >** button…

The next screen…

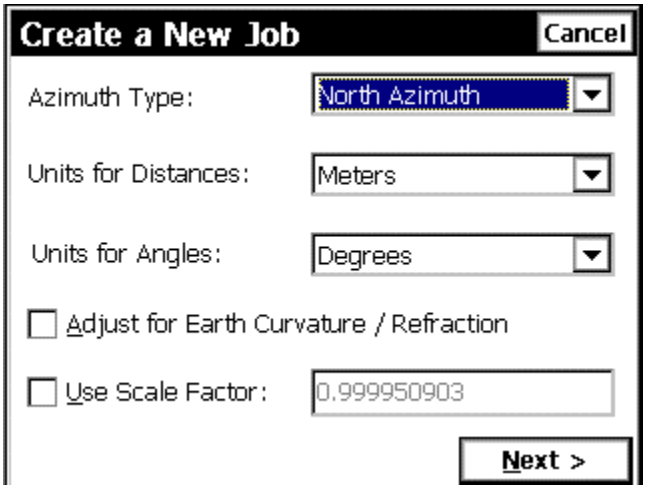

Figure 4

Select the Options as shown above

Next, tap the **Next >** button…

The next screen…

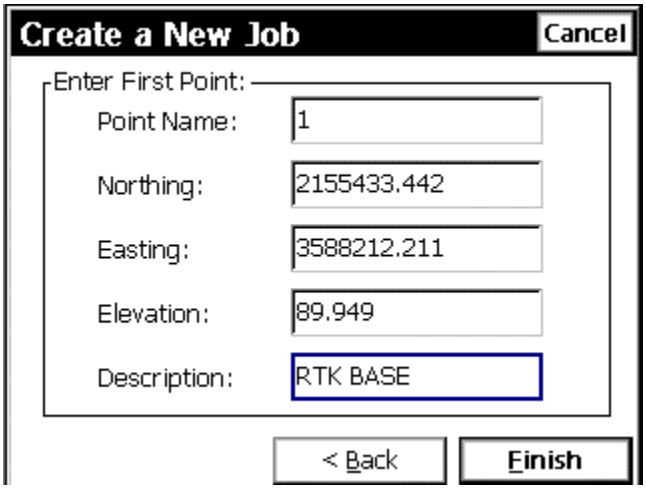

Figure 5

Enter the RTK Base points known NAD83 State Plane Coordinates, Next , Tap the **Finish** button…

To add additional points select, **[2] Job – [B] Edit Points** menu then select **Insert…**

The next screen…

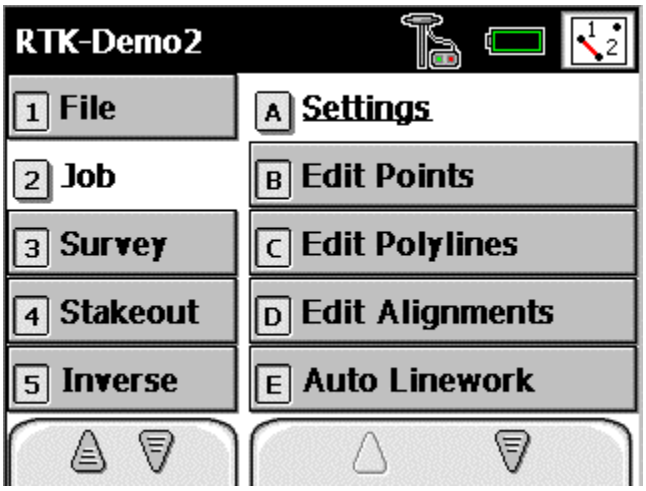

Figure 6

From the Survey Pro CE main menu,
Tap on **[2] Job – [A] Settings** menu…

The next screen…

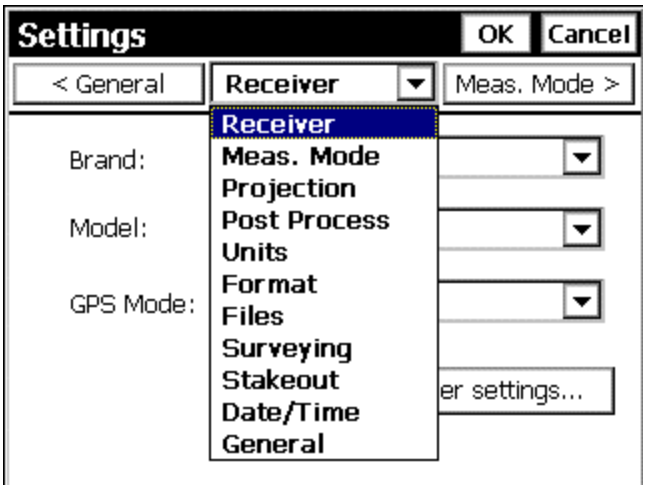

Figure 7

In the **Settings** menu, Tap on the center Pull-Down menu…
This is the Primary Settings Pull-Down menu for the Survey Pro CE software.

The basic flow-chart of the Settings menu, work your way down through the menu, Top to bottom…

Tap on the Down-Arrow, select **Receiver…**

The next screen…

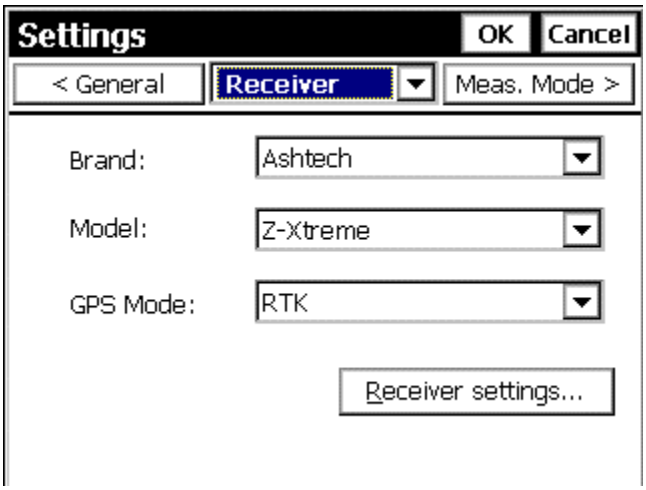

Figure 8

Select the Options as shown above:

Next, Tap on the **Receiver settings…** button,

The next screen…

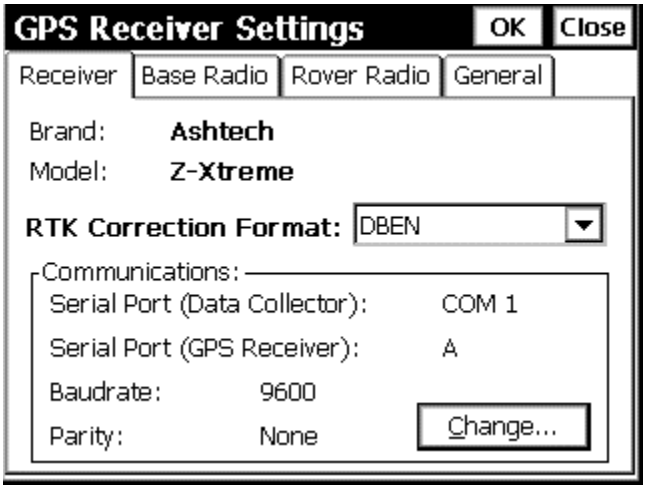

Figure 9

Select the Options as shown above:

Next, Tap on the Base Radio tab…

The next screen…

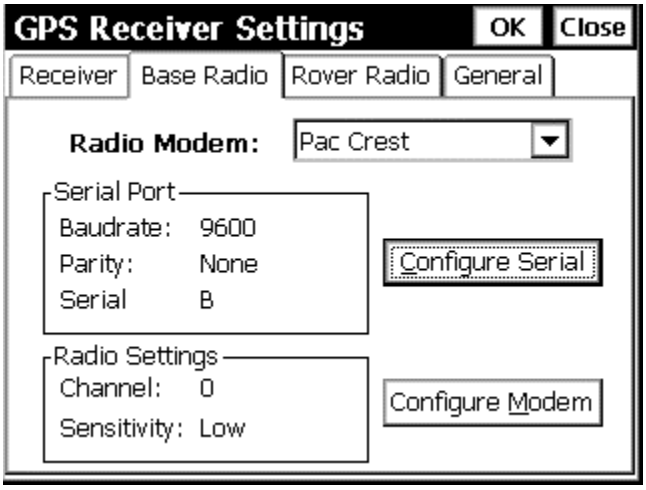

Figure 10

Select the Options as shown above:

Next, Tap on the General Tab…

The next screen…

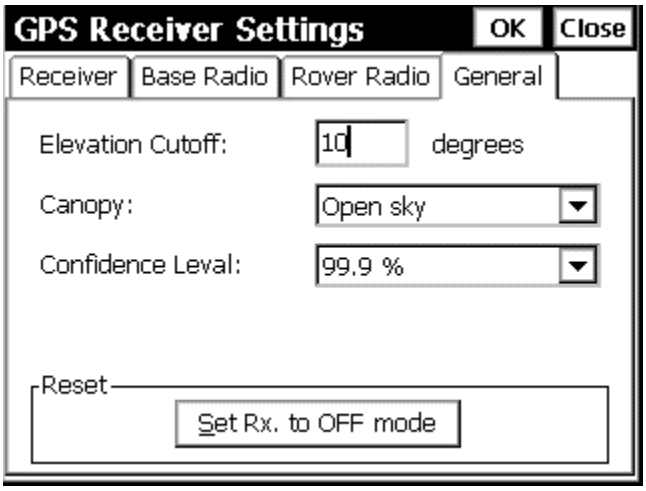

Figure 11

Select the Options as shown above:

When finished verifying the GPS Receiver Settings – Tap **OK…**
This will return you to the **Settings** Menu…

Next, Tap on the Center Pull-Down menu, select **Measure Mode…**

The next screen…

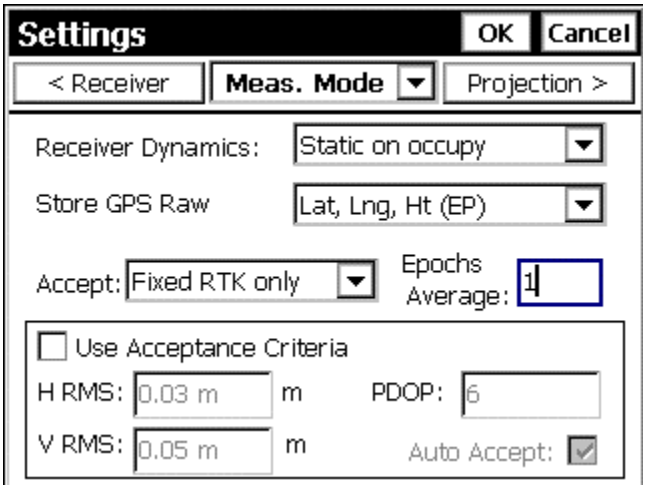

Figure 12

Select the Options as shown above:

Next, Tap on the Center Pull-Down menu, select **Projection…**

The next screen…

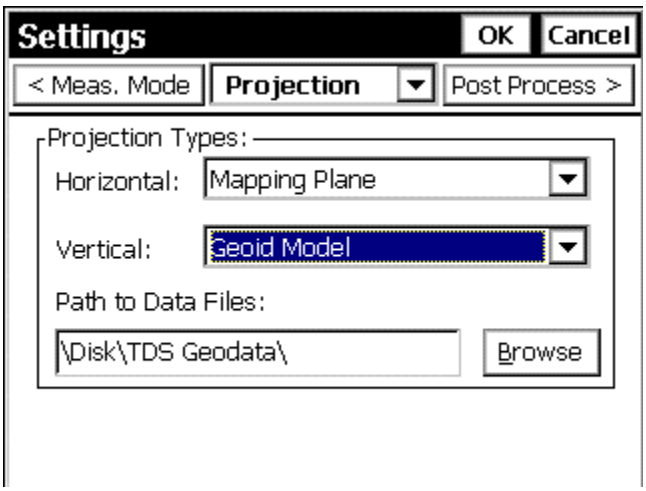

Figure 13

Select the Options as shown above:

After selecting the Projection "Mapping Plane", in the **Job | Settings** menu, for the demo, Tap **OK,** this will return you to the Survey Pro CE Main menu…

Next, Tap on the **[3] Survey - [F] Projection** menu
Select the actual parameters for the Mapping Plane…

