



geometer[®] SCOUT

Agronomist's professional assistant



www.gm-scout.com



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1. INTRODUCTION

GeoMeter Scout is the GeoMeter company's newest development in the field of precision agriculture.

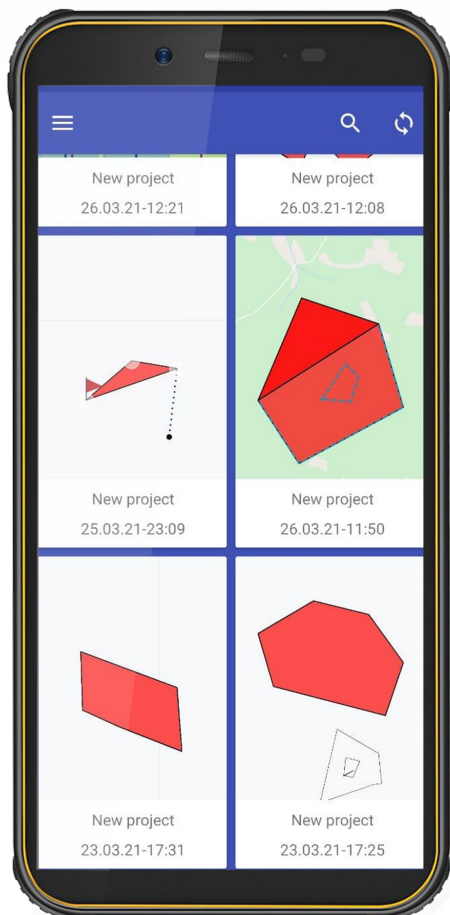
This is absolutely new software with new functions:

- more precise positioning on the ground;
- precise measurement of the area and length;
- three-dimensional measurement;
- placing points on the ground, saving the coordinates, entering your own coordinates;
- digitization of gardens and other objects;
- specialized markings on the ground;
- cutting out land plots;
- embedding new objects



2. POSSIBILITIES AND FUNCTIONS

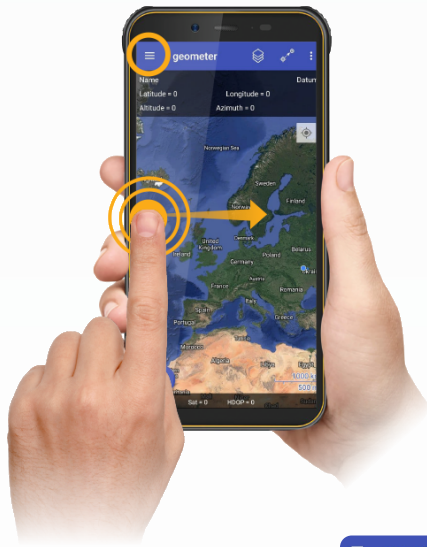
- Land surveying (an external GNSS receiver is required)
- Small plot measuring (an external GNSS receiver is required)
- Survey to the point (an external GNSS receiver is required)
- Creating a map of the fields
- Displaying on Google maps immediately
- Possibility of viewing in the Cadastral Layer mode (available not for all regions)
- Counting the number of runs when using wide-implement equipment




Working with a soil density meter

- Cutting out land plots
- Marking out the field
- Center pivot irrigation systems' layout
- Determining the area
- Determining the distances

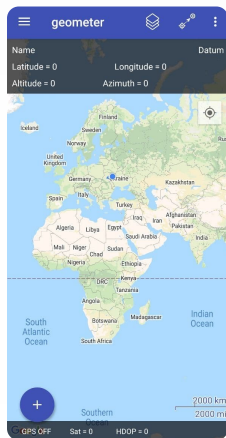
3. THE MENU SECTION



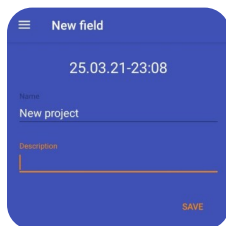
The **menu** can be called up in two ways:

1. Tap the  button in the upper left corner of the screen.
2. Swipe from the left edge of the screen to the center.

“Map” – the starting section where you can select the measurement mode.



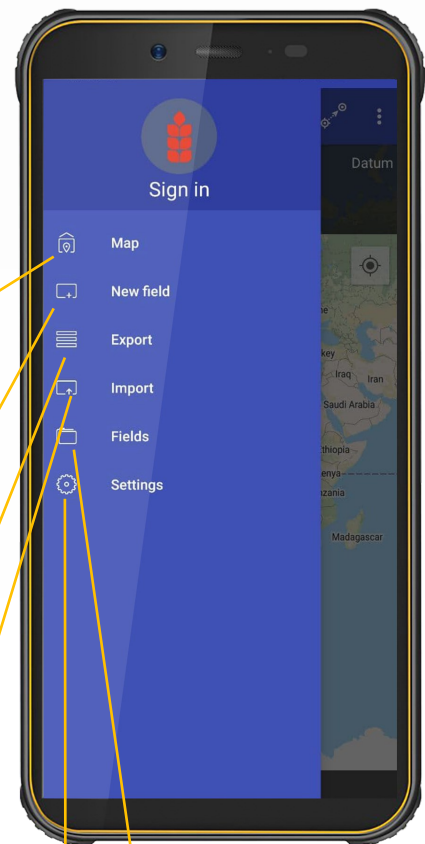
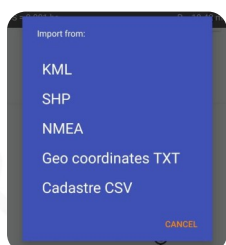
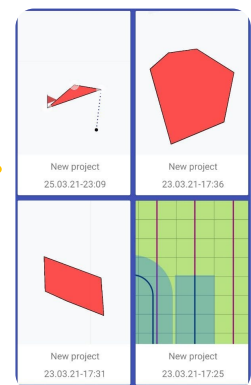
“New Field” – creating a new project (new work) with a description, date, etc.



“Export” – exporting the entire project to a .kml file.

