Support Bulletin

Penmap for Android and R12i

GEOSPATIAL

September 2021

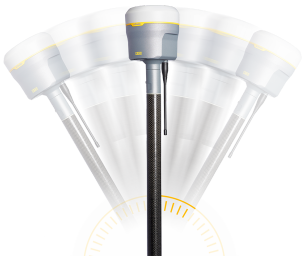
The following support bulletin describes how to use R12i with Penmap for Android

https://geospatial.trimble.com/

Definitions

Trimble TIP™

A New Angle of Productivity Trimble is pleased to announce the release of the Trimble® R12i GNSS receiver. Featuring Trimble TIP™ tilt compensation technology for measurement and stakeout, built on the industry-leading Trimble ProPoint™ GNSS positioning engine, the Trimble R12i enables surveyors to get more done with their rover system than ever before.



Trimble TIP™ tilt compensation offers a completely different way of working because you can:

- Measure accurate points quickly while standing or walking without having to level the pole.
- Concentrate on where the pole tip needs to go, which is especially useful during stakeout.
- Easily survey hard-to-reach locations such as building corners and pipe inverts.
- No longer worry about movement of the pole when measuring, because the receiver automatically corrects for “pole wobble” when the pole tip is stationary.

Trimble Mobile Manager

Trimble Mobile Manager is the gateway to Trimble Catalyst based solutions as well as the Trimble Subscription ecosystem.

Trimble Mobile Manager is needed in Penmap if the Catalyst on demand service is used or an adjustment is needed for the R12i like the pole bias adjustment and the IMU calibration

Pole bias adjustment

The pole bias adjustment corrects errors introduced when using a pole that may have become damaged during normal use and is no longer perfectly straight, or if the pole tip is no longer true and perfectly aligned with the center of the pole. Pole bias adjustment should be performed in an optimal RTK environment with a good IMU alignment.

Trimble recommends that you perform the pole bias adjustment:

- When the receiver is using a pole and quick release in sub-optimal condition.
- Each time you change to a different sub-optimal pole.

IMU bias calibration

If poor quality data is detected, such as excessive IMU bias, the user will be informed and can perform an “IMU bias calibration” via Trimble Mobile Manager.

Excessive IMU bias can be caused by any of the following:

- The receiver may have been dropped or suffered from some other form of physical abuse.

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- The receiver has experienced a large temperature variation since the last time an IMU bias calibration was carried out, or the temperature is very different (many tens of degrees Celcius) from the time of the previous calibration.
- The internal biases inside the IMU increase as the sensors age over a long period of time.

Tilt/ eBubble calibration

Note: Penmap for Android does not support the ebubble so the tilt calibration is not needed

The GNSS eBubble uses the accelerometers in the receiver to provide an electronic representation of the degree of tilt of the receiver. In the case of an AINS receiver, the GNSS eBubble operates independently of the IMU sensors in the receiver.

GNSS eBubble calibration aligns the accelerometers in the receiver to the physical sensor used to measure tilt. If a receiver supports ITiltObservation, you can calibrate the GNSS eBubble to a vial.

The GNSS eBubble calibration takes 30 seconds to complete. You must perform the GNSS eBubble calibration:

- The first time you use the receiver (or the first time you use the receiver in GNSS-only mode, if you are using an R12i receiver).
- When the previous calibration expires.
- After completing a pole bias adjustment.
- If the GNSS receiver suffers severe abuse such as a pole drop.
- If the temperature inside the receiver is more than 30° Celsius different to when the eBubble calibration was performed, the calibration is invalidated.

Use R12i with Penmap for Android

Penmap for Android 11.3.0.2058 supports TIP-measurement with R12i. Just set **GNSS Settings | GNSS receiver** to **R12i**. Penmap **always** uses TIP tilt compensation.

If the IMU is aligned and the measurement accuracy matches the quality settings, Penmap measures as usual. Precision values are shown at **GNSS Settings |Position** e.g the number of GNSS satellites, current DOP, the quality of the IMU alignment. When the IMU is aligned, precision values displayed are at the pole tip.

