



FARM NAVIGATION

User Manual



Corresponding to Software Version
2.5.xx

Dear Customer,

Congratulation for choosing an AvMap Satellite Navigator.

AvMap GPS systems are made in Italy since 1994.

This User Manual is updated to the Software version 2.5.xx released in February 2010 for the AvMap G6 Farmnavigator satellite navigators:

G6 Farmnavigator

G6 Connect Farmnavigator

AvMAP
SATELLITE NAVIGATION

Your journey, Our Technology



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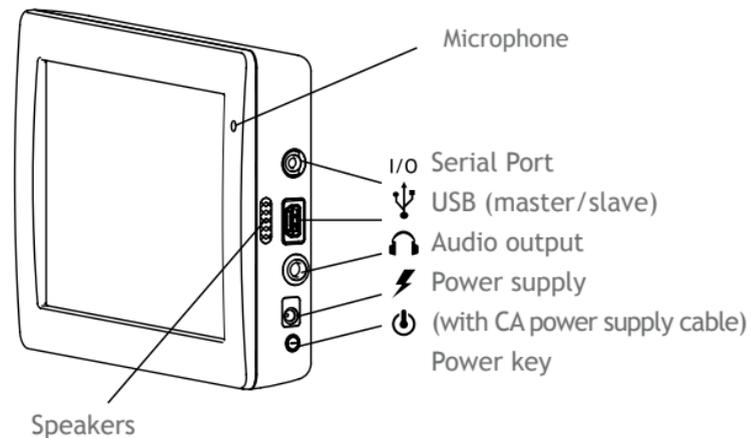
1. Getting started

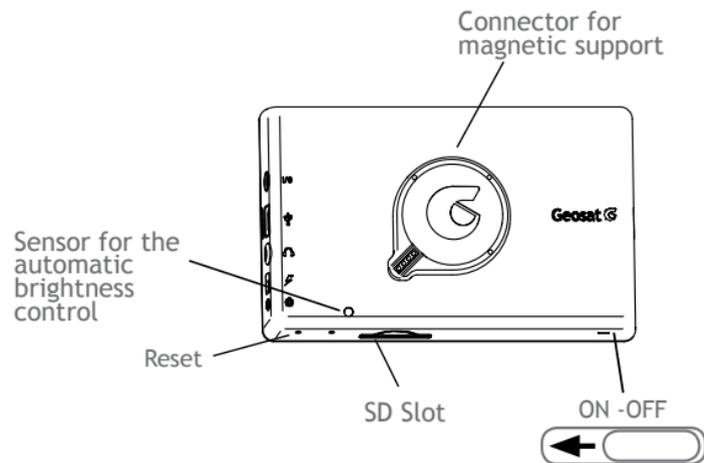
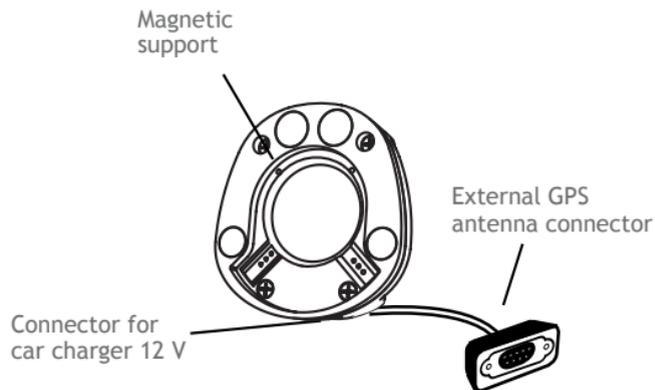
1.1 Content of the box

- G6 Farmnavigator / G6 Connect Farmnavigator
- Charger 220 V
- Car charger 12 V with cigarette lighter plug
- Waterproof External GPS receiver
- Protective rubber frame
- Holder with suction cup
- USB cable
- External DVBT TV antenna *

*Only G6 Connect Farmnavigator model

1.2 Device description





1.3 Mounting

1. Attach the magnetic support the suction cup holder.
2. Mount the suction cup holder on the windshield of your farm machine. Please reassure that the windshield is free from grease and wet the suction cup to improve the adhesion.
3. Connect the 12V power cable to the connector in the magnetic mount, and then to the cigarette lighter plug in your vehicle.
4. Connect the cable of the GPS antenna to the 9 pins Connector coming out of the magnetic support.
5. Connect the antenna cable with the screw coupling to the GPS antenna and mount the antenna above the steering axle. If the hood of your farm machine is not made of magnetic material (plastic or aluminium etc.)

