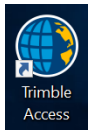
Overview: Use the Iowa Real-Time Network for GNSS surveying.

- Requires a cellular data signal that supports a reliable connection
- Check the operating status of the IaRTN at: iowadot.gov/rtn

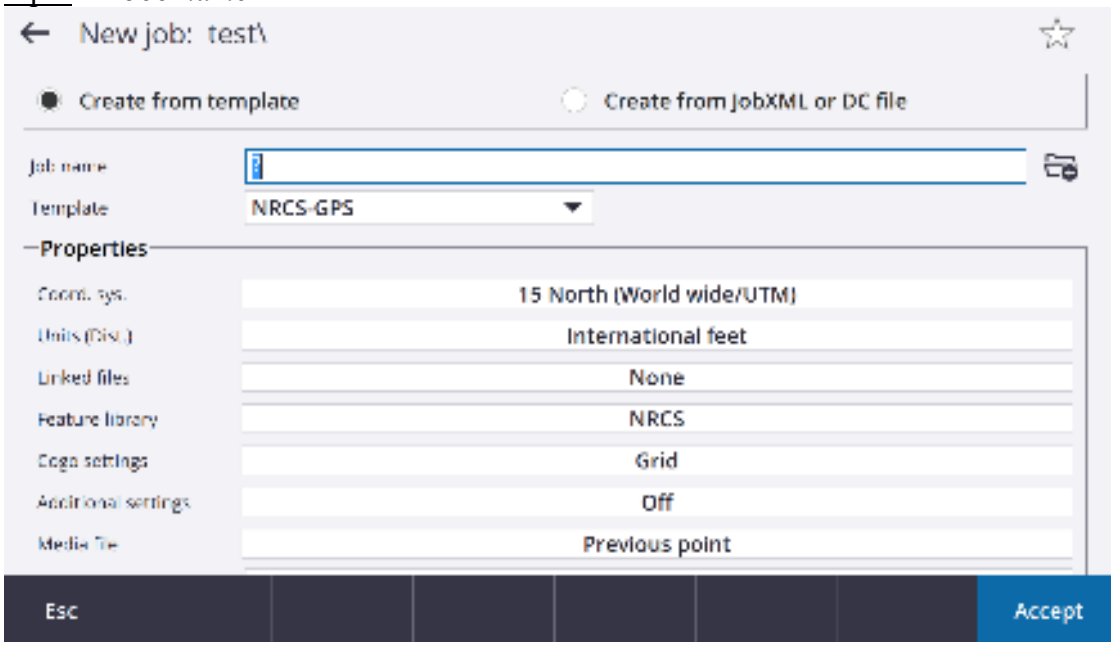
Equipment: Trimble TSC7/T10 with internal cellular connection, GNSS Receiver, Trimble Access v2022.01

Setting up a Survey Job

Start a New Job on the Data Collector for the Receiver
(This can be done prior to setting up the survey equipment.)

1. Turn the TSC7 or T10 controller on by pressing the:
    a. TSC7 – press the **green** button
    b. T10 – press the **black** power button (bottom left corner of collector).
2. Double Tap the **Trimble Access** button 

or Tap *Windows Icon … Trimble Access*.
3. Tap *New* to create a project
4. Tap *Name*
5. Input the *County name,* Tap *Create*
    a. If your county has already been created, Double Tap on to the name
    b. Tap *New*
6. Input the *Job name*

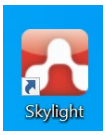


7. Set Template as ***NRCS-GPS***
8. Verify Coordinate system and Units are set properly (see example above).
9. Tap *Linked Files* if you want to select coordinate files that have existing points to be referenced into this project.
10. Tap Accept.

Surveying using IaRTN

Set up the GPS & Enable Data Connection

11. Turn on the R12 or R12i that will be used as the Receiver (external radio antenna is only needed for base-rover surveys).

12. Enable the internal cellular connection: (It may connect automatically, view connection in the bottom right of the screen for cellular bars) ***Ensure that the on/off cellular connection switch on the back of the T10 unit is turned on.***
    a. On desktop screen:
        i. Double Tap the **Skylight** icon 

        ii. Tap **Connect**

The Four Main Survey Styles

a. IARTN_R10/12/12i
b. IARTN_R10/12/12i_BRIDGE
c. R10/12/12i Base – R10/12/12i Rover
d. VX & S Series – Use this when operating a robotic total station

The Two Main Survey Types

a. Measure Points
    a. Use this to capture geographic position information with a survey rod
    b. e.g. flowline points
b. Continuous Topo
    a. Use this to capture geographic position information with a vehicle
    b. e.g. ground points

