Tersus GNSS Inc.
Right to the Point

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This Quick Start Guide briefly introduces the setup and operation for TS21 GNSS Receiver and the operation of Nuwa app. More details please refer to User Manual of TS21 and User Manual of Nuwa app which can be downloaded from Tersus official website:
https://www.tersus-gnss.com/document.

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or log a ticket in our tracking system:
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Figure 3.2 Staking Point List

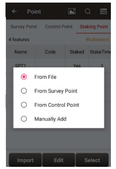

Figure 3.3 Import Targets

3.3 AR Staking

Select one of the point as the target, then click **AR** to enter AR staking interface, which uses dual cameras, as shown below.

Figure 3.4 AR Staking

4.Visual Positioning

4.1 Initialization and Take Video

Go to [Visual Positioning]. Shake the pole or move TS21 as shown in the animation to complete tilt initialization and visual initialization until the upper-right icon turns green and the animation disappears.

Figure 4.1 Visual Positioning Initialization

Click [Start Vision] to start capturing images. Make sure the target can be observed by multiple views. Click [Stop] to end capturing and enter the group name for this visual positioning.

Figure 4.2 Start Vision

4.2 Point Measurements

Click [Photos] to view all groups of photos taken for further measurement. Click on the mode button on the upper right corner in photos screen, there are four modes to take measurement for visual positioning.

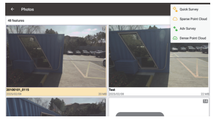

Figure 4.3 Four Measurement Modes

In Quick Survey mode, choose one image and then select feature points to measure first. Switch to other photos, check whether the cross needs adjustment. Confirm and click [Store] to save points.

Figure 4.4 Quick Survey

In Sparse Point Cloud mode, first draw circle around the target point first. After the sparse point cloud is generated, select the point in the sparse point cloud to obtain coordinates directly.

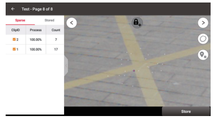

Figure 4.5 Sparse Point Cloud

In Advanced Survey mode, the software will prepare the dense point cloud automatically. Simply pick point on the picture and the software will automatically generate the surrounding dense point clouds. Then select points in the cloud to obtain the results directly.

Figure 4.6 Advanced Survey

In Dense Point Cloud mode, perform the measurement process similarly to sparse point cloud mode, or generate dense point clouds for all objects in photos and export them in LAS format.

Figure 4.7 Export Dense Point Clouds

Quick Start Guide

TS21 GNSS Receiver

- **AR Staking**
- **Visual Positioning**

Version 1.1

!	**Note: Please check each item according to the item list first to confirm that all the accessories are correct for the purchased kit.**
⚠	**Install the radio antenna before switching the radio transceiver to transmit mode, or the radio transceiver may be damaged due to overheating. The energy to be transmitted cannot be emitted out without the antenna, which may cause the temperature rise and overheat of the radio module.**

This Quick Start Guide introduces how to start using TS21 GNSS Receiver quickly, the detailed introduction and operations of TS21 refer to *User Manual for TS21 GNSS Receiver*.

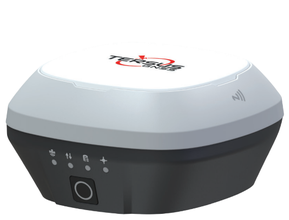

Figure 0.1 TS21 GNSS Receiver

The four steps for TS21 are outlined below:

1. Rover Setup
2. Configuration via Nuwa
3. AR Staking
4. Visual Positioning

1.Rover Setup

According to the customer requirements, set up the system as shown below.

Figure 1.1 TS21 as a Rover

Table 1.1 Devices in Figure 1.1

NO.	Device Name
1	TS21 GNSS Receiver
2	450-470MHz Radio Whip Antenna
3	Ranging Pole
4	Bracket for TC80
5	TC80 Controller

2.Configure via Nuwa

2.1 Connect TS21 in Nuwa App

Long press the power button to power on TS21.

Figure 2.1 Power On TS21

Start Nuwa App, click [Device]-->[Connect], select device TS20/TS21 and target WiFi, then click [Connect] to complete the device connection.

Figure 2.2 Connect TS21

2.2 Configure TS21 as a Rover

Go to the Device interface, click [Rover] to create a new Rover mode or edit an existing rover mode as shown below.

Choose [Internal Radio], [Receiver Network] or [PDA Network] for Data Link to receive the correction data. Fill in the detailed configuration and activate rover mode to get the fixed solution.

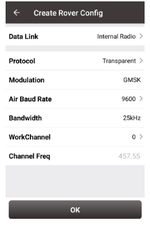

Figure 2.3 Internal Radio

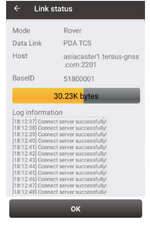

Figure 2.4 PDA Network

NOTE:

1. Requires radio whip antenna required in Internal Radio mode
2. Requires SIM card in TS21 in Receiver Network mode
3. Requires SIM card in controller in PDA Network mode

3.AR Staking

3.1 Open Project

Go to the Project interface, click [Project] to create new project or open a project. Make sure the coordinate system is correct.

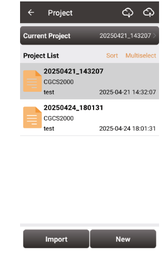

Figure 3.1 Open Project

3.2 Import Targets

Go to the Survey interface, click [Point Stakeout] to enter point stakeout interface. Click ⚑ to show the Staking Point list and click [Import] to import targets from file, from other point lists or directly manually add.