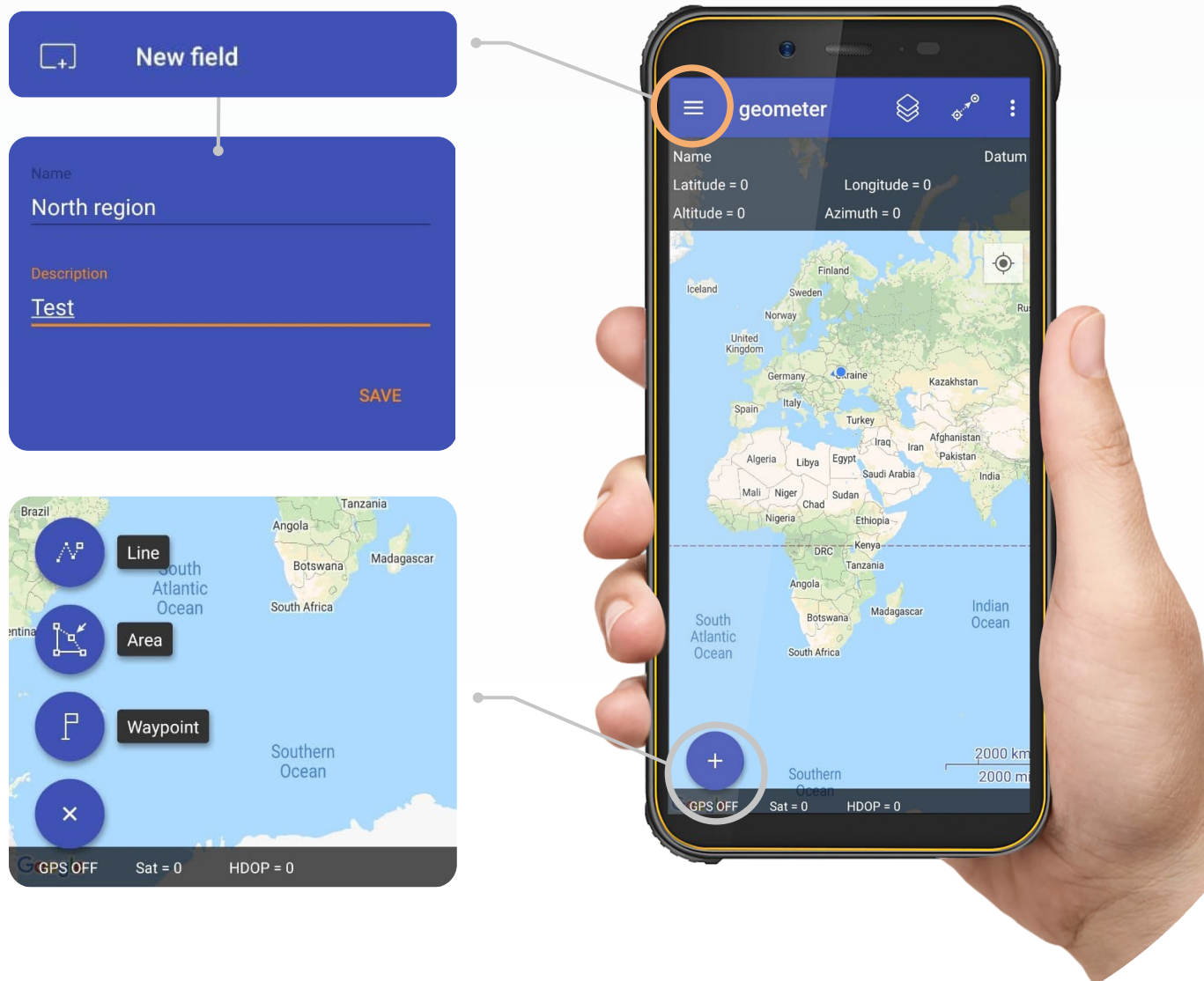


“Fields” – the section containing all your works, projects.




4. GETTING STARTED


There are two ways to start working in a new field (area measurement, distance measurement, marking the waypoints).



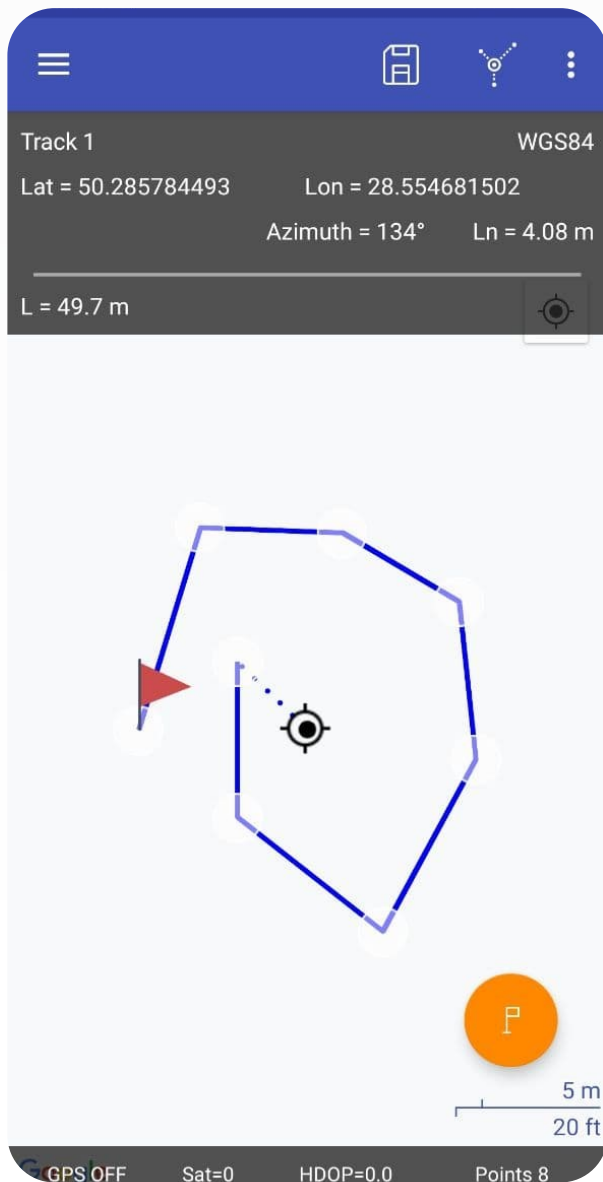
Variant 1 .

In the Map section, press the  icon and select the relevant item. After that, the system will prompt you how to perform the work: by tapping the screen or via GPS.



Variant 2 .

In the New Field section, enter the name and description for your work, and press the  icon after saving. Это поле появится в разделе меню «Поля». После этого система предложит, каким образом произвести работу - по нажатию на экране или по GPS.

LENGTH





Manual

Set the icon  on the starting length measurement point. As soon as you set the cursor on the relevant point, tap the button  in the right bottom corner of the screen to fix the point. All the subsequent points on the map should be set in the same way. The upper panel will display the distance from the last fixed point to the current one, as well as the distance between all the points.

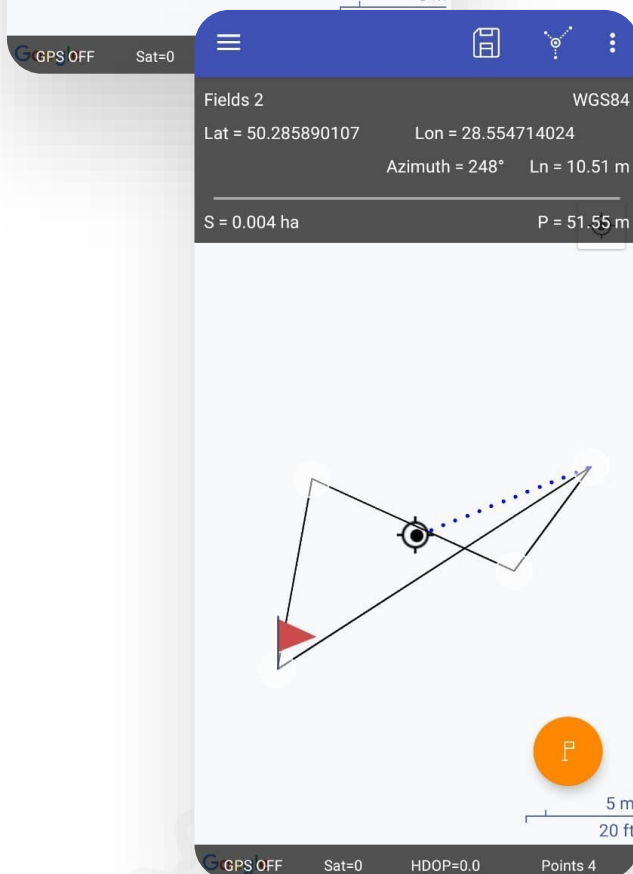
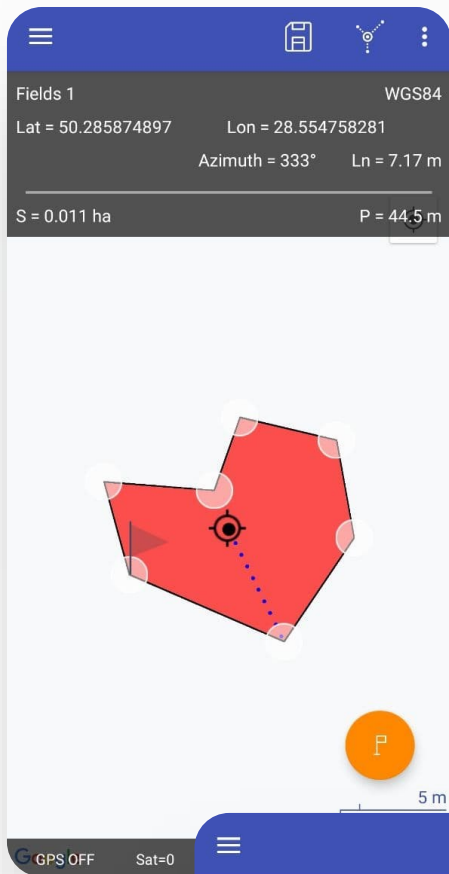


Using GPS



The software will identify your location automatically and display it on the map with the cursor . To fix the point, press the  button in the right bottom corner of the screen.