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you can mount a metal plate or a washer on your hood with for example hot glue.

6. Now you can put the Farmnavigator in the magnetic mount and start working.

ATTENTION:

Never remove the SD Card while the software is running. Even if the device has been sent to stand by mode, software is still running in the background. Always quit the software with the exit button in the road navigation menu, and wait until the device returned to the start menu. Otherwise a system error will occur which could cause heavy data loss.



2. Farmnavigator main menu



In order to use the Farmnavigator functions open the navigation software. Open the main menu and click the Farmnavigator button in the upper right corner.

In the Farmnavigator menu you can find the following buttons.

- Fields
- Spray Boom
- Settings
- Import Fields
- Camera
- Volume and brightness
- Bluetooth

In the upper bar you can find the Field View button, that opens the field view, and the Road Navigation button, that brings you back to the road navigation main menu.

From the field view you can open the Farmnavigator menu by clicking the button with the tractor icon in the bottom left corner of the screen.

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2.1 Fields

In the main menu press the Fields button to enter the fields' database, which contains detailed information for each field. Here you can create a new field or open a saved field, to continue a previously started work. To go back to the main menu, press the Back button in the upper left corner.

2.2 Spray boom

This button opens the setting page for the spray boom virtual control. You can set here the length of your spray boom bar, the exact number of segments, the number of nozzles and the distance between them. The spray boom virtual control function can be used to control sprayers but also other machines such as Spreaders and Planters that work in a similar way. You can find the Spray Boom button also in the Settings menu.





2.3 Farmnavigator settings

Use this button to change the Farmnavigator settings. In this screen you can adjust the functions of the Farmnavigator to your Farm-machine and to its attachments.

The settings include:

- Working width
- Spray Boom
- Guiding lines
- Offset
- Area unit
- Minimum speed
- General settings

To go back to the main menu, press the Back button in the upper left corner.

2.3.1 Working Width

Here you can set the working width of your farm machine. This value is used to calculate the distance between

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the guiding lines. Attention: If the virtual spray boom commander is activated its settings will be used for the calculation.

2.3.2 Spray Boom

The Spray Boom button can be also found in the Farmnavigator main menu (par. 2.2). Read Par. 3.7 on how to use the spray boom virtual control.

2.3.3 Guide lines

Here you can select from four different types of navigation (par. 3.5).

2.3.4 Offset

This setting allows you to move the position of your GPS receiver virtually forward and backwards (to the position of your sprayer), to have more accuracy in work.





2.3.5 Area Unit

Here you can select the Unit of Measurement:

Hectare = (km/h, m, cm,)

Acre = (imperial, mph, Foot, Inch)

2.3.6 Minimum Speed

Set here the minimum speed for recording GPS positions. As the GPS can move a bit around while standing still, a setting of 0.5 MPH minimum speed is suggested to avoid recording these oscillations which false the real GPS position.

2.3.7 General settings

In this menu the basic settings of the device, like language or display settings can be changed. For more info about device general settings, please read the full road navigation manual.

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2.4 Camera

Click this Button to display the pictures from the rear view camera. On the left you can find two buttons.

Field View: Click this button to switch to the field view screen.

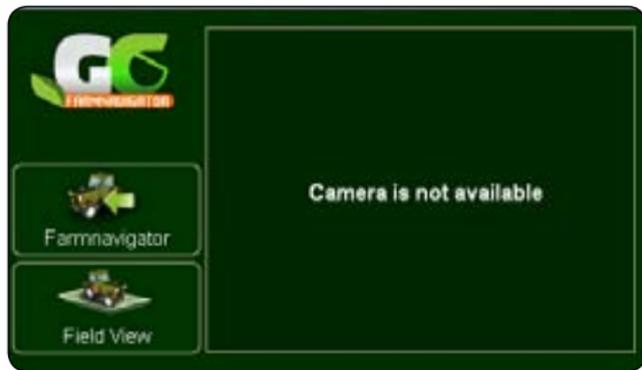
Farmnavigator: Use this button to go back to the farm navigation main menu.