The next screen…

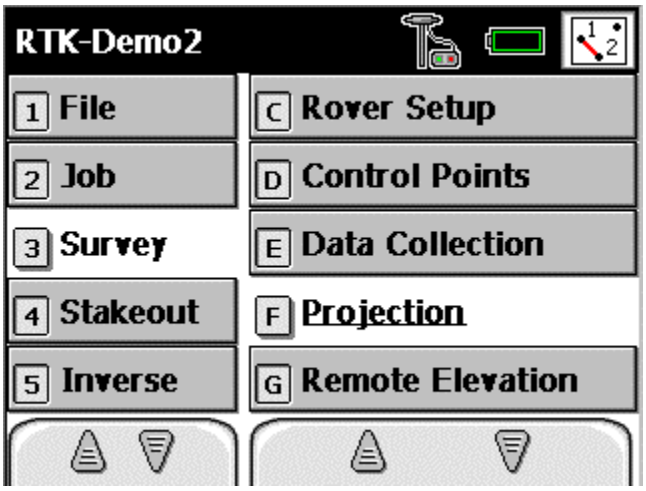

Figure 14

The next screen…

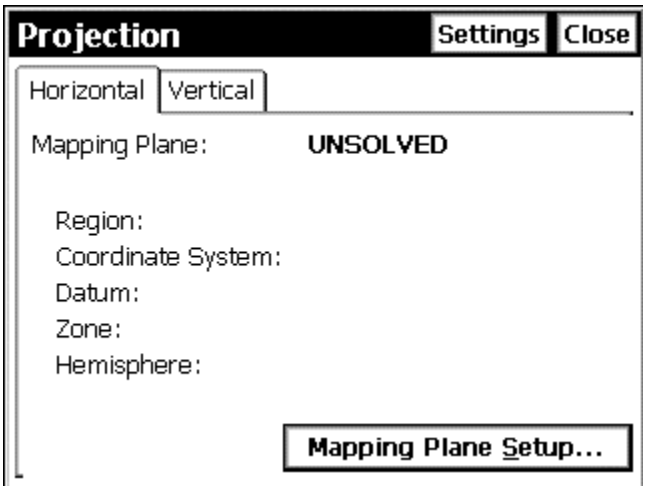

Figure 15

Initially, the Projection will report **UNSOLVED**, to establish the Mapping Plane, from the Horizontal Tab, Tap on the **Mapping Plane Setup…** button,

The next screen…

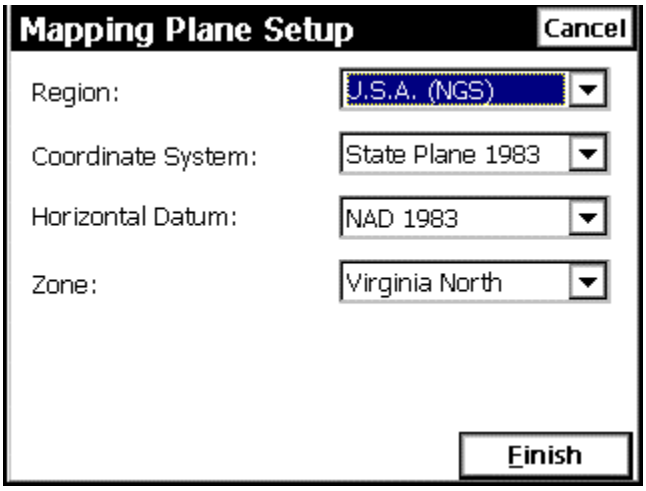

Figure 16

In this example, the RTK Demo will utilize NAD83 Virginia North - State Plane coordinates. Select the appropriate **ZONE** (State - Zone) for your demo.

When the Region, Coordinate System, Horizontal Datum, and Zone have been selected, Tap on the **Finish** button.

The next screen…

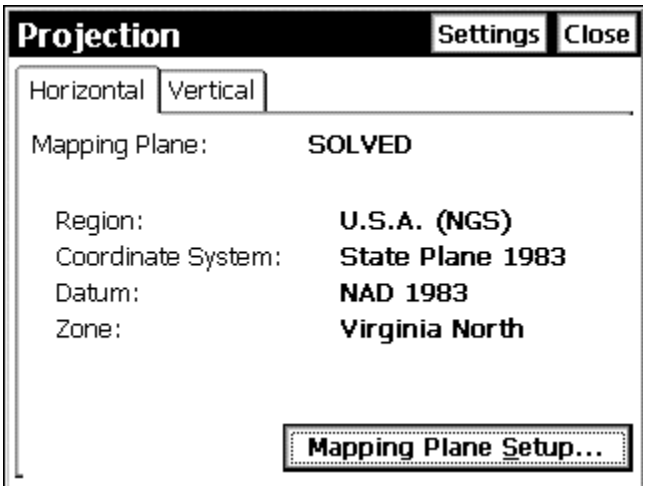

Figure 17

The selected Projection – Horizontal Mapping Plane is displayed.

Next, Tap on the **Vertical** tab…

The next screen…

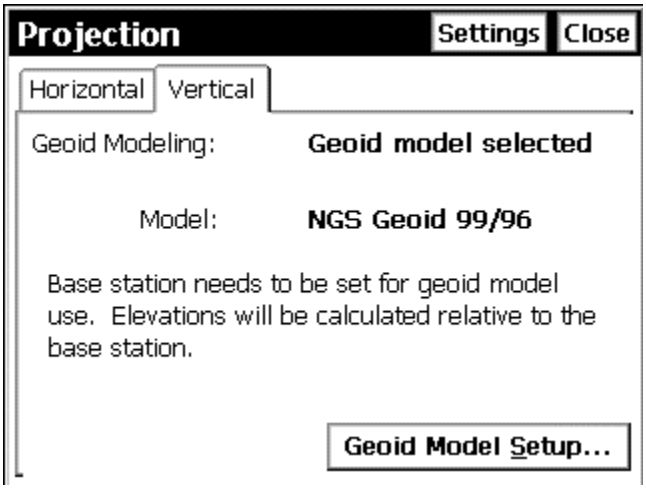

Figure 18

Tap on the **Geoid Model Setup…** button
Select the Geoid Model: NGS Geoid96/99

The next screen…

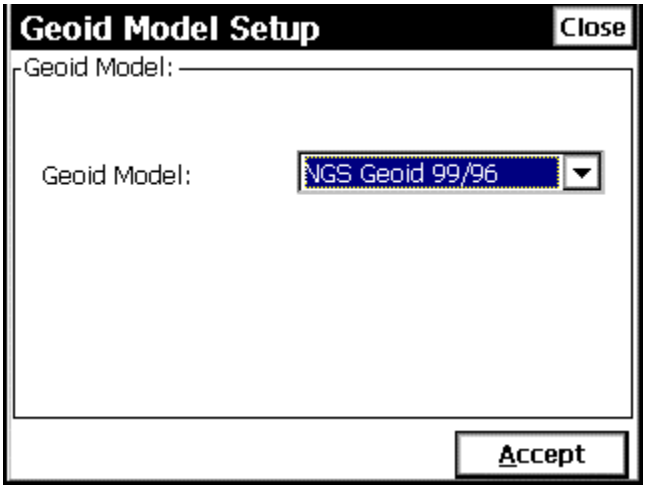

Figure 19

Next, Tap on the **Accept** button…

The TDS Survey Link software supports creation of a Geoid Sub-Grid suitable for use in the field with the Ranger data collector. The Geoid model data can be computed in Geoid96, EGM96 or the newest Geoid Model – Geoid 99.

See the Technical Support Notes on how to create a Geoid Sub-Grid using TDS Survey Link software.

When the Job's Horizontal and Vertical Projections selections have been made,
Tap on the **CLOSE** button, this will return you to the Survey Pro CE main menu,

At this stage of the demo, the TDS Ranger needs to be connected to the Base RTK receiver. Both of the GPS receivers should be powered ON and tracking satellites. The PDL Base Radio should also be powered ON.

Measure the GPS Antenna Heights for the RTK Base GPS Antenna and the RTK Rover GPS antenna.

Next, Tap on the **[3] Survey – [A] GPS Status Menu**

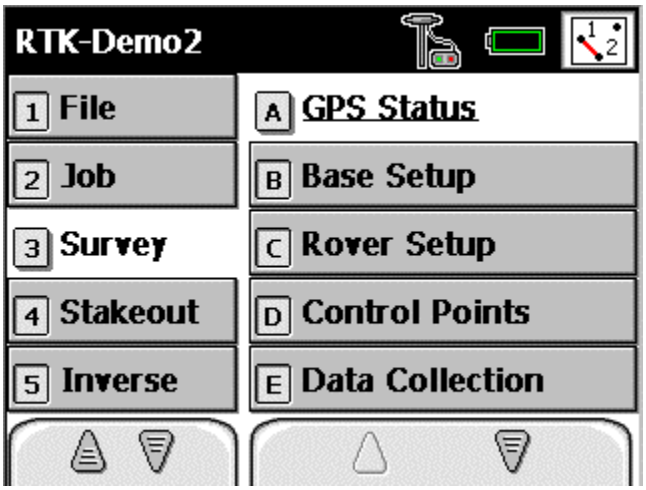

Figure 20

The next screen…

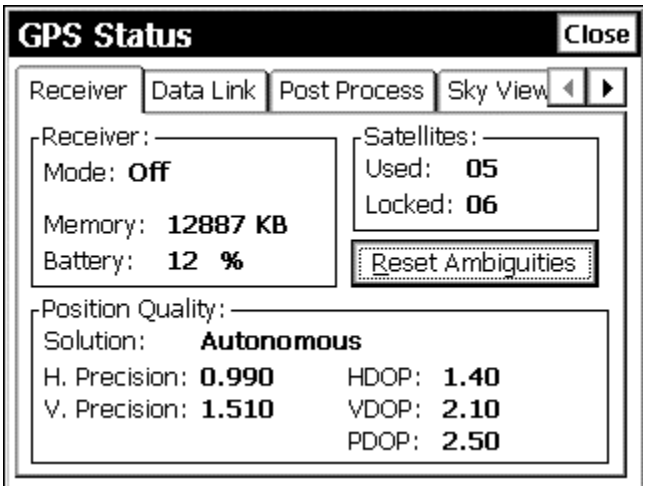

Figure 21

The GPS Status screen confirms you have established communications between the TDS Ranger and the RTK base Receiver.

Notice the Receiver Mode: **Off**, this indicates the GPS receiver is still in STATIC mode, configure the GPS Receiver for RTK Base mode.

Note the Receiver is already tracking and using 6 Satellites.