Requirements

- Penmap for Android version 11.3.0.2058 or higher
- Trimble Mobile Manager version 2.8.1.1050. or higher

Install Penmap for Android and Trimble Mobile Manager via Google Play Store.

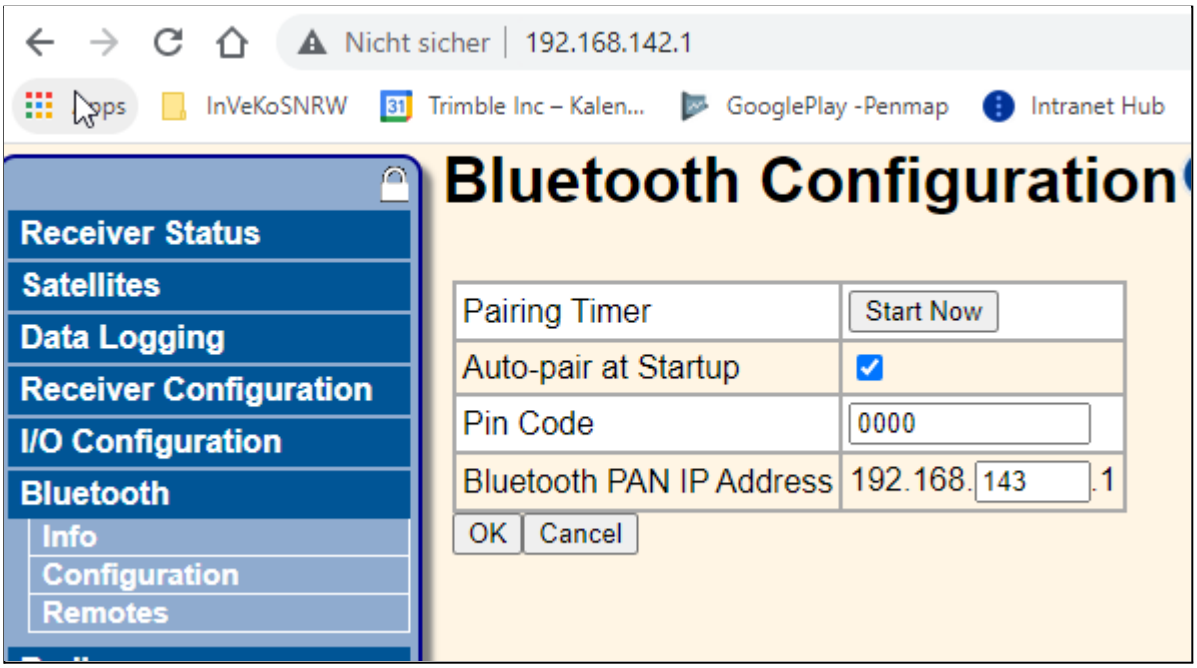
At start up you need to allow access to photos, media and files on the device, access to the device location and the opportunity to manage phone calls also as accepting the End User License Agreement.

Note: Currently it's not possible to disable IMU

Activate pairing for R12i

To pair the Trimble R12i receiver you need to start the pairing via webui

1. Connect the receiver to your device via wifi
2. Open the webui http://192.168.142.1/
3. **Bluetooth|Configuration [Start Now]**
4. Pair the R12i with your device



