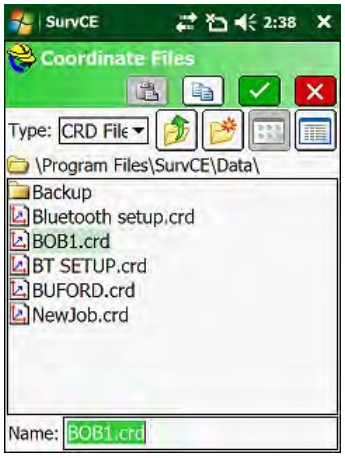
S320 and SurvCE RTK Base Unknown Location

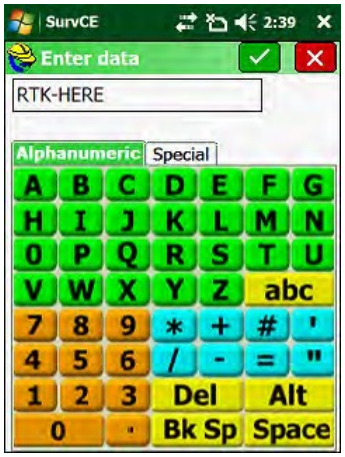
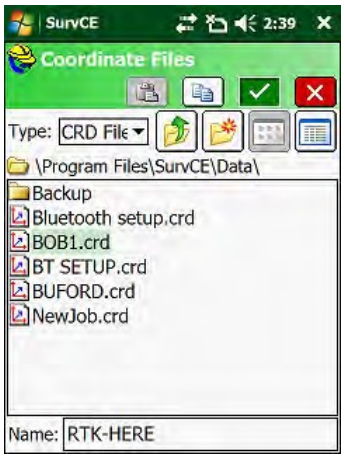
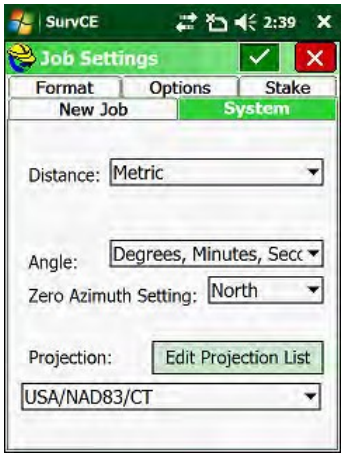
Part Number 874-0303-000 Released April 17, 2012

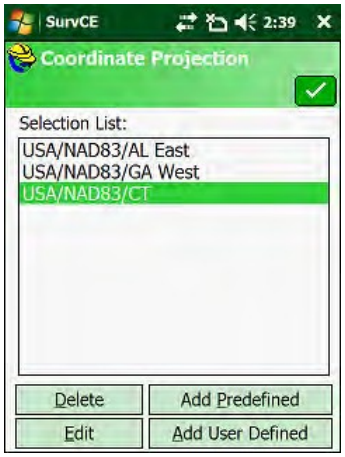
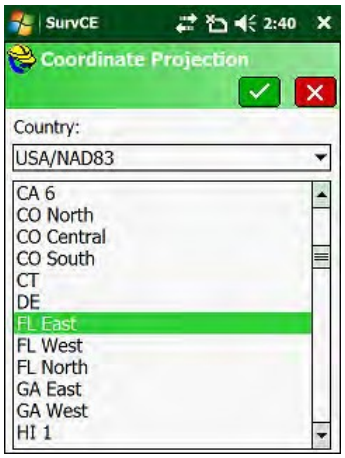
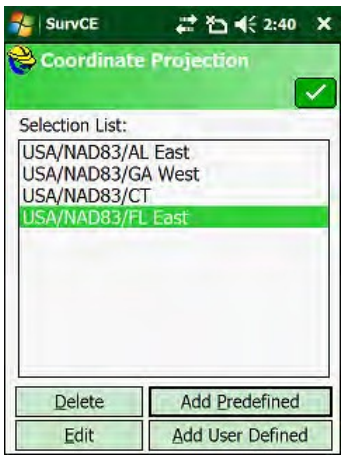
Overview

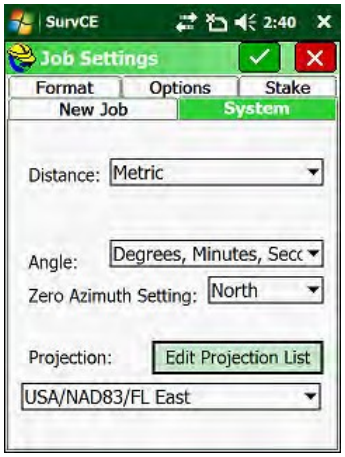
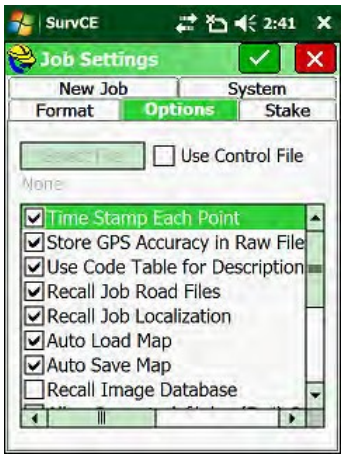
This document describes how to configure the S320 RTK base using SurvCE at an unknown location, perform a **"Read from GPS"** to obtain a starting RTK base position, configure the S320 RTK rover to receive RTK corrections from the RTK base, outlines the procedures to perform a RTK Localization with SurvCE, and demonstrates how to store points with SurvCE and the S320 RTK rover. This quick reference guide outlines the procedures using S320's with the internal 400 MHz UHF radios.