2.5 Volume and Brightness

You can adjust here the brightness of the display and the volume of vocal instructions and acoustic signals, by pressing the left and right arrows. Press Accept to confirm and to go back to the main menu.

2.6 Bluetooth

The Farmnavigator also offers a hand-free calls function for Bluetooth phones. Please read the full road navigation menu to get instructions on how to pair your mobile phone with the Farmnavigator.



3. Creating and working a field



3.1 Creating a field

Open the Farmnavigator Main Menu and click the Field button. A list of all saved fields appears. At first use the table is empty. To create a new field press the button Create New. The field view will be opened.

3.2 Working a field

Before starting a work on a field, or before starting the measurement of the field, it is important to set the working width (the width of the machine you are using),

1. Go back to the Farmnavigator main menu
2. Press the Farmnavigator Settings button
3. Press the Working Width button
4. Use the left and right arrows to set the desired width
5. Press Accept to confirm

Please read par. 2.3 for the other settings.

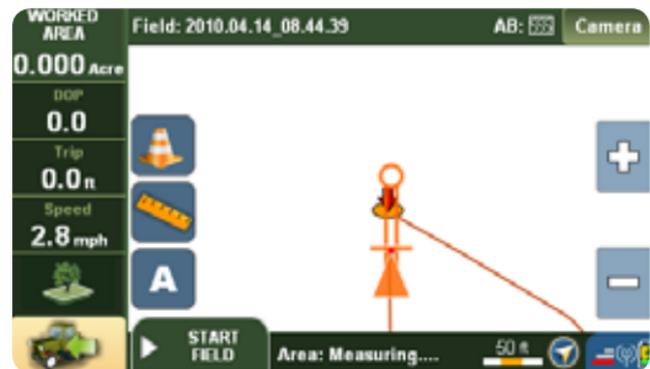
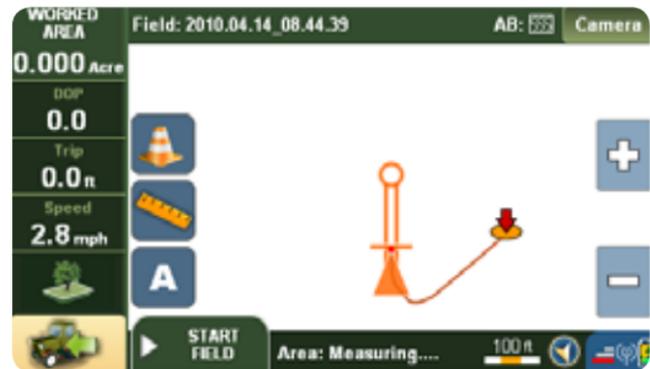
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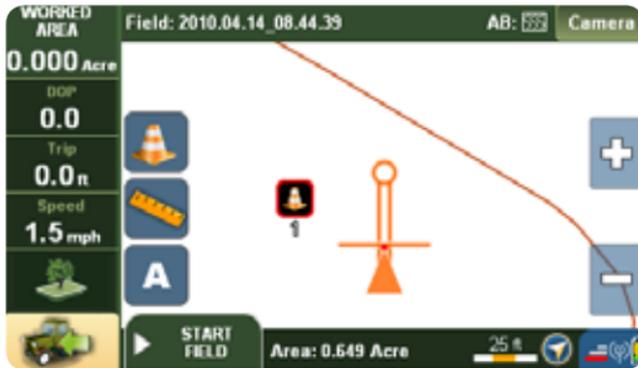
Press Field view. Press the Start Work button in the bottom bar to start recording the data (worked area, speed, perimeter and area) that will be saved in the Fields Database.

To stop the recording of the worked area click stop in the down left corner. You can start working on this field again at any time with a click on start or when you reopen the field in the fields' database.

3.3 Measuring Perimeter and Area

The first operation you can do is to measure the field by driving along the perimeter of the field. Drive some meters at first. Then click the measure button (with the ruler icon). The boundary now is recorded from the starting point (red arrow). Now drive around the field until you have reached the starting point, and then click the measure button again. The Field limits are now saved and the area is calculated. This information is stored in





the fields' database.