Next, Tap on the Sky View tab…

The next screen…

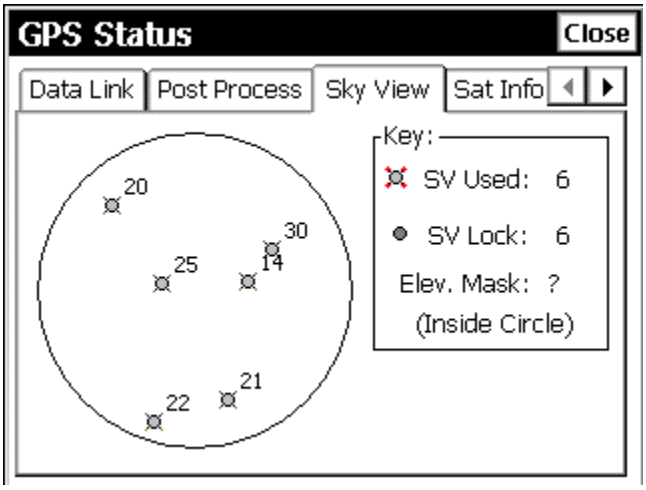

Figure 22

Next, Tap on the **CLOSE** button,

This will return you to the Survey Pro CE main menu…

Next, Select tap on the **[3] Survey – [B] Base Setup** menu…

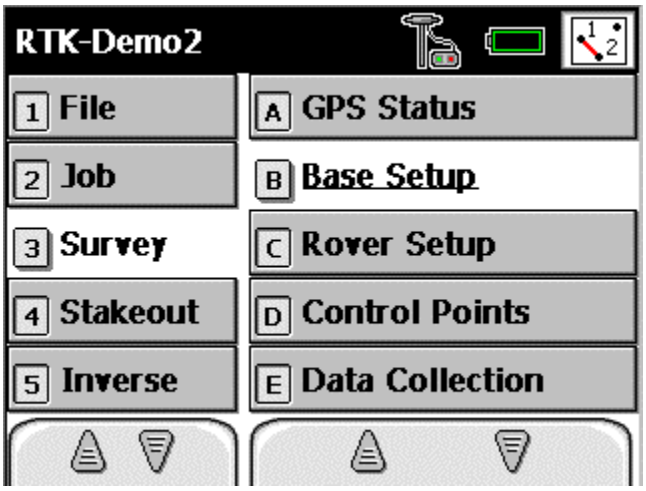

Figure 23

The next screen…

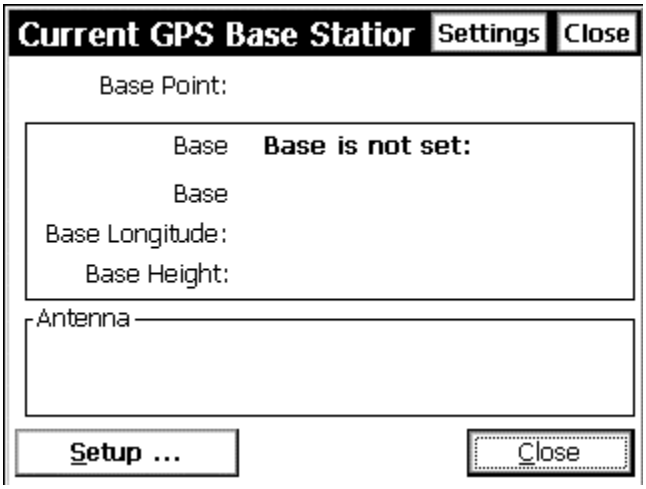

Figure 24

Tap on the **Setup …** button,

The next screen…

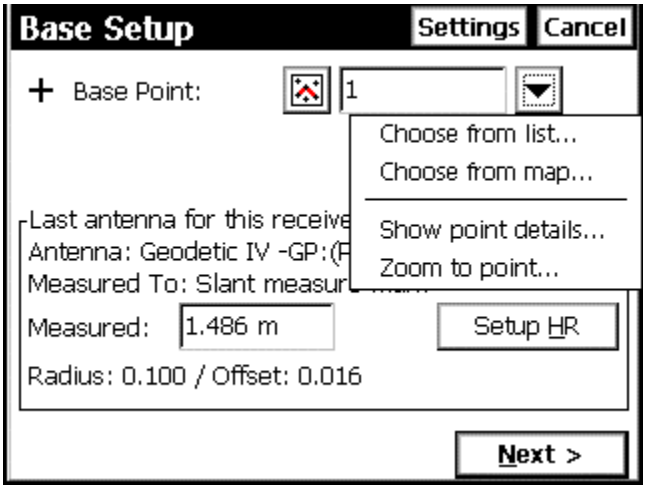

Figure 25

Tap on the Down-Arrow and select – **Choose from list…**

The next screen…

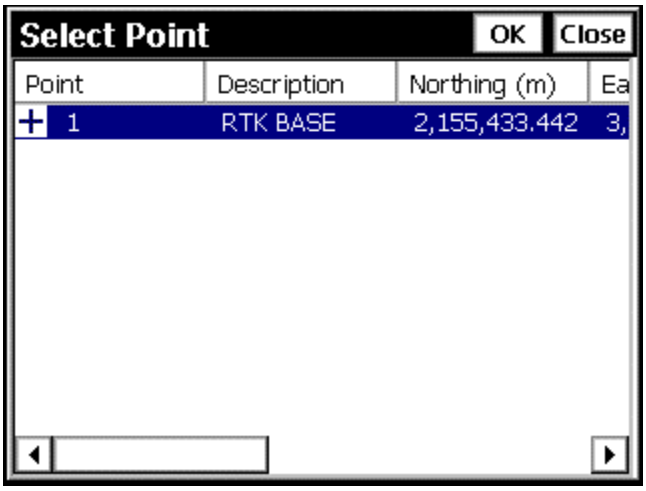

Figure 26

Tap/Select Point 1, RTK Base with the known SPC83 Northing, Easting and Elevation.

Next, Tap the **OK** button…

The next screen…

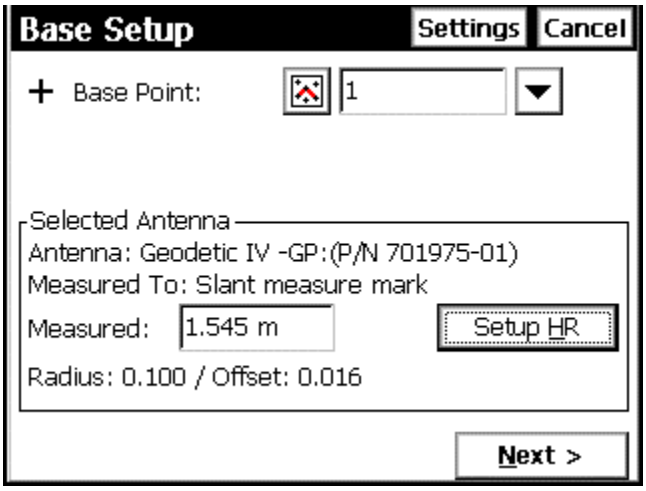

Figure 27

Tap on the **Setup HR** button…

The next screen…

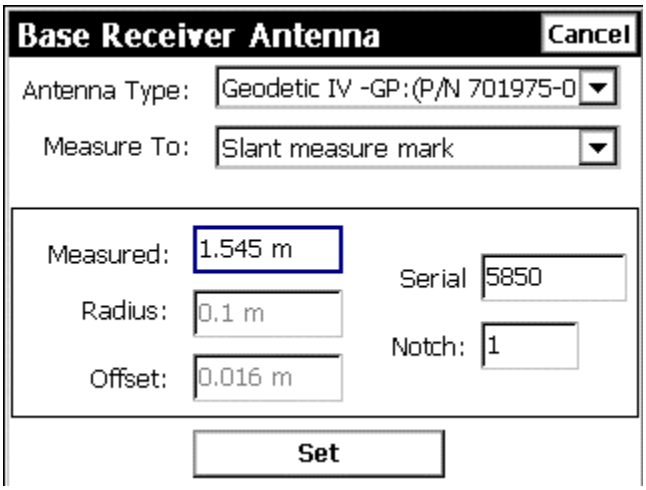

Figure 28

Select the Options as shown above:

The Antenna Type: **Geodetic IV -GP: (P/N 701975-01).** *The –GP = No Ground plane.* In this example, The RTK Base GPS Antenna is mounted to a wooden tripod/Tribrach. The HI Flag = **Slant measure mark.** Enter the Slant HI, measured to TGP (Top of Ground Plane), Units = Meters.

Measured HI = 1.545 m Serial Number for the GPS Antenna = 5851

When finished with the data entry, Tap **Set…**

The next screen…

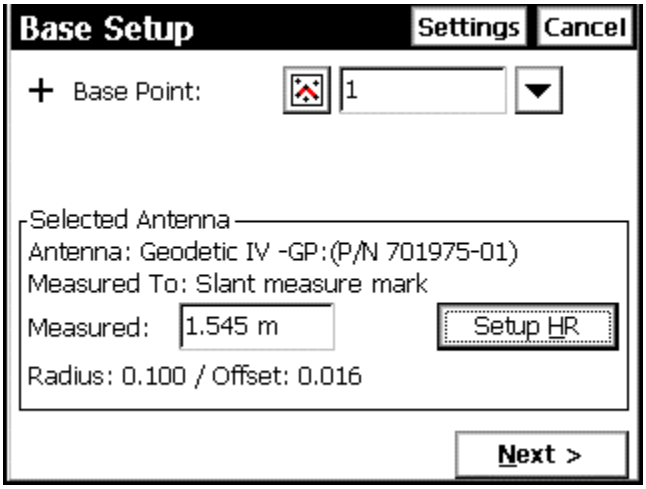

Figure 29

This returns you to the **Base Setup** menu…

Next, Tap on the **Next >** button…

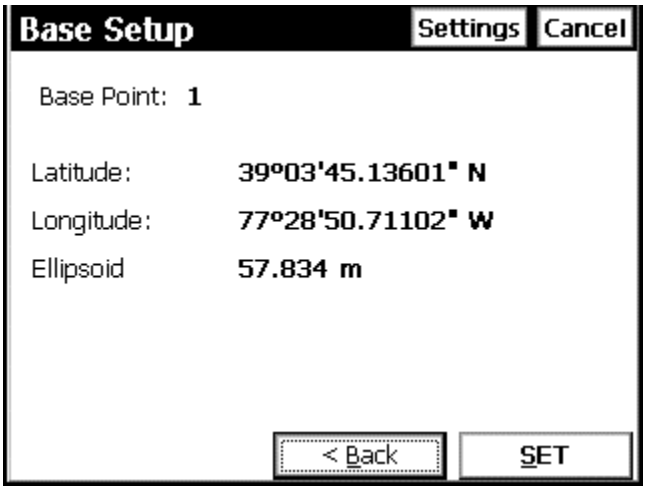

Figure 30

Note the Latitude, Longitude and Ellipsoid Height position. This is the Real-World geodetic WGS84 position. The displayed Geodetic position is derived from the RTK Base point's Northing, Easting and the selected **Survey | Projection** parameters.

Compare the displayed WGS84 position with the Data Sheet, or the known WGS84 position; verify the WGS84 positions match. This is your "In-the-Field" check that the RTK Base station is properly setup. If the WGS84 Positions does not agree, verify the RTK Base Point Number, coordinates and Survey Projection settings.

If the WGS84 position agrees – Tap on the **Set** button.

The next screen…

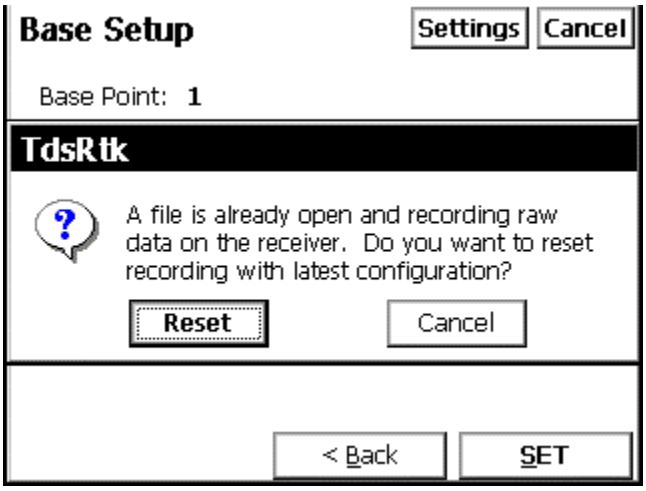

Figure 31

Tap **Reset** button, this function will re-start recording of raw data in the Receiver's PC Card memory, will the latest Post-Processing configurations.

The next screen…

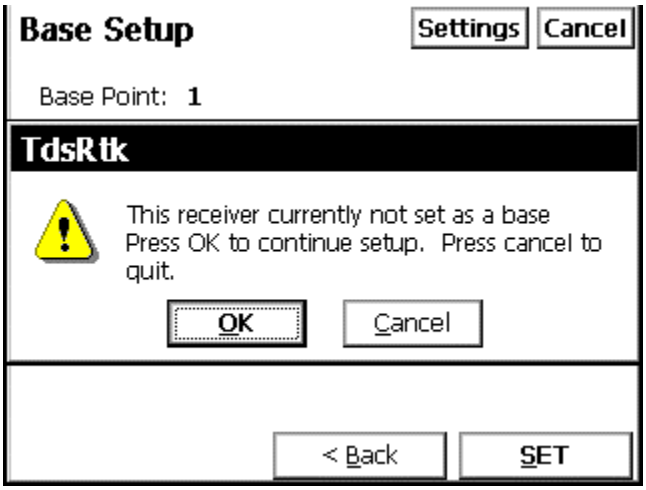

Figure 32

This is the "Trigger" that switches the receiver from STATIC MODE into RTK BASE MODE. The receiver is now configured as a RTK Base, the PDL Base Radio should now begin to Transmit RTK corrections out to the RTK Rover(s)…

The Next screen…

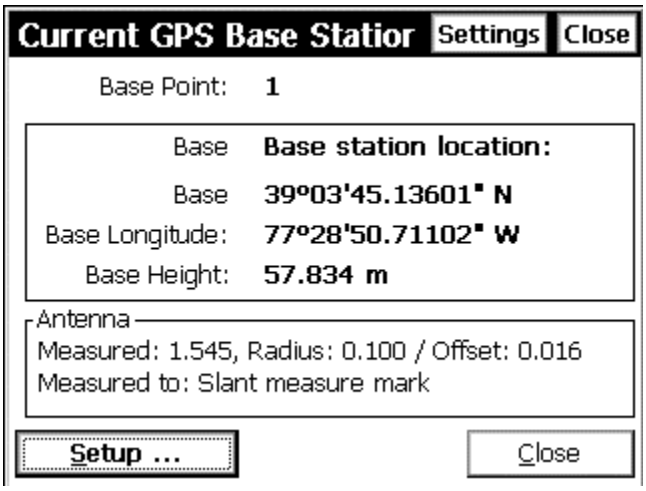

Figure 33

This is the known WGS84 position of the RTK Base station,
This is the position and DBEN data the PDL Base radio will broadcast to the RTK Rover(s). Tap on the **Close** button…

This will return you to the Survey Pro CE main menu…

Disconnect the TDS Ranger from the RTK Base Receiver, Connect the TDS Ranger to the RTK Rover Receiver.