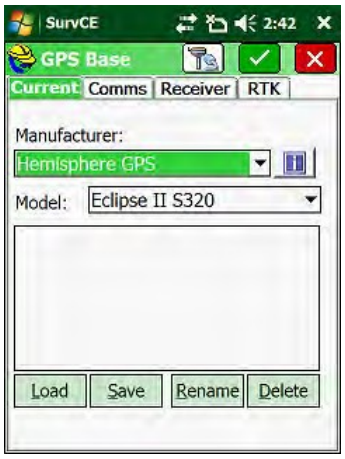
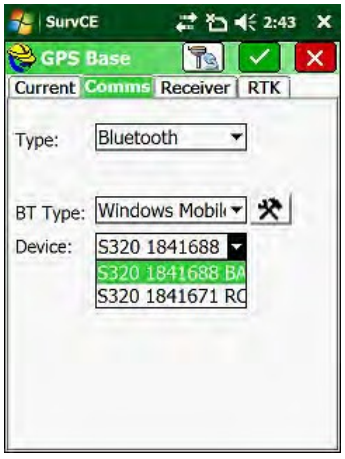
Procedure

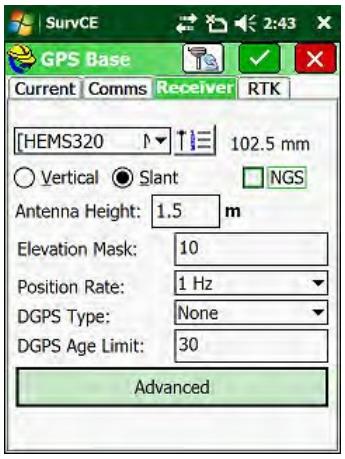
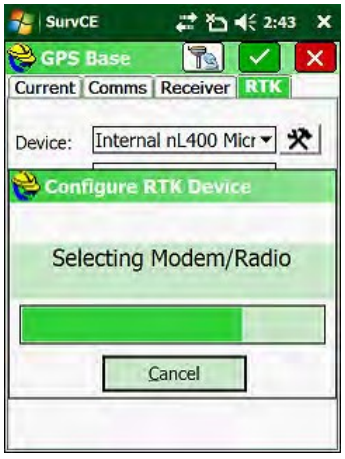
Screenshot or Graphic	Step
	1. Turn on the XF1 data controller, start the SurvCE software. From the SurvCE main menu, Select **File | 1 Job**
	2. **Coordinates Files** menu, A list of all the current jobs stored in the data controller are displayed, the last used job is selected by default. To create a new job, using the stylus, tap into the **Name:** template, the virtual keyboard will pop open,

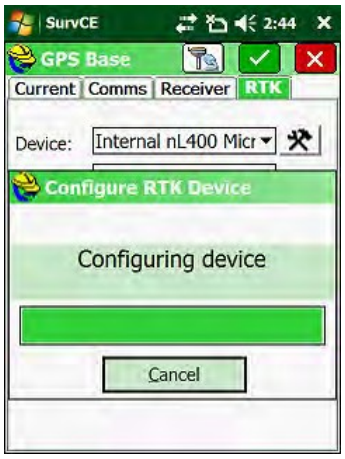
Screenshot or Graphic	Step
	3. **Enter Data** menu, Using the stylus, tap into the Enter Data template, using the virtual keyboard, enter a suitable name for the new job, in this example: **RTK-HERE,** Select/Tap  , the virtual keyboard will close,
	4. **Coordinate Files** menu, Type: CRD Files Name: **RTK-HERE** Select/Tap  to create the new job,
	5. **Job Settings | System** menu, Select the Distance units, Select the Angle preference, Last used Projection is displayed, To change the Projection, Select/Tap  ,

