



MobileMapper™

User Manual

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Introduction to the MobileMapper System

The *MobileMapper* system from Thales Navigation is composed of two main elements: the *MobileMapper* receiver and *MobileMapper Office* software running on a PC-type computer.

The *MobileMapper* receiver is a handheld navigation and positioning device that enables you to describe the features being mapped and then format the data so that later it can be uploaded to a GIS. It offers an easy-to-use and easy-to-deploy solution for general mapping and for asset management.

MobileMapper combines all the navigation capabilities of a recreational handheld with feature attributing software to support GIS data collection in the field.

The *MobileMapper* receiver and its main functions are fully described in Section 1 in this manual.

MobileMapper Office is an office software suite that interfaces the *MobileMapper* receiver with your GIS system. *MobileMapper Office* allows you to prepare GIS jobs, feature libraries and waypoint files, build background maps from GIS data files and manage the information logged in the field (upload/download functions).

The *MobileMapper Office* software and its main functions are fully described in Section 2 in this manual.

All functions relative to data exchange between *MobileMapper* and *MobileMapper Office* are also detailed in Section 2.

Finally, the Appendices section in this manual covers a number of topics such as product specifications, SD card installation, connectors & cables and glossary of terms used.

Please note that a printed *Getting Started Guide* is included in your *MobileMapper* system. This short, multilingual guide, which is presented in a tutorial form, is intended to help you complete your first job. Practising with this guide will allow you to understand the essentials of the system.

1. MobileMapper Field Unit

Keypad Description

The scrolling button has three different functions:

- It is used to move the cursor in the chosen direction, from a data field to another, from an option in a menu to the previous or next option.
- In a highlighted field, the left/right arrow moves the cursor backward/forward; The up/down arrow increments/decrements the highlighted figure or string.
- On the Map screen, a navigation screen, this button allows you to switch to cursor mode and then to move the cursor in ALL directions, not only the left, right, up and down directions.

Under the screen you will see 8 buttons located around a large oval “scrolling” button with 4 directional arrows on it.

IN/OUT: Use these buttons to zoom in and out when viewing a screen with a map displayed.

ESC: Takes you back to the previous screen without effecting any changes.

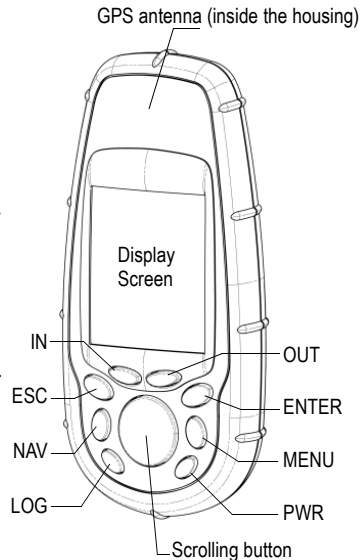
NAV: Takes you to the various navigation screens where you can locate yourself and navigate to waypoints and GIS features.

LOG: Lets you create a new job or open an existing one. With a job and a feature already open, pressing LOG takes you to the feature attribute screen. With an open job, but no open feature, pressing LOG takes you to the feature selection screen.

ENTER: Use this button to accept highlighted input and to initiate various unit functions.

MENU: Provides access to a variety of functions such as setting up and initializing the receiver, selecting targets to navigate to and various GIS logging features.

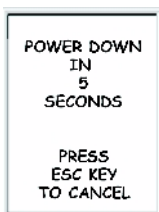
PWR button: Turns on and off the unit. Also turns the back-light on if you hold it down for two seconds (until the back-light level changes).



Battery Life

You can expect up to 16 operating hours from 2 Li-ion AA batteries with the backlight turned off. Using the backlight will shorten the battery life significantly. With the backlight on continuously, you can expect about up to 8 hours of usage from the two Li-ion batteries that came with your MobileMapper.

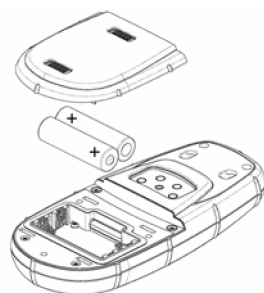
The very first time you use your MobileMapper, or after erasing all the data from memory, the Power-On procedure is longer than described here because the unit having no position in memory, initialization is needed to help the unit track satellites (see 1st-time use on page 6).



Power Down Screen

Installing the Batteries

MobileMapper uses two AA batteries that are installed from the back through the battery cover. To remove the battery cover, push the two buttons on the cover fully to the left and lift the battery cover away from the receiver.



Insert the new batteries as shown opposite, making sure that the batteries are installed with the correct polarity. Replace the cover and push the two buttons fully to the right. Verify that the cover is locked in place.

Turning Power On/Off

In the Power-On procedure described below, it is assumed that the unit has already been used in a working session and so position data is available from the former working session to help MobileMapper compute its position.

- To turn the unit on, press the PWR button. The Start-up screen appears, followed by the Database Copyright screen and the Agreement screen. After accepting the warning information, the last navigation screen you were viewing at the end of the last session will be displayed.

If the last navigation screen view was the Map screen, the last zoom scale setting will be used.

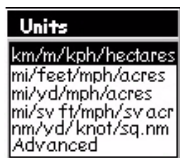
- To turn the unit off, press the PWR button. The Power Down screen is displayed.

Doing nothing will turn off the unit at the end of the countdown sequence.

Pressing the PWR button again will turn off the unit immediately.

Pressing ESC will cancel the Power Down sequence.

To prevent accidentally turning the backlight on and leaving it on, the unit will turn the backlight off when there have been no buttons pressed for 4 minutes. Pressing any button will turn the backlight back on in this instance. You can change the time delay for the backlight using the Light Timer option in the Setup menu (see page 56).



Units Screen



Holding the unit

You can observe the signal strength and the satellites being used on the Satellite Status screen (see page 8).

Setting the Screen Backlight

The screen backlight can be set to one of three levels (low, high or off). At power on, the screen backlight is set to high level. Follow the sequence below to choose another level:

- Hold down the PWR button for 2 seconds : Backlight drops down to low level
- Hold down the PWR button again for 2 seconds: Backlight turns off.
- Hold down the PWR button again for 2 seconds: Backlight comes back to high-level illumination.

Using the backlight makes the screen display easier to see, but it also drains the batteries more quickly.

Setting the Units

To change the units that MobileMapper will use:

- Press MENU. Use the up/down arrows to highlight **Setup** and press ENTER
- Use the up/down arrows to highlight **Units** and press ENTER.
- Use the up/down arrows to highlight the set of units you want and press ENTER. Press ESC to return to the last screen viewed

Getting a Position Fix

The unit is designed to fit comfortably in your hand. Hold the MobileMapper in the palm of your hand with the antenna pointing towards the sky.

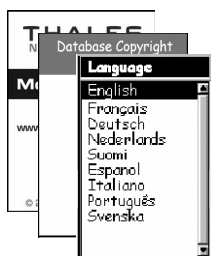
MobileMapper's antenna needs to have a relatively unobstructed view of the sky. This allows the unit to choose from all satellites currently available.

If the view of the sky is poor due to large cliffs or buildings, heavy foliage or other obstructions, the satellite signals can be blocked and the receiver may take longer to compute a position fix.

Initialization for First-Time Use

Skipping Initialization

You can skip the initialization process by pressing the NAV key anytime after selecting the language you want MobileMapper to use and accepting the agreement. If MobileMapper is able to collect satellite data (i.e., have a clear view of the sky) it will begin to self-initialize. This could take anywhere from 3 to 14 minutes to compute its position, depending on how many weeks have elapsed since it was last used.



Start-up, Copyright & Language Screens

MobileMapper will walk you through the process of setting up the receiver for first time use. This procedure is commonly referred to as “Initializing the Receiver”. The purpose of this initialization is to provide MobileMapper with a general knowledge of its approximate location.

This may seem a little confusing at first as why does a device that is used to compute its position need to know where it’s at? MobileMapper uses information from the GPS satellites that orbit the Earth and if MobileMapper has an approximate idea as to its location, it will refer to the almanac it has in memory to select what satellites are overhead. From this information, MobileMapper can then select the satellites that will give it the best information for computing its location.

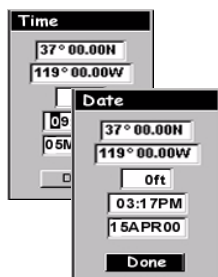
Under normal use, MobileMapper will save the last position it calculated and use that position the next time it is turned on. However, when MobileMapper is new (or when memory has been completely erased), it has no last position information. Thus, MobileMapper can either start polling the satellites to see which ones are overhead or you can provide it with your approximate location allowing MobileMapper to begin computing the initial position, known as “first fix.”

Follow these instructions to initialize MobileMapper:

1. Turn MobileMapper on by pressing the PWR button. The unit turns on and displays the start-up screen, followed by the Database Copyright screen and the language selection screen.
2. Select your language using the up/down arrow to move the cursor to this language. With the desired language highlighted, press the ENTER button. The Warning screen is then displayed for about 10 seconds.



Region & Area Screens



Time & Date Screens

3. If you understand and agree to the warning presented, press ENTER before the 10 seconds have elapsed. Otherwise, the unit will shut off. A message box is then displayed indicating that the unit needs to be initialized.
4. Press ENTER. The unit asks you to select your region and area. Use the up/down arrows to highlight your general region and press ENTER. Again, use the up/down arrows to highlight your area and press ENTER.
5. The cursor appears in the **Time** field, waiting for you to input your local time. Please enter the time in 0-12 hr. format, not in 0-24 hr. format. Set your local time using the arrow keys as follows: use the up arrow to increment the highlighted figure, or the down arrow to decrement it. Then press the right arrow to highlight the next figure. Set this figure now using the up or down arrow, etc. Be sure that you set the AM/PM indicator. When the time is correct, press ENTER.

The last piece of information needed is the date. As above, using the arrow keys, enter the present date and then press ENTER.

All the information that the unit needs to speed up the process of computing its first fix has been entered and the **Done** field is highlighted.

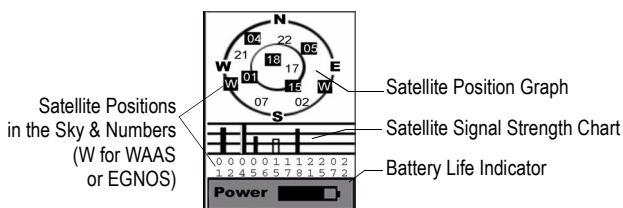
Satellite Signal Strength Chart:

Clear bars indicate that the unit is starting to get information from satellites. Solid bars indicate that the satellites are being used to compute your position.

Satellite Position Graph:

The 2 circles indicate satellite elevation as seen from your current position. The outer circle represents the horizon and the inner circle represents 45° from the horizon. The center of the circle is 90° from the horizon, or directly overhead.

- To complete the initialization process, press ENTER again. The Satellite Status screen is displayed and MobileMapper begins acquiring the data from satellites. Watching the bars appear and turn solid on the screen, you can progressively see the unit lock onto satellites.



Once the first position fix has been computed, the Map screen is automatically displayed. This screen shows a map of the area where you are located. Your current position is represented by a triangle located at the center of the screen (see also page 26).

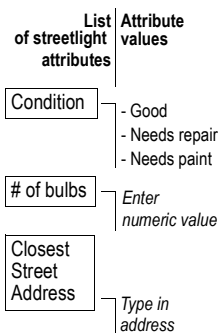
Initialization is now complete and you can proceed to your job.

GIS Data Logging Functions

Feature Libraries

A feature library is a hierarchical structure that guides you through the description process so you know you will describe thoroughly and quickly each feature you visit. You will not have to remember what attributes of each feature you should record: the feature library will tell you!

Example of a “streetlight” point feature, as may be described in a feature library



Feature libraries are created using the Feature Library Editor module in MobileMapper Office.

Feature libraries contain lists of features that you should be visiting during your field sessions.

Features are four types:

- Point feature: The geometrical representation of this feature is a point. Logging this type of feature requires static occupation at the point.
- Line feature: The geometrical representation of this feature is a line. Logging this type of feature requires that you move along this line.
- Area feature: The geometrical representation of this feature is an area. Logging this type of feature requires that you move along its contour or you make several static occupations if it is a regular area (with straight sides).
- Grid feature: The geometrical representation of this feature is an array of evenly-distributed waypoints. MobileMapper will guide you to each of these waypoints where you should enter a measurement performed at this point.

Each feature also has a number of attributes. There are three categories of attributes:

- Menu style where the attribute values are words or phrases that you pick off a list (e.g. Condition attribute opposite)
- Numeric style where you select a number within a specified range (e.g. # of Bulbs attribute opposite)
- Text style where you type in a note that can contain both numbers and letters (e.g. Closest Street Address attribute opposite)

You can input as many as five feature libraries into MobileMapper. Just remember that you can use only one feature library for logging data to an individual job.



Entering a job name

The keyboard is fitted with special keys such as the CLEAR key to clear the job name field, the Shift key to switch between upper and lower-case, the back-space key to delete the last entered character and a space key.

Note that a “Generic” library containing default features is created in MobileMapper at power on. This library contains a point feature, a line feature, an area feature and a grid feature. Each of these features has a single text-style attribute. Use this library only as “backup” library.

MobileMapper uses a fixed, time-based logging interval (1 second) when you log a point feature. The logging interval parameter cannot be accessed when you log a point feature.

Logging New GPS/GIS Data

Prior to starting logging GIS data, be sure MobileMapper is computing your position when you stand near the first feature you want to log.

Press NAV until you display the Map screen. If an arrow is displayed at the center of the Map screen and you can see that your position on the screen is the expected one, then you can start your job. Follow the instructions below to log GIS features.

1. Creating a Job and selecting a Feature Library

- Press the LOG button
- Select the **Create New Job** option and press ENTER. The screen displays the **Job Name** field in which you should enter the name of the new job. A keyboard is displayed underneath to let you enter this name. To use the keyboard, press the arrow keys to move the cursor over the keyboard. For example, if the job name is “JB010”, highlight “J” using the arrow keys and press ENTER. Then select “B” and press ENTER, etc.
- When you have finished entering the name, highlight the **OK** key on the screen and press ENTER. A new screen is then displayed listing the feature libraries stored in MobileMapper
- Use the down/up arrow to highlight the library you want to work from and press ENTER. The screen now lists all the features available from the selected feature library.

2. Logging and Describing a Point Feature

- Choose the type of feature you want to log from this list. You can tell by the name of this feature whether it is a point feature, a line feature or an area feature.
- Highlight a point feature (you are supposed to be near one of these features) and press ENTER. This starts feature logging.

Logging screen

The Logging screen also displays the time elapsed since you started logging at this point feature, the number of satellites currently received and the current value of PDOP (see also page 22).

If you start logging a new feature and you realize you this is a mistake, then you can delete the new feature being logged by pressing MENU and selecting Delete <feature name>.

Deleting features only applies to new features being logged, not to features already logged.

The Logging screen is now displayed where you can see the list of attributes pertaining to this feature. You will now enter the “Description” phase of the feature

- With the first attribute highlighted, press ENTER and choose the right attribute value describing the feature near you and press ENTER. This takes you back to the Logging screen.
- Highlight the next attribute in the list and repeat the previous step. Repeat this step until all the attributes have been properly described.
“Describing” the feature only takes a few seconds. By the time you are done with the feature description, the feature’s GPS position will probably have been saved in the job. You can also stay more time on the feature to let the receiver determine several positions. This will give an even more accurate position for the feature as MobileMapper will average all the GPS positions it has computed on the feature.
- To stop logging the feature, on the Logging screen, use the down arrow to highlight the **Close** field and press ENTER. This takes you back to the Feature List screen
- Move to the next feature and resume the above instructions to log this feature.

3. Logging and Describing a Line Feature

Basically, you use the same procedure as when you log a point feature (see 2. above). There are however two differences when you log a line feature:

- You need to define a logging interval when you start logging the feature
- And then you are supposed to move from the beginning to the end of the line feature before stopping the logging.

These differences are explained below.



Selecting the logging interval option



Logging screen

The Logging screen also displays the distance traveled since you started logging the line feature, the number of satellites currently received and the current value of PDOP (see also page 22).

After highlighting a line feature from the Feature List screen (for example a road) and pressing ENTER, MobileMapper starts logging GPS positions from the position where you are. The first time you log a line area, and then every time you think this is necessary:

- Press MENU, highlight **Logging Interval** and press ENTER. Two options are then prompted:

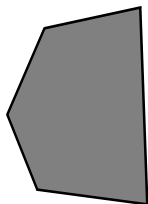
By Time: Select this option when you want MobileMapper to log a new GPS position at regular intervals of time regardless of the distance traveled since the last position logged. After highlighting this option, press ENTER, choose a time interval from the list and press ENTER. This takes you back to the Logging screen where you can see the list of attributes pertaining to the feature.

By Distance: Select this option when you want MobileMapper to log a new GPS position only after you have moved by a certain distance since the last position logged. After highlighting this option, press ENTER, choose a distance interval from the list and press ENTER. This takes you back to the Logging screen where you can see the list of attributes pertaining to the feature.

- Like with a point feature, describe the feature by describing the different attributes pertaining to the feature
- When the description is finished, you can start walking along the line feature
- When you arrive at the end of the line feature, with MobileMapper still displaying the Logging screen, highlight the **Close** field at the bottom of the screen and press ENTER to stop logging the feature.



Irregular area



Regular area

JOB1	
Logging: Park	
Name	
Logging...	
Square: 0.029 hectares	
Num Sat	PDOP
10	2.0
Close	

Logging screen

The Logging screen also displays the current value of area measured since you started logging the feature, the number of satellites currently received and the current value of PDOP (see also page 22).

4. Logging and Describing an Area Feature

Basically, you use the same procedure as when you log a line feature, especially regarding the need for defining a logging interval (see 3. above).

What is new when you log an area feature is that you can use one of the following two methods:

- The first method should be used when contours of areas are irregular. This method is similar to logging a line area in that you have to move along the contour, but you also have to come back to the start point so that MobileMapper can accurately measure the area.
- The second method applies to areas with regular contours, i.e. those with straight sides. With such areas, you just have to go to each corner of the area, make static occupation there and pause the logging between static occupations. MobileMapper will deduce the area after you log the last corner and you close the feature.

