RTK GPS & Base Station setup

1. Assemble Base Station (R7)
   - Attach trirach to tripod and centre over known point (if applicable) using trirach eyepiece
   - Attach 0.250m pole to trirach and R7 GPS antenna to top of pole
   - Hang R7 GNSS receiver and radio transmitter from tripod, connect grey cable to rear of radio, port 3 of the receiver. Connect yellow cable to antenna and GPS port on the receiver. **DO NOT CONNECT POWER**
   - Setup radio mast tripod as high as possible using round centring plate>yellow extendable pole>radio cable adaptor>black antenna adaptor>short or long aerial¹. Connect radio cable to rear of radio
   - Connect power cable to battery (radio will auto power on) and turn on receiver, wait for the GPS light to flash red slowly and check that the radio is on channel 0
   - **IMPORTANT**: Ensure the radio transmit power switch (on rear) is set to low²

2. Assemble Rover (R8)
   - Screw short silver pole to top of staff
   - Insert battery into R8 GPS antenna, attach short black aerial and screw onto top of short silver pole
   - Attach control unit bracket to black part of staff at an appropriate working height
   - Insert control unit into bracket and tighten
   - Turn on antenna (press green button)
   - Turn on control unit (press green power button)
   - Set antenna height at appropriate working height (usually 1.8m), secure with pin and tighten knob

3. Setup new job
   - From home screen tap **Survey Controller**
   - Select **Files> New Job**
   - Enter an identifiable job name (i.e. Users initials and survey location/project name/date)
   - Tap **Coordinate System> Select from library**
   - Select appropriate coordinate system and zone for the area being surveyed. **Important**: If unsure of appropriate coordinate system please consult field store or SAL staff. Ensure ‘Use geoid model’ is selected and ‘Geoid Model’ is **Ausgeoid09**
   - Tap **Store** (you will be returned to the job setup screen) then **Accept** to save the job and return to the Survey Controller main screen. Your job name should now be showing at the top of the screen³

4. Establish Base Station
   - Tap **Configuration> Controller…> Bluetooth** and select **R7-GNSS** from the ‘Connect to GNSS receiver/ VX/S Series’ dropdown list and tap **Accept**⁴
   - On the right hand side of the screen ensure the base antenna is connected to the control unit and is receiving around 10 satellites

¹ Short aerial gives survey range of ~10km, but must be line of sight. Long aerial gives survey range of ~3km, but can cover undulating terrain
² The radio can be set to transmit at a much higher power to extend the range of the signal but uses ~10x more power – significantly reducing battery life
³ All data recorded is directly saved to the internal hard drive you do not need to save the data when the survey is finished
⁴ When establishing the base make sure you stay within 10m (Bluetooth range) of the receiver
Using a known point (Survey Mark)

- Tap **Key In > Points**. Enter survey mark name, northing, easting, elevation, tick ‘Control Point’ and tap **Store**.
- Tap **Survey > RTK & Logging > Start Base Receiver**.
- Tap arrow next to ‘Point Name’, tap **List** and select the point that was keyed in.

Using an unknown point (Post Processing)

- Tap **Survey > RTK & Logging > Start Base Receiver**.
- Tap arrow next to ‘Point Name’, tap **Key In**. Under ‘Point Name’ enter a sensible name for your base station setup, tap **Here** (bottom left) and the device will give you a GPS location (to be processed later via AUSPOS). Tap **Store**.
- Measure the antenna height (using the collapsible staff) from the point the tribrach is centred on to the top of any of the notches on the antenna, and enter the value in ‘Antenna Height (Uncorrected)’. Ensure ‘Measured to’ is **Top of Notch**. ‘Station Index’ is **13** and ‘Transmit Delay’ is **0ms**. Tap **Start** and wait for base to establish. Ensure orange logging light on the receiver is illuminated.

5. Connecting to the base station and starting a survey

- Change connection from the base station to the R8 GPS (rover). Tap **Configuration > Controller > Bluetooth** and select **R8-3** from the ‘Connect to GNSS receiver/ VX/S Series’ dropdown list and tap **Accept**.
- On the right hand side of the screen ensure the rover antenna is connected to the control unit, is receiving around 10 satellites and is displaying radio link image.
- Tap **Survey > RTK & Logging > Start Survey**. Select **13** from ‘Index’ and tap **Accept**.
- Wait for connection to establish and wait for ‘Initialisation has been gained’ to be displayed and spoken. If this does not happen for some time and ‘RTK: Float’ is displayed on the bottom of the screen, the device is not seeing enough satellites. Move to an area of clearer sky view/ higher ground and wait for initialisation to be gained.
- ‘RTK: Fixed’ and the current accuracies will be displayed on the bottom of the screen once initialisation is gained.

6. Measuring points

**Individual Points (Topo Points) – Most accurate**

- Tap **Survey > Measure Points**. Enter an appropriate point name followed by a number (the number will automatically increment with each point).
- Enter the staff height (usually 1.8m). Ensure ‘Method’ is **Topo point** and ‘Measured to’ is **Bottom of antenna mount**.
- Navigate to point(s) to be measured, hold staff steady over point (using bubble level), tap **Measure** (bottom right) or press **Enter** on keyboard and wait for the ‘Epochs Remaining’ to count down to 0.
- Tap **Store** before moving to the next point. ‘Observation Stored’ will be spoken.
- Repeat until all points are measured.

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5 Survey marks can be pre-programmed in before commencement of the job – Contact field store or SAL staff.
6 Ensure your point names are clear if you are recording different features (i.e. Bank, River, Beach, etc.) and end with a number otherwise the program will automatically increment the last letter of the point name through the alphabet.
7 Staff height can be changed during the survey (i.e. if surrounding vegetation is tall), but don’t forget to change the current working height on the device when changing the height of the staff.
8 Do not move during the point measurement or before **Save** has been pressed. Doing so will decrease the accuracy of your point and the controller will flag errors.
Continuous Points (Continuous Topo) – Less accurate
- Continuous points are useful when covering a large area either by foot or in a car and accuracy is less important. It allows you to set an interval for recording (usually distance) while travelling
- To use, tap Survey> Continuous Topo, select a method (usually fixed distance)
- Enter the antenna height and ensure ‘Measured to’ is Bottom of antenna mount\(^9\)
- Enter the interval/distance for points to be recorded and ensure ‘Offset’ is None
- Enter a starting point name, ensuring it ends in a number\(^6\)
- Press Start to begin collecting points. Points will only be recorded when the accuracies are high enough (and only during ‘RTK: Fixed’), therefore if the satellite signal/Telstra signal is lost, points will not be recorded until the signal is re-established\(^{10}\). The control unit will speak and display a notification when initialisation has been lost/gained

7. Ending survey

**Rover**
- Return to Survey Controller main screen
- Tap Survey>End GNSS Survey
- Tap Yes when ‘Power down receiver?’ screen is shown. The R8 GPS antenna will automatically power down
- Hold down green power button on the control unit until ‘5 SECONDS!’ warning screen shows and release. Tap Shutdown>Yes
- Disassemble equipment

**Base**
- Power down radio
- Hold down green power button on receiver until orange logging light goes out. Wait until green power light goes out (~10 seconds) and disconnect power supply
- Disassemble equipment

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\(^9\) If measuring antenna height when attached to anything other than the graduated staff (i.e. a car roof rack), ensure the height is measured to the bottom of the antenna

\(^{10}\) Reestablishment of signal can take a while, if you are in an area that you believe should have a signal, stop and wait for initialisation to be regained