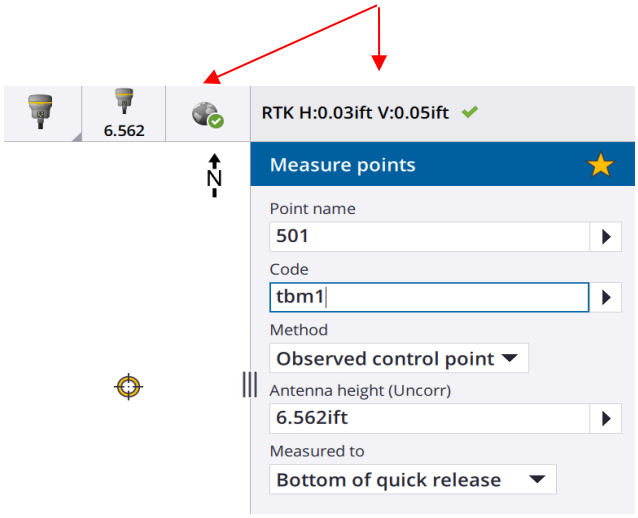
The Three Survey Methods

a. Rapid Point
    a. Provides position information based on one measurement (less accurate)
    b. Not recommended
b. Topo Point
    a. Provides an average position based on three measurements (medium accuracy)
    b. Use for all shots
c. Observed Control Point
    a. Provides an average position based on 180 measurements (most accurate)
    b. Use to establish all benchmarks and control points

Capturing Observed Control Points

13. After setup and starting a job, Tap  … *Measure… Measure Points*.

14. The controller will initialize the GPS survey. Watch for ***RTN:Fixed*** (a globe with a green check mark, see below) to appear and for the Horizontal and Vertical precision to get down to around 0.10 ft. (again green check mark)



***Point Names** for Survey Shots*
Instrument Points use 1, 2, 3 …
Benchmarks use 501, 502, 503 …
Turning Points use 201, 202, 203 …

Topog shots – start at 1000
Continuous Topo – start at 3000

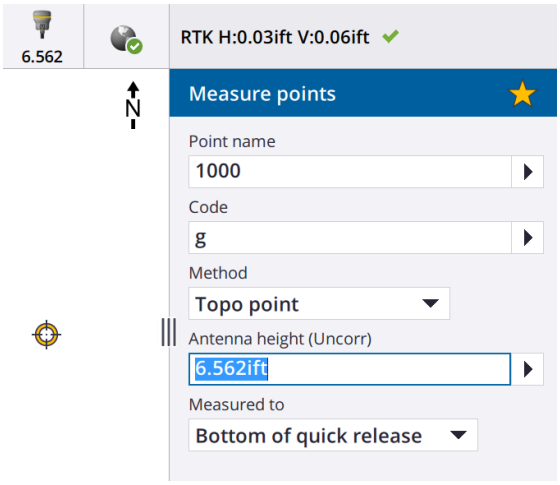
15. Take a Control Point using the Receiver:
    a. Input the *Point Name* for the TBM 1 (e.g. 501)
    b. *Code* = TBM 1
    c. *Method* = ***Observed control point***
    d. *Antenna Height* = 2m
    e. *Measured to* = ***Bottom of quick release***
16. Set up the bipod on the benchmark and Tap Measure
17. Once the 3 minutes of data collection has occurred Tap Store.

Repeat for additional control points.

Please refer to the Iowa NRCS Survey Field Code List for a full list of acceptable survey codes.

Conducting a Topo Point Survey

18. Setup the Receiver GPS with the Data Collector attached as previously instructed.
19. Tap ☰ … *Measure… Measure Points*.
20. On the popup screen saying, "Welcome to the Iowa Real Time Network," Tap OK.
21. Measure topo points:
    a. Input the *Point Name* for the shot (e.g. 1000), *Code* = g
    b. *Method* = ***Topo Point***
    c. *Antenna Height* = 2m or adjust as needed.

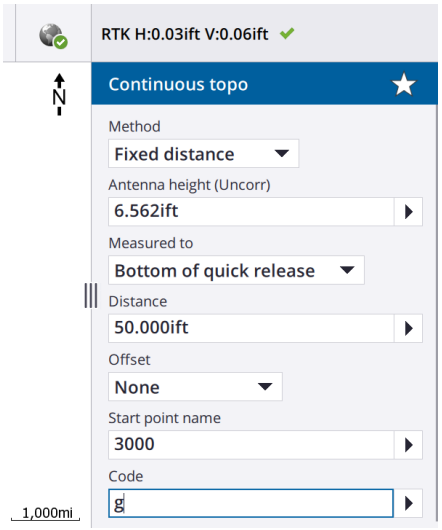


d. *Measured to* = ***Bottom of quick release***

22. Tap Measure
23. Once the 5 seconds of data collection has occurred Tap Store.
24. Tap ESC when done collecting points.