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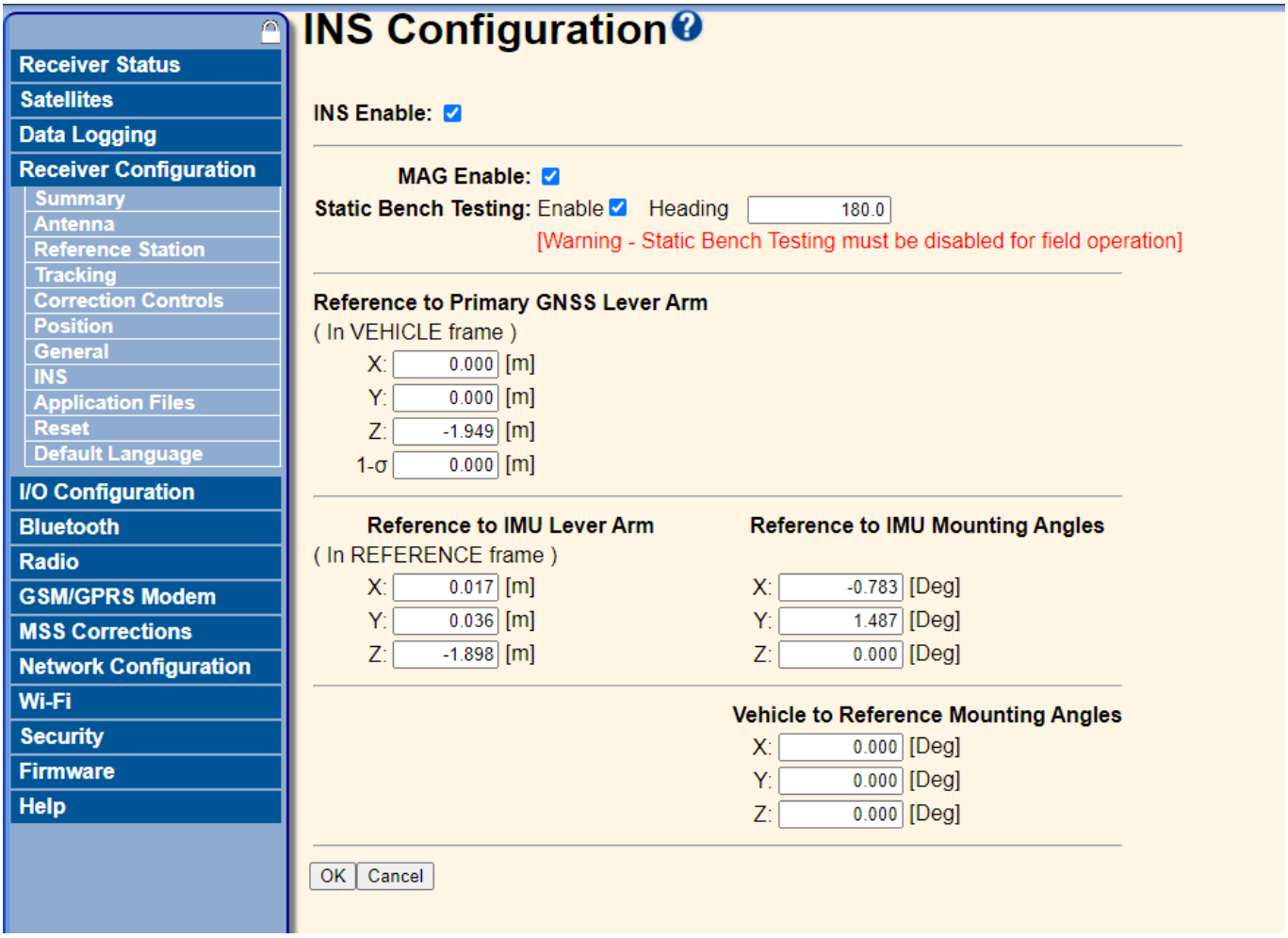
Disable Static Bench Testing



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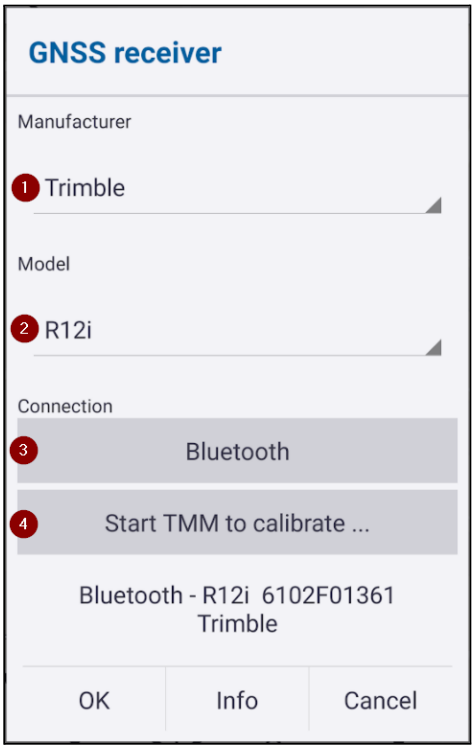
Setup the Receiver

Go to **GNSS | GNSS receiver**, select the **R12i** receiver and connect via **Bluetooth**.