Tap on the **[3] Survey – [C] Rover Setup** menu

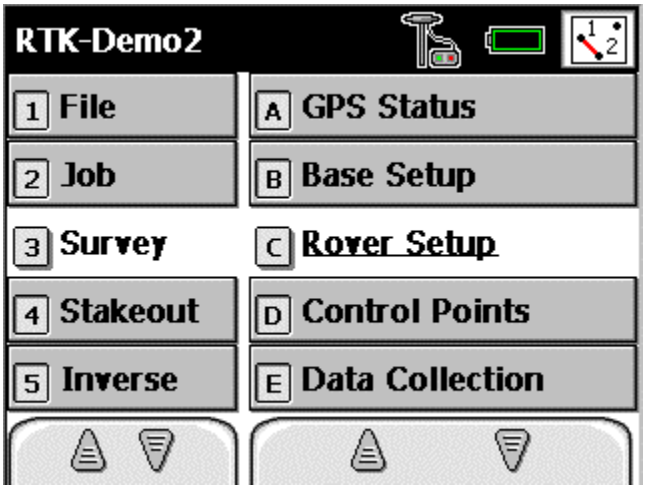

Figure 34

The next screen…

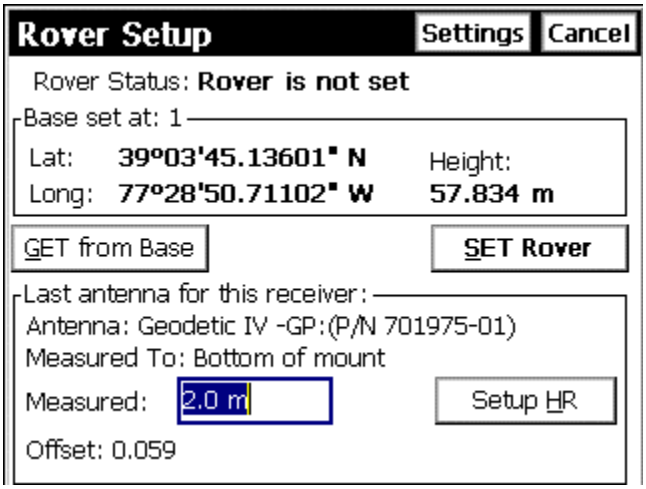

Figure 35

Note the Rover Status: **Rover is not set**, the RTK Rover equipment needs to be configured. Observe the Base point number and WGS84 position, visually confirm this is correct.

DO NOT tap **Set Rover** yet – Configure the RTK Rover Antenna Parameters first,

Tap **Setup HR**

The next screen…

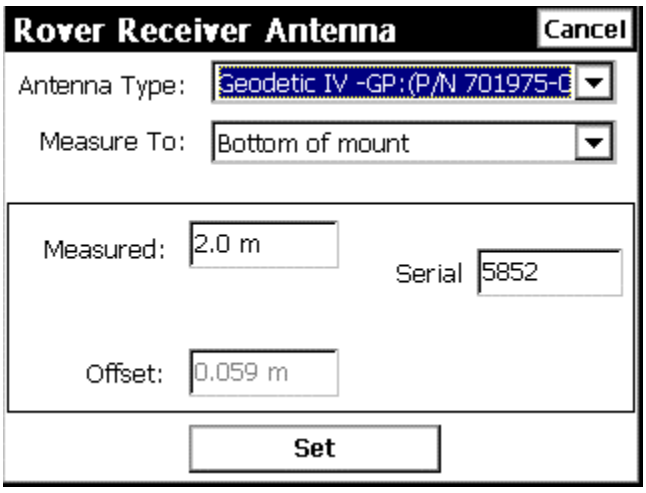

Figure 36

Select the following parameters:

Antenna: **Geodetic IV –GP: (P/N 701975-01**
Measure To: **Bottom of Mount**
Measured: **2.000 m**
Serial **5852**

When you have enter the RTK Rover Antenna parameters,
Tap the **Set** button…

The next screen…

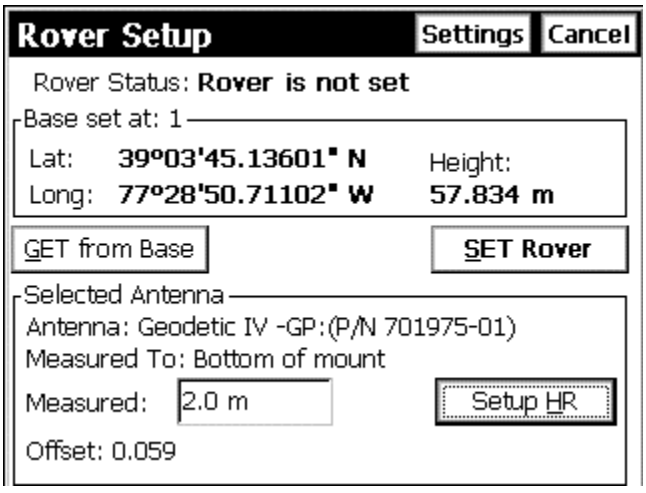

Figure 37

When the antenna parameters for the RTK Rover have been determined,
Tap on the **SET Rover** button…

The next screen…

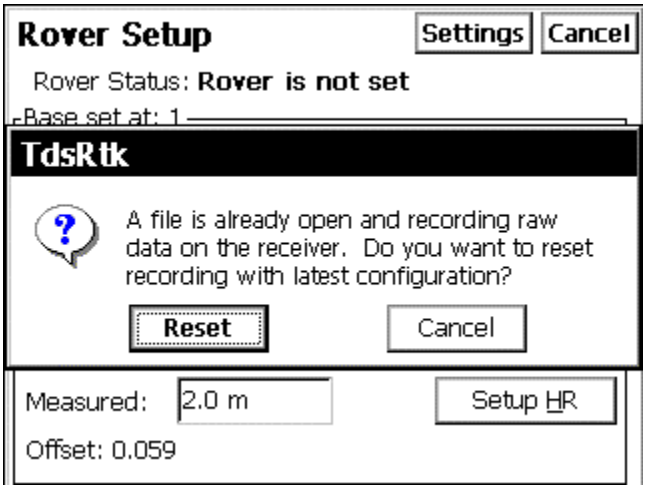

Figure 38

Tap Reset button, this function will open a new file. Recording raw data in the Receiver's PC Card memory, will the latest Post-Processing configurations.

The next screen…

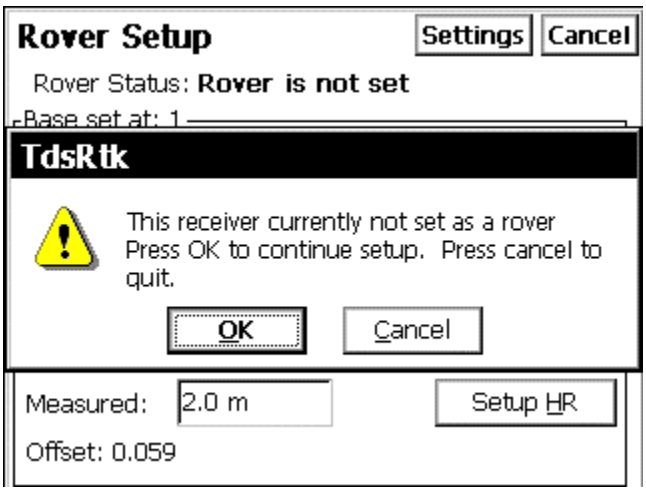

Figure 39

This is the "Trigger" that switches the receiver from STATIC MODE into RTK ROVER MODE. The receiver is now configured as a RTK Rover.

This will return to the Survey Pro CE main menu…

Select **[3] Survey – [A] GPS Status**

The next screen…

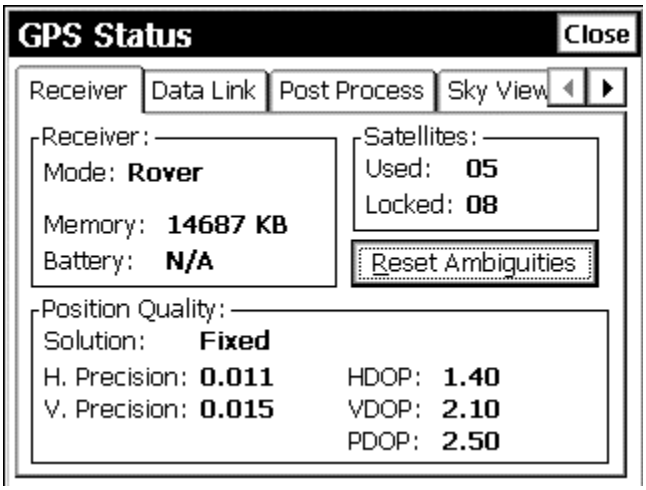

Figure 40

Receiver Tab – note the Receiver mode: **Rover**
Position Quality is **Fixed,** Satellites Used: 5

The next screen..

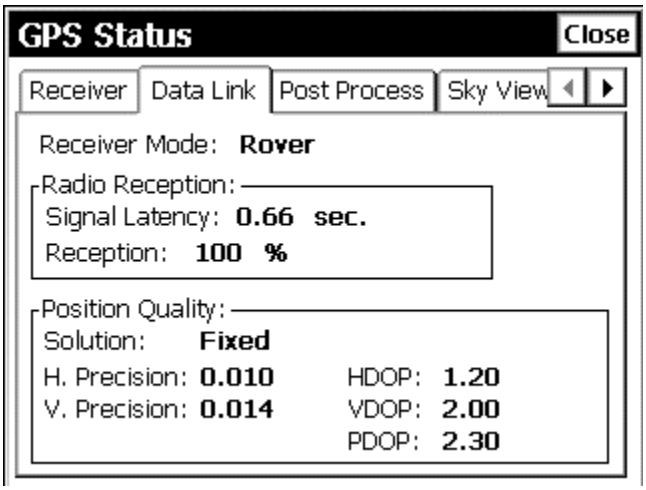

Figure 41

Data Link Tab – this screen display's Radio Reception and Position Quality information.

The next screen…

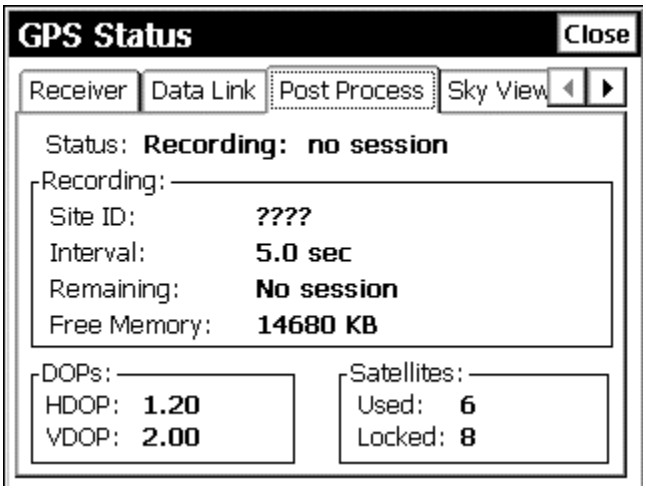

Figure 42

Post Process Tab – Indicates Status for any post-processing Data recording: SITE ID, Interval, DOPs, Satellites

The next screen…

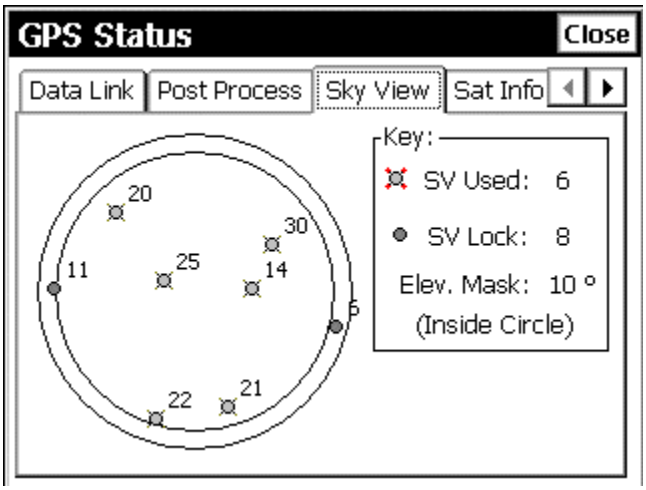

Figure 43

Sky View tab – displays location of satellites relative to Antenna.