When setting benchmarks or control points set the *Method* = **Observed Control Point**

Conducting a Continuous Topo Survey



25. Tap ☰ … *Measure… Continuous Topo*.
26. *Method* = ***Fixed Distance***
27. *Antenna Height* = adjust as needed.
28. *Measured to* = ***Bottom of quick release***
29. *Distance* = ***50.000 ift*** or as desired
    a. Distance between points can be varied based on topography or accuracy needs.
30. Offset = ***None*** or as desired
31. Input the *Start Point Name* for the topo shots (e.g. 3000) and input a code *Code* = G
    a. This Code will be applied to all points captured in the continuous survey.
    b. The code can be changed during a continuous topo survey without ending and restarting the survey.
32. Tap Start.
33. The *Store Point* button at the bottom of the screen can be used to take a point before reaching the next fixed distance spacing. The following point will be taken once you have reached the fixed distance again.
34. To stop the continuous topo Tap End.
35. Tap ESC when done collecting points.

Job & Point Information (Optional but helpful)

36. To review point coordinates (elevations, descriptions, codes, etc.), Tap ☰ … *Job data… Point Manager.*
37. To review GPS quality of points, Tap ☰ *…Job Data…QC Graph.* Tap *Display… Vertical Precision.* and Tap ESC when done.
38. To review job details in the order of work done, Tap ☰ *… Job Data…Review Job.* Antenna Height errors can be corrected, or Notes can be added here. Press ESC when done.

39. To review or change linked files, units, or coordinate system, Tap  … *Job(name)… Properties.* Tap ESC when done.
40. To review the map, Tap  …*Job data*…*Map*

Recheck Control Points

41. Before ending the survey, **return to the benchmarks and control points** and remeasure them using Topo or Observed Control Point. Compare the coordinates and elevations to the earlier results using the Point Manager.

Exporting Points – T10/TSC7

42. With Trimble Access open, Tap  and Tap the job name.
43. Tap *Export* at the bottom of the screen.
44. On the next screen, use the dropdown menu to select the file format you want to export [e.g. Comma Delimited (*.CSV, *.TXT), ESRI Shapefiles]. Tap *Accept*.
    a. If a previous export file exists, you will be asked if you want to override the existing file. Select *Yes* or input a unique name for the new file export.
45. The Select points screen will appear. Tap *All Points* to export the entire survey point file. A pop-up will appear stating *Transfer Complete*. Tap *OK*.

Quit out of Survey

46. When survey is completed, Tap  …*Measure… End GNSS Survey*
47. Tap Yes to Power Down Receiver.
48. Tap  to Close Trimble Access. Scroll down on the left side of the screen and Tap Exit to confirm Access shutdown.
49. Tap on the windows icon in the bottom left of the screen and shutdown data collector.

Setting GPS Bluetooth Connections

Overview: You will only need to establish these connections once. They will be remembered until you add a new receiver.

Settings for GPS Base-Rover mode via Bluetooth

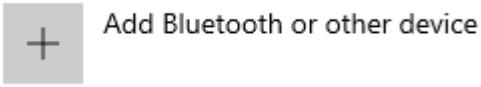
a) Tap  … Scroll down to *Instrument… GNSS Functions… Bluetooth…*
b) Set *Connect to GNSS Rover* = Serial Number of the Trimble R10/R12/R12i being used as the Base. The serial number is located on the underside of the receiver.
c) Set *Connect to GNSS Base* = Serial Number of the Trimble R10/R12/R12i being used as the Rover. The serial number is located on the underside of the receiver.
d) Tap Accept Tap ESC

Check to see that Bluetooth is turned on

a) Tap  (on your T10) or Tap (on the bottom of the TSC7 collector) 
b) Scroll down to *Setting* or locate the  icon
c) Tap *Devices*
d) Confirm the toggle is **Blue** and **On**
e) Tap the upper right *X* on a T10 or Tap the  on the bottom of the TSC7

Creating a new Bluetooth connection to a receiver

a) Tap  (on your T10) or Tap (on the bottom of the TSC7 collector) 
b) Scroll down to *Setting* or locate the  icon
c) Tap *Devices*



d) Tap
e) Tap *Bluetooth*
f) Confirm the serial numbers match the receiver you are attempting to connect to (S/N is located on the bottom of the receiver)
g) Tap the receiver ID. (if password is required contact Technology Engineering Staff)
h) Tap the upper right *X* on a T10 or Tap the  on the bottom of the TSC7
i) Follow steps for *Settings for GPS Base-Rover mode via Bluetooth instructions*