Your location will be displayed on the map as you move. The screen will show the real distance from the last fixed point to your current location, as well as the total measured distance.

AREA




Manual


Set the icon  on the starting measurement point. As soon as you set the cursor on the relevant point, tap the  button in the right bottom corner of the screen to fix the point. All the subsequent points on the map should be set in the same way.

The area of the selected object will be displayed in red on the map, based on the fixed points. If the line segments between the points intersect, the field will be displayed transparent.

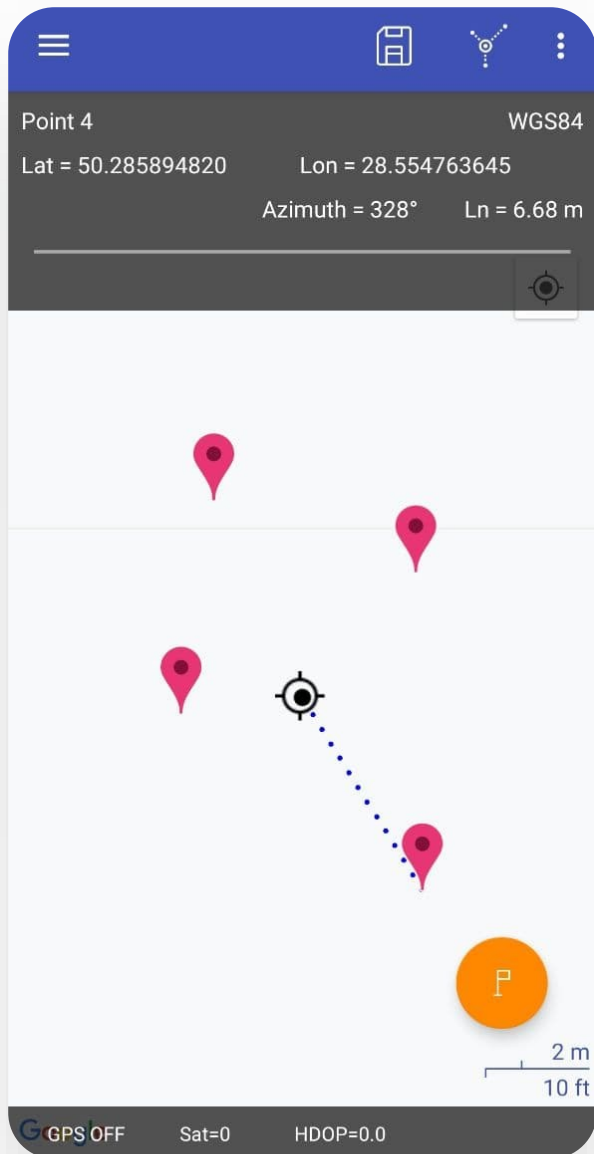


Using GPS



The software will identify your location automatically and display it on the map with the cursor .

To begin measuring the area, press the button  in the right upper corner of the screen and move along the edge of the land plot being measured.

WAYPOINTS





Manual


Set the icon  on the starting measurement point. As soon as you set the cursor on the relevant point, tap the  button in the right bottom corner of the screen to fix the point. All the subsequent points on the map should be set in the same way.



Using GPS

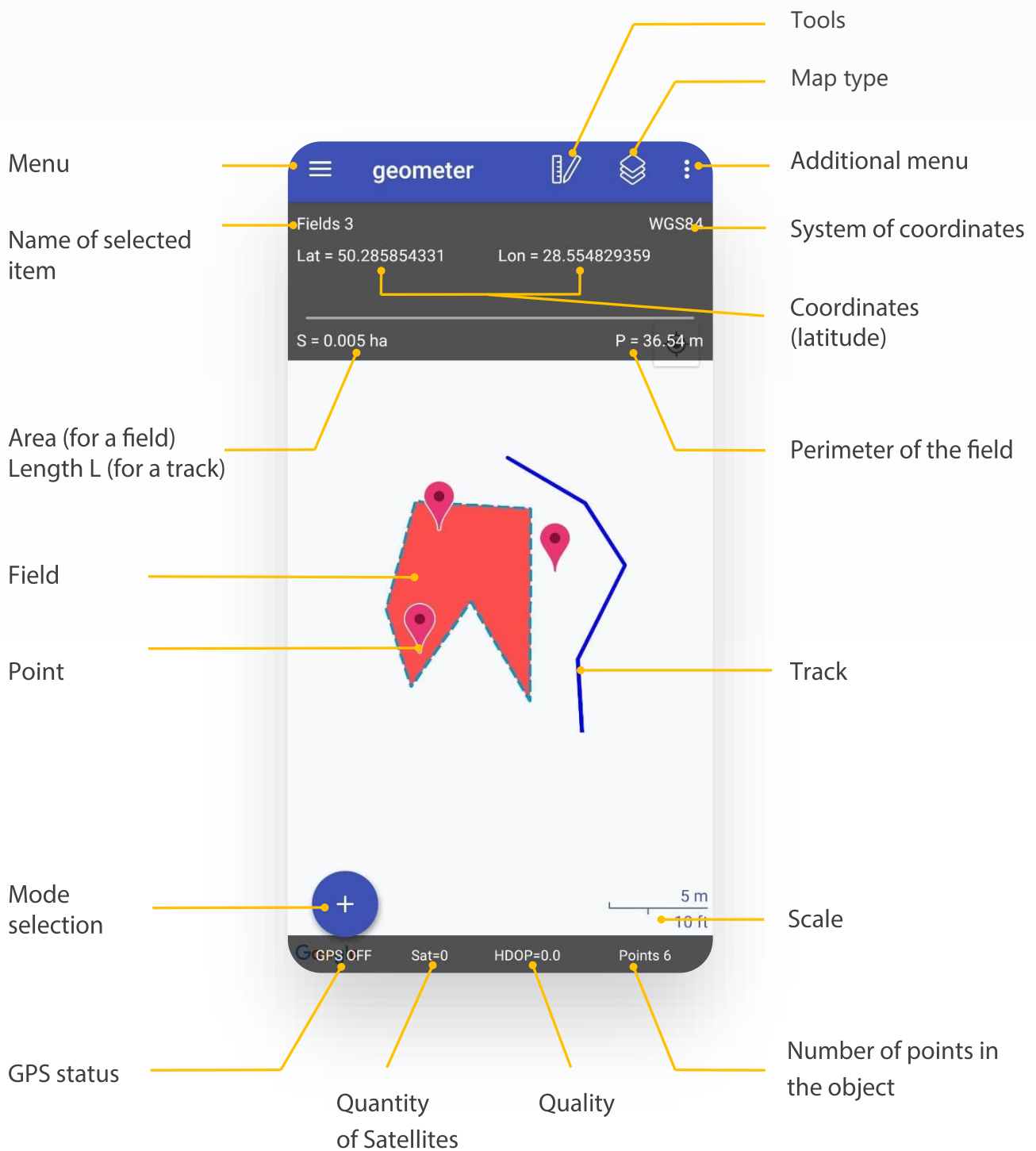
The software will identify your location automatically and display it on the map with the cursor .

To mark your current location, press the  button in the right bottom corner of the screen.

The marked points will be shown with the  icon on the screen.