The next screen…

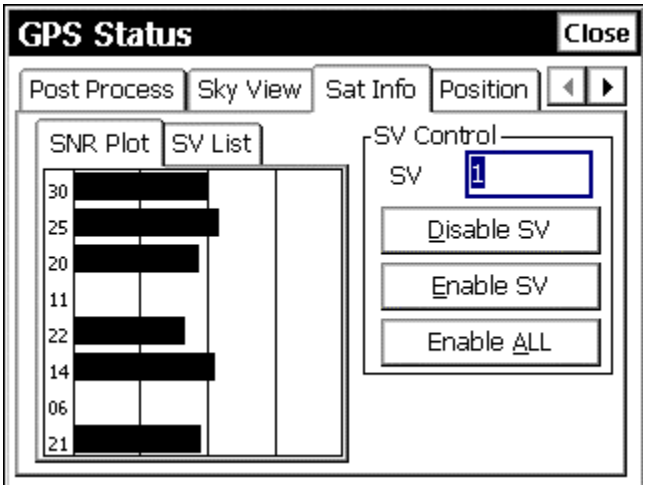

Figure 44

SNR Plot tab – displays SNR (Signal to Noise Ratio) plots.

The next screen…

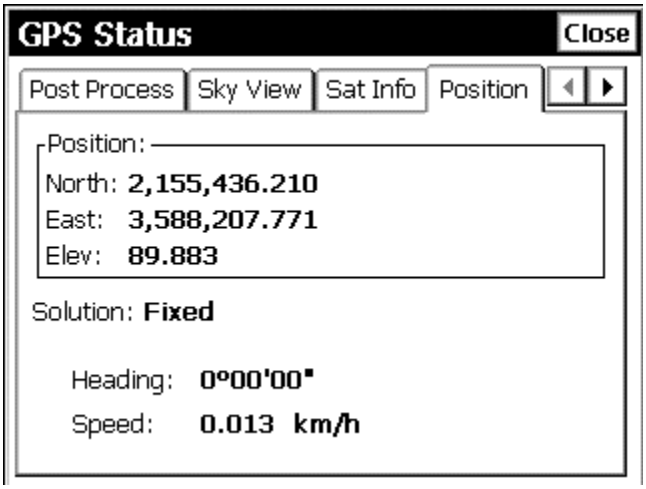

Figure 45

Position tab – displays current Real-Time coordinate and Solution quality, If the Mapping Plane has been Set, coordinates are displayed. If Geodetic Position (Latitude, Longitude, Ellipsoid Ht) are displayed, the Mapping Plane has not been set; return to the **Survey | Projection** menu and define.

The RTK Base and Rover are now configured, continue the demonstration by collecting some Data Collection, perhaps performing some Stake-out…

Select **[3] Survey – [E] Data Collection**

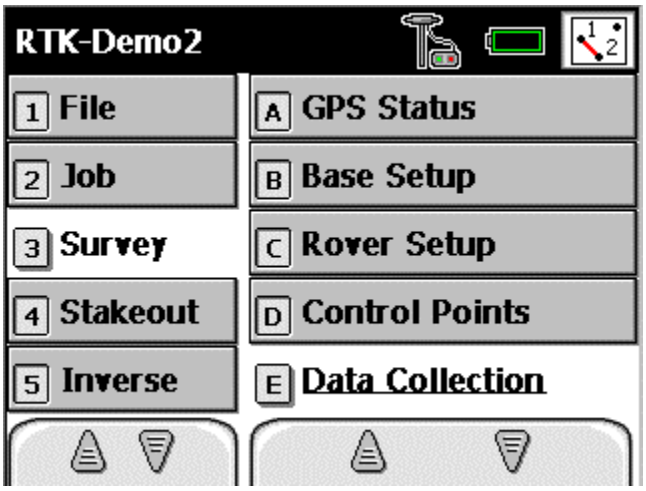

Figure 46

The next screen…

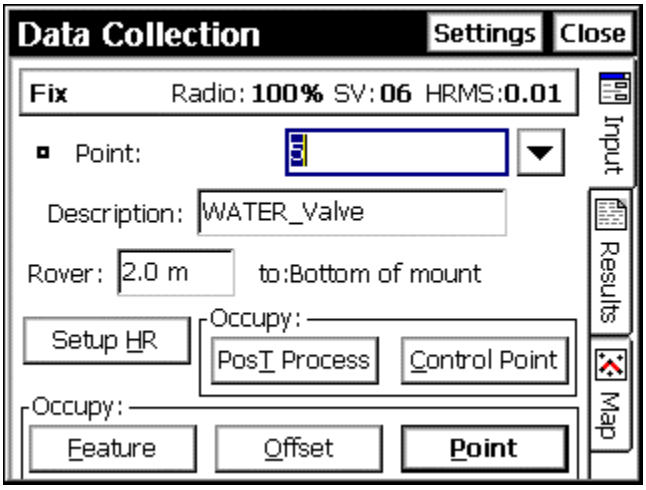

Figure 47

Physically occupy the point of interest, in this example the top surface of a Water Valve lid found in the parking lot. Select the Description for the desired feature, when the RTK Rover pole is plumb and level – Tap on the **Point** button to "Take-the-Shot".

The next screen…

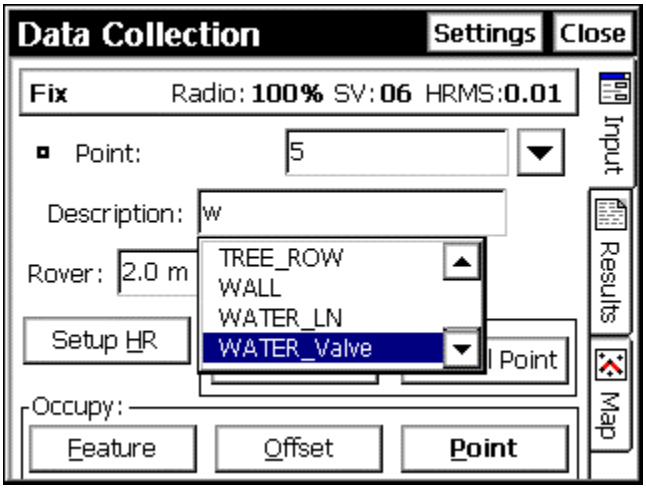

Figure 48

Enter a Description from the Pull-Down Menu, type the first letters of the description. If the user created and copied a descriptor file (Codes.txt), over to the Ranger; a Drop-down menu will automatically appear, exposing the descriptors list. Browse the list and select the topographic code.

To associate a Descriptor file to the Job: **Job | Settings | Files | Description Files:**

Note the Status-Bar in the top portion of the display, The Status-Bar will always indicate the Fix/Float indicator, Radio Reception %, Number of SV's and HRMS.

The next screen…

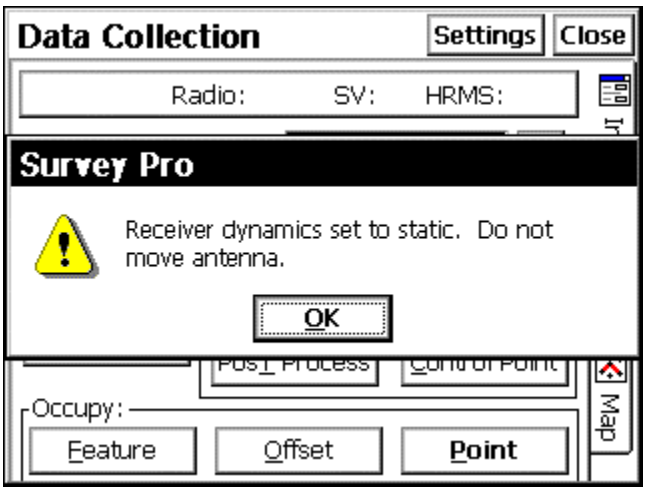

Figure 49

The program warns to user – the Receiver Dynamics are set to Static.
This is a reminder: "Do not move antenna", during the collection process.

The next screen…

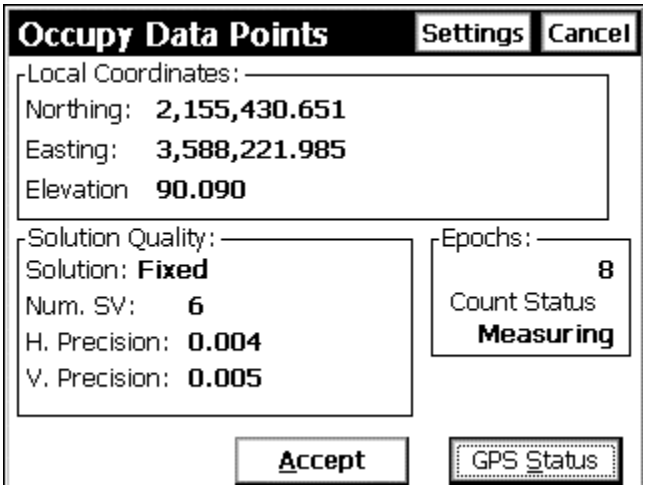

Figure 50

Live screen displaying Coordinates and Solution Quality during Data collection, typically when you observe a **Fixed Solution** and have desirable Horizontal and Vertical Precisions – tap the **Accept** button.

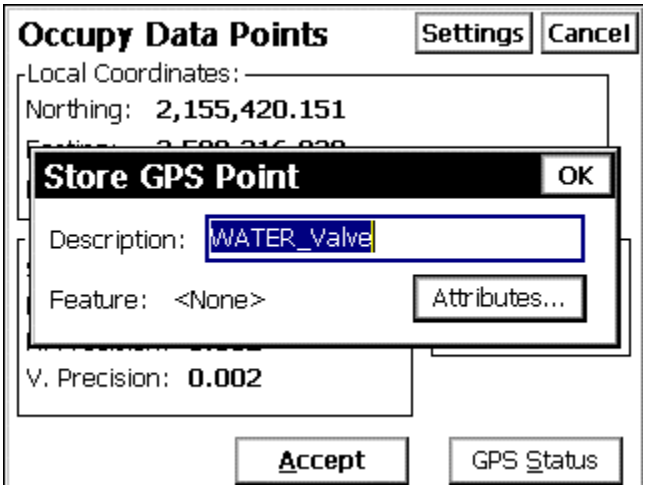

Figure 51

Survey Pro CE allows the user to append the Description if necessary. This Featured can be turned off by the user.

GPS Staking

Note: to perform any Stakeout functions, the Stake-out Point's: Point Number, Northing, Easting, Elevation and Descriptions MUST be Pre-loaded into the Ranger, before any stake out work can be started. Typically, these coordinates are pre-loaded into the Ranger back at the office.

The Customer may have calculated these coordinates with a COGO software, or the coordinates may have been generated from a design, or drawing file.

The coordinates for Control Points and the Design (Stake-Out) points MUST be on the same coordinate system. That is, the points used on the job site for the Control MUST be on the same coordinate system as the Design Points.

Select **[4] Stakeout – [A] Stake Points**

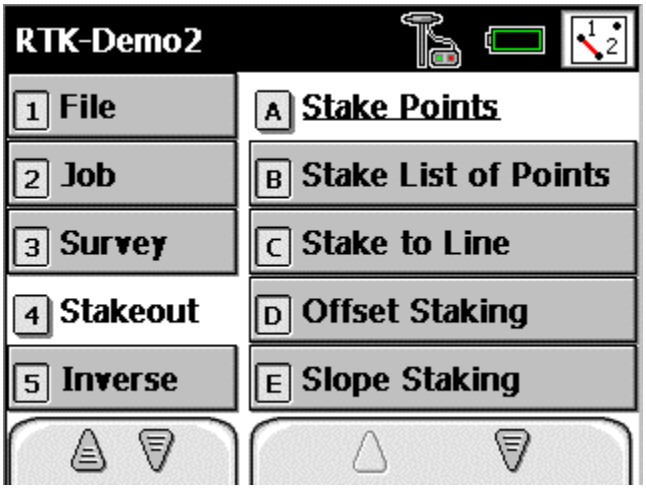

Figure 52

The next screen…

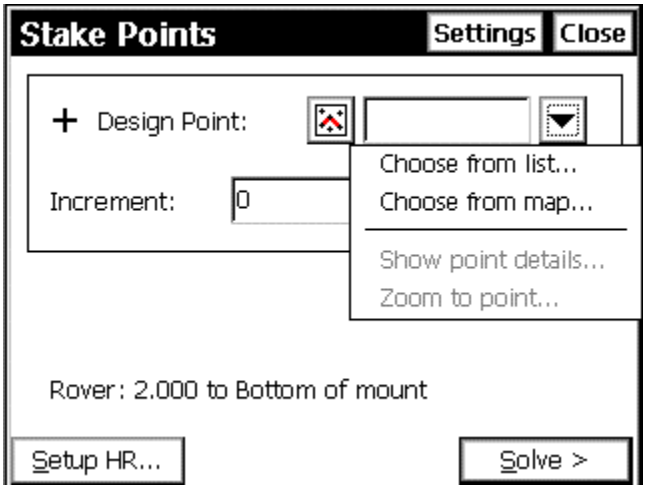

Figure 53

Tap on the Pull-down Arrow, select **Choose from list…**
Select Point Number – 3…