3.4 Positioning obstacles / soil samples

You can record the positions of soil samples or obstacles, like trees or holes.

To save a position, go as near as you can to the relevant object and click the obstacle button (with the orange cone icon). The positions of obstacles and soil samples are now saved in the fields' database and are shown on the map with an orange cone icon and a progressive number.

3.5 Setting the Guide lines

Once you have created the field, you can go on with your work using the Assisted-Driving function (a.k.a parallel guidance).

The recording of field perimeter and the reference line can be done in one step.

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In order to get driving assistance, you need to set the guide lines.

1. Open the farm navigation main menu
2. Press the Settings button
3. Press Guide lines.
4. Choose among 4 different types of guide lines pressing the desired option:
 - Parallel
 - Contour
 - Tram lines
 - Round and Round
5. Confirm by pressing the Accept button
6. Press Field view in the upper right corner

3.5.1 Parallel guide lines

Parallel guide lines are ideal for fields with straight boundaries. When driving the first reference line, set the point A at the beginning of the track by pressing the





A button. The starting point is shown on the map as an orange square with an 'A' on it. Once the point A is set, the B button will appear. When you reach the headlands set the point B by pressing the B button. The point B is displayed on the Map just like Point A. These two points are used to draw the reference straight line and the corresponding parallel lines at a distance previously set as working width.

3.5.2 Contour guide lines

Contour guide lines are used for fields with curved boundaries. Drive the first reference line setting the point A, and then, just before you reach the headlands, setting the point B. The Farmnavigator will record each position and draw the exact driven line and the corresponding parallel lines at the distance previously set as working width or virtual spray boom width.

3.5.3 Tram lines



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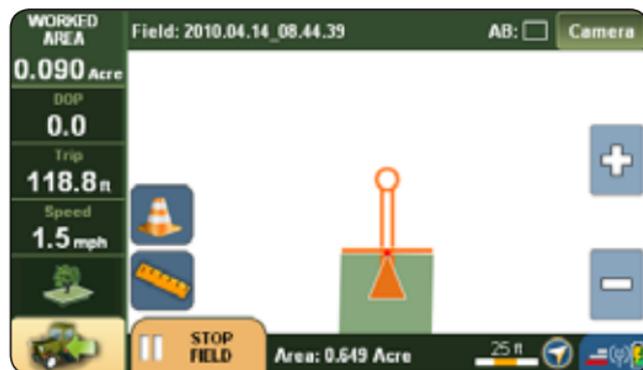
This Option is used to work in fields where tram lines already have been made (e.g. vineyards). In this mode Farmnavigator does not guide you but it shows the worked area and allows using the spray boom virtual control.

3.5.4 Round and Round

Setting the round and round guiding lines you can create concentric lines starting from the field's perimeter up to the centre. Press A, then start driving along the perimeter and press B when you have completed it: the software will draw concentric lines up to the centre of the field.

3.6 Assisted driving

After the Guiding lines have been set, the navigation aid is displayed above the Map. The navigation aid shows with two directional arrows in which direction the steering has to be corrected to drive on the calculated





guiding line. The deviation from vehicle position to guiding line is shown between the directional arrows in m and cm to allow very accurate corrections. On the left side there are four boxes showing: worked area, trip (distance covered), speed and DOP (precision of GPS). For info about the DOP, read appendix A. Once the work is done, press the Stop Work button. The worked area (highlighted in green) is saved in the field page in the Fields Database. You can then open the field and continue the work.

3.7 Using the spray boom virtual control

Farmnavigator includes a virtual control of the spray booms. This function can be used to control sprayers but also other machines such as spreaders and planters that work in a similar way. When spreading chemicals on a field it is very important to control the treated area and to avoid treating twice the same portion of

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terrain. Farmnavigator software will draw your sprayer, reproducing the exact number of sections and nozzles, and it will support you to switch the different sections on and off.

To activate this function press the Spray Boom button in the main menu and then press the Boom On button.

ATTENTION when the spray boom virtual control is activated, its settings are used to calculate the working width, ignoring the width set in the Working Width page (par. 2.3.1).

Now you can set the number of sections and the width of each Nozzle using the arrow Buttons.