Set the relevant number of points as you

5. WORKING WINDOW INTERFACE



6. WORKING WINDOW ICONS



- to save the current work



- to call up the additional menu



- map type selection



- tools to work with the object (appears on the screen when the object is tapped)



- current location cursor



- automated measurement of the area or length (in the By GPS mode)



- to pause the work on measuring the area or distance (in the By GPS mode)



- to set a point on the map



- to select the measurement mode



- view scaling

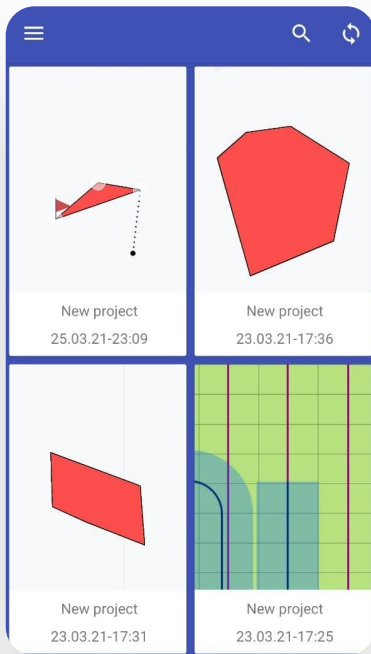


- coordinate averaging mode



- to cut out a hollow space in the measured area

7. WORKING WITH OBJECTS

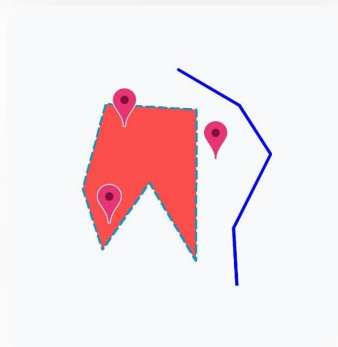


Enter the Fields menu and open the relevant project.
A project can contain many objects.

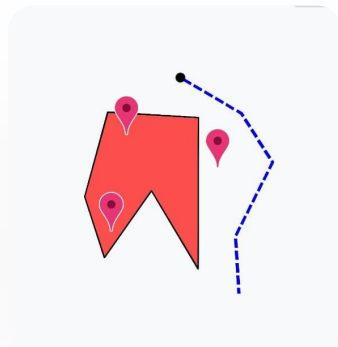
Objects are anything you have added to the map (fields, points, tracks).

To start working with an object, tap it on the screen.

- A selected area will be encircled with a dashed line.
- A selected track will be displayed as a dashed line.
- A selected point will change its color.



A selected area




A selected track



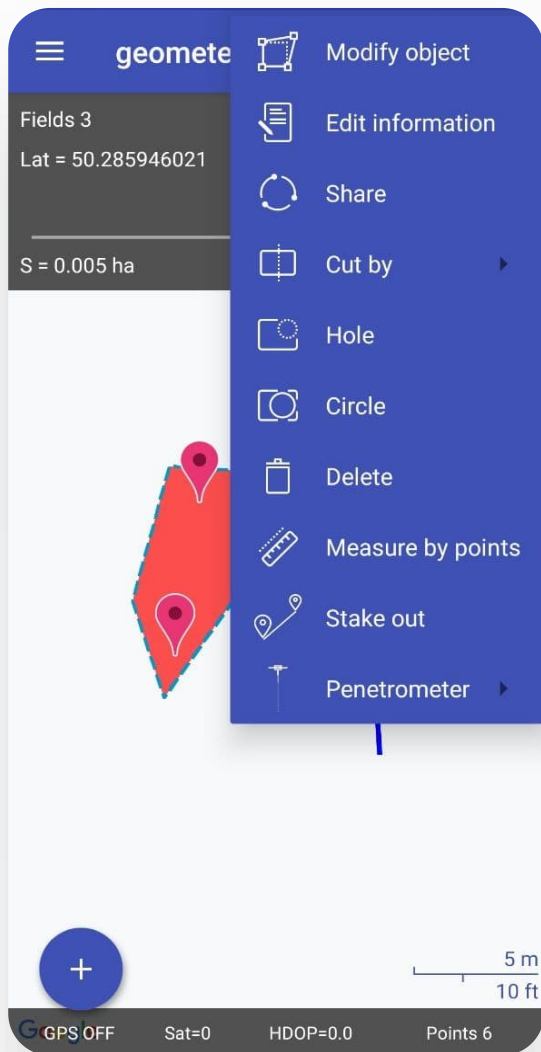
A selected point

The upper part of the screen will display the object's parameters which are available for it:

- for a field: name of the object, its latitude, longitude, area and perimeter;
- for a track: name of the object, its latitude, longitude, length in meters;
- for a point: name of the object, its latitude, longitude.

To work with the selected object, press the Tools button  and select the relevant action.

A BRIEF OVERVIEW OF THE TOOLS



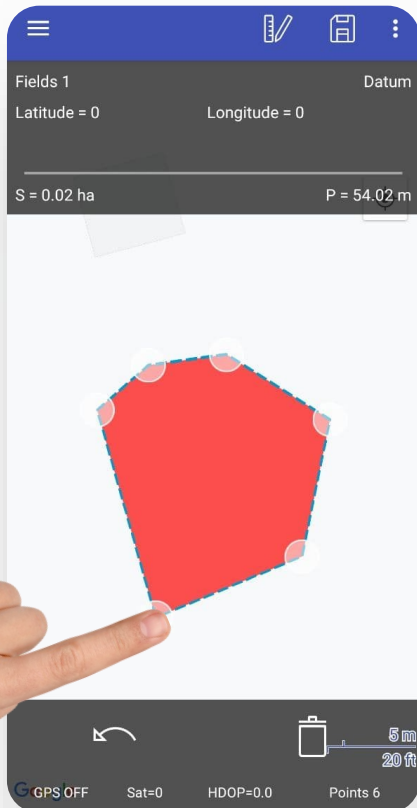
- **Modify object** – allows for moving the points on the selected object, altering its shape.
- **Edit Information** – editing the object's data (changing its name and adding a description).
- **Share** – a possibility of exporting the objects to TXT, UTM, MGRS, KML, CSV file formats
- **Divide** (for areas) – a possibility of dividing the field into several parts, in two ways: by points located outside the field (by AB points) and by point numbers (by the numbers of the points).
- **Hole** (for areas) – a possibility of cutting out a site inside the field.
- **Circle** – the system finds the field center and draws a circle.
- **Delete** – deleting the selected object.

Measure by points – measuring the distance between the selected points.

Stake out – measuring the distance from your location to a certain point in any object you have created.

Penetrometer – connecting a device to measure the soil density.

A DETAILED OVERVIEW OF THE TOOLS




“Modify object”

Select a field or a track on the screen.

In the Tools menu, select the Alter Shape item. All the filed points will be highlighted with white circles.

Hold down the relevant point and drag it in the relevant direction, altering the object’s shape.

You can also delete the last fixed point from the object. The  button will delete points in sequence from the last point that was set to the first one.

To delete any point from the object, tap and hold it, and then press the  button.

Info about measurement

Name
Fields 1

Description

SAVE

“Edit information”

Enter the relevant object name into the appropriate field. The name will be displayed at the top of the screen, above the coordinates.

Export to...

- Geo coordinate WGS-84 TXT
- Geo coordinate WGS-84 CSV
- Geo coordinate (user datum) TXT
- UTM
- MGRS
- KML

CANCEL

“Share”

Save the file in the format you need: TXT, UTM, MGRS, KML, CSV.