The next screen…

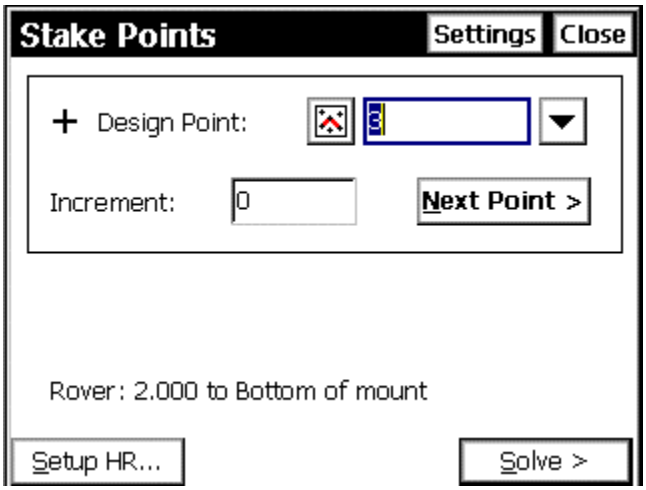

Figure 54

After the Stake Point selection, Tap on the **Solve** button…

The next screen…

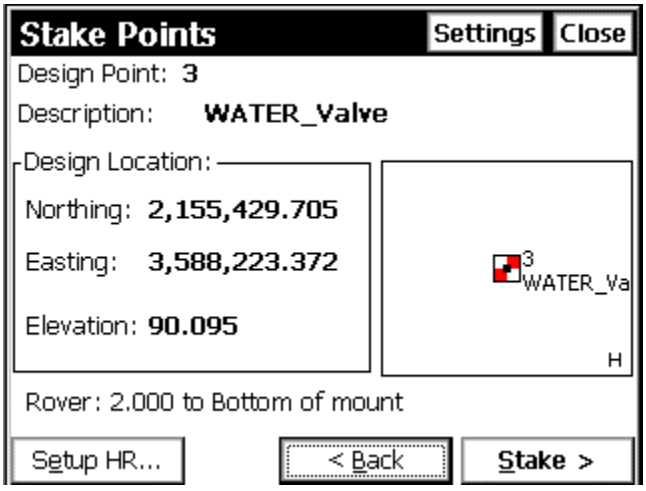

Figure 55

The selected Points Design Coordinates are displayed,

Next, tap on the **Stake >** button…

The next screen…

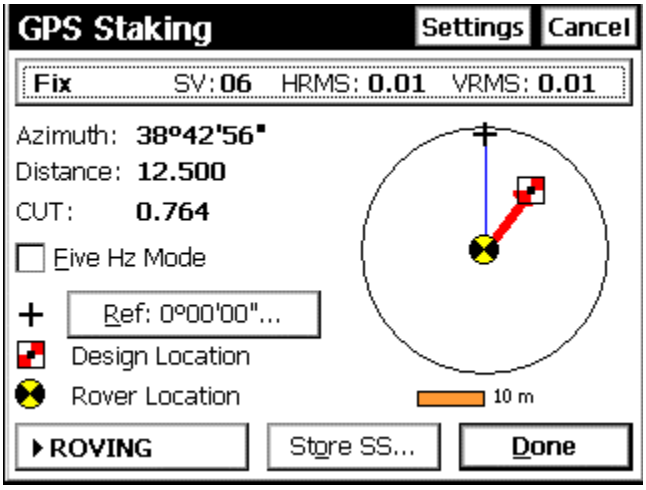

Figure 56

The Azimuth and Distance to the Stake-out point are displayed.

When Staking-out with RTK, it takes a little while to get use to the flow of things… When performing Stake-out with Total stations, the Instrument person back sights a reference point, turns an Angle-Right to direct the Rodman for line, then shoots a distance to determine the distance towards the gun, or distance away from the gun to stake the point's location.

With RTK systems, there are not these types of survey crew deployments. The RTK Base station is typically un-attended, it sits there all by itself. The two-person survey crew is working with the RTK Rover system. One person to carry and operate the RTK Rover system, the second person to carry the wooden stakes, Lath or guard stakes, the sledge hammer and the project's design plans.

To orientate Stakeout directions on the job site with the RTK Rover, Survey Pro CE allows the user to select from two types of orientation on the job site:

Reference Direction: 0° 00' 00000" (Geodetic North), the surveyor can utilize a compass to determine orientation on the job site.

Reference Point: Select any physical point on the job to be used for Orientation.

The next screen…

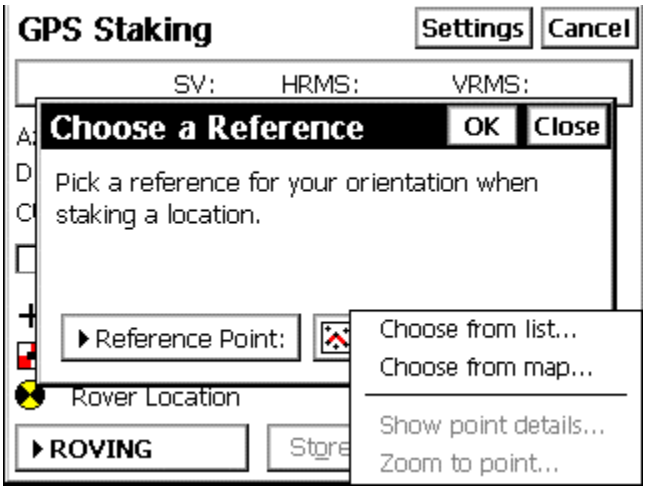

Figure 57

Tap on the **Reference: 0° 00' 0000"** button, the display will Change to **Reference Point:**

The next screen…

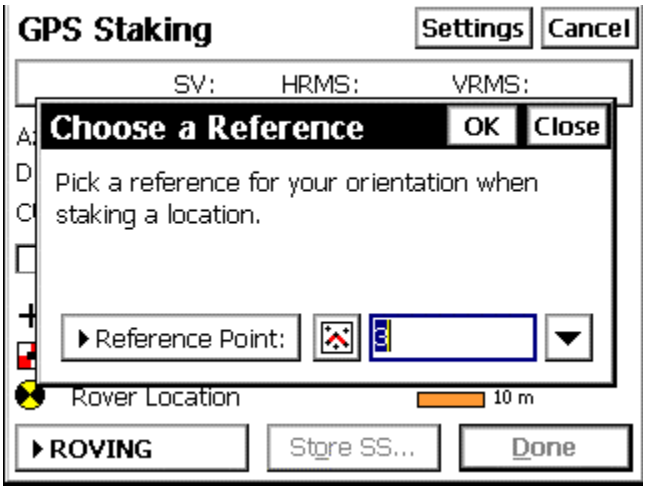

Figure 58

Then tap on the Pull-Down menu and select **Choose from list…**

The next screen…

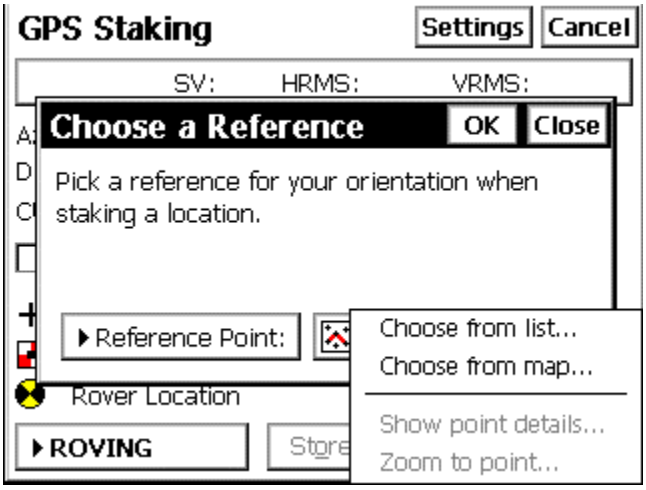

Figure 59

The next screen…

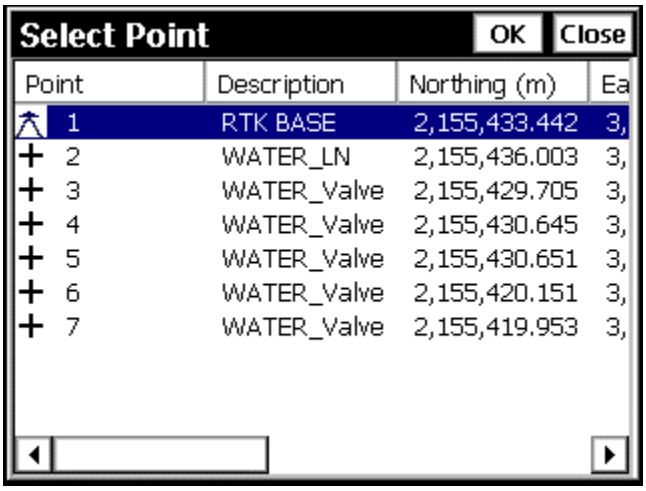

Figure 60

In this example, Point number 1 (the RTK Base) was selected for the Reference point.

The next screen…

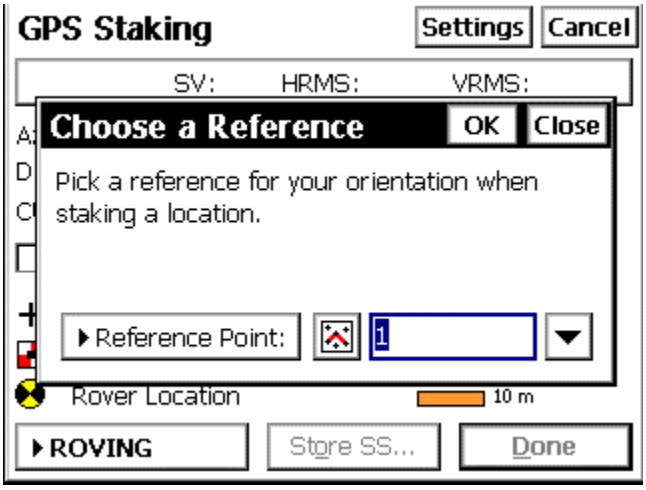

Figure 61

After selecting the Reference Point, tap **OK**

The next screen…

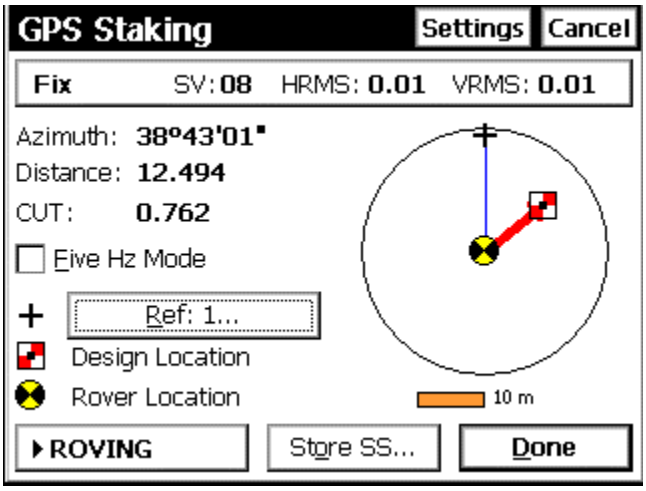

Figure 62

Direction and Distance with visual cues - to the Stakeout Point are are presented, with the Reference Point 1, the RTK Base station .