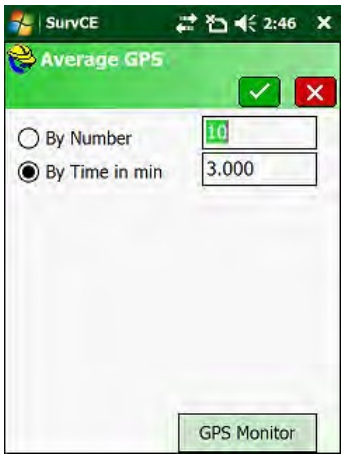
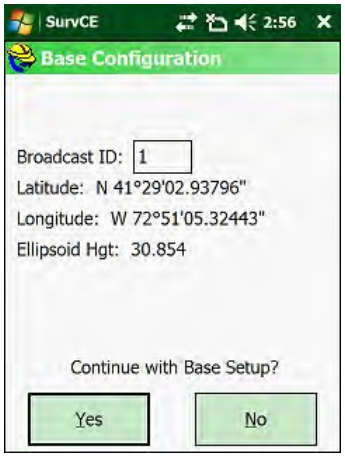
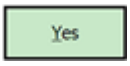
Screenshot or Graphic	Step
	6. **Coordinate Projection** menu, **Selection List:** Recently used coordinate projections are listed, to select a different predefined coordinate projection. Select/tap, Add Predefined
	7. **Coordinate Projection** menu, Country: **USA/NAD83** Browse the list of coordinate projections, Select the appropriate state/zone for your projects location. In this example, **FL East** was selected, tap 
	8. **Coordinate Projection** menu, **Selection List:** **USA/NAD83/FL East** was added to the list, to use this coordinate projection, select **USA/NAD83/FL East** Then tap 

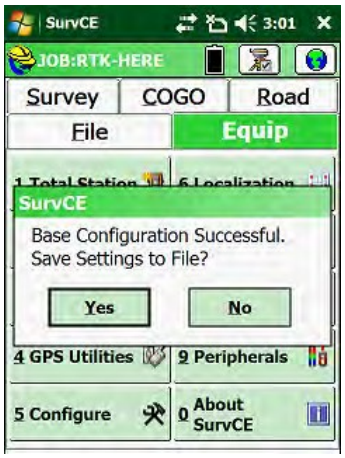
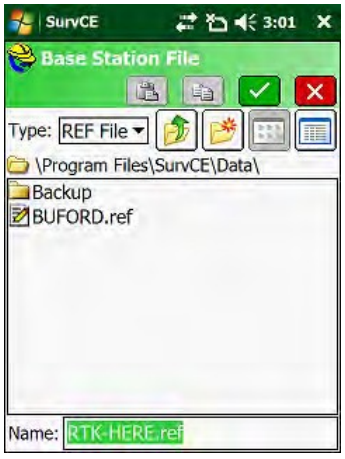
Screenshot or Graphic	Step
	9. The user is returned to, **Job Settings | System** menu,
	10. **Job Settings | Options** menu Browse the list of available options, select the options as needed. For RTK surveys, select the options: √ **Time Stamp Each Point** √ **Store GPS accuracy in Raw File.** When all required options have been selected, Tap user is returned to the SurvCE main menu.
	11. **The following steps outline the procedures to configure the S320 RTK Base**. Setup up the S320 RTK Base over the survey point in the field; turn on the S320 GNSS receiver. Select **Equip | 2 GPS Base**

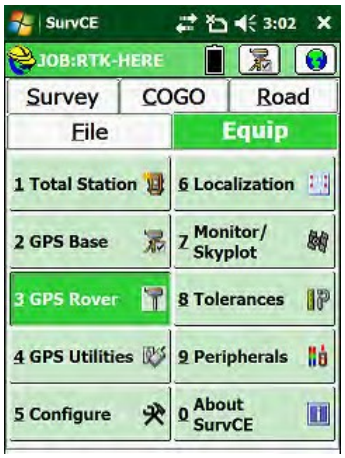
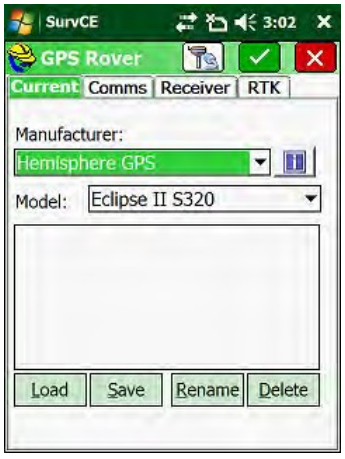
Screenshot or Graphic	Step
	12. **GPS Base | Current** menu, Select the options, **Manufacturer: Hemisphere** **GNSS Model: Eclipse II S320**
	13. **GPS Base | Comms** menu, **Type: Bluetooth** **BT Type: Windows Mobile** **Device: S320 184xxxx** Where the Device: **S320184xxxx** will be the actual serial number of your S320 Base.
	14. **GPS Base | Comms** menu, From **Device:** using the stylus, tap the down arrow, select **S320 184xxxx BASE;** this will be the actual serial number of your S320 RTK Base. Select/Tap,  icon to establish the Bluetooth connection between SurvCE and the S320 RTK Base. On the S320 RTK Base, the Bluetooth LED will be solid blue, indicating a successful connection.