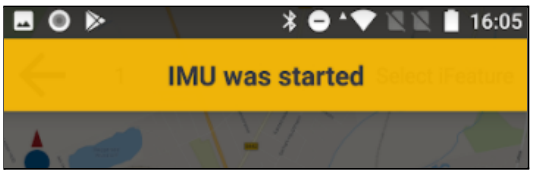


At the first usage we recommend adjusting the pole bias. To do so **Start TMM to calibrate...** and follow the steps from Pole bias adjustment.

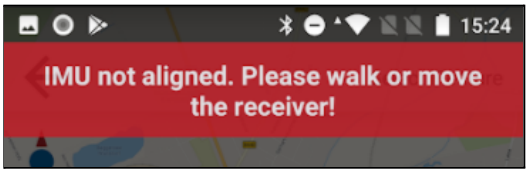
Connect to the receiver

Start GNSS to connect to the receiver.

Penmap will start the IMU if it was disabled.



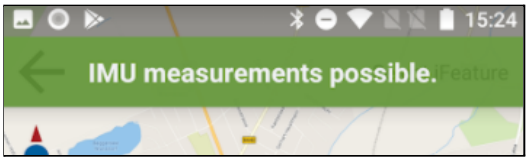
To start measurement the IMU needs to be aligned. If the IMU is not aligned the following toast pops up



Please do the following steps

1. Attach the receiver to the survey pole.
2. Make sure you correctly enter the antenna height
3. Move the pole so that the receiver experiences acceleration and changes in position. This can range from rocking the survey pole back and forth while keeping the pole tip on the ground, to walking a short distance (generally less than 3 meters) while changing direction a few times.

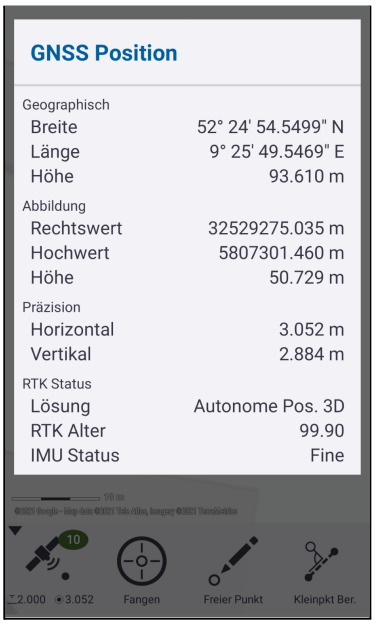
If the IMU is aligned the measurement can start



Measure

Measurement is possible if the IMU is aligned by tap to the GNSS Icon.

Penmap for Android shows the horizontal accuracy at the GNSS Icon.



It's also possible to check the status in **Start GNSS | Position** there the horizontal and vertical accuracy at the pole tip is shown as the same as the IMU status.

Measurement is only possible if the IMU status is Fine, which means the IMU is aligned and the ground coordinate is received.

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Trimble Mobile Manager (TMM)