Navigate towards the Design Point, this is live screen. If your Navigating in the right direction – the distance should decrease. If your navigating in the wrong direction, the distance will increase…

The next screen…

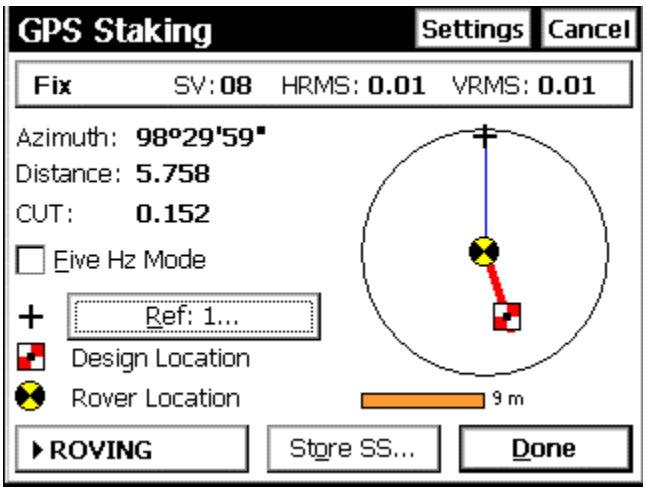

Figure 63

The Distance is decreasing – your getting closer…

The next screen…

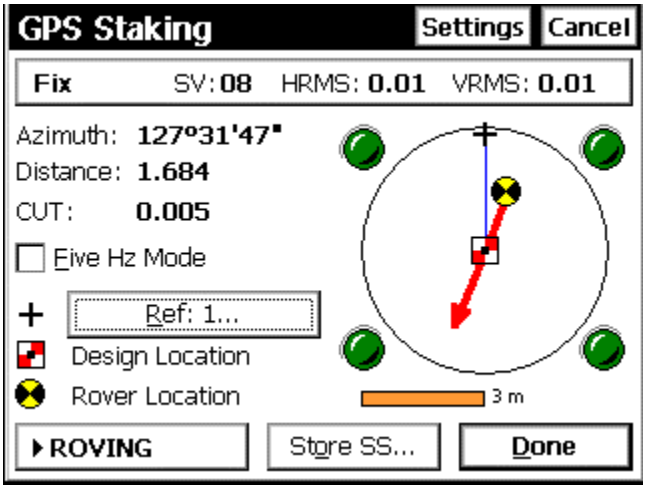

Figure 64

When you get within a meter of the Design Point,
The scales of the GPS Staking screen will enlarge,
Providing greater detail to stakeout the point…

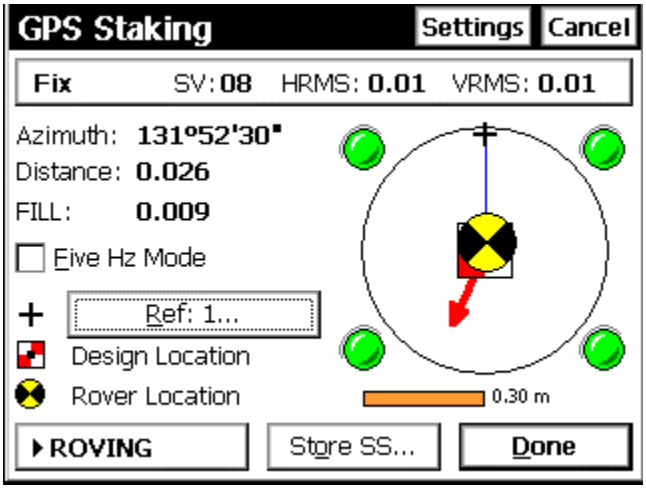

Figure 65

When you get within a few decimeters,
the scale is enlarged once again.

When you arrived at the Design Point, Tap **Done,**
The next screen…

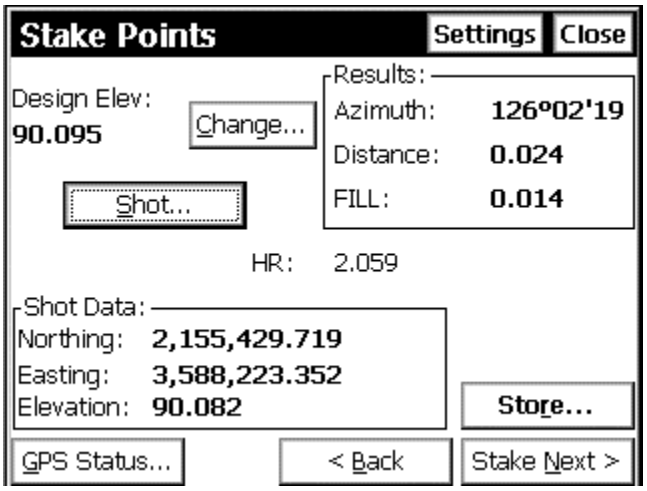

Figure 66

To accept the "AZ-Built" Shot Data, Tap **Store…**

The next screen…

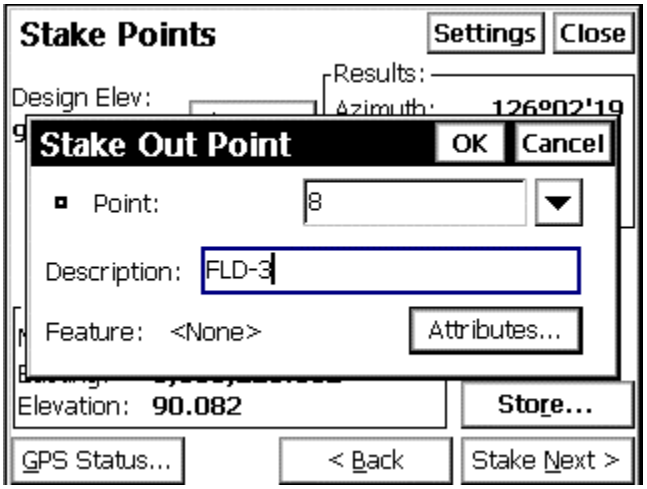

Figure 67

A Description can be appended to the Stake Out Point…

The **"FLD-3"** Description can be used to store the AZ-Built Coordinates, where the FLD-3 = Field coordinate for design 3. This type of description can help locate the Cut/Fill data.

The next screen…

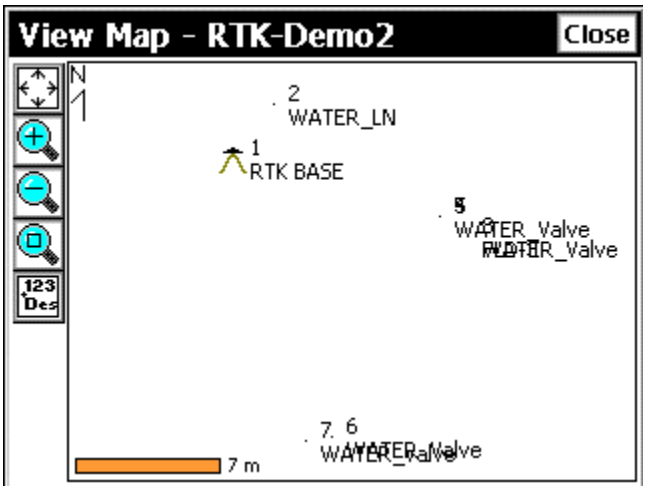

Figure 68

Points in the current job file can be viewed by tapping on the **View Map** icon…

The next screen…

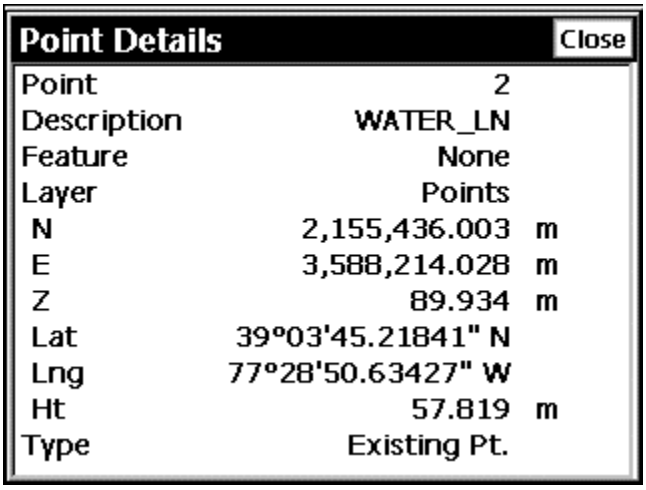

Figure 69

Tap on a point in the **View Map** display, the **Point Details** Will be displayed…

Tap **Close** to return to the View Map…
Tap **Close** to return to the Survey Pro CE main menu…

Advanced Data Collection:
Collect continuous data by Time –or- Distance filters:

Select **[3] Survey – [E] Data Collection**

The next screen…

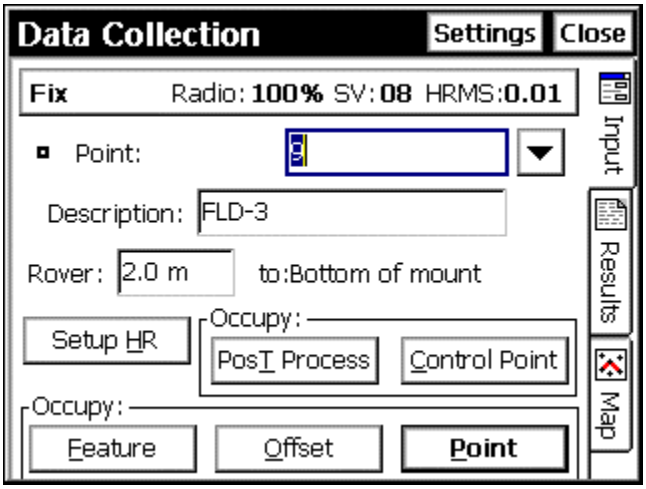

Figure 70

Specify the Description, then Tap **Feature…**

The next screen…

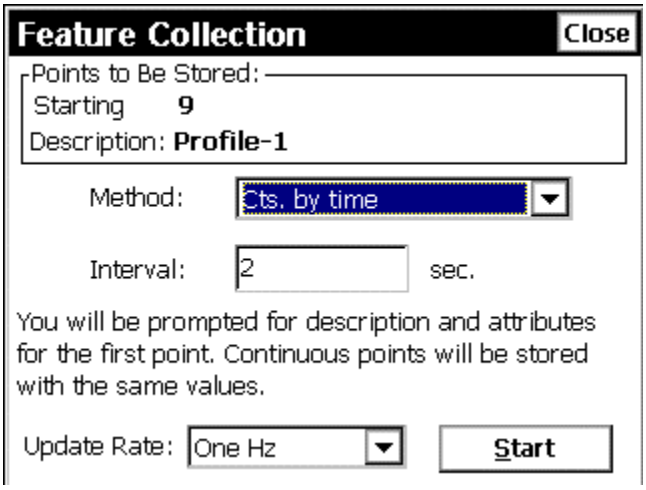

Figure 71

Select Method: Cts. by Time –or- Cts. by Distance,
In this example Cts. by Time / 2 Second Interval has been selected.
When ready to begin, Tap **Start…**

The next screen…

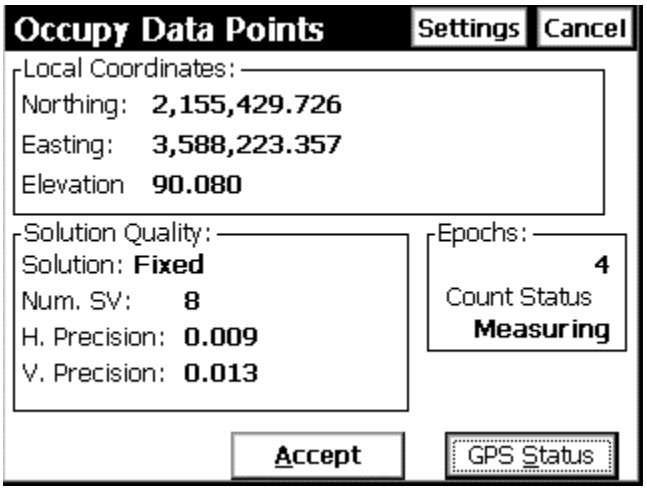

Figure 72

To start the Continuous Data Collection mode, the user must manually accept the first shot, Tap **Accept…**

The next screen…

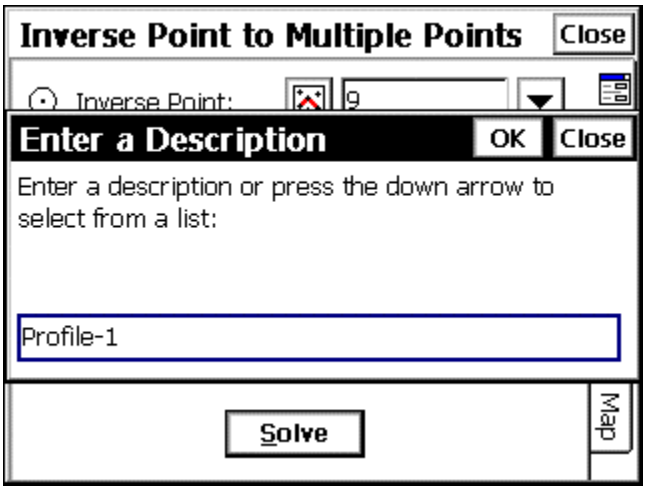

Figure 73

An opportunity is provided to append the Description, Tap **OK,** or press Enter on the Ranger keyboard…

Once the initial shot has been Accepted, the continuous Data Collection mode will begin, in this example **Cts. by Time / 2-Second Interval** was selected. If the conditions of the HRMS/VRMS filter are met, the Ranger will beep every 2-seconds, indicating data collection is occurring. Start walking the feature you desire to data collect / map.