Cut by


AB points


Numbers

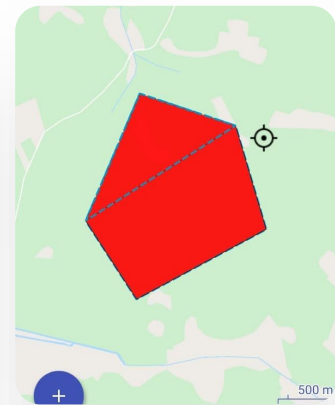
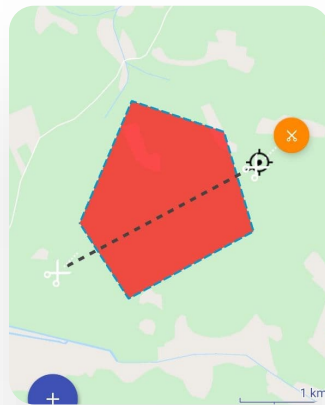
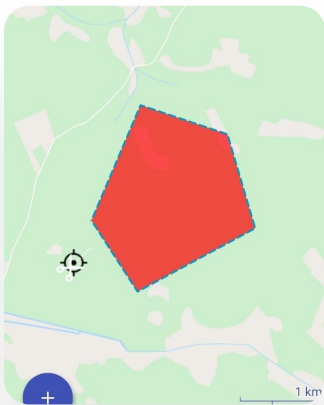
“Cut by”

Dividing the field by AB points:

1. After you have selected the “by AB points” option, set the pointer on the relevant point OUTSIDE THE FIELD by tapping the screen in the right spot. A scissors-shaped icon will appear near the pointer’s location: 

2. Set the second pointer on the other side of the field. The following icon will appear at the side of the screen: 

3. Press the  icon, then the software will automatically detect the fixed points on the field boundary which are located closest to the points you have selected, and divide the field along a straight line between them.



Dividing by point numbers:

1. After tapping the “by point numbers” option in the Divide tool, select the two points you want to use to divide the field.


As soon as you have selected the two points, the  icon will appear.

Tap it, and the field will be divided along a straight line between the specified points.

“Hole”





Manual

After you have selected this item in the Tools menu, set the location cursor inside the relevant field by tapping the screen. Set the other points in the same way. The part of the field to be cut out is marked with a dashed line. To cut out the selected part of the field, press the  button at the top of the screen.



Using GPS

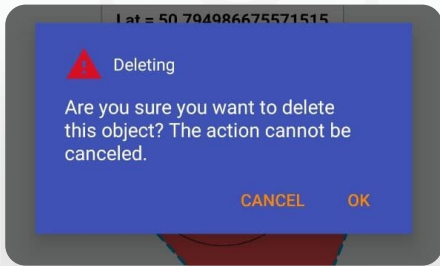
Get to the relevant point on the map and press . Move along the perimeter of the plot being cut out. Your way will be displayed on the map as a dashed line. To cut out the selected part of the field, press this button at the top of the screen: .

“Circle”

The software will automatically embed the circle inside the selected field in such a way that the circle does not fall outside the limits of the field’s contour. This function is convenient for designing center pivot irrigation systems.

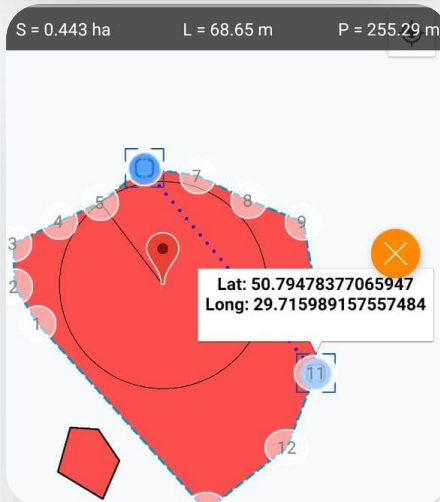
Attention! For the circle to properly fit inside the field, the field must have a high number of points for analyzing and embedding the circle.





“Delete”

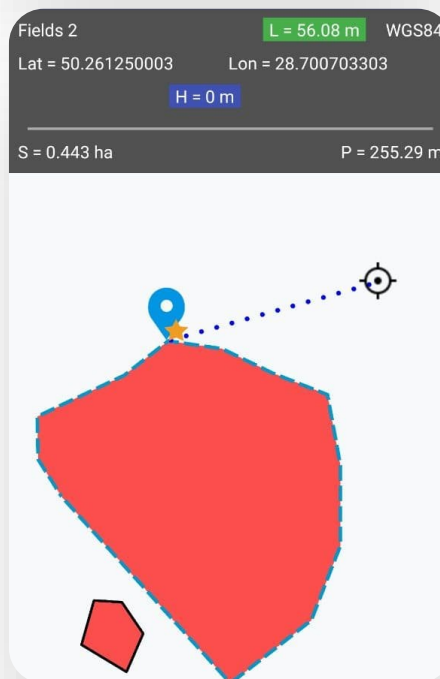
Deleting the selected object.



“Measure by points”

Select a point on the object you have selected. It will be highlighted in light blue. Then select another point you want to measure the distance to. Both points selected on the object will be highlighted in light blue. The distance between them will be specified at the top of the screen:

$L = \dots \text{ m}$.

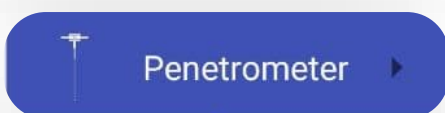


“Stake out”

It shows the precise distance from your location to the point specified on the selected object.

To achieve maximum precision, you can connect external receivers (GM SPIKE, GM SMART, GM RTK).

Read more about this option in **Section 11**.



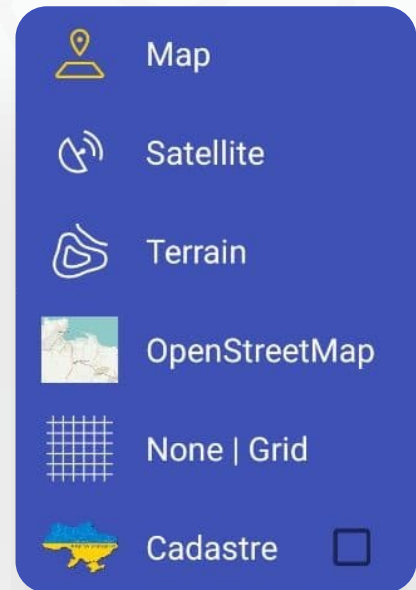
“Penetrometer”

Read more about this option in **Section 14**.

MAP TYPES



Tap the corresponding icon to change the map display type. The map selection will be preserved, so all the subsequent work with the object will be performed using the selected map type.

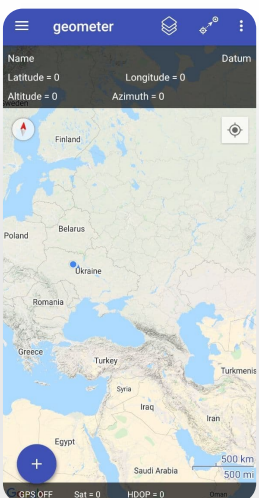
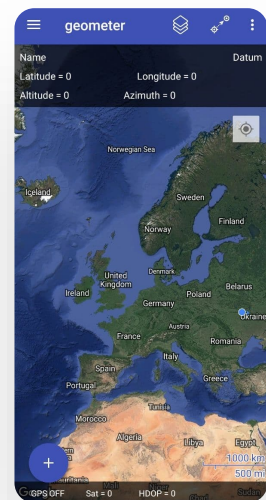


The following map types are available:

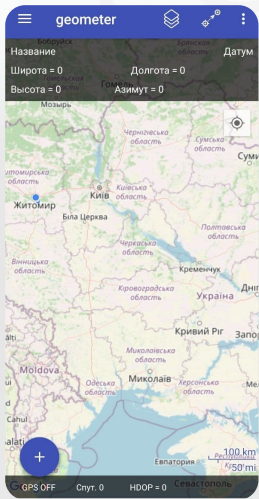


Map – a simplified display of a map that includes standard cartographic data: roads, parks, and boundaries. This type of map cannot be displayed without an Internet connection.