Use the same procedure as on page 11 when you choose the first method.

When the shape of the area allows you to use the second method, do the following after arriving at one of the corners and with the Attribute List displayed on your MobileMapper:

- Select the name of the area feature from the list of features and press ENTER. MobileMapper starts logging the area feature.
- Choose a time-based logging interval (see explanations given for a line area on page 12). This takes you back to the Logging screen where the list of attributes for the feature is displayed
- Describe each attribute by selecting or entering the appropriate attribute value for each of them. (Note that you have to do this only once, not on each corner of the area.)



Selecting the Pause
Park option

By the time you are done with the description, MobileMapper will probably have logged the GPS position of the corner.

- Now, press MENU, highlight **Pause <feature name>** and press ENTER. This pauses the logging of the feature.
- Move to the next corner of the area where you can now resume logging the feature
- To do this, press MENU, highlight **Resume <feature name>** and press ENTER. This resumes the logging.
- Resume the previous three steps until all the corners of the area have been visited.
- After logging the GPS position of the last corner, highlight **Close** at the bottom of the screen and press ENTER. This closes the logging of the area feature.

5. Repeating a Feature

If you close a feature and want to log the location of another feature of the same type and with an identical description, use Mobile Mapper's Repeat Feature function.



Selecting the Repeat
Feature option

- After closing a feature, MobileMapper takes you back to the Feature List screen. Then do the following:
 - Move to the next similar feature you want to log
 - Then press MENU, highlight **Repeat Feature** and press ENTER. This starts feature logging. Note that the feature has the same attribute description as the former one
 - After logging the GPS position(s) of this feature, highlight the **Close** field and press ENTER to close the feature.

6. Nesting a Feature

When you are logging GPS positions to a feature, you may find another feature that you also want to log. Rather than log the entire feature and come back to record this other feature, you can simply pause the feature being logged, log the other feature, close it and resume logging the first feature.

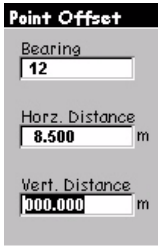
Logging one feature while you have paused another feature is called “nesting.” You can nest any feature, point line or area, into any line or area feature. It does not make sense to nest a feature into a point feature.

Nesting is particularly useful when you are mapping things such as a road with streetlamps along the route or a shoreline with stretches of erosion along it and the locations of certain habitats.

Assuming you are logging a line feature and the Logging screen is displayed, do the following, for example to nest a point feature:

- Press MENU, highlight **Nest Feature** and press ENTER. This pauses the logging of the line feature.
- Move to the location of the feature you want to nest
- In the Feature List screen now displayed, highlight the feature you want to nest and press ENTER
- Describe the attributes of the feature as you would normally do
- Highlight **Close** at the bottom of the screen and press ENTER. This closes the nested feature and takes you back to the Logging screen of the paused feature
- Press MENU, highlight **Resume <feature name>** and press ENTER. This takes you back to the Logging screen from which you can normally finish the logging of this feature.

7. Offsetting a Point Feature



Point Offset screen

If you do not have a compass, you can use MobileMapper's Compass screen (see also page 31) to determine the bearing to the offset feature. If you have been moving for 5 to 10 seconds along a straight line, the Compass screen will tell you your bearing. You can use this to determine the bearing to the offset feature. CAUTION! The receiver cannot determine direction while stationary.

Visual estimation for horz. & vert. distances is usually good enough in terms of accuracy.

Sometimes the feature you want to put on the map is in area of poor GPS reception or is not accessible. This is when you can map the feature using the offset utility. By combining the receiver's position with the bearing and distance to the feature, MobileMapper will automatically calculate and record the position of the feature.

To input an offset for a point feature, assuming the Feature List screen is now displayed, do the following:

- Highlight one of the listed point features available from the selected feature library and press ENTER
- Press MENU, highlight **Offset** and press ENTER. This displays the Point Offset screen on which you should enter the following parameters:

Bearing: Compass direction to the feature from your current position. You need a compass to measure this angle (see also opposite). To input a value for **Bearing**, press ENTER and increment or decrement the highlighted number using the up/down arrows. To edit another digit, use the left/right arrows. When you are done, press ENTER again. Press the down arrow to move the cursor to the next field.

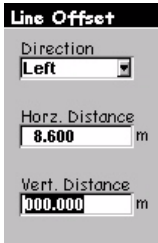
Horz. Distance: Horizontal distance to the feature from your current position. Enter a value for **Horz. Distance** as described above for **Bearing**. When you are done, press ENTER again.

Vert. Distance: Vertical distance to the feature from your current position ("0" if the feature and yourself are at the same elevation -on a flat area). Enter a value for **Vert. Distance** as described above for **Bearing**. When you are done, press ENTER again.

- Then press ESC to return to the Logging screen. This writes the offset into memory, but you can edit it later if you like by going through the same process. If you close the feature and return to the Map screen, you will see that the feature is offset from your position in the middle of the screen.

8. Offsetting a Line or Area Feature

For the same reasons as a point feature (see previous page), you may need to use the offset utility to map a line or area feature. By combining the receiver's position with the direction and the distance to the feature, MobileMapper will automatically calculate and record the location of the feature.



Line or Area Offset screen

To input an offset for a line or area feature, assuming the Feature List screen is now displayed, do the following:

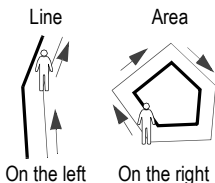
- Highlight one of the features available from the open feature library and press ENTER.
- Press MENU, highlight **Offset** and press ENTER. This displays the Line or Area Offset screen on which you should enter the following parameters:

Direction: Location of the feature with respect to your actual path. To input a value for **Direction**, press ENTER, choose one of the two options (Right or Left) and press ENTER again. Press the down arrow to move the cursor to the next field.

Horz. Distance: Horizontal distance to the feature from your current position. To input a value for **Horz. Distance**, press ENTER and increment or decrement the highlighted number using the up/down arrows. To edit another digit, use the left/right arrows. When you are done, press ENTER again. Press the down arrow to move the cursor to the next field.

Vert. Distance: Vertical distance to the feature from your current position ("0" if the feature and yourself are at the same elevation -on a flat area). Enter a value for **Vert. Distance** as described above for **Horz. Distance**. When you are done, press ENTER again.

- Then press ESC to return to the Logging screen. This writes the offset into memory, but you can edit it later if you like by going through the same process. If you close the feature and return to the Map screen, you will see that the feature is offset from your position in the middle of the screen.



Visual estimation for horz. & vert. distances is usually good enough in terms of accuracy.

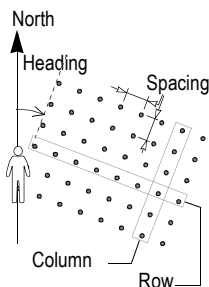
To operate the grid mapping utility, you will need a measurement device - anything from a depth sounder to a ruler, your own sense of smell or your ability to make visual observations. You will also need a compass.

9. Logging GIS Data on a Preset Grid Network

MobileMapper's grid mapping utility is an easy way to automatically set up a series of GPS waypoints to facilitate the logging of data in an orthogonal grid. This utility assures that you gather measurements made using field sensors such as chemical detectors, depth sounders and magnetometers at an evenly distributed set of locations. This in turn assures the creation in your GIS of contour maps with a prescribed density of data and without any gaps that might force you to return to the field.

To log GIS data on a preset grid, do the following:

- **Navigate to the waypoint of the grid where you want to begin logging data:** If you have created a waypoint to help you locate the first grid point, you can use any of MobileMapper's navigation screens to get there. To access a waypoint file you can use to navigate to the point of beginning, press the MENU button and select the GOTO option. Then select the **User** option. This will place the waypoint symbol and label on the base map displayed on the receiver's Map screen. Again, you may use any of MobileMapper's navigation screens to arrive at this waypoint.
- **Display the grid:** Once you arrive at the point of beginning, you should open up the job file that includes the feature library describing the grid. If you opened an existing job, press LOG to take you to the New Feature screen. Then select the grid feature type listed on the screen. Usually the term "grid" is included somewhere in the feature name so that you can easily recognize this type of feature. After selecting the grid feature, the Grid Setup screen appears on which you can read the definition of the grid (spacing, columns, rows and heading).



How a grid is defined in MobileMapper

*It is also possible to navigate to any grid waypoint (or any location for that matter) on the Map screen by moving the arrow key over another grid waypoint and pressing ENTER. After you record data at this location, the **Next Pt** field may still be selected to go to the next grid waypoint in the network.*

- **Record an observation or measurement:** With the **OK** field highlighted, just press ENTER. This takes you to the Logging screen that indicates that you have begun logging data to the feature and that the receiver is ready to log the feature's attributes. Remember that you remain stationary for all point features. Describe the feature as you would any other point feature.
- **Navigate to the next grid point:** When you have finished recording the first point feature, you can select **Next Pt** at the bottom left to navigate to the next grid waypoint and record the next point feature within the grid. This takes you to the Map screen where you can see your current position marked by the arrow and the next grid waypoint highlighted with a “crossed box” target symbol. Small red circles indicate the locations of all the unvisited grid waypoints. The locations of where you recorded point feature are indicated by small black squares.

As you begin moving toward the target symbol, you will see your heading indicated by the direction of the arrow marking your position. Adjust your movement as necessary until you are positioned over the target symbol. You may also use any of the other navigation screens available with MobileMapper. The Arrival alarm is disabled when navigating to grid waypoints. It is best to note your distance to the next waypoint and stop when this value goes to zero. When you arrive at the next grid point, press the LOG button and you will see the same Logging screen you used for the earlier measurement or observation.

Each grid waypoint is a geographic coordinate you should make every effort to occupy so that the data you record is evenly spaced and complete. However, each grid waypoint is merely an aid for navigating to the ideal location for an observation or measurement. All the data you record is ascribed to the position of the MobileMapper receiver and NOT to the grid waypoint. If you cannot physically occupy this waypoint, but can make the necessary visual observation, you should do so and record an offset estimating the distance and bearing to the grid waypoint. If you are recording measurements made by an instrument, you should NOT record an offset but rather try to make a recording as close as possible to the position.

- When you have occupied as many of the grid waypoints as you can and recorded the necessary observations and measurements at each, highlight the **Close** field at the bottom of the Logging screen and press ENTER. This closes the grid feature and returns you to the New Feature selection screen where you may either log data to another feature, even to another grid, or close the entire job.

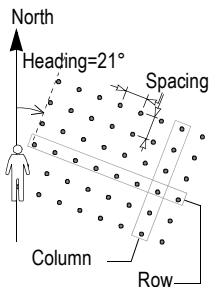
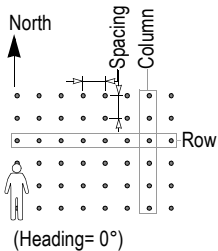
10.Changing the Parameters of a Grid Network Before Logging GIS Data

When you navigate to the location of the grid, you may decide to readjust the size and orientation of the grid based on field observations that you did not foresee back in the office. For example, you may find that navigating to waypoints with an east-west orientation is not feasible if the area of interest is situated on a narrow strip of land between two north-south running streams.

When you change the definition of a grid, MobileMapper always assumes that you are standing in the corner of the grid from which you can see the grid extend in front of you and to the right.

Grid Setup
Soil dpth
 Spacing: **0020**
 Columns: **008**
 Rows: **012**
 Heading: **045** deg
OK

Grid Setup screen



*In the two examples
 above:*

*Columns=8
 Rows=6*

In the open job, do the following:

- On the Feature List screen, select the grid feature and press ENTER. On the Grid Setup screen that is now displayed, set the parameters listed below.

Spacing: Distance between any two consecutive waypoints in any row or column (default: 50 meters or 100 feet, depending on the units used)

Columns: Number of waypoints along the axis facing you (default: 10; Max.: 100)

Rows: Number of waypoints along the axis perpendicular to the direction you are facing (default: 10; Max.: 100)

Heading: Direction you face when the grid's columns extend in front of you and the rows extend to your right.

To change the above parameters, use the up/down arrows to move the cursor to each of these fields, press ENTER, use the up/down arrows to increment/decrement the highlighted figure, use the right/left arrows to highlight the next/previous digit in the field. When you are done with the definition of a field, press ENTER. Then press the down/up arrow to access the next field, etc.

Once these parameters have been changed, highlight **OK** at the bottom of the screen and press ENTER

- This takes you to the Logging screen from which you can start logging data as explained previously.

11. Closing a Job

To close a job, all you have to do is open up another job or turn the receiver off. To open another job, use the **Open Job** option after pressing the MENU button.

GPS Accuracy

MobileMapper is also capable of providing 3-m horizontal accuracy using real-time differential corrections from its built-in WAAS/EGNOS receiver. You must be in North America to make use of the free WAAS signal broadcast by the US Federal Aviation Administration. You must be in Europe to make use of the free EGNOS signal broadcast by the European Union. If you are receiving a WAAS or EGNOS signal, a “W” appears on the screen.

Num. Sat	PDOP
8	2.0

GPS quality indicators

Tracking 3 satellites will allow you to calculate a 2D position (lat/lon) using the last altitude recorded by the receiver. You need to track at least 4 satellites to get a 3D position (lat/lon/altitude)

MobileMapper provides better than 10-m autonomous accuracy around the globe assuming the receiver is tracking five GPS satellites and the PDOP < 4 (which is almost all the time).

If you average positions for a point feature for a few minutes, even better accuracy is possible.

MobileMapper will warn you if your accuracy of your positions has dropped below the level you selected during Setup (see page 54, **Alarms** option). If you see this warning you may press the ESC button and continue logging. However, if you are recording line or area features, you might want to return to the field when the GPS satellites are in a better configuration overhead (the constellation changes slowly but constantly). And if you are recording a point feature, you should strongly consider moving to another location with better satellite reception and recording an offset (distance and bearing) to the feature.

GPS Quality Indicators

On each logging screen as well as on the Satellite Status screen, you can see at the bottom two numbers that give you a good indication of how accurate your positions should be.

The first is the number of satellites that the receiver is tracking.

The second number is the Positional Dilution of Precision, which is an estimate of accuracy that the receiver constantly calculates using the geometry of satellites in the sky. The more satellites that are being tracked and the more evenly they are distributed around the sky, the better the accuracy. PDOP values less than 4 or 5 are good. If the PDOP value is over 10, you should consider moving to an area with a clearer view of the sky and recording features with offsets.

Revisiting and Updating Existing GPS/GIS Jobs

You can use MobileMapper not only to position and describe new GIS features but also to update information gathered previously. This is particularly useful when collecting data on things that change over time: streetlight bulbs burn out, new roads are added to housing developments, new crops are planted, etc.

1. General Procedure

After you have arrived in the area of the job to be reviewed, after you have turned on MobileMapper and made sure it calculates your position, follow the procedure below to revisit and update this job.



Job List screen

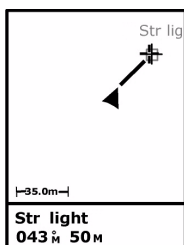
Note that you are not prompted to select a feature library when you select an existing job.

This is because the library that was selected when the job was created is necessarily the one that must be used for the job when re-opening this job

- Press the LOG button, select the **Open Existing Job** option and press ENTER. MobileMapper lists all the jobs present in its memory.
- Press the down arrow to highlight the name of the job you want to update and press ENTER. MobileMapper displays the navigation screen that was last used.
- Unless this screen is already displayed, press NAV repeatedly until the Map screen is displayed. From this screen, you will now indicate the first feature you want to revisit. If necessary, press the IN or OUT button to adjust the scale so you can see this feature.
- Press any arrow key to switch to the cursor mode on the Map screen and then use the arrow keys to move the cursor over the feature you want to revisit first. It's a good idea to keep the Map info visible on the screen as it tells you exactly when the feature is selected. (The feature name appears in the lower part of the screen when the cursor is positioned over the feature.)
- When this happens, press ENTER. The Selected screen is now displayed showing the attribute values currently ascribed to the feature. Note that the **Goto** field is highlighted at the bottom of the screen.



Selected screen



Map screen showing
straight line to target

- Press ENTER to ask MobileMapper to guide you to this feature. If you simply press ENTER, you will make the selected feature your destination and all the navigation screens will be set to help you reach that feature. Press NAV to access any of these screens. On the Map screen, you can now see a straight line connecting your current destination to the selected feature.
- Walk to the feature according to the navigation instructions provided on the Map screen. You can use other navigation screens if you prefer (see also Navigation Screens chapter from page 26). You will know when you are close to the feature when the distance to the feature goes to zero or close to zero, or simply because you can identify it visually. Another nice way of being informed that you have arrived at the feature is to set the **Alarms** option (see explanations on page 54)
- After arriving at the feature, press the LOG button. This takes you back to the Selected screen.
- Now that you are near the feature, highlight the **Edit** field and press ENTER. You are now allowed to edit each of the feature's attributes.
- After reviewing the attributes that need to be changed, highlight the **Close** field at the bottom of the screen and press ENTER. This ends the review of this feature and displays the Map screen again.
- Follow the same 7 steps described above to revisit and update the other features present in the job.

The Repositioning function only applies to point features, not to line or area features.



**Selecting
Update Position**

2. Repositioning a Point Feature

If a point feature appears to be mislocated on the Map screen or if you wish to make the position more accurate (by using an external antenna, occupying point positions for more time, etc.), do the following once you have arrived at the feature and the Selected screen showing all the feature's attributes is displayed:

- Press MENU, select the **Update Position** option and press ENTER.

If you press NAV and go back to the Map screen, you will now see two features (one at the old position, the other at the new position). To remove the feature's old position, just move the map cursor so that the feature is off the screen. When you move the cursor back to the feature, only the new position will be visible.

3. Adding More Features and Attributes to the Job

If you want to add more features and descriptions to the existing job, you just have to record them exactly as you record features into a new job.

4. Closing the Job

To close the job, all you have to do is open up another job or turn the receiver off. To open another job, use the **Open Job** option after pressing the MENU button. You cannot accidentally lose data with MobileMapper without opening the receiver and losing or damaging the internal memory card.