The Sections are displayed by numbered squares. You can select each section and change its width by clicking the modify size button. Use the arrows to adjust the number of booms and confirm with OK to save the settings and



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continue with the next section.

These settings are saved even if the spray boom virtual control is deactivated. If the spray boom virtual control has been set and activated the different sections are displayed as numbered “LED” lights in the Field View. Each “LED” shows whether the specific section should be turned on or off by the operator. Yellow means that the spray boom can be open, red means that the section is overlapping an area that has already been treated so the operator should turn it off.

To open the field database, go to the Farmnavigator

4. Fields Database

menu and click the button Fields. A table with every saved field appears. Select from the table the relevant field and click open, then press Show Info to see the full Info. The full Info informs you about the shape of your field, the work time, the area, the worked area, the maximum speed and the maximum DOP Value. Click Select to switch to the next submenu.

4.1 Editing the fields

To edit the data saved with the field, open the Field full info page and press the Options button.

The options menu includes the following buttons:

Open: You can open previously worked fields and continue to work.

Edit Name: After a field has been created, it is named automatically with the data of creation. This option allows you to rename the field to your wishes.

Clear Obstacles: If you recorded obstacles or soil samples





in your field, you can remove them with this option.

Clear Worked Area: If you want to start a new work on a previously worked field, you can clear the worked area. Perimeter, total area and obstacles positions will be kept.

Delete: The whole field is deleted.

Export: Open the field then press this button to create a .kmz file, which can be opened in Google earth. The file is stored in the SD in the Fields folder.

4.2 Exporting field data to Google Earth

You can export each field created and worked with the G6 Farmnavigator and view it on Google Earth.

1. Open the Field Database, select the field you want to export and open it pressing Open Selected. WARNING: in order to be able to export a field, this has to be open.
2. Go back to the field database, select the field and press Show Info, press Options and then press Export.

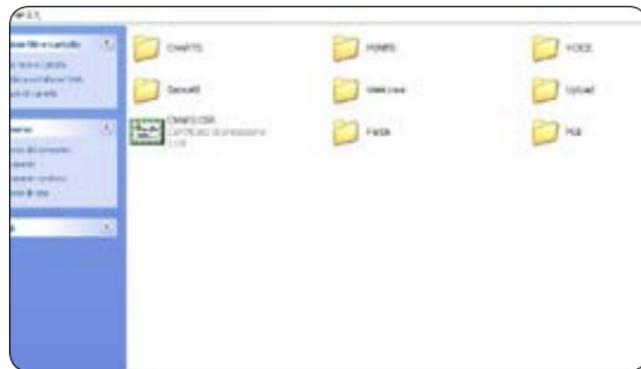
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(If the field has not been opened then the export button is deactivated). G6 Farmnavigator will convert the field info in *.Kmz, format, that is compatible with Google Earth. These files will be saved in the Farmnavigator's SD memory, inside the Fields folder.

3. Connect G6 Farmnavigator to the PC with the USB cable provided, without feeding it, the USB image will appear on the navigator's display. The PC will read G6 Farmnavigator as an external memory support and the "removable disc" window will automatically pop up.

4. In the removable disc window, open the Fields folder: it contains a folder for each saved field and the *.Kmz files. Copy the *.Kmz file and paste it in a folder that you have created for this purpose in your PC.