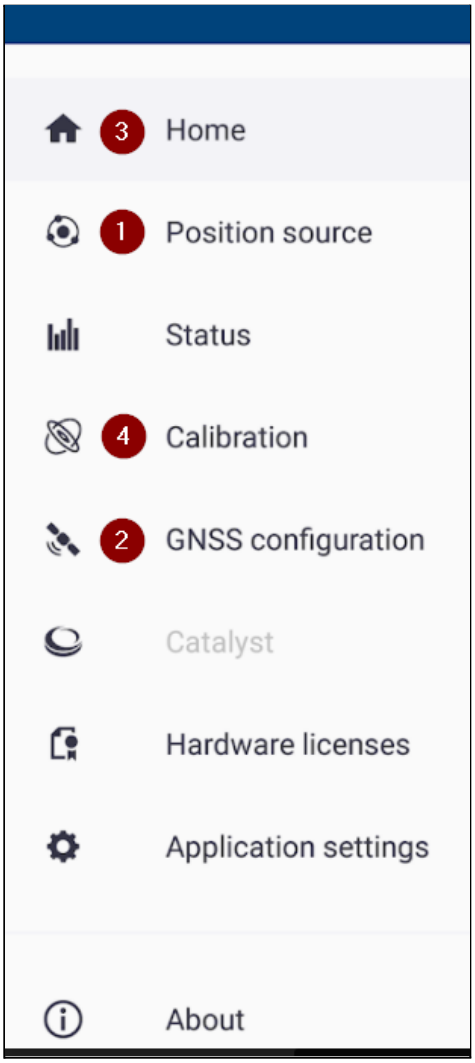
At the first start of TMM some setup is needed. The settings are stored for later use.

Setup TMM at the first startup

Login in to TMM with the **same TID** used in Penmap for Android

- (1) Set R12i via **Main menu | Position source**
  - **GNSS receiver type** -> Bluetooth Receiver
  - **[List connected Devices] | Show all** -> Select R12i
  - **Connect and Pair** the device

    Note: if the receiver is not shown [check if pairing is active via webui]



- (2) Set the correction service via **Main menu | GNSS configuration**
  - GNSS correction source
    - GNSS correction source -> Custom local
  - Server parameters
    - Protocol -> NTRIP
    - Set your Server URL e.g. www.vrsnow.de
    - Port -> e.g. 2101
    - Mount point name -> e.g. TVN_RTCM_32
    - GNSS source reference frame -> e.g. Auto
  - Server Account
    - Set username
    - And password for correction service
  - GNSS output
    - Detection mode -> Auto
    - Geoid -> e.g. EGM96 (global)
- (3) **Home**
  - Connect to R12i

- (4) **Calibration**

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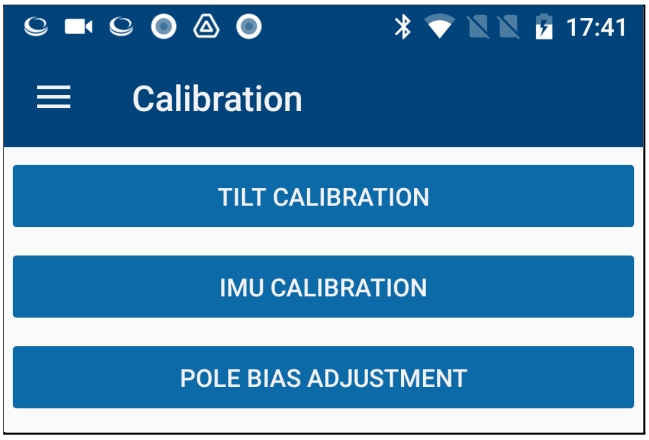
Calibration

There are three options in Trimble Mobile Manager for calibration



Tilt calibration

The tilt calibration is not needed in conjunction with Penmap for Android or the adjustments for the R12i (see above).

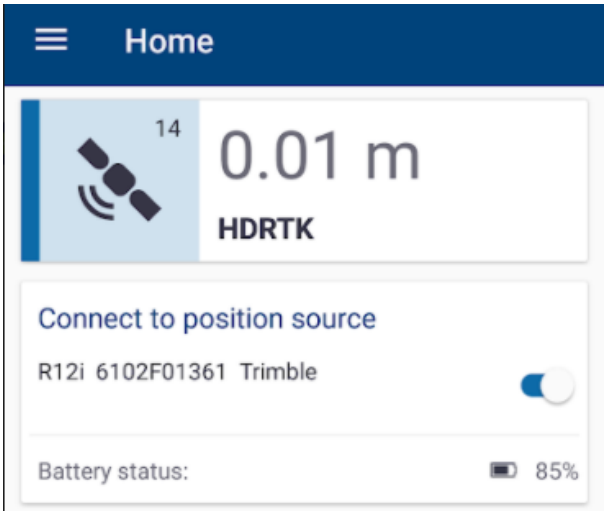
IMU bias calibration

The IMU bias calibration is needed if there is an excessive bias and Penmap gives the information “IMU has an excessive bias error”