The Map screen has two modes: Position and Cursor. Use any arrow key to select Cursor mode, ESC to return to Position mode

When a Position screen is displayed, press the Left or Right arrow key to display the other. Press this key again to return to the previous screen.

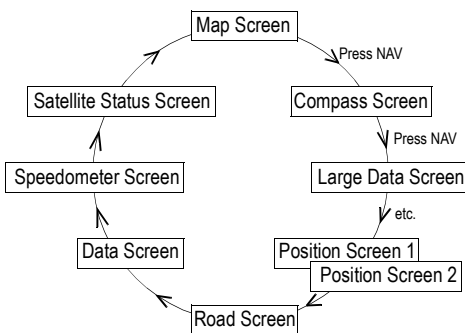
Except for the Satellite Status screen, all navigation screens can be customized.

Navigation Screens

MobileMapper offers 7 different navigation screens to help you locate yourself or navigate to waypoints or point features in an existing job. From any

displayed screen, simply press the NAV button to access navigation screens. To display the next navigation screen, press NAV again. The sequence of navigation screens is as shown above. It can be scrolled in the reverse direction by pressing ESC once any of these navigation screens is displayed.

Each type of navigation screen is presented hereafter.



Map Screen

The Map screen shows a map of the area surrounding your current location. Use the IN and OUT buttons to adjust the scale.

The Map screen is always in the Position mode when you access this screen. In this mode, your present position is indicated by the large arrow icon in the center of the display. If you are moving, the arrow will point in the direction that you are heading. At the bottom of the screen is the scale for the map displayed and two data fields that can be customized, or turned off, depending upon your needs.

The present position icon will change to an hourglass when the MobileMapper is unable to compute a position fix due to poor signal reception.



Map screen
in Position mode



**Map screen in
cursor mode**

The dotted line on the map displays the history of where you have traveled since the last time you cleared the track history.

Press any of the arrow keys to switch to the Cursor mode. In this mode, you are provided with a cross hair cursor that can be moved on the map with the arrow keys. At the bottom of the display is the information for the position of the cursor relative to your present position (heading and distance). Also any points of interest or GIS features that the cursor is over will be shown.

To return to the Position mode, press ESC. The cursor will disappear and the present position icon will appear centered on the map.

To set and/or customize the Map screen, use the functions described below. These context-sensitive functions are accessed by pressing the MENU button while the Map screen is displayed.

Show/Hide Map Info

Use this option to show or hide the two data fields displayed at the bottom of the Map screen. To customize these fields, see **Select Map Info** below.

The Map screen must be in Position mode if you wish to customize data fields. If the Map screen is in cursor mode (cursor is a cross-hair), press ESC to return to the Position mode

Select Map Info

Use this option to tell MobileMapper which data should be displayed at the bottom of the Map screen. This can be:

- **Customize Fields.** This function is equivalent to the **Customize** function available from all navigation screens other than the Map screen. See page 38.
- **Street info:** This option displays an information block at the bottom of the display showing the name of the street your present position or cursor is on. If in the cursor mode, the bearing and distance from your present position are displayed.

Map Setup

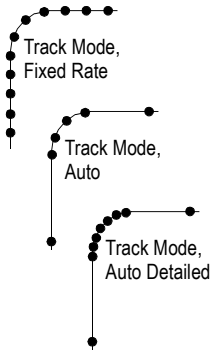
You can make the following settings using the **Map Setup** option. To access this option, press MENU when the Map screen is displayed, select **Setup** and then select **Map Setup**. The screen that appears contains two tabs: the **Format** and **Display** tabs.



**Map Setup screen,
Format tab**

On the **Format** tab, you can set the following parameters:

- **Orientation:** You can change how the map is orientated on the screen to either North Up, Course Up or Track Up. Default is North Up.
- **Detail:** Use this field to set the map detail. The detail of the map can be set to highest, high, medium, low or lowest. This changes the zoom level that different map objects (cities, highways, labels, etc.) are displayed. If you have set a zoom level and the display is too cluttered, set the map detail to a lower level; conversely set it to a higher level to view more detail.



Map Setup screen,
Display tab

- **Track Mode:** Allows you to set how often MobileMapper stores track points. Setting the mode to **Off** stops the unit from saving any new track points. With **Auto** or **Auto Detailed** enabled, MobileMapper uses a method for track point storage that maximizes memory. Using **Auto**, you will see more points on and near turns and less points on straight stretches of the map. You also have the option of selecting fixed intervals for track point storage.
- **Primary Usage:** MobileMapper can be set to either **Land** or **Marine** usage. When in Land (default), the map displays land areas in white and water areas in blue. For marine applications it may be desirable to reverse the display, showing water as white and land as blue. This will make reading some of the data information on the water easier.

From the **Display** tab, you can customize the Map screen by specifying the items that MobileMapper should display on the map:

- **Waypoints** (default: checked)
- **Track Lines** (a dashed line; Default: Checked)
- **Pos-Dest Line** (line connecting current position to destination)
- **Depart-Dest Line** (line connecting initial position to destination)

Check the items you want to show and clear those you want to hide. You can also check or clear all these items in a single operation by respectively selecting **Mark All** or **Clear All** just above these items and then pressing ENTER

Goto Cursor

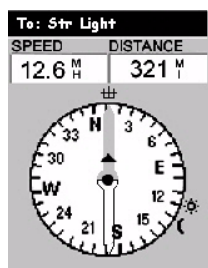
If the Map screen is in cursor mode, the first option available from the list displayed after pressing the MENU button is **Goto Cursor**. Select this function when you want MobileMapper to guide you to the location where the cursor currently is on the Map screen. Starting from your current location, MobileMapper will indicate the distance to go and the heading to the cursor location.

Compass Screen

The two data fields on top are customizable. The lower portion of the Compass screen not only displays your heading in a graphical manner, but also displays the relationship of the sun, moon and your destination (if navigating on a route) to your heading.

The Compass screen contains the following information, from top to bottom:

- In the title bar: destination name if you are using the Goto function
- Data Fields: customizable data fields (see **Customize** option below). Some of the data displayed requires you to be moving to be computed. Invalid data is indicated by dashes.
- Icon representing destination: Displayed outside the compass when you are using the Goto function. This provides you with the direction you need to head to arrive at the destination. When you are on course and heading straight for the destination, the destination icon will be lined up with the heading marker
- Compass/Heading marker: Using the compass and the heading marker, you can view your heading information in a familiar manner. Note that you need to be moving for this data to be valid.



Compass Screen

To customize the Compass screen, use the function described below. This context-sensitive function is prompted when you press the MENU button while the Compass screen is displayed.

Customize

See page 38.

Large Data Screen

The Large Data screen is similar to the Compass screen but here the compass has been removed to allow for large display of the navigation data. This screen is ideal for when you have your unit mounted on the dashboard of a vehicle. Even from a distance the customizable information can be read with ease.

To: Str Light	
BEARING	247° M
HEADING	321° M
SPEED	36.1 ^M / _H
DISTANCE	12.6 ^M / _I

Large Data Screen

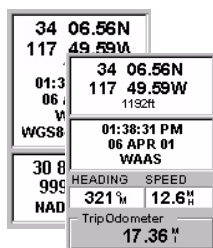
The Large Data screen contains the following information, from top to bottom:

- In the title bar: destination name if you are using the Goto function
- Data Fields: customizable data fields (see **Customize** option below). Some of the data displayed requires you to be moving to be computed. Invalid data is indicated by dashes.

To customize the Large Data screen, use the function described below. This context-sensitive function is prompted when you press the MENU button while the Large Data screen is displayed.

Customize

See page 38.



Position Screens 1 & 2

To switch from a screen to the other, just press the Left or Right arrow key

The same data as on Position screen 1 is displayed on Position screen 2 except that the lower part of the screen, containing the two data fields and the trip odometer field, is replaced with the current position's coordinates expressed in the chosen secondary coordinate system and map datum.

Position Screens

Position screens #1 and #2 display your present position using the coordinate systems that you have selected. This screen shows all of the basic position, time and satellite information. Additionally, on Position screen #1, current navigation information is shown in the bottom half of the screen.

For the sake of comparison, Position screen #2 provides the coordinates of your present position both in the selected primary coordinate system and map datum, and in the selected secondary coordinate system and map datum.

Position screen #1 contains the following information, from top to bottom:

- Coordinates and elevation of your current position: Displays your current position in the chosen coordinate system. Also displays the elevation of the current position. If MobileMapper is not computing position fixes, the last computed position is displayed.
- GPS Status: Provides information on the current status of the GPS receiver portion of the MobileMapper (see table below).

Message	Description
Searching - 1st sat	Searching for 1st satellite
Searching - 2nd sat	1st satellite found; searching for 2nd satellite
Searching - 3rd sat	2 satellites are being tracked; searching for a 3rd
Searching - 4th sat	3 satellites are being tracked; searching for a 4th
Collecting Data	All satellites needed for position fix are being tracked and position is being computed
Averaging	MobileMapper is computing fixes; speed is near 0.0 and so position is being averaged
EPE xxx.	Estimated Position Error. MobileMapper is computing fixes while moving
DGPS	Computed fixes are being differentially corrected

- **Data Fields:** customizable data fields (see **Customize** option below). Some of the data displayed requires you to be moving to be computed. Invalid data is indicated by dashes.
- **Trip Odometer:** The odometer performs like the odometer in your car. It can be reset through the MENU button.

To customize the Position screens, use the functions described below. The first of these context-sensitive functions is prompted when you press the MENU button while a Position screen is displayed. Some of these functions also exist in the Setup menu.

Coord System, Map Datum and Elev Mode

See page 51 and page 52

Reset Trip (from Position screen 1 only)

If you select this option and you press ENTER, a warning message is displayed asking you to confirm your choice. To reset the trip odometer, highlight the **Yes** field and press ENTER.

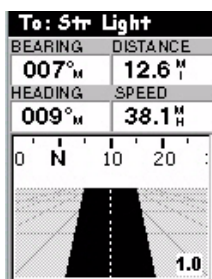
Customize (from Position screen 1 only)

See page 38.

Road Screen

The Road screen presents your route as if you were traveling on a road. When you need to make a turn, the road will graphically display the turn and the direction. Waypoint and destination icons will be displayed relative to your position as they come into view. Above the road is a compass that displays your heading and above that are four customizable data fields.

The Road screen contains the following information, from top to bottom:



Road Screen

- In the title bar: destination name if you are using the Goto function
- Data Fields: customizable data fields (see **Customize** option below). Some of the data displayed requires you to be moving to be computed. Invalid data is indicated by dashes.
- Compass: Displays your heading in a familiar compass format.
- Road: This graphically displays the route (Goto) that is active. As you move left or right of your intended track, the road will move on the display indicating which way you need to steer to get back on track. Ideally, the road would be centered on the display. Also, you will see upcoming turns in advance allowing you to make necessary preparations.
- Scale indicator: Use Zoom In/Out to change the scale.

To customize the Road screen, use the function described below. This context-sensitive function is prompted when you press the MENU button while the Road screen is displayed.

Customize

See page 38.

Data Screen

When you need to see a lot of information in one place then you will appreciate the Data screen. The Data screen provides you with six data fields and an active compass that is the same as the one used on the road screen. You have the option of customizing this screen by selecting what data is displayed in the upper six fields. The lower portion of the screen is occupied by a compass providing your heading.

The Data screen contains the following information, from top to bottom:

To: Str Light	
SPEED	DISTANCE
12.6 ^M _H	38.2 ^M _I
VMG	XTE
14.1 ^M _H	1.2 ^M _R
HEADING	BEARING
009 [°] _M	007 [°] _M
330 N 30 6	

Data Screen

- In the title bar: destination name if you are using the Goto function
- Data Fields: customizable data fields (see **Customize** option below). Some of the data displayed requires you to be moving to be computed. Invalid data is indicated by dashes.
- Compass: Displays your heading in a familiar compass format.

To customize the Data screen, use the function described below. This context-sensitive function is prompted when you press the MENU button while the Data screen is displayed.

Customize

See page 38.

Speedometer Screen

The Speedometer screen displays your speed in a familiar graphical format. There are four additional data fields at the top of the display that can be customized to display the data that you need. The bottom of the screen contains a trip odometer that will record the distance travelled since the last time the odometer was reset.

The Speedometer screen contains the following information, from top to bottom:



Speedometer Screen

- In the title bar: destination name if you are using the Goto function
- Data Fields: customizable data fields (see **Customize** option below). Some of the data displayed requires you to be moving to be computed. Invalid data is indicated by dashes.
- Speedometer: Displays your speed using a familiar speedometer display. The scale of the speedometer is not adjustable but will change dynamically to best display your speed.
- Trip Odometer: The odometer performs like the odometer in your car. It can be reset through the MENU button.

To customize the Speedometer screen or reset the trip odometer, use the functions described below. The first of these context-sensitive functions is prompted when you press the MENU button while the Speedometer screen is displayed.

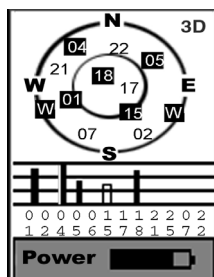
Reset Trip

If you select this option and you press ENTER, a warning message is displayed asking you to confirm your choice. To reset the trip odometer, highlight the **Yes** field and press ENTER.

Customize

See page 38.

Satellite Status Screen



Satellite Status Screen

Although the Satellite Status screen is part of the navigation screen sequence, it is not actually a navigation screen. For more details on this screen, refer to page 8.

When MobileMapper is computing your position, an additional information appears in the right-upper corner with two possible values: 3D or 2D. 3D means the computed position is 3-dimensional (elevation computed). In 2D (2-dimensional), elevation is not computed. Mobile Mapper assumes that the last computed or entered elevation is the elevation for all computed positions.

Customizing Data Fields on Navigation Screens

Except for the Satellite Status screen, all navigation screens can be customized through the following procedure:

Available data:

- BEARING
- DISTANCE
- SPEED
- HEADING
- VMG (Velocity made good)
- CTS (Course to steer)
- ETA (Estimated time of arrival)
- ETE (Estimated time enroute)
- XTE (Crosstrack error)
- TURN
- Elevation
- TIME
- DATE
- EPE (Estimated Positional Error)
- AVG. SPEED (Average speed)
- MAX. SPEED

- Press NAV repeatedly until the desired navigation screen is displayed
- Press MENU
- Highlight **Customize** and press ENTER. For the Map screen, first highlight **Select Map Info** and press ENTER. Then highlight **Customize Fields** and press ENTER.
- On the Navigation screen now shown in edit mode, highlight the data field to be changed using the left/right arrow and press ENTER
- Choose the data in the list that you wish now to display in this field. Press ENTER. Data change in the field is immediate.
- Resume this procedure for all the fields that need to be changed on this screen and on the other navigation screens.

GOTO Function

Purpose

You will use the Goto function to ask MobileMapper to guide you from your current position to a destination point.

After you will have specified which destination point to go to, you will select your favorite navigation screen. You will then be able to read the information computed by MobileMapper to help you reach the destination.

Destination Point Types

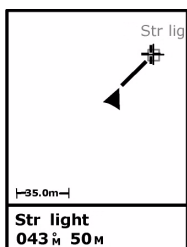
Not only can MobileMapper guide you to previously logged GIS features but also to other pre-loaded or created points. In fact, the destination point can be any of the following:

- Any feature logged in the open GIS job which you will select graphically on the Map screen
- Any waypoint created earlier using the MARK function. This type of point is stored as a “User” Point of Interest (POI)
- Any point of interest (POI) pre-loaded in MobileMapper.

Selecting a GIS Feature as the Destination Point

Press NAV until the Map screen is displayed. Press the arrow button in any direction to make the selection cursor appear and to position it over the feature you want to go to. You know that the cursor is positioned over the feature when the “Cursor” indication at the bottom of the screen is replaced with the name of that feature.

Press ENTER. A new screen appears giving the current description of the feature. At the bottom of the screen, the **Goto** field is highlighted: simply press ENTER again to enable the Goto function with this feature as your destination. Then select your favorite navigation screen, using the NAV button, and navigate to this feature.



Selecting a GIS feature
on the Map screen

Selecting a POI as the Destination Point

Press MENU, scroll to the **GOTO** option and press ENTER. The possible categories of POIs are now listed on the screen. Select the category the destination point belongs to.

Before pressing ENTER to list all the points stored in this category, choose how you want these points to be listed by setting the **Find By** field. Press the left/right arrow to set this field. Two values are possible in this field:

- **Alphabetical**: Points will be listed in alphabetical order. MobileMapper will then help you find the desired point through one of the following two methods: *Keyboard Search* and *Alphabetic Scroll*.

Keyboard Search: Before displaying the list of points in alphabetical order, MobileMapper displays a keyboard that you can use to enter the first few characters of the point you are looking for. When you highlight **OK** and press ENTER, (or as a shortcut, press IN), you are taken to the alphabetical list with the point you began typing at the top of the display. Anytime you are viewing the list of points, you can re-access the keyboard by pressing ESC.

Alphabetic Scroll: You can use the IN and OUT buttons to step up or down the alphabet. If you were viewing points beginning with the letter “A”, pressing OUT would take you to the first waypoint beginning with “B”, and then “C” and so forth. Pressing IN does the same function but only in reverse.

- **Nearest To**: Only the 20 points from this category the closest to your position will be listed.

When these 20 points are listed, MobileMapper indicates the bearing and distance to your current position from the first point in the list. You can change the point from which the nearest points are found. With the **Nearest To** field now highlighted, press ENTER and scroll to the category where this new point can be found. Select a new point and press ENTER.

*NOTE: If you have already pressed the arrow keys and one of the nearest points in the list is highlighted, use the ESC button to scroll back to the **Nearest To** field*

The screenshot shows a handheld device screen titled "Mark". It contains several input fields: "Icon" with a small icon, "Name" with the text "WPT001", "Location" with the coordinates "37°00.00N" and "119°00.00W", and "Elevation" with the text "00000ft". Below these fields is a "Message" section with the text "CREATE MESSAGE?". At the bottom of the screen are two buttons: "Save" and "Route".