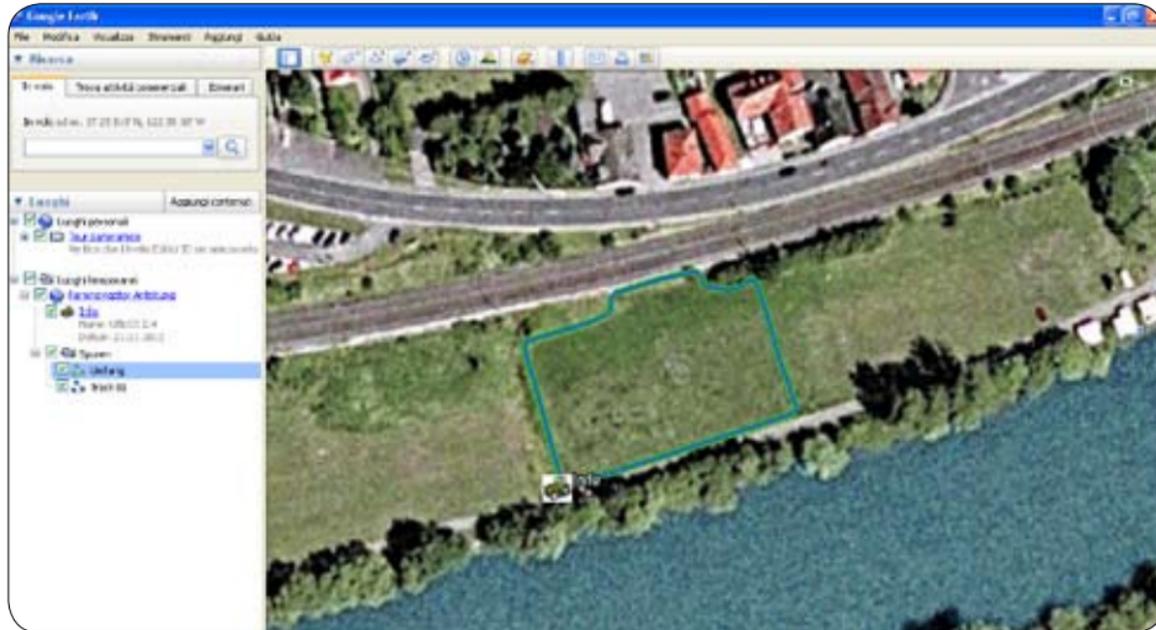
5. If Google Earth is installed in your PC, you just have to click on the *.Kmz file to open it. (Download Google



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Earth for free from <http://earth.google.com/>). It will be possible to see on the Google Earth map the field's perimeter marked with a coloured line, and the obstacles saved on the field.

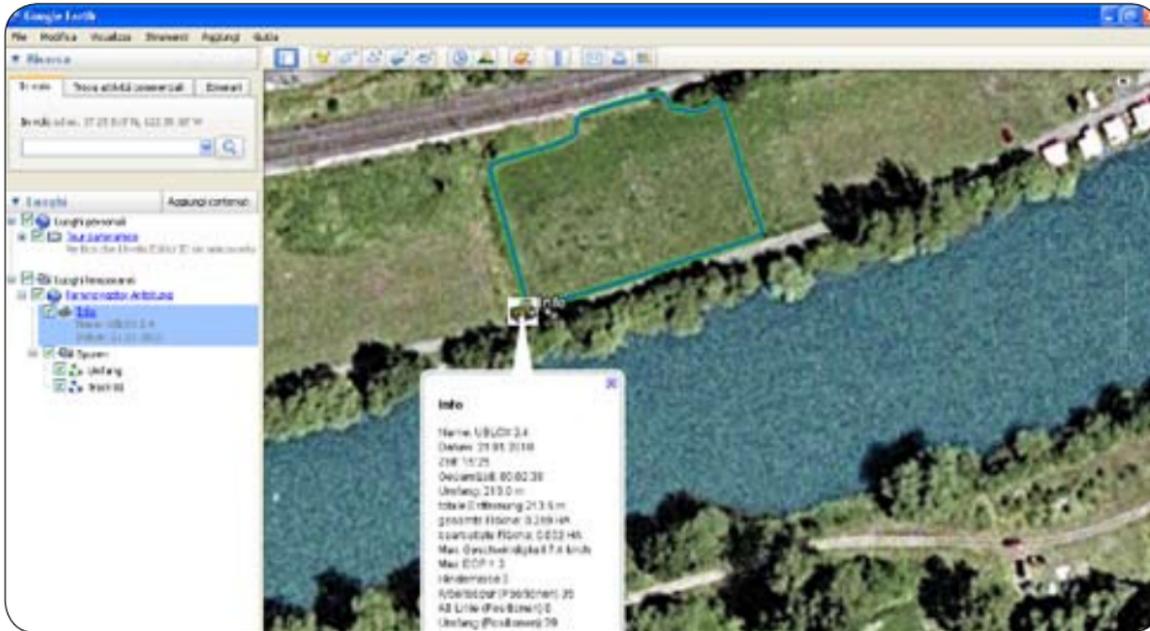
The Places window shows all the data relative to the field (area and obstacles positions). Click on the Fields