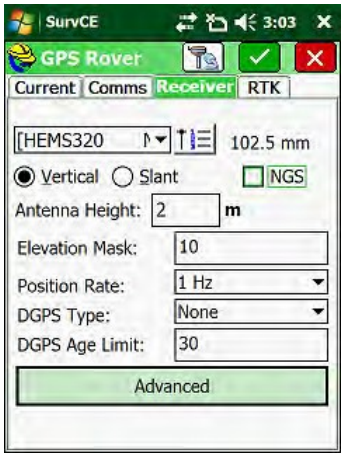
Screenshot or Graphic	Step
	15. **GPS Base | Receiver** menu, Select the **HEMS320** antenna model, measure and enter the RTK Base antenna height. Select Vertical or Slant measurement type. If using a tripod/tribrach setup, select Slant. If using a 2-meter Fixed Height GPS tripod, select Vertical. For most all RTK surveys, the default Elevation Mask: 10, Position Rate: 1 Hz, **DGPS Type: None,** DGPS Age Limit: 30 are acceptable.
	16. **GPS Base | RTK** menu, **Device: Internal nL400 Microhard** **Message Type: ROX** This is the default Hemisphere GNSS RTK message type. Other supported RTK message types options include: CMR and RTCMV3. To check the current UHF radio frequency, tap the  tools menu icon,
	17. **GPS Base | RTK** menu, Configure RTK Device Selecting Modem/Radio

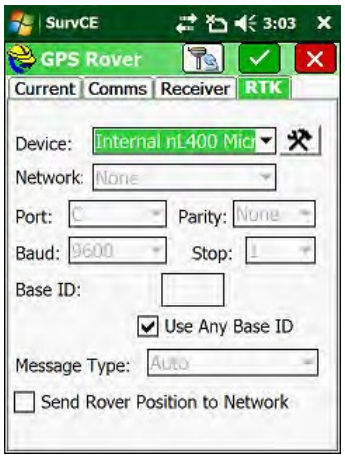
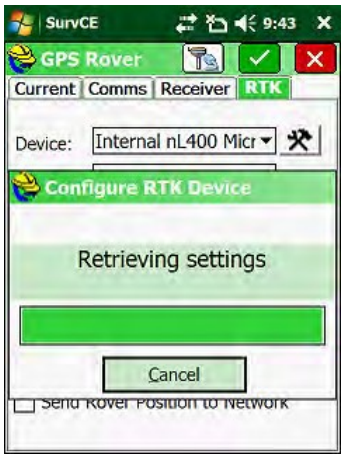
Screenshot or Graphic	Step
	18. **Configure Internal nL400 Microhard** Power: 1 Watt (this is the max power setting for the internal radio). Current **Frequency: 445.4500** The user can enter the frequency, as permitted in their FCC Radio Station License. To change the frequency, using the virtual keyboard, manually enter the numerical frequency. Select/Tap  to set the radio frequency.
	19. **GPS Base | RTK** menu, **Configuring Device**
	20. **Base Configuration** menu, Two Base Configuration options are available: **From Known Position** **From New Position** In this example, the RTK Base is setup over an unknown location, the user does not know the GPS coordinates; select the option: **From New Position,** Then select the option: 

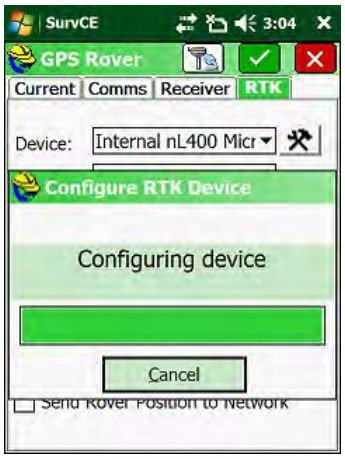
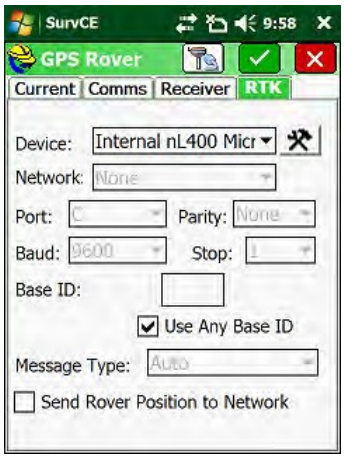
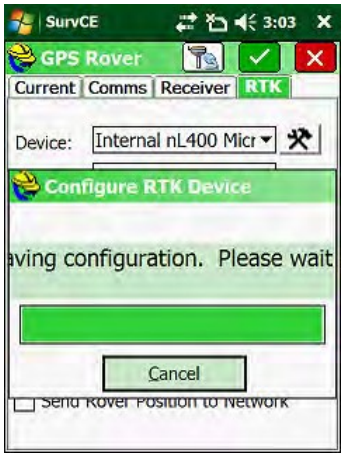
Screenshot or Graphic	Step
	21. **Average GPS** menu, Available options are: **By Number** (of measurements), **By Time in Min** Select the option you prefer, enter a suitable numerical value. In this example, **By Time in Min** option was selected, 3.000 minutes was entered. Select/Tap  to start the Average GPS readings,
	22. **Average GPS** menu, Taking Readings… In this example, **By Time in Min** option was selected, 3.000 minute duration was entered. Status of the Average GPS process is displayed to the user.
	23. **Base Configuration** menu, Upon completion of the **Average GPS** process, the resulting Latitude, Longitude and Ellipsoid Hgt are displayed, Enter a **Broadcast ID: 1** **Continue with Base Setup?** Select/Tap 