Mark screen

The Mark option from the Menu list provides a function similar to the LOG button when held down for 2 to 3 seconds

Saving Your Current Position as a Waypoint

Saving your current position as a waypoint is very easy and can be done regardless of whether a GIS job is open or not.

From any navigation screen, just hold down the LOG button for 2 to 3 seconds until the Mark screen is displayed. This screen provides the description of the waypoint you are about to save.

You can accept all the defaults by simply pressing ENTER (**Save** field already highlighted).

You can also edit the **Icon**, **Name** and **Message** fields using the arrow keys to access these fields. Obviously you should keep the **Location** and **Elevation** fields unchanged as they contain the coordinates of your current location.

Creating a Waypoint With the Map Cursor

This is another way of creating a waypoint whose coordinates will be based on the location of the cursor on the Map screen.

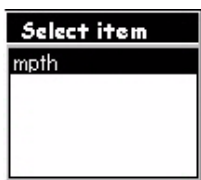
Press NAV until the Map screen is displayed. Press any arrow key to make the cursor visible on the map. Move the cursor to the desired location on the map using any arrow keys. Hold down the LOG button for 2 to 3 seconds until the Mark screen is displayed.

You can accept all the defaults by simply pressing ENTER (**Save** field already highlighted).

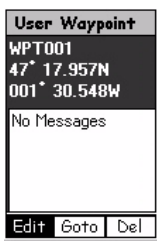
You can also edit the **Icon**, **Name** and **Message** fields using the arrow keys to access these fields. Obviously you should keep the **Location** and **Elevation** fields unchanged as they contain the coordinates of the cursor location.

Editing/Deleting a User Waypoint

You can edit/delete a waypoint from the Map screen:



Select Item screen



User Waypoint screen

- Press NAV until the Map screen is displayed
- Use the IN or OUT button, or move the cursor so that the waypoint you want to edit or delete is visible on the screen
- Position the cursor over that waypoint. The name of the waypoint then appears at the bottom of the screen.
- Press ENTER. This opens the Select Item screen on which MobileMapper lists the names of waypoints and POIs present in the vicinity. Highlight the waypoint you want to edit/delete.
- Press ENTER again. This opens the User Waypoint screen on which you can see the definition of the waypoint (coordinates+comments). At the bottom of the screen are three command fields that you can use for the following tasks:

Edit (default choice): Select this field if you want to edit the definition of the waypoint. The following parameters can be changed: icon, name, coordinates, elevation and comment.

Goto: Select this field if you want MobileMapper to guide you to this waypoint

Del: Select this field if you want to delete the waypoint. MobileMapper will then ask you to confirm that you really want to delete the selected waypoint.

Routes

As explained below, MobileMapper can handle two types of routes: GOTO route and multi-leg route.

GOTO Route

This is in fact a route that you define when:

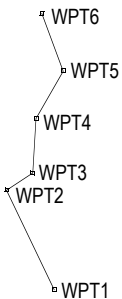
- You select a feature on the Map screen, you press ENTER to display the attributes of this feature, and you press ENTER again to enable the Goto function to this feature (by default, the **Goto** field at the bottom of the screen is highlighted). The same can be done to choose a POI or a waypoint as the destination point.
- You use the **GOTO** option from the Menu screen and you choose a POI or waypoint as the destination point.

GOTO routes are not saved in memory. When you turn your MobileMapper off and then back on, the GOTO route is gone. You need to create a new GOTO route if you intend on completing the route.

A GOTO route is a one-leg route whose two ends are your current position and the chosen destination point.

Multi-leg Route

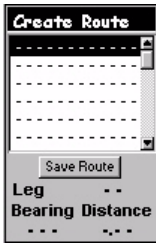
A multi-leg route consists of several waypoints or POIs that you should reach one after the other. The segment between any two consecutive waypoints or POIs is called a “leg.” Unlike GOTO routes, multi-leg routes can be stored in memory.



1. Creating a Multi-leg Route

Press NAV to display a navigation screen, press MENU, scroll down to **Routes** and press ENTER.

The Route List screen is now displayed. Scroll down the list and highlight the first **Empty** route in the list. Press ENTER.



Create Route screen

The Create Route screen is now displayed. Note that the first line on this screen is highlighted.

Press ENTER. The Add WPT screen is now displayed. Select the category of points containing the first waypoint of the route and press ENTER. Choose a point from the list and press ENTER. The first waypoint in the route is now defined and you are now prompted to define the second one. Resume the instructions in this paragraph for the second point, then for the third, etc.

When the last point of the route is defined, highlight the **Save Route** field on the Create Route screen and then press ENTER to save the route.

2. Creating a Multi-leg Route from the Track History

Press NAV to display a navigation screen, press MENU, scroll down to **Routes** and press ENTER.

Regardless of which route is highlighted in the route list, press MENU again and highlight the **Save Trk to Rte** option. Press ENTER. MobileMapper then takes you back to the Route List screen on which you can see that the track history has been saved as the last route in the list. This route uses a naming convention of “T01P01 to T01Pxx” where Pxx indicates the number of points in the route.

3. Activating/deactivating a Multi-Leg Route

Press NAV to display a navigation screen, press MENU, scroll down to **Routes** and press ENTER.

In the Route List screen now displayed, scroll down the list and highlight the route you want to activate. Press MENU, highlight the **Activate Route** option and press ENTER. MobileMapper comes back to the Route List screen where the activated route now appears in bold characters. Press NAV to navigate along this route.

To deactivate this route, press MENU, highlight **Routes**, press ENTER, highlight the activated route (shown in bold characters), press MENU, highlight **Deactivate Route** and press ENTER. The route is now deactivated.



Route List screen

4. Other Functions Tied to Routes

You can also do the following on the highlighted route using the functions available from the MENU button (see also diagram on page 49):

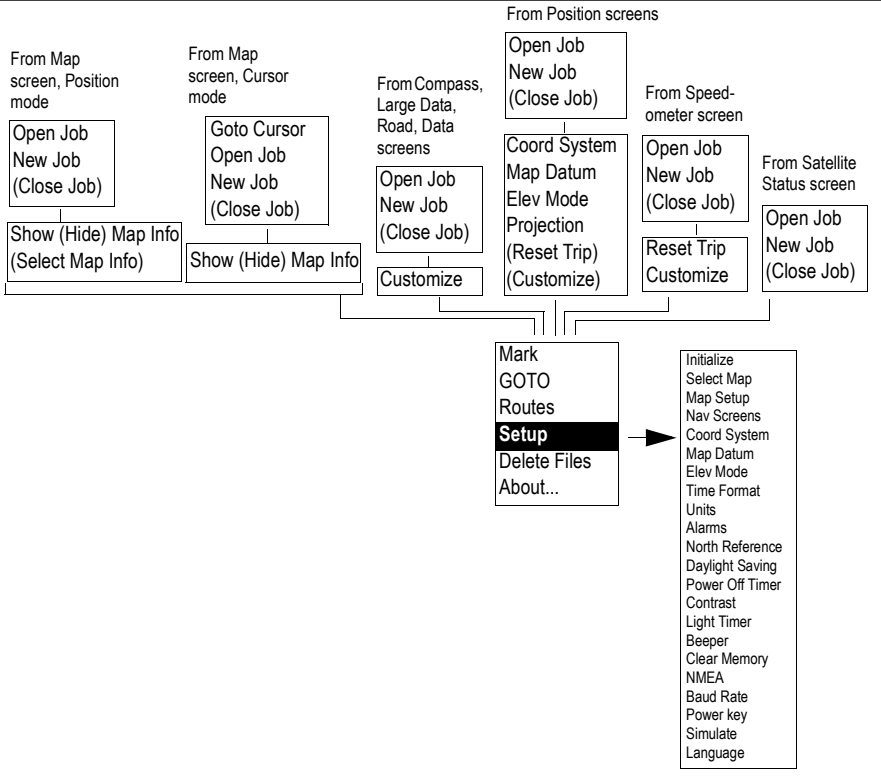
- Viewing the route on the Map screen by highlighting the **Map View Route** option and pressing ENTER. The Map screen then appears showing the route. Press ESC to come back to the Route List screen.
- Editing the route by highlighting the **View/Edit Route** option and pressing ENTER. From the View/Edit screen you can then press the MENU button to access options allowing you to insert, delete, replace the highlighted waypoint and then to save the changes made to the route.
- Reversing the route, i.e. reversing the direction of travel along the route, by highlighting the **Reverse Route** option and pressing ENTER. This instantly reverses the route. Note that the first and last waypoints in the route name have been swapped.
- Deleting the route by highlighting the **Delete Route** option and pressing ENTER. A message will appear asking you to confirm this operation.
- If a route has been activated, selecting the leg you want to follow by selecting the **Select Leg** option and pressing ENTER. The screen then shows the list of points making up the route. Select the point you want to navigate to and press ENTER. A warning message will appear asking you to confirm the leg change. After choosing **Yes** or **No**, press ESC twice to return to the navigation screen.

MENU button

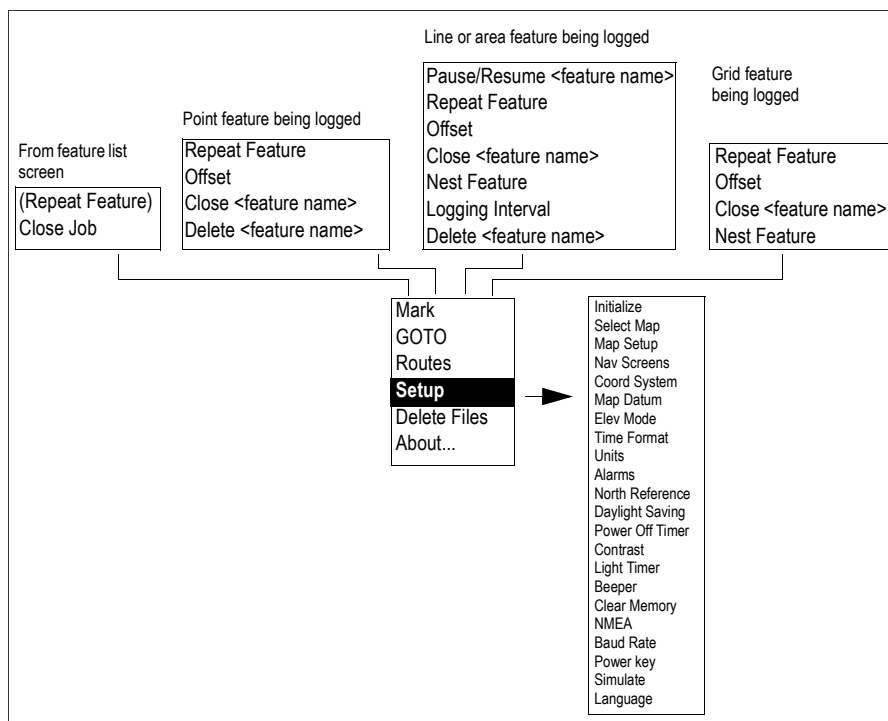
In the previous chapters, we have introduced most of the context-sensitive functions available from the menu list. In fact, these functions are closely tied to MobileMapper's main functionality (GIS data logging and navigation). In this chapter, we present the supplemental functions.

The list of functions that you can have access to by pressing the MENU button depends on which navigation screen is displayed and whether GIS data logging is in progress or not. The context-sensitive functions are always listed first in the menu list (after the ever present **Open Job / New Job** or **Close Job** options). The other functions, which are always available as long as the MENU key is active, are always last in the list. On the menu screen, a horizontal line separates context-sensitive functions from the other ones.

The diagram below shows the available functions when pressing MENU while navigation screens are displayed and no GIS data logging is in progress. These functions are listed in the same order as on the screen. Context-sensitive functions appear in the upper frames. Lines connect the context-sensitive functions to the permanent functions so you can see what the entire menu is made of in each context.



The second diagram shows the available functions when pressing MENU when a GIS job is open and one of the GIS logging-specific screens is displayed.



When data logging is in progress and one of the navigation screens is displayed, then the functions specific to the selected navigation screen and to GIS data logging add up in the menu (functions specific to data logging are listed first).

(See also **Routes** option, page 49, for which the MENU button gives access to specific functions.)

When you select the **Setup** option in the menu list, another menu is displayed containing a number of options, as shown in the above two diagrams.

All the options available from the Menu screen are described below.

Open Job

This option provides another way of opening a GIS job. It is similar to selecting the **Open Existing Job** option that is prompted on the screen after pressing the LOG button when no job is open yet. Selecting this option when a job is already open allows you to close the currently open job and open another one.

New Job

This option provides another way of creating a new GIS job. It is similar to selecting the **Create New Job** option that is prompted on the screen after pressing the LOG button when no job is open yet.

Mark

This option allows you to quickly create a new waypoint whose coordinates will be those of your current location.

A typical use of this option is when you are located at a new point of interest and you wish to log its position.

When you select **Mark** in the menu list, MobileMapper displays the Mark screen with the following default values:

- Default icon in the **Icon** field
- “WPTxxx” as waypoint name in the **Name** field. “xxx” is a number that MobileMapper automatically increments as you create new waypoints
- Coordinates of your current location in the **Location** and **Elevation** fields

If you agree with all these parameters, and as the **Save** field is already selected at the bottom of the screen, you just have to press ENTER to create the new waypoint. This is the fastest procedure to create a new waypoint.

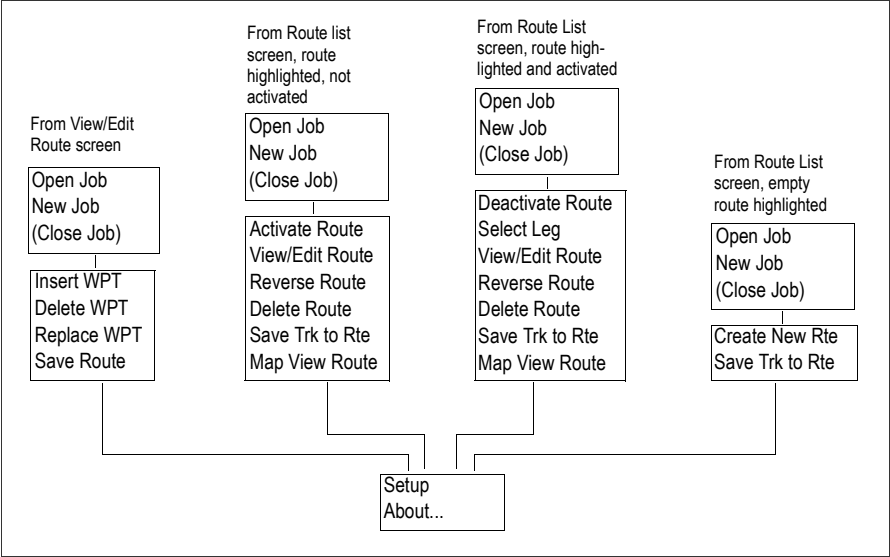
On the other hand, if you have to change any of these parameters or add a comment in the **Message** field, then you have first to edit the corresponding fields before selecting the **Save** field and pressing ENTER

GOTO

This option is discussed in detail on page 39.

Routes

This option is discussed in detail on page 43. The MENU button gives access to a list of specific options when the **Routes** option is enabled. This is summarized in the diagram below.



Setup Menu

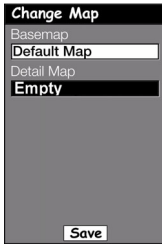
This menu contains most of the ancillary functions introduced at the beginning of this chapter. Each of these functions is described below.

1. Initialize

This option guides you through the complete procedure that allows you, any time, to initialize MobileMapper.

2. Select Map

This option is mainly used to choose the base map used as background map on the Map screen. The following parameters can be set on the Change Map screen:



Change Map screen

- **Basemap:** If no SD card containing a specific map is installed in MobileMapper, then only the **Default Map** option can be selected in this field. The default map is always present in MobileMapper. If an SD card containing specific maps is installed in the receiver, then you can choose one of them as the one shown on the Map screen.
- **Detail Map:** If no SD card containing a specific map is installed in MobileMapper, then only the **Empty** option can be selected in this field as the default map only has one level of details. If an SD card containing specific maps is installed in the receiver and you chose one of them in the previous field, then you can choose the level of details you wish to see on the Map screen.

After choosing the desired options for these parameters, highlight the **Save** field at the bottom of the screen using the down arrow and then press ENTER.

3. Map Setup

This option allows you to set the viewing options for the Map screen (see page 28).

4. Nav Screens

This option allows you to remove the navigation screens that you do not need from the navigation screen sequence that you scroll by pressing NAV repeatedly (see page 26).

When selecting this option, you are asked to turn off or on each of the available navigation screens. Choose “Off” and press ENTER for all these screens that you are not currently using. Note that the Map screen cannot be turned off. You must cycle through all the screens in order to save any changes to the On/Off status of any screen.

5. Coord System

This option allows you to define a primary coordinate system, and also a secondary coordinate system if you need one.

By defining a coordinate system, you tell MobileMapper how the calculated coordinates should be expressed. For example, if you choose **Lat/Lon**, all coordinates will be expressed as angles (latitudes and longitudes) and if you choose **UTM** or any other system, coordinates will all be distances (Northings and Eastings) from the chosen origin.

When you select the **Coord System** option from the Setup menu, MobileMapper asks you to specify which system you want to define (primary or secondary). Select it and press ENTER. In the list that appears, select the coordinate system you want to use and press ENTER. Depending on your choice, MobileMapper may then ask you additional information:

*Default coordinate
systems:
Primary: Lat/Lon
Secondary: UTM*

- Lat/lon display format
- Distance units if you chose another system (other than UTM). If for example a calculated coordinate is 249173N and you choose 1 meter as distance unit, then the coordinate will appear as 249173N on the Position screen, or 24917N if you choose 10 meters, or 2491N if you choose 100 meters, etc.
- For some systems, information on grid zones or types
- For the User Grid, projection type (Transverse Mercator, Lambert Conic, Stereographic, Oblique Mercator or Polyconic), coordinates of origin, scale factor, unit to meters conversion and false Easting and Northing at origin

6. Map Datum

This option allows you to define a primary map datum, and also a secondary map datum if you need one.