The next screen…

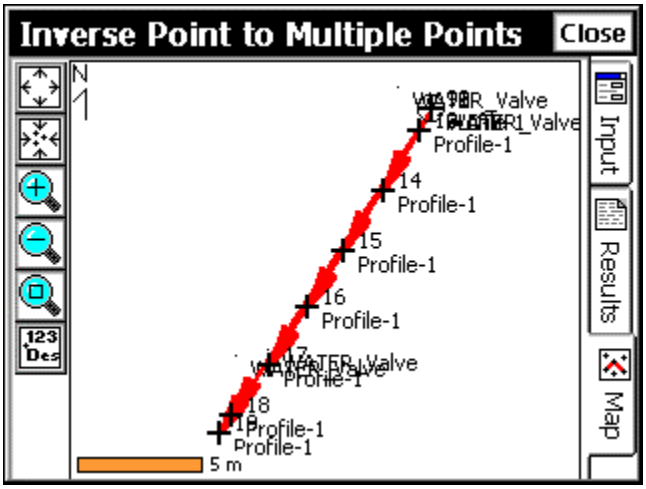

Figure 74

Example of Profile Line collected with the Continuous Data Collection Mode.

To Export coordinates:

Select **[1] File – [D] Export Coordinates**

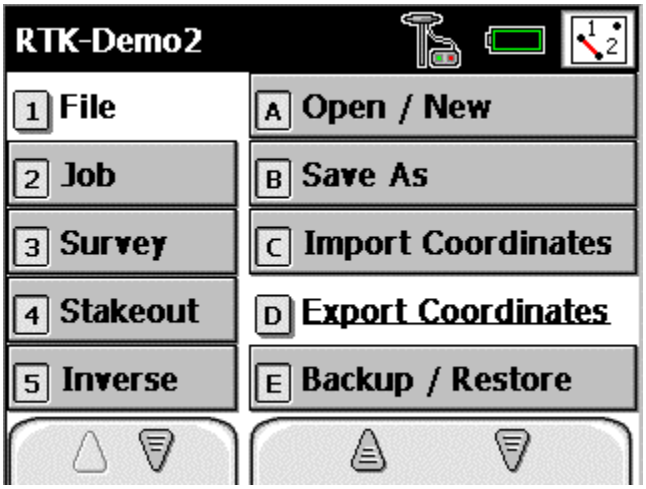

Figure 75

The next screen…

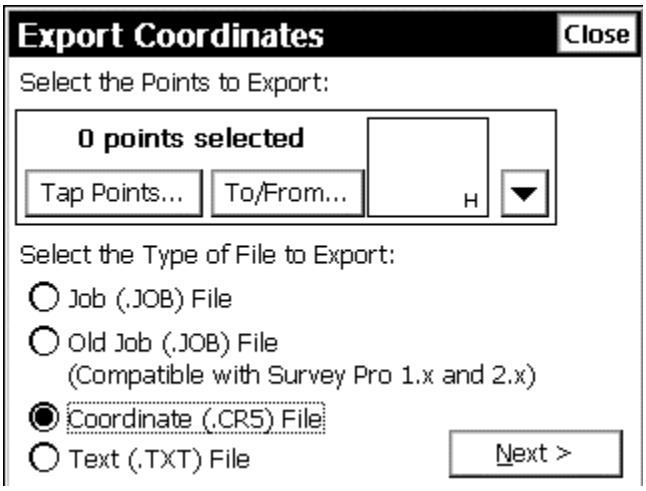

Figure 76

Tap on the Down Arrow…

The next screen…

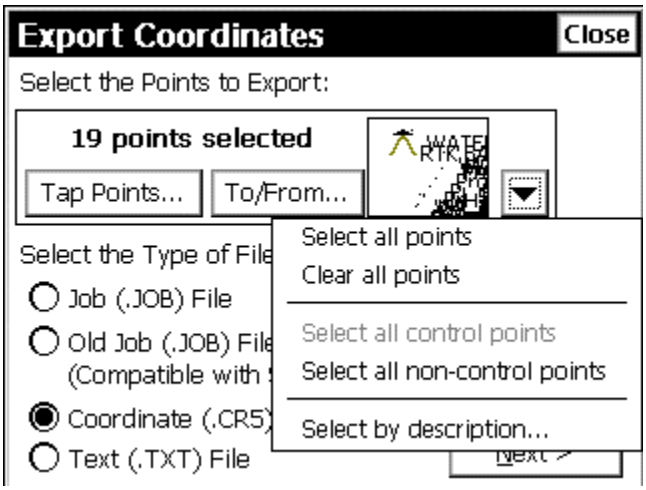

Figure 77

Tap on the **Select all Points** option…

The next screen…

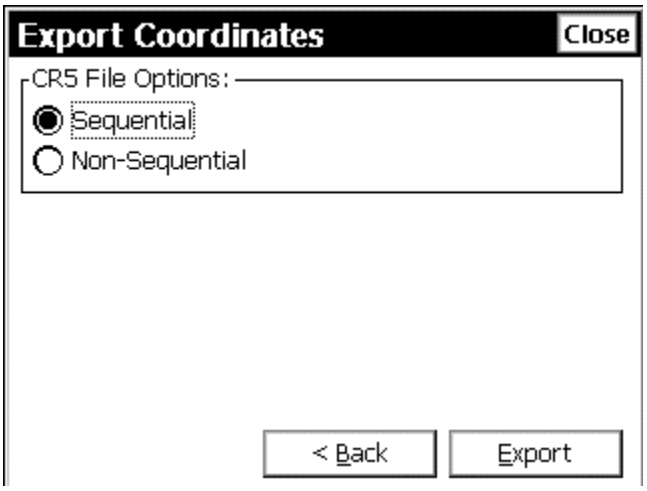

Figure 78

Choose Sequential –or- Non-sequential option…

Tap the **Export** button…

The next screen…

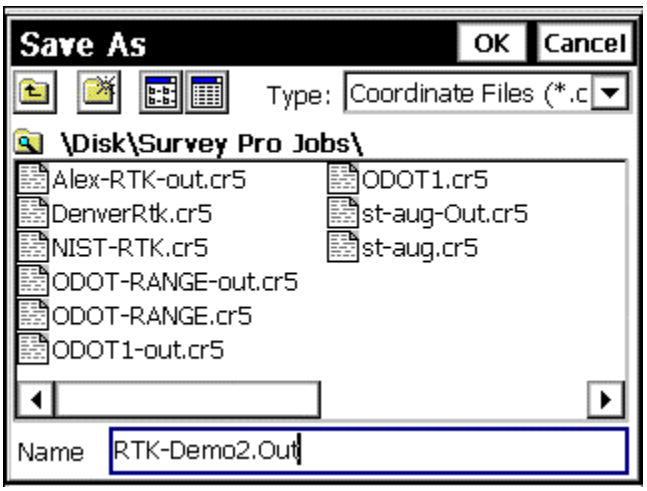

Figure 79

Specify a **Name and File -Type Extension** for the **Export Coordinates…**

Next, Transfer the Coordinates from the Ranger back over to the office Computer,

The next screen…

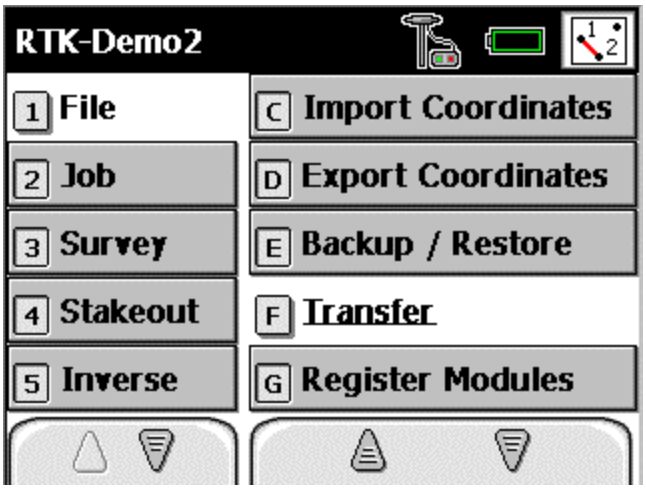

Figure 80

The next screen…

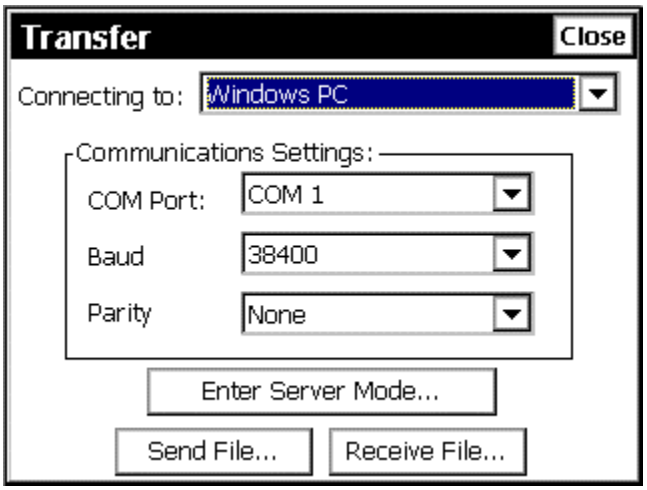

Figure 81

Select the Transfer **Communications Settings,**

Start the TDS Survey Link software on the PC,

Start | Programs | TDS Survey Works | Survey Link…

From the Pull-Down menu → Select **Transfer | Send / Receive…**

Select the **Receiver Tab…**

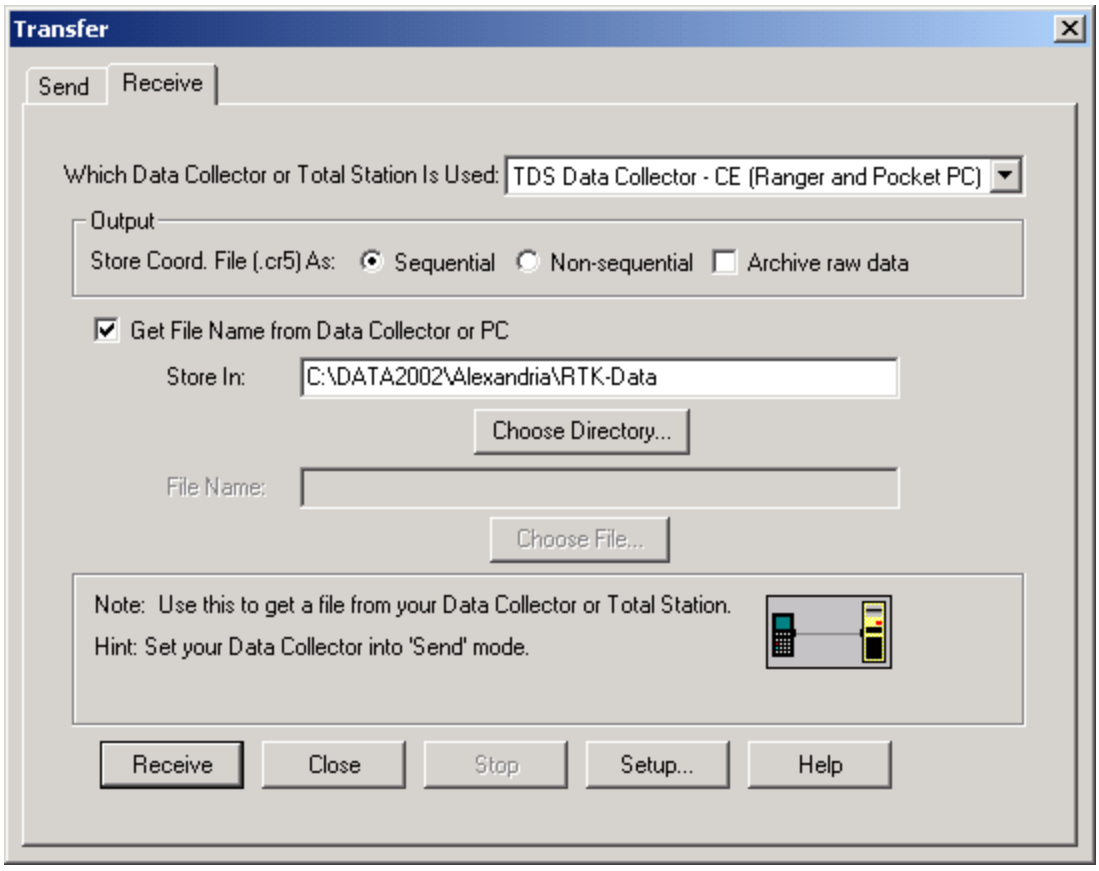

Figure 82

Last Updated by RDL: 9/10/02