The IMU bias calibration requires

- Connection to the receiver
- RTK correction data

1. Start Trimble Mobile Manager
2. Connect to the receiver in the **Home** Screen



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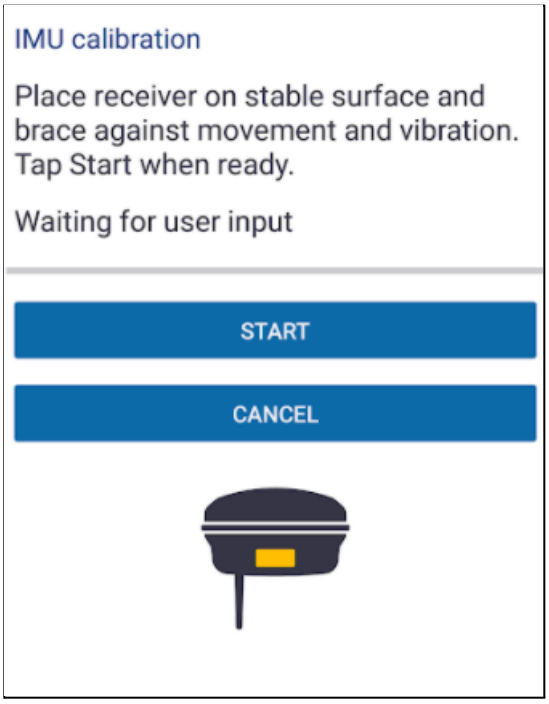
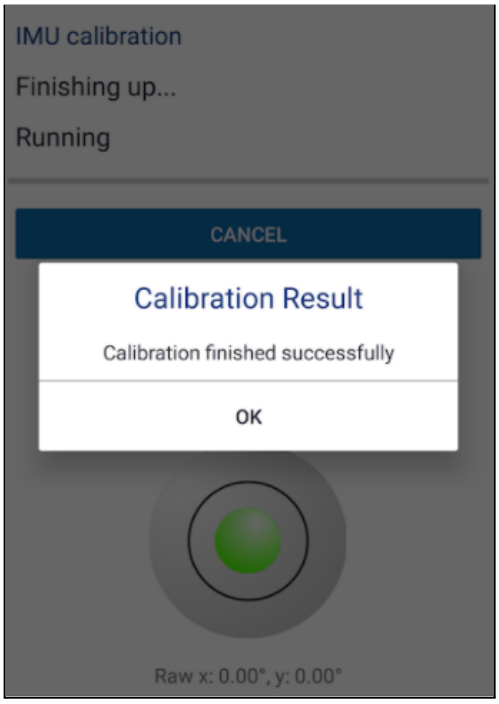
3. Go to **Calibration | IMU Calibration**
4. Follow the instructions step by step until the calibration is complete
   Note: the picture shows how the receiver needs to be placed in each step



...Follow the steps...

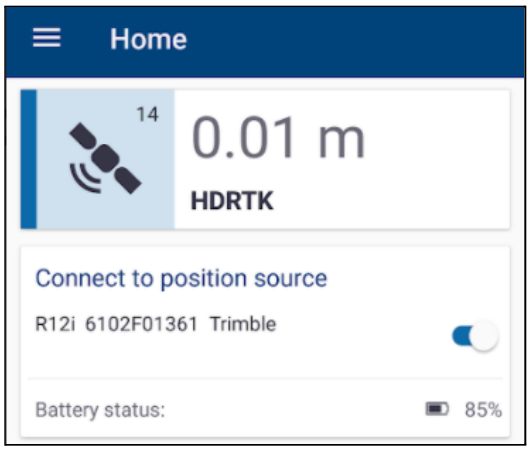


Pole bias adjustment

Each time you change the pole you should process a pole bias adjustment. The pole bias adjustment requires

- Connection to Receiver
- RTK correction data
- Precision of 0.02m or better
- Aligned IMU

1. Start Trimble Mobile Manager
2. Connect to the receiver in the **Home** Screen



3. Ensure that the connection to the correction service is established and the accuracy is 0,02m or better
4. Go to **Calibration | Pole Bias adjustment**
5. Follow the instructions step by step until the calibration is complete

Notifications

The receiver firmware constantly monitors the IMU sensors for data quality and indicates the current quality status in the IMU bias group box in the Sensor calibration screen.