A map datum is a geographic reference that MobileMapper will refer to to calculate the coordinates of your position. MobileMapper holds more than 70 different map datums in its memory.

Default Map datums

Primary: WGS84

Secondary: WGS84

After selecting the **Map Datum** option from the Setup menu, choose the map datum from the list that applies to your country and working area and then press ENTER.

7. Elev Mode

This option allows you to choose between 3D and 2D mode.

In 3D mode, MobileMapper will compute the 3 coordinates of your position: horizontal coordinates plus elevation.

Default Elev mode: 3D

In 2D mode, MobileMapper will not calculate your elevation. Only the horizontal coordinates of your position will be computed. MobileMapper will assume that the last computed or entered elevation is your current elevation.

Operating in 3D requires at least 4 tracked satellites whereas 2D requires only 3.

Consider using the 2D mode when the conditions of reception are poor or if the working area is relatively flat and elevation is not important.

After selecting the **Elev Mode** option from the Setup menu, choose the mode that matches your case of use and then press ENTER.

8. Time Format

This option allows you to select the time format you want to use in MobileMapper. You can choose from three different time formats: Local 24Hrs, Local AM/PM or UTC.

*Default time format:
Local AM/PM*

After selecting the **Time Format** option from the Setup menu, choose the time format that suits you and then press ENTER.

If you have selected **Local 24 Hrs** or **Local AM/PM**, you will be prompted to enter your local time.

9. Units

This option allows you to select the units of measurement that will be used when displaying navigational data or features being logged.

*Default units: km/m/kph/
hectares*

All sets of units are formatted as follows: **long distance unit/short distance unit/speed unit/area unit**. You can select from 5 different sets of units.

You can also create your own set of units by selecting **Advanced** at the end of the list. You are then prompted to specify the unit you wish to use for each type of possible measure, i.e. Distance, Speed, Elevation, Bearing and Area.

After selecting the **Units** option from the Setup menu, choose a set of units from the displayed list and then press ENTER. If you have selected **Advanced**, a new list appears prompting you to choose a unit for each type of measure. Select the first measure in the list, press ENTER, choose a unit and press ENTER again. This takes you back to the former screen where you can select the second measure, etc. When all units are defined, press ESC to come back to the Setup menu.

10. Alarms

All of the Alarm options are set in the same way. The instructions below apply to all of the Alarm settings. When the beeper is turned on for alarms (see **Beeper** option) an audible beep will be sounded for the alarm. A visual alert is displayed for the alarm whether the beeper is turned on or off.



Alarms menu

Setting the Arrival Alarm: The arrival alarm alerts you that you have arrived at the destination of your GOTO route or to the destination of any leg in a route you are navigating on. This option allows you to set the distance, in the measurement units you selected, from the destination at which the alarm will begin to sound.

Setting the PDOP Alarm: This turns on or off the alarm that can sound whenever MobileMapper has lost its ability to compute accurate position fixes due to poor geometry of the GPS constellation. Generally, PDOP values less than or equal to “5” are indicative of good operating conditions. So it is a good idea to set this alarm to “5.” To turn off the PDOP alarm, enter “00.”

NOTE:

Apart from the Arrival and PDOP alarms, MobileMapper will generate a warning message on the screen in each of the following two cases:

- “Low Memory.” This message will appear when the handheld is running out of memory. If a job is being logged, then the occurrence of this message will automatically stop GIS data logging. You will however be allowed to enter the attribute values of the current feature before the job is closed.
- “Out of Memory.” This message will appear when the memory is full. The occurrence of this message will immediately close the currently open job and you will not be able to log any new feature until you free some space in memory.

*Default North
Reference: True*

11.North Reference

This option allows you to define the type of North reference you want MobileMapper to use. This can be True North, Magnetic North, Military True North or Military Magnetic North.

After selecting the **North Reference** option from the Setup menu, choose the desired North Reference from the displayed list and then press ENTER.

12.Daylight Saving

This option allows you to select the region where you are located so that MobileMapper can automatically adjust the time displayed to compensate for daylight saving time. You can select one of three possible regions:

- **United States:** Daylight saving starts on the first Sunday in April and ends on the last Sunday in October
- **European Union:** Daylight saving starts on the last Sunday in March and ends on the last Sunday in October
- **Customize:** this option allows you to set the month and day that daylight saving starts and ends in your area.

Default: The appropriate daylight saving time (United States and European Union only) will automatically be set during startup when you use mobileMapper for the first time.

After selecting the **Daylight saving** option from the Setup menu, press ENTER again to list the three available regions. Choose one using the up/down arrow and then press ENTER. Press ESC to come back to the Setup Menu screen. If you chose **Customize**, first set all the displayed fields according to your local daylight saving times before pressing ESC.

Default: Off

It's a good idea to use this option when you transport your MobileMapper unprotected in a bag. This will prevent the batteries from being entirely discharged after the PWR button has been inadvertently depressed.

13. Power Off Timer

Conserving battery life is important to any handheld GPS user. The Power Off Timer option provides another tool in saving battery life.

Selecting **On** will allow you to select the mode and how long MobileMapper will stay powered on.

- If the **Power off mode** you select is **Time**, then the **Power off Timer** field allows you to select time that MobileMapper will remain on before automatically powering off is no keys are pressed (1 2, 4, 10, 30 or 60 minutes).

If the **Power off mode** you select is **Position**, the **Power Off Timer** field sets how soon MobileMapper will be powered down when the position has not changed and if no keys have been pressed.

14. Contrast

This option allows you to set the screen contrast. After selecting this option, a new screen appears on which you can set the percentage of contrast using the left/right arrows to respectively decrease or increase that percentage. The impact of your contrast setting upon different color bars is instantly shown in the lower part of the screen.

15. Light Timer

This option allows you to set the time interval that will be used to turn off the display backlight when not in use. Times available are: 30 seconds, 1, 2, 4 or 10 minutes, or Timer Off.

Default: 4 minutes

After selecting the **Light Timer** option from the Setup menu, use the up/down arrow to highlight the desired choice and then press ENTER.

16. Beeper

This option allows you to select which actions will cause the beeper to sound. You can select one of the following choices:

- **Off** (beeper will never sound)
- **Keys Only** (pressing a key causes a beep)
- **Alarms Only** (when an alarm is activated)
- **Keys & Alarms** (beeper will sound when a key is pressed or an alarm is activated)

After selecting the **Beeper** option from the Setup menu, use the up/down arrow to highlight the desired choice and then press ENTER.

17. Clear Memory

This option allows you to clear one of the following data sets from MobileMapper's memory:

- **Track history**: Will clear the track history displayed on the Map screen from memory
- **Wpts/Routes**: Will clear all waypoints and routes from memory
- **Routes**: Will clear all routes from memory
- **Reset default**: Will reset the receiver by restoring all factory defaults
- **All**: Will clear all memory

After selecting the **Clear Memory** option from the Setup menu, use the up/down arrow to highlight the desired choice and then press ENTER. MobileMapper will ask you to confirm your choice. If you have selected **All**, MobileMapper will then shut off. The next time it is turned on, it will prompt you that it needs to be initialized.

18.NMEA

This option allows you to select the NMEA message that will be output from MobileMapper. Your choice will depend on which message is needed by the device connected to MobileMapper:

- **V1.5 APA:** Autopilot Sentence “A”
- **V1.5 XTE:** Crosstrack error according to NMEA0183 V1.5
- **V2.1 GSA:** Standard GPS position message according to NMEA0183 standard in version 2.1

After selecting the **NMEA** option from the Setup menu, use the up/down arrow to highlight the desired choice and then press ENTER.

19.Baud Rate

This option enables you to set the baud rate of the data being sent out from the MobileMapper’s output port. The possible choices are: 1200, 4800, 9600, 19200, 57600 or 115200 baud.

After selecting the **Baud Rate** option from the Setup menu, use the up/down arrow to highlight the desired choice and then press ENTER.

20.Power Key

This option allows you to change how the PWR button operates in turning MobileMapper on or off. Two choices are possible:

- **No protection:** this is the normal case of use. With this option enabled, you will have to press the PWR button to turn MobileMapper on. You will press the PWR button again to turn MobileMapper off.
- **On/Off protected:** To turn MobileMapper on with this option enabled, you will have to press and hold the PWR button until the first screen is displayed. To turn it off, you will have to press the PWR button, and then press the ENTER button before the power off timer is done.

Default: No protection

After selecting the **Power Key** option from the Setup menu, use the up/down arrow to highlight the desired choice and then press ENTER.

21.Simulate

This option allows you to set the simulator. It shows you how MobileMapper uses its various functions based on a simulated journey. The simulator is useful for learning or demonstrating MobileMapper functions when indoors and there is no GPS reception. When the simulator is on, MobileMapper quits normal operation to operate in the simulator mode. You can choose one of the following three options when you access the **Simulate** option:

- **Off:** Will turn the simulator off. MobileMapper will return to normal operation
- **Auto:** Will turn the simulator on. A predefined heading and speed rate will be used.
- **User:** Will turn the simulator on. A user-defined heading and speed rate will be used.

After selecting the **Simulate** option from the Setup menu, use the up/down arrow to highlight the desired choice and then press ENTER.

If you have selected **User**, MobileMapper will then ask you to enter heading and speed data. A message will then appear warning you that enabling the simulator will necessarily clear track history. Make the appropriate choice.

If you have selected **Auto**, MobileMapper will also display the warning message about track history.

22.Language

This option allows you to select the language that MobileMapper will use to display text.

TIP: If you change the language setting in MobileMapper just to see what it looks like and need to get back to the Language Select screen, follow these instructions. Press NAV until the Satellite Status screen is displayed and press MENU. Select the sixth item in the list and press ENTER. Press the up arrow once and press ENTER. You are back at the Language Select screen.

Delete Files

This option allows you to list the job files stored in memory. Use the up/down arrow to scroll through the list.

A symbol is placed before each filename. The meaning of this symbol is as follows:

- > Indicates that this file is the current file into which data is being recorded
- + Indicates that the file has not yet been downloaded from the handheld
- Indicates that the file has been downloaded from the handheld.

Pressing ENTER will display the File Info dialog box showing the name, size and creation date for the job file you have highlighted in the list.

You can delete this file by pressing ENTER again (**Delete** field already highlighted) or you can come back to the job file list by pressing ESC.

About...

The About... screen displays the current status of your MobileMapper. Using the About... screen you can tell what the version of the software is, the version and memory size of the base map, the number of and total memory size of detailed maps you may have installed, and how much free memory is available.

2. MobileMapper Office Software

Introduction

The functions supported by MobileMapper Office are listed below:

- **Creating Job files.** A job should always contain a feature library. The name of the coordinate system selected in the program is also automatically attached to the job. The following information will also be saved to the job if the relevant data is displayed in MobileMapper Office: names of waypoint/route files and name of background map.
- **Uploading** job files to the MobileMapper handheld so that field operators can revisit previously completed jobs. When you do that, not only do you upload GPS positions and descriptions of the previously visited features but also the name of the coordinate system used in the job, the complete feature library associated with this job, and possibly the names of the background map and waypoint/route file attached to this job.
- **Downloading** completed job files from the MobileMapper handheld. Again, when you do that, the name of the coordinate system used in the job, the complete feature library associated with this job, and optionally the names of the background map and waypoint/route file attached to this job are downloaded in addition to the GPS positions and descriptions of the visited features.
- **Exporting** jobs in GIS formats (SHP, MIF, DXF). Note that exporting to DXF requires that a grid system, not a lat/lon system, be used in the job.
- Creating standalone feature libraries using the **Feature Library Editor**. GIS layers can be imported from your GIS system when you create a feature library.
- Creating lists of waypoints and routes using the **Waypoint/Route Editor**.

*Conventions used
for directions
of data transfer*



- Creating background maps using the **Background Map** and **Create Map** utilities. When you create a background map, you can import SHP, DXF or MIF files to add useful details to your map. Remember however that background maps are for viewing only. You cannot edit them or access information on their features. They provide a backdrop, which gives visual orientation for your data and waypoint files. If you want to edit the positions or descriptions of a SHP, MIF or DXF file, you should import them into a MobileMapper job file.
- **Uploading** individually any standalone feature library file or background map to the MobileMapper handheld.
- **Downloading** individually any standalone feature library file, background map file or waypoint/route file.
- Defining the **coordinate system** used by MobileMapper Office to display the coordinates of features and waypoints.

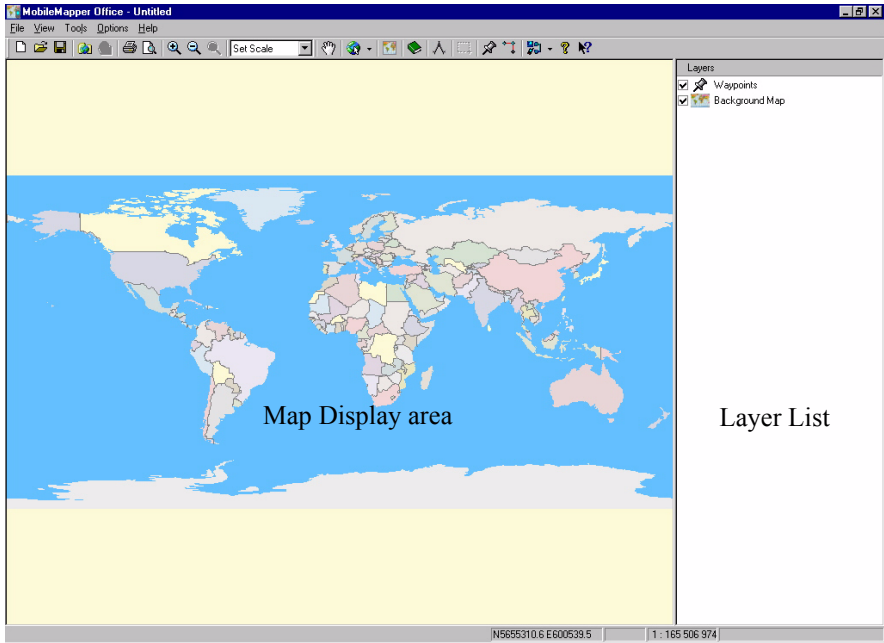
Installing MobileMapper Office

- Close all the applications running in Windows
- Insert the installation CD-ROM in the drive
- If the Autorun program does not start automatically from the CD-ROM, in the Windows task bar, click on Start and select Run...
- Type x:\setup (where x is the name of the CD-ROM drive) and then press Enter. After you specify where to install MobileMapper Office programs, and you agree to the terms of the software license, your computer will complete the installation process.

Launching MobileMapper Office

On the Window Task bar, select successively **Start**, **Programs** and **MobileMapper Office**. This starts the program causing the main window to open on the PC screen. You may alternatively start just the Feature Library Editor or the MobileMapper Transfer utility in order to use these standalone applications.

MobileMapper Office Main Window



The main window of MobileMapper Office is organized as explained below (see also above figure):

- The Map Display area runs from the bottom of the Menu bar to the bottom border. It takes up about two-thirds of the screen, right to left.
- At the bottom of the window, in the status bar, a box is used for displaying the geographic location of the cursor in the selected coordinate system
- The right third of the window is used to display the Layer List. When opened, the window relevant to the Waypoints or Routes List is placed over the Layer List.
- The Create Map editor and the Feature Library Editor are each displayed in a secondary window that appears at the center of the screen.

Map Display Area

Controlling the Content of the Map Display Area

The data displayed in the Map Display area is controlled by the Layers List shown on the right-hand area of the main window.

When you want one of the listed layers displayed in the Map Display area, just fill in the check box located before this layer name. As a result, all the items pertaining to this layer will be shown in the Map Display area. Conversely, if you clear the check box, none of the items pertaining to this layer will be visible in this area.

By default, the following two layers are always displayed:

- Waypoints
- Background map

If a job is open, each feature from the feature library used in the job also appears as a layer which can be displayed/hidden on the Map Display area. In addition, for these layers, you can change their look on the Map Display area by double-clicking on their names. Different icons are available for point features and different colors are available for line, area and grid features.

If you import a MIF or SHP file from your GIS system, then new layers will also be added to the Layer list.

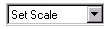
A number of viewing options are also available from the bottom of the **Options** menu to let you customize the Map Display area. You can for example show/hide the grid values, the scale interval, the feature and waypoint labels, etc.

The grid will reflect the choice of the coordinate system used. However, all features will be PLACED on the map only based on their WGS84 coordinates.

Below is the list of buttons from the Map toolbar that you can use to work on the content the Map Display area:



: Allow you to respectively zoom in, zoom out and fit the scale to the map content



: Allows you to adjust the scale to preset values



: Allows you to drag the map in any direction.



: Allows you to select the map of a continent for display in the Map Display area as a backdrop to the job data (and also to the background map itself, if displayed).



: Gives access to the Background Maps dialog from which you can attach/detach a background map for the currently open job



: (Gives access to the Feature Library Editor window; not a map-related button)



: Allows you to measure distances on the map. See next chapter.



: Allows you to define a map region




: Allows you to place new waypoints on the Map Display area

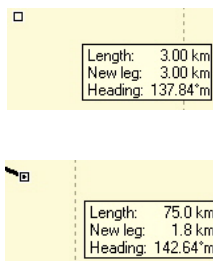


: Allows you to draw routes connecting waypoints shown on the map

Making Measurements on the Map Display Area

You can measure the distance and heading between any points displayed in the Map Display area:

- On the toolbar, click , then click on the point on the map from which to start the measurement. The start point is then marked with a small square symbol.
- Then, as you move the mouse cursor away from the start point, MobileMapper Office will calculate the length and heading from the current location of the cursor to this point
- If you click on a second point, a straight line will appear on the map between the start point and the second point. MobileMapper Office will also start calculating the distance and heading from the current location of the cursor to the second point, plus the total length from the measurement's start point.
- To stop measuring distances and headings on the map, press the Esc key.



Deleting Features

You can delete features from the Map Display area, and so from the open job, using the following procedure:

- Make sure none of the buttons on the toolbar are active
- Click on the feature you want to delete. The feature then appears surrounded by a thick pink frame
- On the menu bar, select **Tools>Delete Feature**, or on the keyboard, press the Del key. A warning message asks you to confirm the delete operation
- Click the **Yes** button to let MobileMapper Office delete the feature, or the **No** button to cancel this operation.