Satellite – display of satellite images of the Earth, detailed display of objects. This type of map cannot be displayed without an Internet connection.

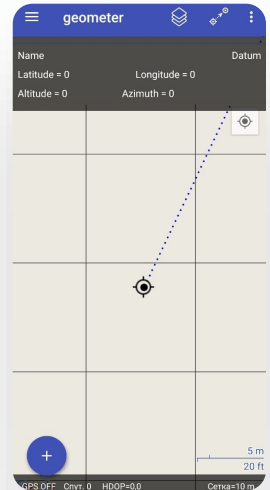


Terrain – a universal map that provides a detailed display of the territory and conveys the location and features of the main natural objects and socio-economic facilities. It cannot be displayed without an Internet connection.



OpenStreetMap – maps provided by the international community of cartographers. This type of map cannot be displayed without an Internet connection.

None | Grid – there is no map displayed in the background. An automated reference grid is enabled with its maximum scale equal to 2 m. No Internet connection is required for this map to be displayed.

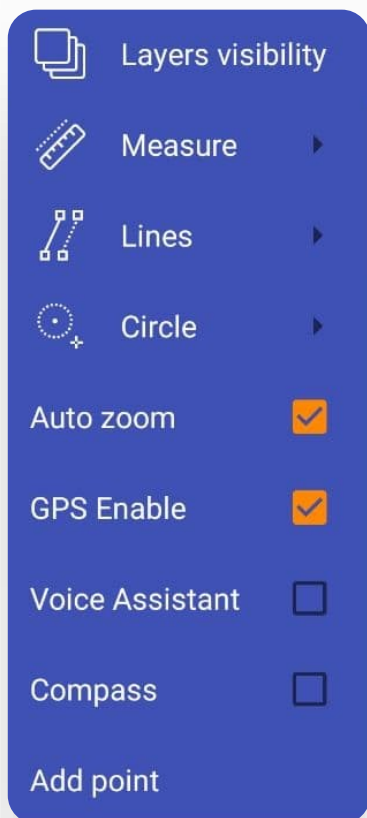


Cadastral – a cadastral layer from the Public Map is uploaded as a separate layer over the selected map type.



For the maps to be displayed correctly, a stable Internet connection is required! The maps are cached, after being uploaded once they will be available with no Internet connection.

ADDITIONAL MENU



“Layers visibility”

Each object in a project constitutes a separate layer. You can hide one of them temporarily without deleting it.

On the Layers tab, select the name of the object you want to hide and tap the slider.

If the slider is grayed, the layer has been hidden. Calculation of total area and distance values is available in the layers. You can quickly go to an object by clicking on it.

“Measure”

Distance by the AB points

Select the start measurement point (A) and the end point (P) on the map. The distance between the specified points will be displayed at the top. The end point B can be moved.

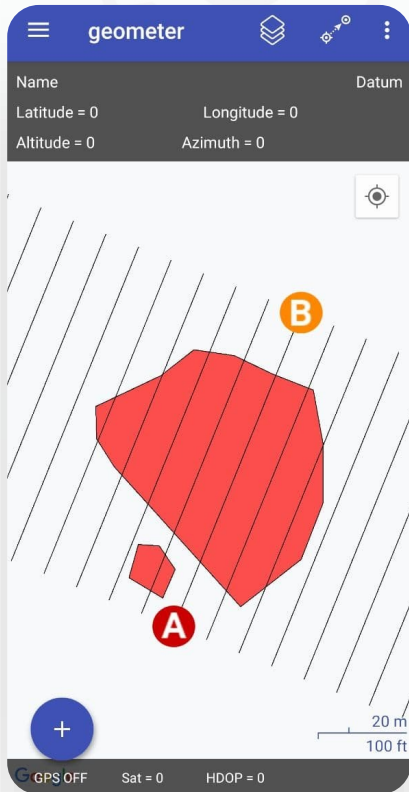
Distance by point numbers

You can measure the distance between any two specified points in the same object, or between different object. To do that, select the names of object A and object B in the drop-down menu, and enter the number of a precise point of that object below the name.



To find out the number of a point of a particular object, go to the Measurement Between Points tab in the Tools menu.

Press the CALCULATE button and see the distance between the specified points in the same window.



“Lines”


Drawing of uniform parallel lines over the objects will be of use when processing a field or to calculate the number of agricultural machinery runs. To create these lines, you need first of all to configure the appropriate settings via the main Settings menu (the distance between the lines and their number). The way to do it is described in **Settings**.

To create these lines, press Add, then click on point A and point B on the map. To alter their direction, press Alter, then move one of the points, A or B.


“Circle”

To draw a circle on the map, mark the center point and the radius point. This can be done in the “By tapping” and the “By GPS” mode.

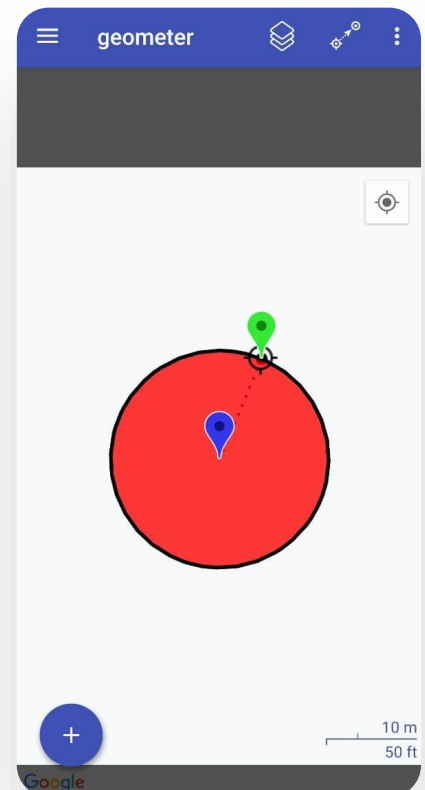
By tapping

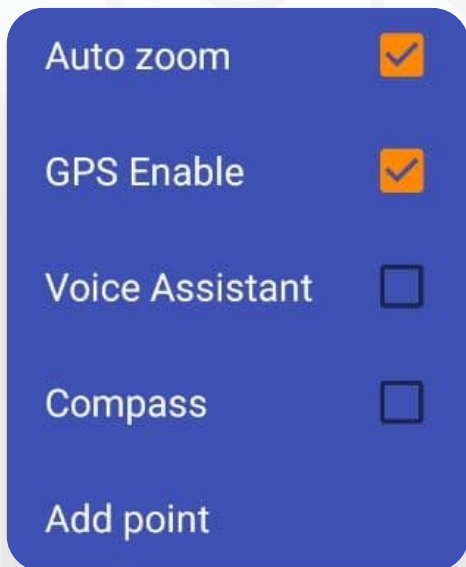
Mark the circle center point by pressing the button  then mark the radius point in the same way. Move to the edge of the intended circle, and the software will automatically create a circle with the line segment marked by you as its radius.

By GPS

Get to the site on the map which will be the circle center, and fix the point by pressing the  button. Then get to the radius point and fix it in the same way.

To alter the circle you have created, press Alter, then hold down the point you want to move and drag it to the relevant place.





“Auto Scale”

When this mode is activated, the system will automatically scale the map to fit all the objects located on it.