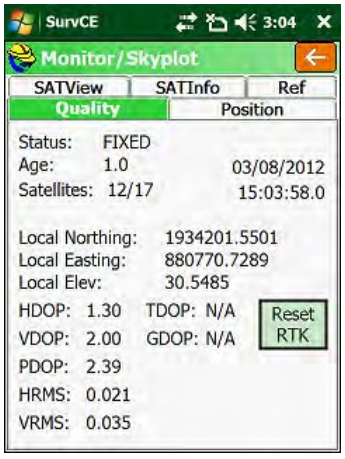
Screenshot or Graphic	Step
	24. **Equip | 2 GPS Base** Configuring base Saving Configuration. Please wait
	25. **Equip | 2 GPS Base** Base Configuration Successful. Save Settings to File? Select/Tap Yes This option lets the user recall the RTK Base position at a later time, using the original **Read from GPS** position.
	26. **Base Station File** Type: REF File Name: **RTK-HERE** By default, SurvCE will use the current job name, **RTK-HERE.ref** The user can change the name, but the .ref file extension must be used. Select/Tap

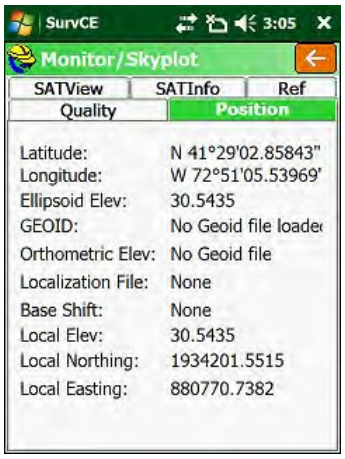
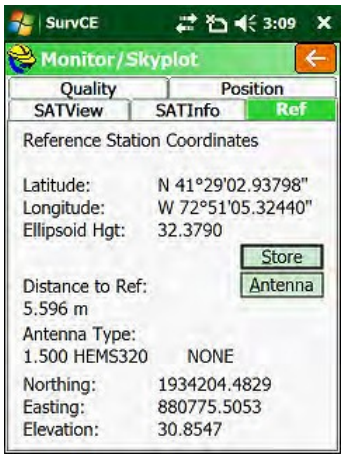
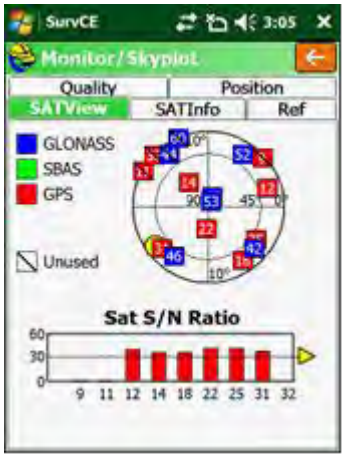
Screenshot or Graphic	Step
	27. **This completes the S320 RTK Base setup**. The user is returned to the SurvCE main menu. On the S320 RTK Base, the UHF/GSM LED will be flashing red, indicating RTK Base data is being transmitted over the radio. The GPS LED will be solid yellow, indicating a valid position. The Battery LED's will indicated current battery condition, (both should be green), the flashing green LED indicates which battery is in use.
	28. **The following steps outline the steps to configure the S320 RTK Rover.** From the SurvCE main menu, select: **Equip | 3 GPS Rover,**
	29. **GPS Rover | Current** menu, Select the options: **Manufacturer: Hemisphere** **GNSS Model: Eclipse II S320**