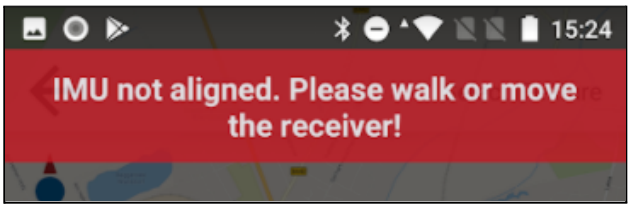
The IMU integrity monitoring field can contain the following values:

- IMU not aligned
- IMU state is unknown
- IMU error detection
- IMU excessive bias detection
- Pole bias adjustment expired

IMU not aligned

To use IMU tilt compensation, the IMU needs to be aligned in the receiver. The alignment process is simple and straightforward, and mimics normal use of the receiver.

If the IMU is not aligned the following toast pops up



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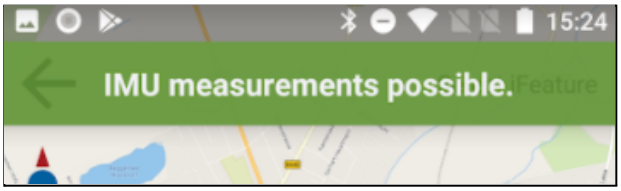
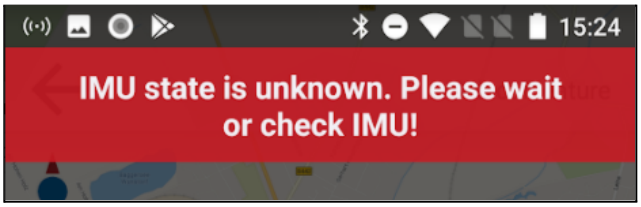


IMU state is unknown

IMU state is unknown and will be shown e.g. at connecting to the real time correction service. After connecting the message will vanish and the measurement is possible



IMU error detection

If the IMU integrity monitoring feature detects the IMU sensors have become temporarily saturated due to an impact such as a pole drop, Penmap displays the warning message "**IMU has an error**". When this happens, you must restart the receiver to reset the sensors.

Actions to deal with the warning are provided with the warning message. To immediately restart the receiver, tap **Restart**. To disconnect tap **Disconnect** and try to restart the receiver.

IMU excessive bias detection

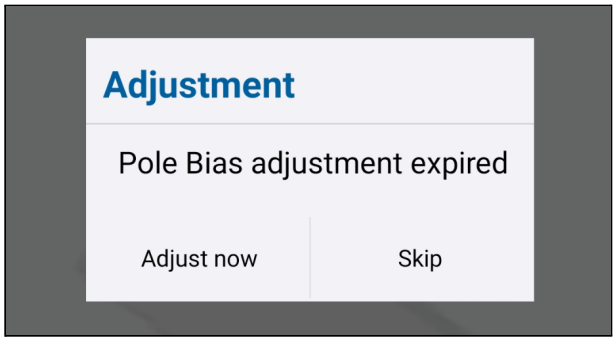
If poor quality data is detected, such as excessive IMU bias, Penmap displays the warning message "**IMU has an excessive bias error**". The IMU calibration can be done in TMM via start **calibrate now**.

Follow the steps from IMU bias calibration in Trimble Mobile Manager.

Pole bias adjustment expired

The Pole bias adjustment may have an expiry date. This can be set e.g. in the WebUI or via Trimble Access.

Just press **adjust now** and follow the steps from Pole bias adjustment in Trimble Mobile Manager.



Contact

For more information or questions contact the Trimble Penmap community.

https://community.trimble.com/groups/penmap-for-andriod