Working on Job Files

Creating a New Job

Before you ask field operators to create a new job, you just need to create the appropriate feature library and upload it to their handhelds. Field operators will then just have to create a new job based on this feature library. But you can also prepare an “empty” job using the procedure below and ask field operators to open that job for their field operations. By “empty job” we mean “with no features logged yet in the job.” But this empty job can contain waypoints, routes and a background map as explained below.

You create job files using the **New** command from the **File** menu. Select **Save** from the **File** menu, type in a name for the job and click the **Save** button to create a new *.mmj file in the Docs folder (default folder).

To create a feature library, see explanations from page 76.

A job file cannot do without a feature library as field operators do need a feature library to complete their jobs. That is why you have to import a feature library –created earlier– into the job before uploading the job to the handheld. You can do that using the **Import** command from the **File** menu, specifying the **Feature Library Files** option in the **Files of Type** field, selecting the feature library to associate with the job and then clicking **Open**. As a result, all the features read from this library will appear as layers in the job.

To create waypoints and routes, see explanations from page 90.

You can also add waypoints, routes and a background map to be part of the job. This is simply done by saving the job when a waypoint/route list displayed in the right-hand part of the screen and a background map is attached to the job and shown in the Map Display area.

To create a background map, see explanations from page 94.

To choose a coordinate system, and for more information on coordinate systems, see explanations from page 103.

The coordinate system attached to the job will be the one currently selected in MobileMapper Office. This information will be required in the handheld if you have created a list of waypoints in the job so that the handheld can identify the coordinate system used to express these waypoint coordinates.

Connecting the Handheld to the PC

- Connect the MobileMapper handheld to one of the serial ports on your office PC using the serial cable provided with the handheld
- If you are connecting the handheld to the PC for the first time, do the following:
 - On the menu bar, select **Options** and then **GPS Settings...**
 - In the dialog box that opens, click **Autodetect**. MobileMapper then starts a sequence to determine the port that MobileMapper is connected to, as well as the baud rate used on the receiver side. At the end of this sequence, the message “Found MobileMapper” should appear as the status of one of the ports
 - Click **OK** to close the dialog box.
- If communication has already been established with the receiver during this working session and you want to make sure MobileMapper Office is still communicating with the handheld, do the following:
 - On the menu bar, select **Options** and then **GPS Settings...**
 - In the dialog box that opens, click **Test**. MobileMapper then tests the data link to the receiver, indicating which baud rate is used during this test. The message “Found MobileMapper” should appear as the status of the port connected to the handheld.
 - Click **OK** to close the dialog box.

Uploading a Job to the Handheld

First of all, you have to connect the handheld to the PC running MobileMapper Office and test the connection, as explained in the previous chapter.



You must make sure that the SD card is inserted into the receiver to ensure proper data transfer between the handheld and MobileMapper Office

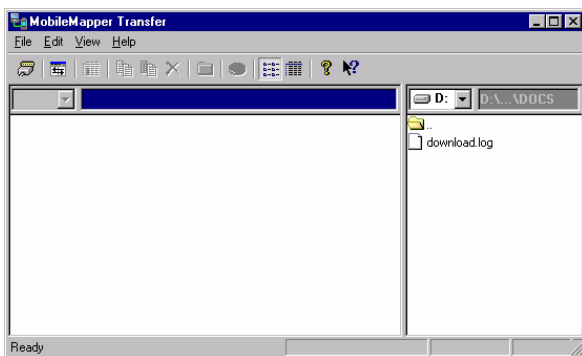
- Open the file job in MobileMapper Office using the **File>Open** command. Job filenames are in the form “*.mmj”.
 - On the menu bar of the MobileMapper Office main window, select **File, Upload to GPS** and **Job...**. MobileMapper Office then routinely searches for the right baud rate to communicate with the handheld. When communication is established with the handheld, the upload sequence is automatically started. A dialog box keeps you informed on the file being transferred. A message is also displayed on the handheld informing you that file transfer is in progress. These two indications disappear from the PC and handheld screens when data transfer is complete.
- IMPORTANT!** When you upload a job file, not only do you upload all the logged features, if any, contained in this job, but also the feature library attached to the job. All MobileMapper job files include a feature library.

Downloading a Completed Job from the Handheld

MobileMapper Office uses the MobileMapper Transfer utility as an interface program to access the files stored on the MobileMapper handheld.

First of all, you have to connect the handheld to the PC running MobileMapper Office and test the connection, as explained on page 70.

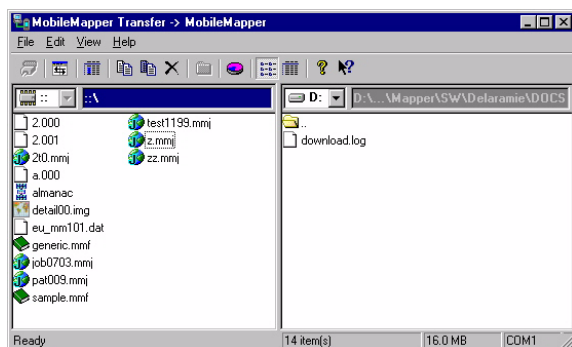
- On the menu bar, select **File>Download from GPS**. This opens the MobileMapper Transfer window on your screen.



The right-hand pane lists all the files present in the default directory (...Docs) on your PC (see example above). The left-hand pane will list the files stored on the handheld once the connection to this device is established.

- To connect to the handheld, on the menu bar at the top, select successively **File>Connect>GPS Device via Cable**. This will cause the transfer utility to routinely test which baud rate should be used to communicate with the handheld. Once communication is established, the transfer utility starts reading the content of the handheld's memory.

After a while, the window's left-hand pane should list the content of the handheld's memory.



Downloading a job always includes importing the downloaded data to the open job, unless the downloaded data is not based on the same feature library as the open job.

1. Downloading a job file

- Drag and drop this file from the left-hand pane to the right-hand pane.
- Close the MobileMapper Transfer window. This will cause the downloaded job to be imported into the currently open job, provided both jobs use the same feature library. Otherwise a message will warn you that importing this job is impossible.

The Import operation performed in the job downloading context is similar to using the **Import** command from the **File** menu. With this function, the downloaded data will automatically add up to the data of the currently open job. This means that you can merge multiple job files created for a single project before exporting the whole data to your GIS. In this particular case, it is indeed very likely that all these job files were created based on the same feature library.

2. Deleting a file from the handheld

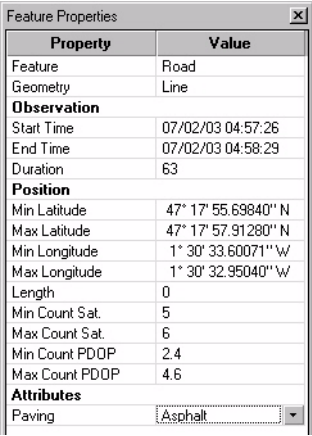
- Select this file in the left-hand pane and press the Del key. MobileMapper Office then asks you to confirm that you want to delete the file. Click Yes if that is what you really want to do.

Viewing the Content of a Job

After downloading a completed job in MobileMapper Office as explained in the previous chapter, you can also open it in MobileMapper Office using the **File>Open** command. As a result, MobileMapper Office shows the content of this job in the main window. First of all, you can see the list of layers present in this job in the right-hand part of the screen. Clear or check the buttons for the layers you want to see in the Map Display area. If enabled for display, the background map shown is the one currently selected in the Background Map List.

Now the main purpose of viewing a job in MobileMapper Office is to get a view of the features that were logged during field operations. If enabled for display, these features are represented on the Map Display area according to the viewing choices made for the corresponding layers. You can do more than just view these features. You can also view the conditions in which these features were logged. To do that, just click on these features, one after the other in the Map Display area. This opens a new window in which you can see the properties of these features. In the example below, MobileMapper Office shows the properties of a line feature:

If you access the Feature Library Editor after opening a downloaded job, this window will show the definition of the feature library that was used to create the job. Unlike a standalone feature library, you CAN NOT edit a feature library attached to a job.



Feature Properties	
Property	Value
Feature	Road
Geometry	Line
Observation	
Start Time	07/02/03 04:57:26
End Time	07/02/03 04:58:29
Duration	63
Position	
Min Latitude	47° 17' 55.69840" N
Max Latitude	47° 17' 57.91280" N
Min Longitude	1° 30' 33.60071" W
Max Longitude	1° 30' 32.95040" W
Length	0
Min Count Sat.	5
Max Count Sat.	6
Min Count PDOP	2.4
Max Count PDOP	4.6
Attributes	
Paving	Asphalt

Exporting Jobs in GIS Formats

The most important processing of your field data is its export to a GIS. Exporting field data has two processes: conversion of the data files to a standard format a GIS can read and then the actual transfer of the file.

To convert your data into SHP, MIF or DXF:



Exporting to DXF requires that a grid system be used in the job

Note that you can also export a job to the MMF format. Use this option when you want to create a standalone feature library from the feature library contained in this job

- On the menu bar, select **File>Open** to list the job files in MobileMapper Office
- Select the file you want to export and click **Open**. The content of this file is now displayed on the screen.
- Select **File>Export**.
- Choose the export format (SHP, MIF, DXF -or MMF, see opposite) from the **Files of type** field.
- Select the directory to which the reformatted file will be transferred. If you don't know where to put this file, just select a temporary location and click **Export**. Your job will be automatically formatted and transferred to the selected folder. You can select any folder that is accessible by your PC - including any GIS folders that may be on your network. When you start recording data to export to a GIS, you will typically export data to a GIS database.

When exporting a job file to SHP format, the following files are created for each feature type (layer, theme) in the file:

- featurename.shp
- featurename.dbf
- featurename.shx

When exporting a job file to MIF format, the following files are created for each feature type (layer, theme) in the file:

- featurename.mif
- featurename.mid

A single DXF file is created for each existing feature type when exporting a job to DXF format.



Whatever the chosen export format, all coordinates of feature positions are exported in WGS84

Using the Feature Library Editor

Introduction

*Note the following limits
for feature libraries:*

*No. of feature types:
15 max.*

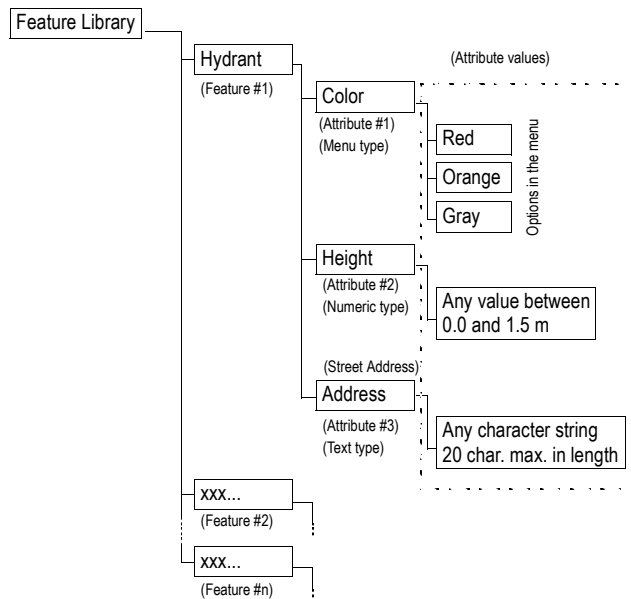
*No. of attributes
per feature: 10 max.*

*No. of attributes values
per Menu-style attribute:
5 max.*

MobileMapper Office allows you to create new feature libraries using the Feature Library Editor.

Feature libraries are used by field operators as a common basis for describing the features they visit in the field.

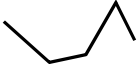
A feature library describes a number of features that MobileMapper operators will have to visit in the field. Each feature is defined as a set of attributes. In fact, it will be the task of field operators to provide an attribute value for each attribute of a feature, depending on what they see or measure when they are near this feature. The diagram below shows the general architecture of a feature library through a simple example.



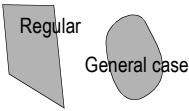
There are four different types of features:



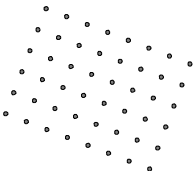
Point feature



Line feature



Area feature



Grid feature

- **Point feature:** This feature can be described as a point, geometrically speaking. Field operators should log point features in static mode, i.e. they are supposed to stay stationary at these points for at least one second.
- **Line feature:** This feature can be described as a line. Field operators should log line features in kinematic mode, i.e. they should start logging this type of feature at the beginning of the line, move along this line and stop logging when reaching the end of the line.
- **Area feature:** This feature can be described as an area. Field operators can log area features either in kinematic mode (general case) or in “multi-static” mode in case of areas with regular (straight) contours.
- **Grid feature:** This feature defines an array of evenly distributed waypoints where field operators record observations or make measurements using some instrument. In-depth information on grid features is given on page 86.

There are three different types of attributes:

- **Menu style:** the attribute value can only be one of the preset values from a user-defined menu
- **Numeric style:** the attribute value can only be within a pre-defined range of numeric values
- **Text style:** the attribute value is in text form and should not exceed the permitted length (20 characters).

Creating a New, Standalone Feature Library File

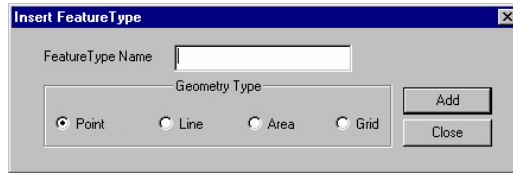
- On the menu bar, select **Tools**, then **Feature Library Editor**. This opens the Feature Library Editor window at the center of the screen.

Warning! If a job is open in MobileMapper Office's main window, the Feature Library Editor window then shows the feature library used in the open job. This library cannot be changed. That's why you have to do the following.

- On the menu bar, select **File**, then **Save As...** A new dialog box opens in which you can name and choose the folder where to store the new feature library. The default folder is .../Docs. It is a good idea to group all feature library files in the "Docs" default folder. These files can only be saved as "mmf" files as mentioned in the **Save as type:** field.
- Enter a name for the library in the **File name:** field. For example, type in "Libr#1" and click **Save**. The new name of the feature library now appears on the left-hand part of the Feature Library Editor window.

Inserting New Features to the Feature Library

- In the Feature Library Editor window, right-click on the feature library name and select **Insert Feature**. A new dialog box opens in which you can define the first feature for the library:

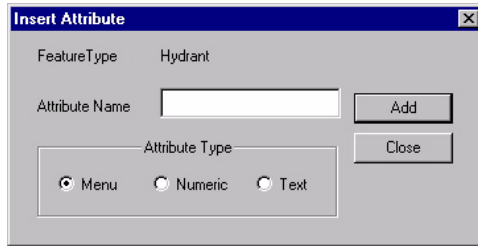


It sometimes is a good idea to choose a name that reflects the geometry type of the feature. For example, as the last 2 characters in the name, you could use "Ln" for a line feature, "Ar" for an area feature, "Gd" for a grid feature and "Pt" for a point feature (although point feature names are often self-explanatory). The reason for doing this is that the field operator will be able to rely on feature names to clearly identify the type of feature she/he selects from the feature list.

- Enter a name for this feature in the **Feature Type Name** field (see recommendations opposite).
- Indicate the type of the feature. For example, if the feature is a hydrant, check **Point**, if it's a coast line, check **Line**, if it's a car park, check **Area**, if it's an area where measurements should be performed according to a preset array of waypoints, check **Grid**. Grid features are presented in detail in a separate chapter starting on page 86. Refer to this chapter if you need to define a new grid feature.
- Click the **Add** button. The Insert Feature Type dialog box is displayed one more time so that you can now define the second feature for the library.
- Indicate the type of the second feature as explained above and then click the **Add** button.
- Repeat the above steps until all the features have been defined.
- After defining the last feature, click the **Close** button.

Defining Feature Attributes

- Under the feature library name, in the left-hand part of the Feature Library Editor window, select the first feature name, right-click on it and select **Insert Attribute**. A new dialog box opens where you can define the first attribute for the feature:

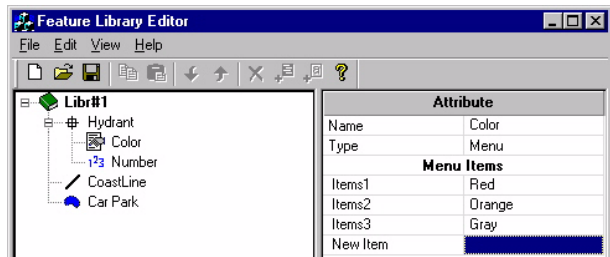


- Enter a name for this attribute in the **Attribute Name** field
- Indicate the type of the attribute. There are three types of attributes: Menu, Numeric and Text. If the attribute consists of a list of statements that the field operator will have to choose from, check **Menu**, if it refers to a number the field operator will have to enter, check **Numeric**, and if the feature refers to a description or any other alphanumeric string that the field operator will have to type in, check **Text**.
- Then click **Add** to add another attribute for the feature, or **Close** after the last attribute has been defined.
- Select the second feature on the left, right-click on it, select **Insert Attribute** and then define all the feature's attributes as explained above. Click the **Close** button when it's done.
- Repeat the above steps until all the attributes have been defined for all the features present in the library

Defining Attribute Values

You define attribute values in the right-hand pane of the Feature library Editor window.

- Click on the name of the first attribute of the first feature. The right-hand pane of the Feature Library Editor window now shows a table containing the definition of this attribute. The highlighted cell is where you can enter the first attribute value for this attribute. Click on this cell.
- Type in the attribute value and press ENTER on your keyboard. A new row is added in the table where you can enter a second attribute value, etc.
- When you are done with the values of this attribute, click on the second attribute in the left-hand pane of the Feature Library Editor window. Resume the previous and present steps as many times as necessary.
- Example of attribute values (red, orange, gray) for one of the attributes (color) of a point feature (hydrant):



For a Menu style attribute, you should define a list of options the field operator will have to choose from.