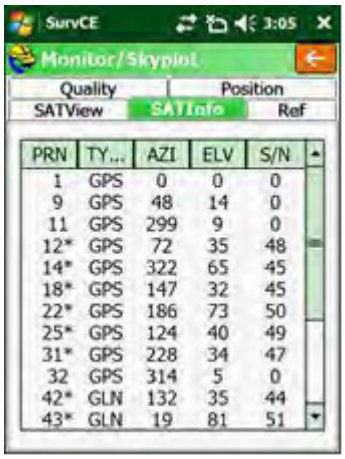
Screenshot or Graphic	Step
	30. **GPS Rover | Comms** menu, **Type: Bluetooth** **BT Type: Windows Mobile** **Device: S320 184xxxx** Where the Device: **S320184xxxx**, Will be the serial number of your S320 Rover.
	31. **GPS Rover | Comms** menu, **Device:** using the stylus, tap the down arrow, select **S320 184xxxx ROV,** the actual serial number of your S320 RTK Rover. Select/Tap  icon to establish the Bluetooth connection. On the S320 RTK Rover, the Bluetooth LED will be solid blue, indicating a successful connection.
	32. **GPS Rover | Receiver** menu, Select the **HEMS320** antenna model, Measure and enter the Rover antenna height. Typically, a fixed height 2-meter RTK survey pole is used. Select **Vertical** **Antenna Height: 2.000 m** For most RTK surveys, the default values for the Elevation Mask, Position Rate, **DGPS Type: None** and DGPS Age limit can be used.

Screenshot or Graphic	Step
	33. **GPS Rover | RTK** menu, **Device: Internal nL400 Microhard** √ **Use Any Base** **Message Type: Auto** To check/verify the UHF radio frequency, Tap the tools menu icon,
	34. **GPS Rover | RTK** **Configure RTK Device** A series of status messages are displayed to the user… **Retrieving settings**
	35. **Configure Internal nL400 Microhard radio** Power: **1 Watt** (this is the max power). Current Frequency: **445.4500** **Note:** this frequency **MUST** match the frequency set in the S320 RTK Base's internal radio. This enables the S320 RTK rover's internal radio to receive the RTK corrections from the S320 RTK Base. To set the **Frequency,** select/tap

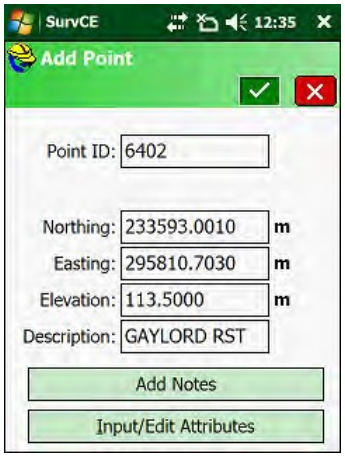
Screenshot or Graphic	Step
	36. **GPS Rover | RTK** menu, Configure RTK Device Configuring device **Device Configured**
	37. User is returned to the **GPS Rover | RTK** menu, To save all the GPS Rover configuration settings, Select/Tap 
	38. **GPS Rover | RTK** menu, A series of SurvCE status messages are displayed to the user: **Configuring Rover** **Selecting modem/radio** **Sending Data** **Configuring Rover** **Saving Configuration. Please wait** **Save Complete.**

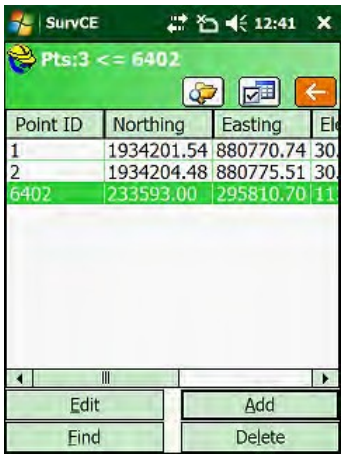
Screenshot or Graphic	Step
	39. The user is returned to the SurvCE main menu. **This completes the steps to configure the S320 RTK Rover with SurvCE.** On the S320 RTK Rover, Status LED's UHF/GSM LED flashing Red = RTK Float UHF/GSM LED flashing green = RTK Fix GPS LED solid yellow = valid GPS position
	**40.** To view the current RTK Rover status through SurvCE, Select **Equip | Monitor/Skyplot**
	41. **Monitor / Skyplot | Quality** User can observe current RTK rover status: **Fixed** Age of corrections, number of satellites being used, local coordinates, DOP's, horizontal and vertical RMS values. Status: **Fixed** is the best type of RTK solution available, the **HRMS** and **VRMS** values are an indication of the RTK position quality.

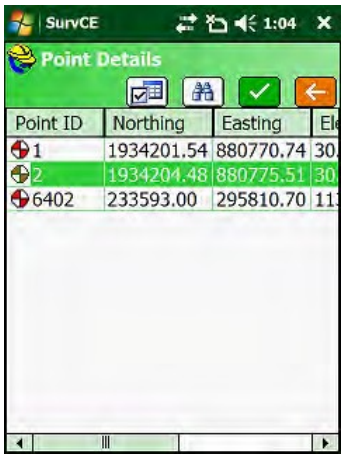
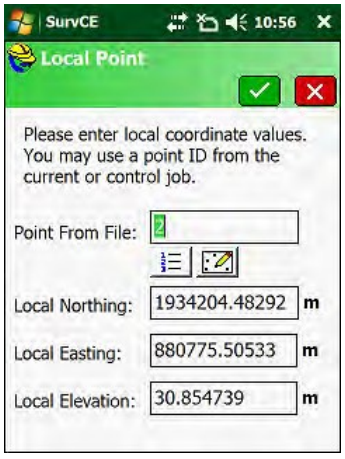
Screenshot or Graphic	Step
	42. **Monitor/Skyplot | Position** User can observe the RTK Rover's Latitude, Longitude, Ellipsoid Elev, if a Geoid model file is loaded, Orthometric Elev will be displayed. Local Northing, Easting coordinate details.
	43. **Monitor/Skyplot | Ref** User can observe the **Reference Station Coordinates** details: Latitude, Longitude, and Ellipsoid Hgt. This is a good place to check/verify the RTK Rover is using the correct RTK Base position, the RTK rover radio is listening to your RTK Base. **Distance to Ref:** and RTK Base **Antenna Type/Antenna HI** details are displayed.
	44. **Monitor/Skyplot | SATView** Graphical Skyplot of the current RTK Rover GNSS satellites in view.