“Voice Assistant”

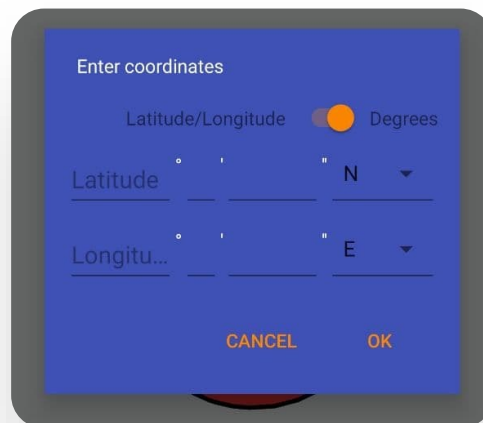
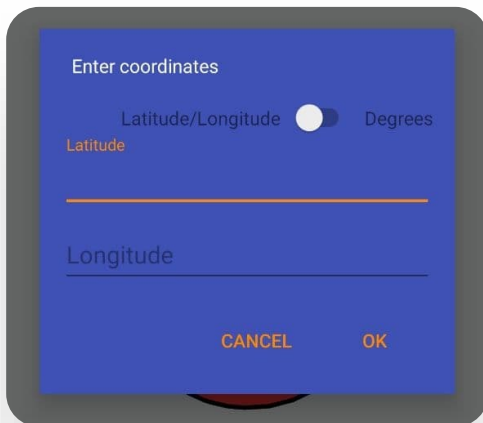
Activation of this mode allows for enabling voice prompts in the Getting to the Point mode.

“Compass”

When this mode is activated, a compass icon appears on the screen. Press it to align the map display in such a way that the north would be at the top.

“Add point”

Entering the point coordinates manually in the Latitude/Longitude and Degrees/Minutes/Seconds formats.




8. THE AVERAGING MODE

The coordinate averaging technology is based on obtaining coordinates from different satellites in the same place and subsequent averaging of the data obtained.


To determine the field area using the averaging method, determine the coordinates of the points forming the “corners” of the field, which will be connected with straight lines, and the area of the figure drawn in this way will be calculated then. To get the most accurate results, it is recommended to perform the survey in the averaging mode, at least for 5 minutes per each point.

How it works:

1. Walk to the position where the area measurement will start. Launch the software, select the Area Measurement mode, wait for the GeoMeter to find satellites (at least 10, the more the better), and the HDOP must not exceed 1.1. The smaller this value is, the higher the reading accuracy will be.

2. Being in a static condition (without moving), press the averaging button . The screen will display the coordinates of the point where you are located.

The upper line will show the number of measurements (points) which will be performed approximately once per second, or more frequently if an external GNSS receiver is used. With a good satellite signal, the minimum number of measurements performed must be 1520 (the more measurements are made, the more accurate the surveys will be).

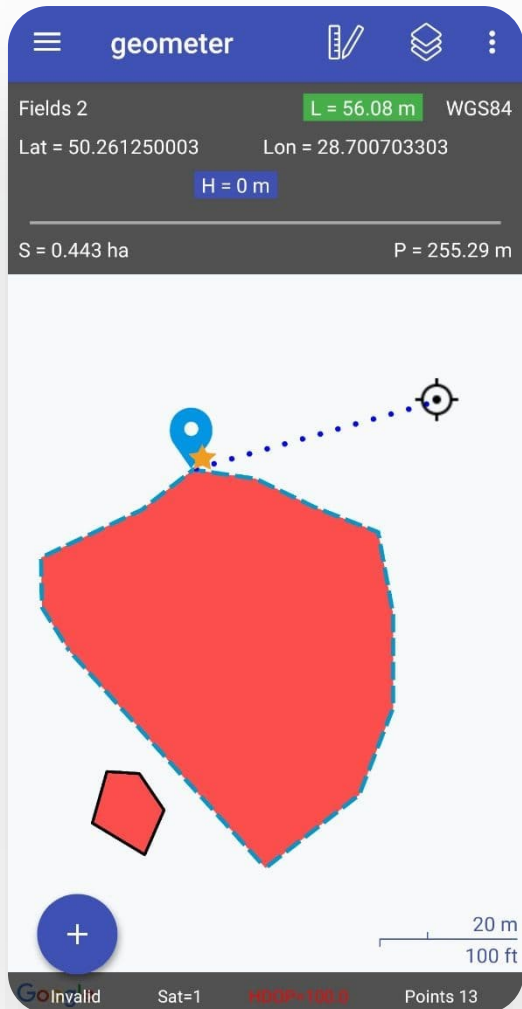
After the number of measurements reaches the intended value, press the  button on the screen. After that, the first marked point will appear on the screen.

3. Then walk to the next measurement point, stop, and repeat step 2. Do the same for all the next points.


In this way, you can make the measurements more accurate provided that the field boundaries are straight, or almost straight, lines. The more complicated the field shape, the more points have to be determined to measure its area.

The averaging mode can be used to measure distances and set waypoints in the same way.

9. STAKE OUT



Staking out is available for any objects: the area, the length, the waypoint. You can also enter your coordinates and get to the point using the coordinates entered.

To get to the relevant point, select the object this point is located on, then select Getting to the Point in the Tools menu. After this, the numbers of all points will become visible; press the one you need to get to. Then mark your location on the map. The end point will be marked with the following icon: 

The distance to the specified point will be displayed at the top, in the green field.

Getting to the point allows for measuring the precise distance from your current location to any point on the selected object.

You can increase the accuracy of staking out the points by using one of these receivers: **GM SPIKE, GM SMART, GM PRO, GM RTK**. Each receiver has its own accuracy tolerance, be sure to study each receiver's technical specifications before use.

10. CONNECTING AN EXTERNAL GNSS RECEIVER

1. Setup

- Enable your external Bluetooth receiver before getting started. To do this, go to the Android operating system's main menu and select SETTINGS.
- Then, select CONNECTED DEVICES – ADD DEVICE. The system will begin to search for available Bluetooth devices. Wait for your device's name to appear.
- Click on your external receiver's name. This may be "GM PRO", "GM SPIKE", "GM SMART", or "GM PRO RTK" depending on the receiver model.
- The PIN for getting connected is 1234.
- If the connection is successful, the new device will appear at the top of the CONNECTED DEVICES list.

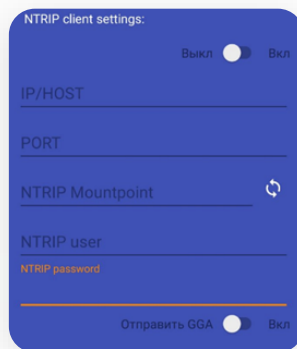
2. Connection

- Launch the geometer application and select SETTINGS.
- In the GNSS SIGNAL SOURCE item, select Bluetooth and tap OK.
- Select your receiver's name in the EXTERNAL DEVICE SETTINGS menu and close the settings window.
- The Bluetooth icon will be displayed at the top of the screen, when an active connection with the receiver has been established it will be highlighted in orange. Now only the external GNSS receiver will be used for any measurements until you change the setting.
- To disable the receiver and use the built-in GPS built-in, go to SETTINGS in the geometer application and select INTERNAL RECEIVER in the GNSS SIGNAL SOURCE item.

11. SETTINGS



“GNSS Signal Source” – select the receiver connection type.



“Ntrip Client” – enter the data to receive paid corrections when using an RTK receiver.

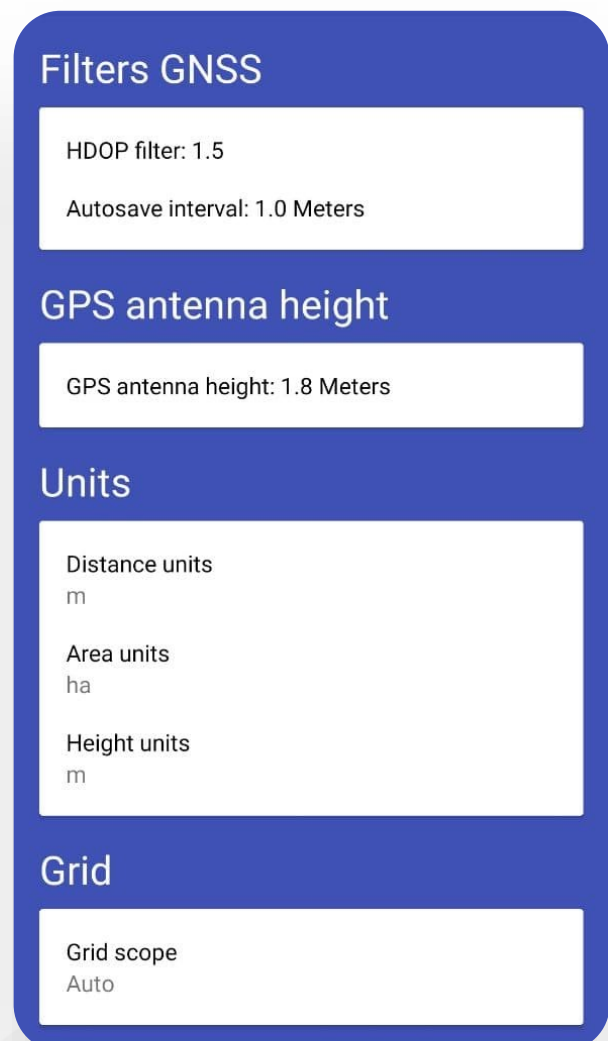
“Lateral Offset” – your receiver’s virtual offset in relation to its actual location.