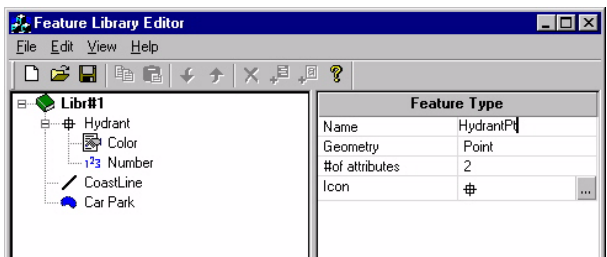
For a Numeric style attribute, you should define the precision, default value and range of possible values for the attribute (minimum and maximum values).

For a Text style attribute, you should define the maximum number of characters allowed and the default value for the attribute.

Renaming a Feature, Defining its Representation on the Map


Still from the Feature Library Editor window, you can change the name of a feature as explained below:

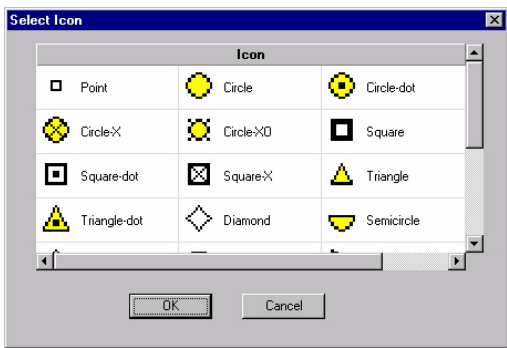
- In the left-hand pane of the window, click on the feature name you want to edit. This displays the Feature Type table on the right.
- Double-click on the cell containing the feature name (see example below) and type in a new name
- Press the Enter key to record the change.



From the same table, you can also change the shape and aspect given to a feature on the map.


The representation of a point feature on the map is an icon that you can define as explained below:

- In the Icon row of this table, click . A new dialog box opens in which you can select a new icon for the feature:

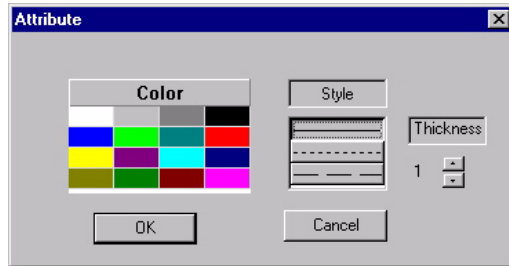


Up to 22 different icons are listed in this box. The icon you choose here will also be shown on the receiver's Map screen during field operations dealing with features of this type.

The representation of a line or area feature on the map is based on line properties that you can define as explained below:

- In the Style/Color/Width row of this table, click . A new dialog box opens in which you can define the properties of the line representing the line feature or the contour of the area feature (color, style and width):

Possible choices: 16 for color; 3 for style and 3 for width. The choices you make here will be used on the receiver's Map screen during field operations dealing with features of this type.



Deleting Features, Attributes or Attribute Values

The Feature Library Editor lets you delete, in a very simple manner, any feature, attribute or attribute value option from the open Feature Library.

- To delete a feature, you just select its name and you press the Del key on your keyboard. Deletion is immediate as MobileMapper Office does not require user confirmation. By deleting a feature, you also delete all attributes and attribute values attached to this feature.
- To delete an attribute from a feature, expand that feature in the left-hand pane of the Feature Library Editor window, select the attribute you want to delete and press Del on your keyboard. Deletion is immediate as MobileMapper Office does not require user confirmation. By deleting an attribute, you also delete all attribute values attached to this attribute.

- To delete an attribute value from the list of possible values of a Menu-style attribute, first select the concerned attribute in the left-hand pane of the Feature Library Editor window. Then in the right-hand pane of this window, highlight the cell containing the attribute value you want to delete and press Del on your keyboard. Deletion is immediate as MobileMapper Office does not require user confirmation.

Saving a Feature Library

When you are done with the definition of a feature library file, don't forget to save the file by selecting **File>Save** on the menu bar of the Feature Library Editor window.

Attaching a Feature Library to a Job

When you want to attach a feature library to a GIS job, you just have to import this feature library into the job open in the main window, using the **File>Import** command. The features contained in the feature library will then appear as "layers" in that job. When you save the job, the complete feature library will also be saved in this job.

Similarly, when you open a job after downloading it from a MobileMapper handheld, then the features from the library file used for that job will automatically appear as layers pertaining to the job. If you open the Feature Library Editor window in that case, then it's the feature library used in that job that will be shown in this window.

Importing a Feature Library from a Job or GIS File

Using the **File>Import** command in the Feature Library Editor window, you can import the feature library used in an existing job or from a MIF or SHP file.

Uploading a standalone feature library file

You usually have to upload a standalone feature library file to the handheld when it's the first time this feature library is used and so there has been no job created yet from this library

- Unless already done, select **Tools>Feature Library Editor** to open the Feature Library Editor window
- Open the feature library file you want to upload using the **File>Open...** command. Feature library filenames are in the form “*.mmf”. If you want to upload the feature library used in the open job, then you must save it as an mmf file from within the Feature library Editor window before you are allowed to upload this file to the handheld.
- On the menu bar of the Feature Library Editor window, select **File** and then **Upload to GPS**. MobileMapper Office then routinely searches for the right baud rate to communicate with the handheld. When communication is established with the handheld, the upload sequence is automatically started. A dialog box keeps you informed on the file being transferred. A message is also displayed on the handheld informing you that file transfer is in progress. These two indications disappear from the PC and handheld screens when data transfer is complete.

Grid Mapper Utility

Introduction

Working with the Grid Mapper Utility is an easy way to log GPS positions and GIS data at waypoints arranged in an evenly spaced grid. This allows you to gather measurements - made by field sensors such as depth sounders, chemical detectors and magnetometers - in an organized fashion with an easy-to-use navigation feature. You can then create contour maps with the necessary density of data while avoiding any gaps that might force you to return to the field.

Grid Features vs. Grid Points

The Grid Mapper Utility refers to two different grid concepts: grid features and grid points.

- Grid features are arrays of uniformly spaced points oriented in rows and columns.
- Grid points are navigation features similar to routes. They are created by MobileMapper Office and uploaded to the handheld. You navigate to each grid point using MobileMapper and record your observations or measurements using its data logging software.

Think of an apple orchard where the rows are about 15 feet (5 meters) apart and each tree is about 15 feet (5 meters) apart from the next tree in its row. The orchard is a grid feature. The location of each tree is a grid point. The number of apples on each tree is the attribute you wish to record.

Like a point, line or area feature, a grid feature is a feature geometry type. You can see the similarity in two ways:

- Just as a line or area feature is made of a string of point positions, a grid feature is a set of points.
- As with line and area features, a single feature type name corresponds to the entire grid feature. In a single job, you might record positions and descriptions of several line features classified as “roads” and two area features classified as “lakes.” And you might use one grid feature named “water depth” and one named “magnetic field.”

However, line and area features differ from grid features in two important ways:

- The positions making up line and area features mark the locations of real things like roads, lakes, etc. But the points making up a grid feature are imaginary target locations that you navigate to.
- The attributes you record for a road or a lake pertain equally to each of the point positions making up feature, but you typically record different descriptions at each grid point making up the grid feature.

Setting up a Grid Feature in a Feature Library file

Use the Feature Library Editor window to set up a grid feature. To add a grid feature to the feature library:

- Right-click on the name of the feature library and select the **Insert Feature** option. Then select **Grid** as the feature type
- Click on the **Add** button, then on the **Close** button.
- Then define the attributes of the point feature that you will record at each of the grid points. Do this as you would for any point, line or area feature (see pages 80 and 81). Typically, these are text-type attributes for visual observations and numeric-type attributes for measurements made with instruments. But it is also possible to record observations using a menu-type of attributes.

Editing the Grid Properties

When you are done adding attributes to the grid feature, you will see the grid symbol and the name of the grid feature in the tree display of the feature library. If you click on the name of the grid feature, you will see a two-column table on the right labeled “Feature Type.” This is where the default values of the grid feature are indicated. If you want to change any of these values, double click on the value and type in a new one.

Feature Type	
Name	Land#1Grid
Geometry	Grid
#of attributes	2
Number of Column	10
Number of Rows	10
Step	50.000000

Grid properties table

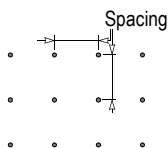
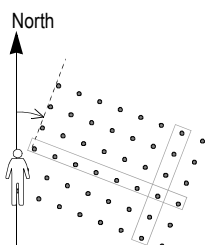
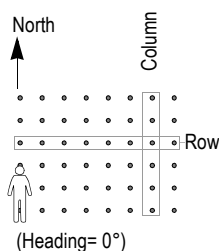
Name: Feature names like “pole,” “road” or “lake” make it easy to identify the geometry of point line and area features. This is not so easy with grid features. You might find it helpful to insert the word “grid” into the name of grid features. However, there is a 10-character limit to the name length so you may prefer to name the grid types with distinctive names like “mag. field,” “H₂O depth” or “CO₂ conc.”

Geometry and # of attributes: Cannot be edited

Number of Columns/Number of Rows: The easiest way to determine how large the entire grid must be is to measure the area using a background map showing appropriate layers. You can draw a rectangle over the area to be mapped and measure the two sides of the rectangle in meters. Then divide each distance by the grid feature’s spacing. Imagine yourself standing at one of the two corners of the rectangle where the grid feature is arrayed in front of you and to your right. The number of columns is the length of the side of the rectangle to your right divided by the grid spacing (in meters). The number of rows is the length of the side of the rectangle in front of you divided by the grid spacing.

Heading: The default heading is 0° (due North). If you leave the heading at this default value it means that the grid feature will be arrayed to the north and east of your position because these are the directions in front of you and to your right. If you want the grid feature oriented in any other direction, just type in the compass direction that you will face when standing with the grid in front of you and to the right.

Grid spacing: The default value for the distance between adjacent grid points is 50 meters. You can set this spacing to any number of meters you would like. This number will be automatically converted to any other distance unit is set in the receiver.



When changing from the default 50 meters, keep in mind that the selected value will determine the density of measurements. If this number is less than 5 meters or so, there is no point in using a Grid feature. Simply walk around and take samples by visually estimating the required density. If you increase the spacing, be sure the spacing supports the density of measurements you require.

Uploading the Grid Feature to the Receiver

You upload grid features to the receiver by uploading the feature library that contains it. You can either upload the feature library as a standalone library that the user in the field can select to record a new job. Or you can use MobileMapper Office to import the feature library into a job created in the office. Either way, you just have to click on **File>Upload to GPS** and select the file you want to use in the field.

If you want to inform the field user where to begin logging the grid feature, just create a waypoint in MobileMapper Office by clicking on **Tools>Place Waypoints**. Make sure you change the name from the default “WPT001” to a name telling the user that this is the point of beginning for logging a grid. Then upload this waypoint as described on page 71.

Using the Waypoint/Route Editor




Introduction

The Waypoint/Route Editor allows you to easily create a list of waypoints that might be useful for the field operator when she/he is performing a GIS job. For example one of these waypoints may help to localize a hardly visible feature.

The Waypoint/Route Editor also allows you to build new routes, based on the existing list of waypoints.

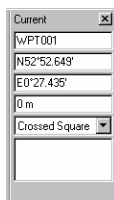
To save your waypoints and routes, you just need to save the currently open job. When you do that and there are waypoints and routes in the job, then MobileMapper Office creates a separate wpt file containing this list of waypoints and routes.

Placing Waypoints

- First of all, click the down arrow next to  on the toolbar and select the region where your jobs are going to take place. As a result, a map of your region appears on the Map Display area.
- On the toolbar, click  and then draw a rectangle around the part of the map you want to enlarge. When releasing the mouse, the map scale is adjusted so the Map Display area only shows this part of the map.
- On the toolbar, click . This opens a new window in the right-hand part of the window where you can edit your definitions of waypoints.
- Click on the Map Display area where your first waypoint should be located. A waypoint icon now appears on the map with the name of the waypoint displayed next to it (see example opposite).



Creating a waypoint



Editing a waypoint



Defining the name and icon of the next waypoint

- In the right-upper part of the window (see example opposite), you can now make changes to the definition of this waypoint (name, coordinates, icon, optional comment).
- Next to this definition area, you can also define the name and icon for the next waypoint you will create
- When you are done with the definition of the first waypoint, create the second waypoint by clicking on the map where this second waypoint should be located. Again, you can adjust the definition of this waypoint in the right-upper part of the window, etc.

Note that a waypoint table is updated in the right-lower part of the window as you create new waypoints. You can scroll this table horizontally and edit each of the cells if necessary. The second column (Name) contains a check button allowing you to show/hide each waypoint icon & name on the Map Display area.

Creating Waypoints from the Waypoint Table

Another very quick way of creating new waypoints is to use the aforementioned waypoint table.

- Right-click anywhere over this table and select **New Waypoint** in the pop-up menu. As a result a new waypoint is added in the waypoint table with default parameters and “zero” coordinates.
- You can then edit each cell to complete the definition of the new waypoint. The waypoint will then appear on the map (if located within the area covered by this map).

Waypoints		
#	Name	Latitude
1	<input checked="" type="checkbox"/> wPT001	N52°52.649'
2	<input checked="" type="checkbox"/> wPT002	N52°51.352'

Waypoint table

Use the View function when you have some difficulty finding a waypoint on the map because there are lots of them, or simply because you don't want to spend too much time searching for it

Finding a Waypoint on the Map

MobileMapper Office helps you locate rapidly a waypoint.

- In the waypoint table, right-click on the row containing the definition of the waypoint and select **View**. The map is then moved accordingly within the Map Display area so as to take the searched waypoint exactly at the center of the Map Display area.

Deleting Waypoints


Waypoints can only be deleted individually from the waypoint table.

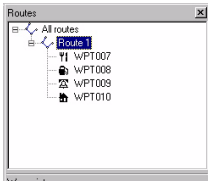
- Select the row containing the waypoint you want to delete
- Press the **Del** key or right-click on the row and select **Delete**. Waypoints are deleted instantly, without user confirmation.

You can also delete all the existing waypoints and routes through a single operation by selecting the **Clear All Waypoints** option from the **Tools** menu. In that case, MobileMapper Office will prompt you to save all these waypoints and routes in a separate wpt file before actually deleting them from the waypoint table (i.e. from the currently open job). If you click **Yes** you will have to name the wpt file and specify the folder where to store that file.

Building a Route

After you have created a number of waypoints as explained in the previous chapter, you can now define routes graphically. Follow the instructions below to do this.

- On the toolbar, click . This opens a new window in the right-upper part of the window where MobileMapper automatically creates a new route named “Route1” (if it’s the first one in the list) (see opposite). Note that MobileMapper Office continues to display the waypoint table below this window.
- Come back to the Map Display area and click on the waypoint that you want to define as the route’s start point
- Then click on the second point, then on the third, etc. Every time you click a new waypoint, “Finish” is displayed next to this waypoint which means you don’t have to do anything special to end the definition of the route. MobileMapper Office will “understand” that the route definition is complete when you proceed to another task in the software.



Creating a four-way-point route

Note that you can edit the name of the route by double-clicking on it. You can also remove a waypoint from the route by right-clicking on it and selecting **Delete**. The Map Display area is then updated to reflect that change in the definition of the route.

Background Maps

Introduction

Background maps are designed to provide useful details on working areas. Field operators might like to see these details on their handheld screens as they progress in their jobs so that they can more easily go to the places they have to visit.

Background maps are for viewing only. You cannot edit them or access information on their features. They provide a backdrop, which gives visual orientation for your data and waypoint files.

Background maps are shown in the Map Display area of the MobileMapper Office main window. They are independent of jobs. Whether there is an open job or not, you can have a background map displayed in this area. You may create this background map once and then it can be used as a backdrop for many jobs at a certain location.

Background map projects are created using the Create Map editor. The notion of “background map project” allows you to define the different layers the background map will result from, plus a number of parameters, i.e. map scale setting, map name, etc. Use the **Tools>Background Maps** command to access the Create Map editor. Background map projects are saved as separate files with the “mmp” extension.

Once you have defined and saved a background map project, you will then have to use the **Operations>Create Map** command to build the actual background map for the open background map project.

Usually it takes time to create a map, so it would be a benefit to do that once. After the background map is created, it will appear in the Background Maps list with the given name, and it can be selected at any time as a background for various job data.



Please, carefully read the explanations opposite to understand the difference between a background map “project” and the resulting “background map” on the Map Display area

A background map generally consists of a base map, plus additional details that you can for example import from your GIS system. Thus, a background map is a stack of several layers, but as opposed to layers in a job file, which you can select on the Map Display area, the layers composing a background map result in a single, merged, raster-type map on the Map Display area, with no possibility to select any individual items shown on this map

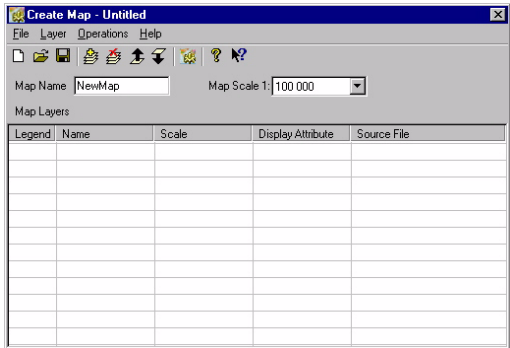
MobileMapper Office can only take MIF, SHP and DXF shapefiles in WGS84 lat/lon as source data. This includes shapefiles from GIS files and MapSend maps.

All background maps are in WGS84, lat/lon.

When you upload a job file to the MobileMapper handheld, the background map currently shown in the Map Display area when you saved the job is NOT uploaded to the handheld as being part of the job. That's why you will have to use the **File>Upload to GPS>Background Map** command to upload the background map separately to the handheld.

Creating a New Background Map Project

- On the menu bar, select **Tools** and then **Background Map**. This opens the Background Maps window
- Click on the **Create New...** button. This opens the Create Map window from which you can create a new background map project:



- Type in a name for the background map project in the **Map Name** field.
- In the **Map Scale** field, choose a scale value above which the background map will NOT be displayed on the Map Display area or on the handheld screen. (This is used to hide the background map when the current scale value of the Map Display area in the office software or on the handheld's Map screen is incompatible with the extent of this background map.)