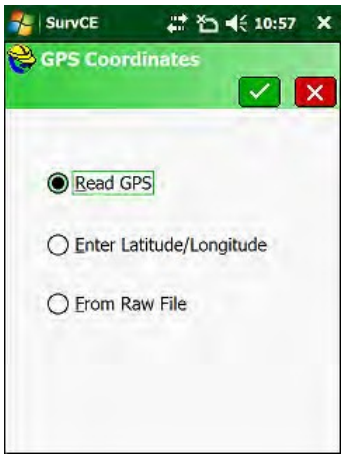
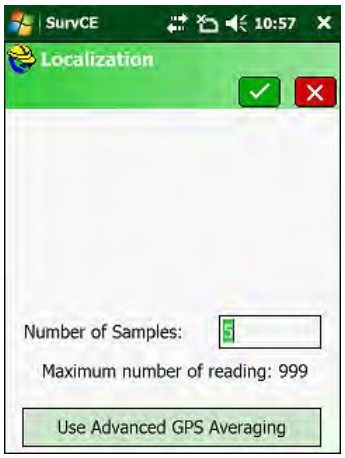
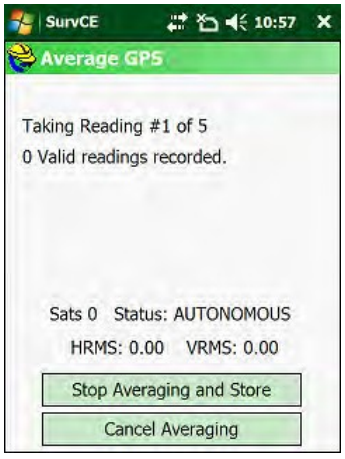
Screenshot or Graphic	Step
	45. **Monitor/Skyplot | SATInfo** Table view of current RTK Rover GNSS satellites in view. PRN, Type of GNSS SV(GLN=Glonass), Azimuth, Elevation, S/N, (Signal to Noise). Select/Tap  to return to the main menu,
	46. Since the RTK Base used an Unknown GPS position, the RTK Rover **MUST** localize, **Equip | Localization** Localization is a process that allows the user to shift the GPS measurements to a local coordinate system. Localization can be used to improve the local fit of your national coordinate system, (so your survey fits the local control), or to create a completely arbitrary coordinate system, (with new origin and axes). To adjust to local control: The RTK Rover must have a Fixed RTK Solution when observing the control points. Typically, the RTK Rover occupies a single, or multiple control points, storing the RTK Fixed GPS coordinates, associating the GPS coordinates to the local coordinate values.
	47. **Localization | System** Displays the current projection, selected when the job was created.

Screenshot or Graphic	Step
	48. **Localization | GPS** menu, Localization Method Multiple Point Method: Plane Similarity One Point Azimuth: State Plane Grid If the local control points are State Plane coordinates, and you want RTK derived Orthometric heights, you must attach a Geoid model to the Projection. To attach a Geoid Model, Select/Tap Geoid File:
	49. **Geoid Separation File** menu, **Type: GSF File** The **GSF File** is created on the office PC using the Carlson XPort utility S/w. The GSF File is a small manageable sized file that contains the Geoidal separations that encompass the project site. After the GSF file is created, it is copied to data controller's **\Program Files\SurvCE\Data** folder. The GSF file gets attached to the coordinate projection, enabling Orthometric elevations to be computed and stored with the point coordinates. If a GSF file is not attached to the Projection, only Ellipsoid Heights will be computed. After selecting a GSF File, Select/tap
	50. **Localization | Points** menu, Typical field procedure, the S320 RTK Rover occupies the local control point, selects/Tap **ADD.** The local control point coordinates must be previously stored in the current Job's coordinate file before the RTK Rover can occupy the control points for Localization. The user cannot add control points using the **Add** button. **ADD** is the occupy function of the Localization process. To add control points/coordinates to the job, exit from the Localization menu, From the main menu, select **1 File | 3 Points**