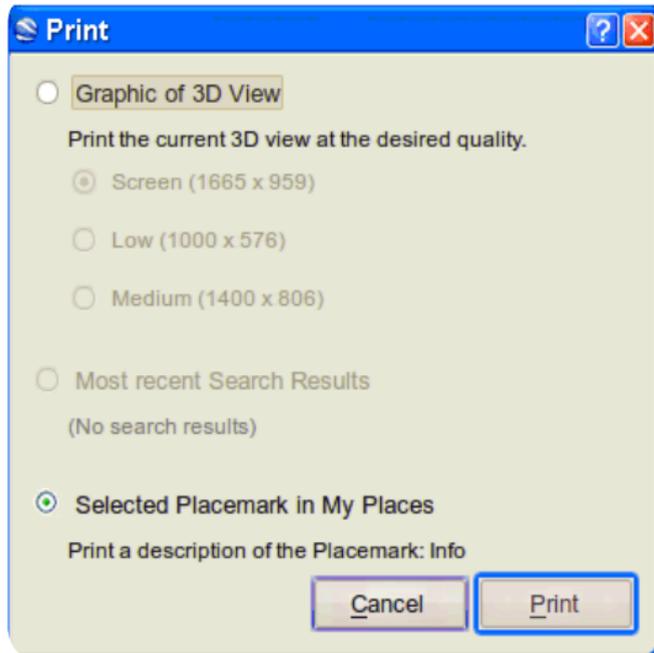


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name or on the Info icon to view more data about the work on the field (duration of the work, maximum DOP, working width settings, etc).

4.3 Printing the field map from Google Earth





You can print out the map of your fields with all the relative info.

1. Click on the name of the field in the place window.
2. Click on the File menu, then click on Print.
3. The Print dialogue window will open. Select the second and click on the Print button.

Google Earth will print the map of the field and its data.

4.4 Importing the field data

You can transfer the field database from one G6 Farmnavigator to another, exporting the data and then importing them in the new Farmnavigator.

1. To export the files, follow the procedure described in par. 4.2, up to step 4.
2. To import the file please connect the G6 Farmnavigator in which you want to import the data to the PC with the USB cable provided. Do not feed the navigator. The USB

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image will appear on the navigator's display. The PC will read G6 Farmnavigator a san external memory support and the "removable disc" window will automatically pop up.

3. Copy and Paste inside the Fields / Import folder of G6 Farmnavigator (removable disc) the *.Kmq files previously copied on the PC

4. When the procedure is over, close the window and remove safely the hardware.

5. Switch on the Farmnavigator and open the main menu. Press Import Fields to see the list of *.Kmq files, select the file and press the Import button on the right to add the field in the database.

6. Go back to the main menu and press Field: in the imported field is now added to the list.

The DOP (Dilution of precision) is a value indicating the
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Appendix A: The Dop

precision of the GPS

The Errors in the position a GPS receiver gives you are due mainly to two factors: the precision with which the distance to each GPS satellite is known, and the geometry of the satellites. Distance errors can be compensated for by using WAAS, and other techniques: Farmnavigator is equipped with a special waterproof external GPS antenna with a U-Blox receiver that is WAAS/EGNOS DGPS enabled. But the maximum position accuracy you can achieve is limited by GPS satellite geometry, that varies during the day.

The signal from each GPS satellite has level of precision; depending on the relative geometry of the satellites, these precisions can be combined to give amplified or greatly compressed precision. A low DOP value represents a better GPS positional precision due to the wider angular separation between the satellites used to calculate a GPS unit's position. The higher the DOP, the greater the possible error in the accuracy of your position. Other factors that can increase the effective DOP are obstructions such as nearby mountains or buildings.

It is important to know the DOP value in every moment as this information helps you to understand how much you can trust the precision of the GPS in that moment. If the DOP is bad then you could consider to wait until the DOP gets better to start the work.

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DOP Value Rating Description

1	Ideal This is the highest possible confidence level.
1.1 - 1.2	Excellent At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive applications.
1.3 - 2	Good

The Farmnavigator is only working if DOP is better 2.0. If DOP is above 2.0 Farmnavigator will stop do on to bad Sat constellation

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