“GNSS Filter”:

- “HPOP Filter” – this setting allows you not to record the points if you limit the maximum permissible error margin.
- The recommended value for this setting is 1.5, but the tolerance can be higher or lower under different conditions. Press Apply to save the setting.
- “Auto Save Interval” – select the auto save mode (meters or seconds) when measuring an area or a track. The standard setting is 1.0 m

“GPS Antenna Altitude”

Set the altitude for the external GNSS receiver or antenna.

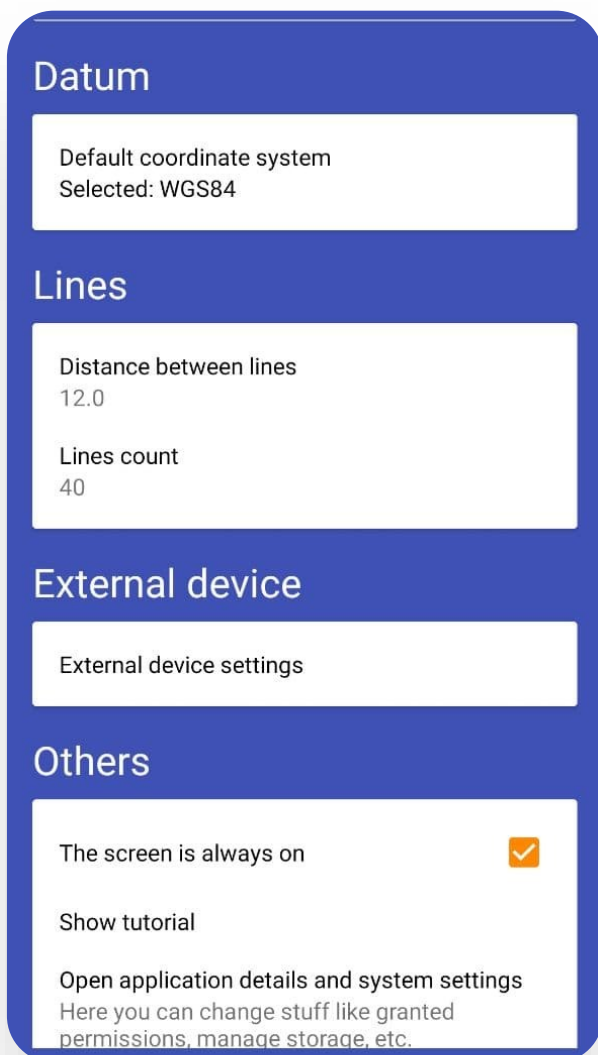


“Units of Measurement”

- You can select convenient units of measurement.
- Distance: kilometers, meters, feet, yards, miles
- Area: hectares, square meters, square kilometers, квадратные футы, square yards, acres, square miles
- Altitude: meters, feet.

“Grid”

In this menu item, you can specify the scale for the grid on the screen (from 10 m to 10 km, or automatically by the system’s choice).



“Datum”

In this item, you can select the system of coordinates you are going to work in.

“Lines”

In this item, you can specify the number of lines to be superimposed on the map, as well as the distance between them.

“External Device”

You can connect compatible external devices for soil exploration and data mapping with the use of sensors. At the present moment, working with a penetrometer is supported. Connect the necessary device here.



“Miscellaneous”:

- “Screen Always On” – the instrument screen will always be in the active mode. Activation of this setting will deplete the battery power more quickly.
- “Show tutorial” – the built-in interactive manual. You may need Internet access for the manual to be displayed.
- “Open the application's system settings” – information about the application: setting the notifications and the access, traffic statistics, memory, energy consumption information.
- “Calculate Area Based on Length” – the built-in hectare calculator. With this setting enabled, when you select the Length Measurement mode the calculated area value will appear based on the length and width of the tool’s cut. Specify the tool’s cut width in this setting.
- “Application Version” - the current version of the installed application and the possibility to update the software.
- “Support” – direct contact with the application developer or product supplier. You can call or write to any convenient messenger.

12. WORKING WITH THE PENETROMETER

Penetrometer


Start

Add points



View

Compaction map

Export to CSV

All the measurements performed with the penetrometer will be bridged to a particular object, field, or land plot. So, for the data to be transmitted to GeoMeter Scout when the penetrometer is operated, you have to select an object, go to Tools , select the Penetrometer mode and tap the Connect option. The penetrometer must be added to the EXTERNAL DEVICE settings menu.

At the bottom of the screen, you will see the notification that the penetrometer is being searched for, and then, that that the penetrometer has been connected.

Then, tap Add Points and measure the soil density in this location. To do that, set a waypoint in the software  and tap the Save icon. 

After the measurement is performed, you can view the points on the map. Tap a point, and the screen will display the information about the changes.

You can also view the Compaction Map. To do that, select the date ranges and the depth for the compaction map to be drawn up.

13. SAFETY PRECAUTIONS



Read this section attentively and be sure to follow the instructions described here. This will help you ensure the system's quality work and prolong its life.



The company shall not be responsible for any damage arising due to violations of safety rules and of this instrument's operation rules.



Never open the instrument's, antenna's or power adapter's case. The instrument must be serviced only by our specialists at GeoMeter's service center.



Do not touch the screen with any sharp-pointed objects, to avoid damaging it.



Do not drop the instrument, be sure to protect it against intensive vibrations and shocks. Avoid contact with liquids.



Lay the cables in such a way that nobody could stumble over them, and to eliminate the risk of pinching or breaking the wires.



Do not disassemble and do not repair the instrument on your own. This may cause serious malfunctions and cancel the warranty, thus ruling out the possibility of free repairs for the instrument. Warranty repairs must be performed only by our specialists at GeoMeter's service center.



Do not place containers with water or other liquids, as well as small objects, on the instrument's top surface, because there exists a risk of fire or damage to the device if they get inside.



The suction cup is not intended for use as a permanent fixture. We recommend to use suction cup mounting only while the console is in operation. Degrease the installation site with alcohol or a similar agent before installing the mounting bracket. Clean the mounting surface and the suction cup regularly.



Attention!

The GeoMeter company shall not be responsible for any damage caused to the instrument or any other items located in the cab due to a suction cup mounting failure.

Remove the adapter from the cigarette lighter socket, operating immediately if it is on, and contact the service center in the following cases:

if the power adapter or its cord has been melted or damaged;

if the case or the power supply unit has been damaged or there is liquid ingress.

To prevent possible damage, the service center specialists have to check the instrument's components.

The company shall not be responsible for any possible damage caused to the instrument or for any loss of data stored on it arising from improper handling.

The instrument must be stored in a dry place at a temperature of from +5°C. Do not leave electronic devices in cold rooms or on machines during the cold months of the year.

Recommended operating conditions: at a temperature of -10°C to +40°C.



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