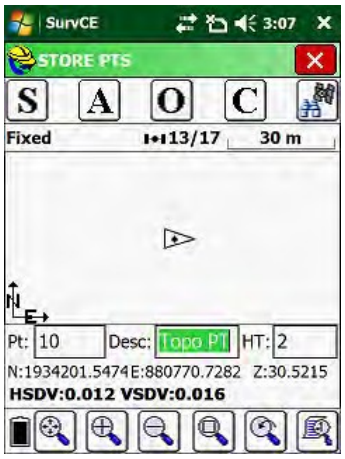
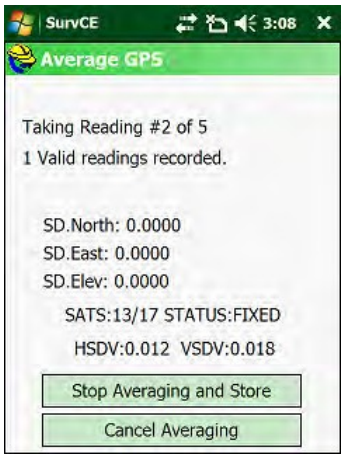
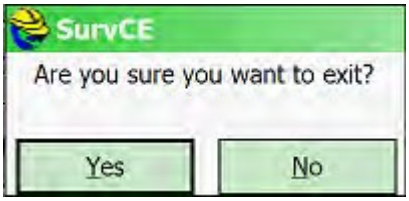
Screenshot or Graphic	Step
	51. To add control points to the current job, so they can used for the Localization, Select **File | 3 Points** menu,
	52. From the **File | 3 Points** menu, Select/Tap Add,
	53. **Add Point** menu, Using the stylus, tap into the **Point ID** template, the virtual keyboard will pop open, Enter the Point ID, Northing, Easting, Elevation, and Description for the control point, To store the Point, select/tap

Screenshot or Graphic	Step
	**54.** From the **File | 3 Points** menu, If you need to add additional control points, select/Tap Add, After entering all the control points required to the current job, select/tap  , user is returned to the main menu, The user can return to the **Equip | Localization** menu, resume the Localization process.
	55. From the main menu, select **Equip | Localization,**
	56. Return to the **Localization | Points** menu, The S320 RTK Rover occupies the local control point, When ready, tap the Add button,

Screenshot or Graphic	Step
	57. **Local Point** menu, Select/Tap the points icon,
	58. **Point Details** menu, Select the Point ID of the local control point to be physically occupied by the RTK Rover, to be included in the Localization. Select/Tap
	59. **Local Point** menu, When ready to start taking RTK observations on the Local Point **(2),** Select/Tap

Screenshot or Graphic	Step
	60. **GPS Coordinates** menu, Select the option **READ GPS** Next, select/tap ✓
	61. **Localization** menu, Enter the **Number of Samples:** desired Plumb and level the S320 RTK pole over the control point, it may help to use Bi-Pod legs to help keep the RTK Rover plumb and level over the control point during the Localization process. Select/Tap ✓
	62. **Average GPS** **Taking Readings…** In actual practice, the S320 RTK Rover should be tracking at least five SV's and must have a FIXED RTK Status.

Screenshot or Graphic	Step
	63. Typically, after storing the first control point in the localization process, the RTK Rover moves to the next control point, occupies the point, plumb and levels the RTK Pole, select/taps Add, selects the Point ID of the control point, Selects **Read From GPS.** Typically, 3-5 control points are occupied during the Localization process. After a sufficient number of control points have been occupied, select Save the localization results can be reviewed, suspicious points can be toggled On/Off, bad control points can be **Deleted.** If making changes to the Localization, be sure to **Save.** This completes the overview of the Localization. For addition details on Localization, refer to the SurvCE manual. Select/Tap ✓ to exit the Localization menu.
	64. After successfully completing the Localization process, the user can **Store Points, Stake Points,** etc. To Store Points, Select, **Survey | 1 Store Points**

Screenshot or Graphic	Step
	65. **Store Points** menu, Before storing points with the S320 RTK Rover, enter a starting PT: number, enter a suitable description, enter/confirm the RTK Rover Antenna Height. The RTK rover should have a Fixed RTK solution, observe the **HSDV and VSDV** values, when ready to Store the Point, Plumb and level the RTK antenna/pole over the point of interest, Select/Tap **S**, to store the point,
	66. If the user configured the Averaging settings in Average GPS Menu **A** The user will observe the Taking Reading status. Upon the completion of the 5 readings, the point will auto store. Continue storing points as needed.
	67. When the user has completed the RTK survey, return to the main menu, Select **File | 0 Exit**  Select **Yes**

Further Information

The Precision Products Technical Support team in Scottsdale has coordinated defining these Quick Reference Guides. You can contact Precision Products Technical Support at techsupport@hemispheregnss.com for further information.

For additional information on SurvCE, please visit the Carlson SurvCE web site at:

www.survce.com

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