(To be continued in next paragraph)

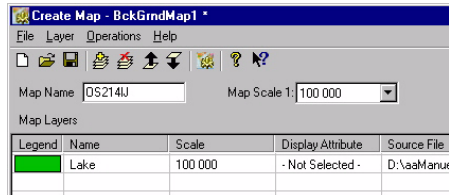
Adding Layers to a Background Map Project

(Continued from previous paragraph.)

You can add as many layers as necessary to build a background map. Layers may be SHP files or MIF files.

For example you could export to SHP or MIF the features of a completed job and then add them as layers to create a background map. In this case you would merge these features into the background map and so they would no longer be selectable as individual entities on the Map Display area.

- Click , or on the menu bar, select **Layer>Add...** A dialog box opens in which you should indicate the folder where to find the layer and then select the file corresponding to that layer.
- In the combo box located in the lower part of the dialog box, select the coordinate system on which the layer to be added is based. (*You are supposed to know this information*).
- Click on the **Open** button. The selected file now appears as a layer in the first row of the Create Map window:





- Resume the previous steps as many times as necessary to add all the layers you need for your background map.
- Select **File** and then **Save** or **Save As**. In the dialog box that opens, choose a folder and enter a name for the background map project you want to create. This project will have the “mmp” extension.
- Then click **Save** to save the project.

Changing the Order of Layers


When you build the background map, the first layer you placed in the table will be brought to the front, and the last one will be sent to the back. Intermediate layers will occupy intermediate positions in the layer stack.

If one of your layers contains area features, it is important that this layer be placed at the bottom of the table otherwise all layers containing point or line features located within these area features would be hidden by these features.

To change the position of a layer in the table:

- Highlight the row containing this layer by clicking on any cell in this row
- Click  or , or select **Layer>Move Up** or **Move Down** to move up or down the layer by one row. If necessary, repeat this step until the layer is at the right position in the table.

Removing Layers

- Highlight the layer you want to remove
- Click , or select **Layer>Remove** from the menu bar, or press the Del key. This instantly removes the layer from the table.

Changing the Visual Aspect of Layers

You can customize each layer by clicking on the corresponding leftmost cell in the table. This opens a dialog box in which you can choose the aspect you want for the layer when the background map is built up later. As you will probably notice, the available options are much similar to those available when creating features with the Feature Library Editor.

- For a point feature layer, you can choose the type of icon that will be used to represent all the features pertaining to the layer
- For a line feature layer, you can choose the color and width of the line representing all the features pertaining to the layer
- For an area feature layer, you can choose the fill-in color for all the features pertaining to the layer.


In addition, you can also define the following:

- Edit the layer name
- Select which attribute to display together with the icon or line
- Choose a scale value above which all features pertaining to the layer will NOT be displayed on the Map Display area or on the handheld screen.

Building the Background Map


Once you are done with adding, arranging and setting layers, you can build the background map from these layers.

- First save the background map project using the **File>Save** command if you are happy with the project name or the **File>Save as** command if you wish to rename the background map project.

- Then click , or on the menu bar, select **Operations>Create Map**. MobileMapper Office then builds the background map. A dialog box is displayed indicating that this operation is in progress. It disappears from the screen when the build operation is complete.
- Close the Create Map window. This takes you back to the Background Maps window where you can now attach the newly created background map to the open job. See below.

Selecting a Background Map for Display

This function allows you to select the background map that you want to view in the Map Display area.



- Unless this window is already open, click  to open the Background Maps dialog box. This box lists the names of the existing background maps.
- Select the name of the background map you want to view and click on the **Attach** button. A clip icon appears before this name indicating that the attachment is now effective.
- Click on the **Close** button. This closes the dialog box and displays the attached background map in the Map Display area.

The following functions are also available from the Background Map dialog box:

- **Create New...:** Provides access to the Create Map window
- **Detach:** Detaches the highlighted background map from the job (if it's the one currently attached to the job)
- **Remove:** Deletes the highlighted background map.

Setting a Map Region

This function allows you to define the exact limits of the background map –shown on the Map Display area– that you wish to upload to the handheld. Using this function also allows you to limit the file size of the uploaded portion of the background map for better display performance in the field.

- Click  on the toolbar, drag a rectangle around the desired region in the Map Display area and release the mouse button. The limits of the region are then represented with a rectangle with hatching on the outside. You can still resize or reshape the rectangle by dragging its control points (corner and mid-side points). You can also move the whole rectangle by dragging the mouse cursor from inside the rectangle.
- When the definition of the region is okay, click outside of this region. The region definition is now complete and its limits are now represented with a thick green line.
- If necessary, click  again (this deletes the region you have just defined) to redraw the region entirely.

Uploading a Background Map

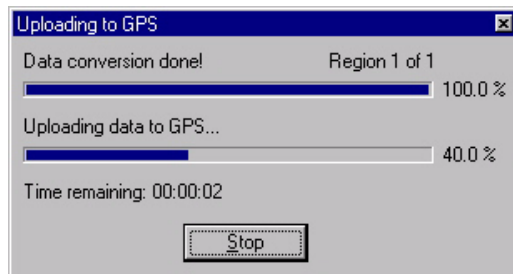
After attaching a background map to the open job and possibly setting a map region (see the previous two chapters), you can now proceed with the uploading of the background map to the handheld, to the PC's hard disk or to the SD card inserted in the local SD card reader.

We'll explain here how you can upload a background map. You have to upload jobs and background maps separately. Background maps are not included in the job files. Only feature libraries are actually written into job files. However, the names of the background maps are included with the job files so they can be displayed whenever you pick the job to display.

- On the menu bar, select **File>Upload to GPS>Background Map**. If no Map region has been defined previously in the Map Display area, a message will pop up warning you that the whole background map is going to be uploaded. If you click **Yes**, the procedure will continue. If you click **No**, the procedure will be aborted.

In the next dialog box that opens, you have to select the destination of the background map. This can be the MobileMapper receiver (GPS Unit), the local SD Card reader or the PC hard disk (Hard Drive).

- Check **Upload to GPS Unit** and click the **Next>** button. If you have previously run the procedure described on page 70 to test the communication with the handheld, then a new dialog box will be displayed reporting successful connection to the handheld. Otherwise, MobileMapper Office will suggest that you change the settings of the PC port connected to the handheld.
- After successful connection to the handheld, click the **Next>** button again. A new dialog box indicates the size of the file to be downloaded.
- You just have to click the **Finish** button to let MobileMapper Office complete the upload operation. The following message is displayed while the file is being uploaded:



Coordinate System

Introduction to Coordinate Systems and Datums

The Earth is really not a sphere but a “spheroid” because its rotation causes the equator to bulge out slightly so that the Earth’s circumference is greater around the equator than it is through the poles. When looking at the Earth’s surface, however, you are really considering just sections of the spheroid. And, if you remember your geometry correctly, the name for a section (slice) taken through a spheroid is an “ellipsoid.” An ellipsoid is to a spheroid as a circle is to a sphere. Mathematician-cartographers have historically attempted to write equations for ellipsoids that accurately describe the Earth’s geometry. For example, the ellipsoid the most commonly used today was developed by Clarke, in 1866.

The MobileMapper system uses standard coordinate systems and datums used by surveyors and cartographers around the world. MobileMapper offers the capability to define your own coordinate systems and datums. This involves selecting your own map *projections*, *coordinate systems*, and *datums* - all of which are defined below.

A map is developed using a *projection* that is a mathematical translator between the roughly spherical Earth and the flat map. For this reason, any map is inherently inaccurate because it must “stretch” to fit over a sphere (see comment opposite). This is actually quite complicated, because a map is flat and the Earth is not. You can demonstrate this yourself by taking any spherical object such as an orange and trying to wrap a sheet of paper around it while creating the minimum of folds and wrinkles. The only way to get the paper to wrap evenly is to cut some sections out and stretch others.

That is what a map projection does, but in reverse. It takes the somewhat spherical surface of a portion of the Earth and flattens it while trying to avoid distortion along the way. The challenge is to make a projection that fits optimally throughout the space it covers with the least distortion possible.

There are many map projections available to the mapmaker, but for the most part there is only a handful in practical use today. MobileMapper Office software supports most of these common projections.

Coordinate systems describe where you are in a map projection. Some people use “grid systems” using northings and eastings - the distances, typically meters or feet, to the north and east of an agreed-upon starting point. Others work in geodetic coordinate systems using latitude and longitude numbers that divide the Earth into the degrees, minutes, and seconds that most people are familiar with.

The most common coordinate systems are Universal Transverse Mercator (UTM) and latitude/longitude, but there are many variations that are tied to specific regions of the Earth. MobileMapper allows you to use any of the more common grid coordinate systems or create your own.

Each regional system is tied to known positions within the region according to their positional relative to a geodetic *datum*. According to the *Geodetic Glossary* (National Geodetic Survey, National Ocean Service, National Oceanic and Atmospheric Administration, Rockville, MD, September 1986) p. 54, a geodetic datum is: “A set of constants specifying the coordinate system used for geodetic control, i.e., for calculating the coordinates of points on the Earth.” The key words here are “geodetic control” - the means of establishing grid or lat/lon coordinates relative to given control points. The datum is what is “given.” The most common examples of datums in North America are NAD27 and NAD83- the North American Datums of 1927 and 1983. Most countries have their own datums and there are also regional datums for Europe and other parts of the world.

There have also been attempts to create datums for the entire world. The most widely used is Worldwide Geodetic System developed in 1984 (“WGS84”). The Global Positioning System, being global, uses WGS84 as a standard datum. All GPS receivers, including MobileMapper, calculate their positions in the lat/lon coordinate system tied into the WGS84 datum. Users can then select other coordinate systems to display their data and other datum to define how the coordinates are calculated. There are many mathematical algorithms for “transforming” coordinates from one system to another according to various datums.

Which system/datum you use can have a very profound result. For example, the difference between NAD27 and NAD83 is minimal in Bloomington, Indiana, about 42 meters in Albany, New York, about 70 meters in Las Vegas, Nevada and as much as 100 meters in parts of California. Why are there such differences? The NAD83 is a closer and more refined mathematical description of the shape of the Earth in North America. For this reason, the WGS84 datum uses elements of the NAD83 datum to calculate coordinates in North America.

Similar discrepancies are seen around the world when calculating positions using different datums. To make matters even more complicated, different organizations, governments and corporations use different algorithms to calculate positions for their own maps. This is not normally a problem as long as an organization's maps are in agreement with themselves. Because Thales Navigation cannot know what algorithm you wish to use to make MobileMapper data conform to the datum you are using, we export our positions in world standard WGS84 coordinates. This allows your GIS to make the transformations that are consistent with your map collection.

For the purposes of collecting or updating map data, both MobileMapper Office and MobileMapper receiver software will display the coordinates of features imported from your GIS maps in whatever datum you wish. This means that if you move the map cursor (in either MobileMapper Office or the receiver software) over a feature on a map screen, the coordinate numbers (lat/lon or northing/easting) will be displayed in the coordinate system/datum of your choice. This allows you to compare the coordinates of features on a MobileMapper map with coordinates you might have in a database.

However, MobileMapper uses only the WGS84 datum to project data onto the map screen, i.e. to position features spatially on a map. One way to visualize this is if you were to select NAD27 or EUR79 as your datum in either MobileMapper Office or the receiver and moved the map cursor over a feature, you would display coordinate numbers (lat/lon or northing/easting) that were calculated using this datum. If you switched to the WGS84 datum, the coordinates displayed on the MobileMapper receiver's Position Screen or in MobileMapper Office suite's coordinate display window would change - but the position of the feature on the map screen would NOT change.

Why is this? Calculating coordinates doesn't take much computing power but using powerful map projection algorithms does. Moving features around on the small map extents used by workers in the field does not warrant any decrease in receiver map display performance. It would take an unnecessary increase in time to display a map that would hardly change in appearance. To re-project positions on a MobileMapper Office map screen using a variety of datums would not be a problem for the PC and its larger screen. However, this is a GIS function that is outside the purpose of MobileMapper Office, which is designed as a GPS data communication, display and validating tool and not as a GIS in itself. Because Thales Navigation does not know what algorithms your GIS uses for map projections, you should always transform MobileMapper positions using the same GIS you use to manage your existing maps. This is the best way to assure conformance of MobileMapper positions to your GIS maps and databases.

Coordinate Systems in MobileMapper Office

In MobileMapper Office, the definition of a coordinate system can be split into two different sets of parameters: horizontal system and height system.

The horizontal system may be one of two types:

- Geodetic type: the system relies on the definition of a datum. A datum is an ellipsoid with possible linear and angular shifts
- Grid type: the system relies on the definition of a datum and a projection

The height system may be one of two types:

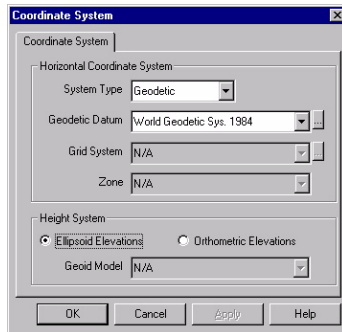
- Ellipsoid elevations: All elevations are calculated from the datum defined in the coordinate system used
- Orthometric elevations: All elevations are calculated from the available geoid model (EGM96 Worldwide Geoid model)

A large number of geodetic and grid systems are available for use. However, if none of these systems is suitable for your jobs, you can create a new one, based on the information you have to define this system. This is described on page 109.


Selecting a Pre-defined Coordinate System

- On the menu bar, select **Options** and then **Coordinate System**. A new dialog box opens showing the name of the currently used coordinate system (see below).


This dialog box allows you to select a pre-defined coordinate system or create a new system (refer to page 77)



1. Selecting an existing Geodetic system

- Click the down arrow on the right of the **System Type** combo box and highlight **Geodetic** (unless already done). Then click the down arrow on the right of the **Geodetic Datum** combo box and highlight the name of the desired datum. The properties of the selected datum can be viewed by clicking the  button located on the right of the **Geodetic Datum** combo box.

2. Selecting an existing Grid system

- Click the down arrow on the right of the **System Type** combo box and highlight **Grid**. Then click the down arrow on the right of the **Grid System** combo box and highlight the name of the desired grid system. The properties of the selected grid system can be viewed by clicking the  button located on the right of the **Grid System** combo box.
- Click the down arrow on the right of the **Zone** combo box and highlight the name of the zone corresponding to your working area.

3. Defining the height system

- In the lower part of the **Coordinate System** dialog box, check the desired option (**Ellipsoid elevations** or **Orthometric elevations**). If you choose **Orthometric elevations**, the **Geoid Model** field just below will automatically be set to **EGM96 Worldwide Geoid Model** as this is the only geoid model available in MobileMapper Office.

4. Enabling the chosen coordinate system

- Click **OK** to close the dialog box and enable the coordinate system you have just chosen.


Creating a New Coordinate System

If the coordinate system you should use for a job is not available from the list and you have the complete definition of this coordinate system, follow the procedure below to create this coordinate system in Mobile Mapper Office.

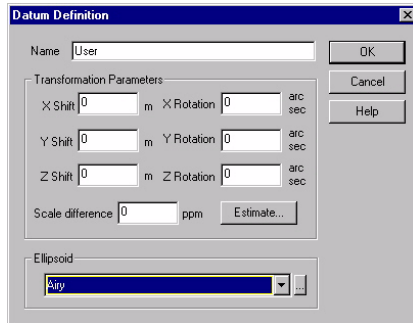
- On the menu bar, select **Options** and then **Coordinate System...**A new dialog box opens showing the name of the currently used coordinate system (see below). This dialog box allows you to create and select a new system.

1. Creating a new Geodetic system

- Click the down arrow on the right of the **System Type** combo box and highlight **Geodetic**. Then click the down arrow on the right of the **Geodetic Datum** combo box and highlight the first option in the list (**NEW**).

- Click on the  button located on the right of the **Geodetic Datum** combo box. This opens a new dialog box in which you should enter the name of the new datum and specify the ellipsoid used as well as the possible shifts and rotations.



*You can also create a new ellipsoid according to the same principle as the datum itself, i.e. by selecting the **NEW** option on top of the **Ellipsoid** combo box list and then clicking the button to enter its characteristics.*



The image shows a 'Datum Definition' dialog box. It has a title bar with a close button. Inside, there is a 'Name' field with 'User' entered. Below it is a 'Transformation Parameters' section with fields for X Shift, Y Shift, Z Shift (all in meters) and X Rotation, Y Rotation, Z Rotation (all in arc seconds). There is also a 'Scale difference' field in ppm and an 'Estimate...' button. At the bottom is an 'Ellipsoid' dropdown menu currently showing 'Airy'. On the right side of the dialog are 'OK', 'Cancel', and 'Help' buttons.

- Then click **OK** to close this dialog box.
- Click **OK** again to close the **Coordinate System** dialog box and make the newly defined system the currently used coordinate system in MobileMapper Office.

2. Creating a new Grid system

- Click the down arrow on the right of the **System Type** combo box and highlight **Grid**. Then click the down arrow on the right of the **Grid System** combo box and highlight the first option in the list (**NEW**).
- Click on the  button located on the right of the **Grid System** combo box. This opens a new dialog box in which you should enter the name of the new grid system (**System Name** field) and define the working zone for the grid systems as explained below.
- Click on the  button located on the right of the **Zone** combo box.

This opens a new dialog box in which you should define a name, a datum, a projection and other parameters for this zone (see example below).

	Value
1 Longitude of Central Meridian	000°00'00.00"W
2 Scale factor at Central Meridian	0.000000
3 Latitude of grid origin	00°00'00.00"N
4 False easting (m)	0.000
5 False northing (m)	0.000

- Then click **OK** to close this dialog box.
- Click **OK** again to close the **Grid System Definition** dialog box.
- Click **OK** again to close the Coordinate System dialog box and make the newly defined system the currently used coordinate system in MobileMapper Office.

Note: Although MobileMapper Office allows you to create new coordinate systems and datums, you cannot upload them to the receiver. This is done to preserve the maximum amount of receiver memory for data collection. However, creating new coordinate systems and datums on MobileMapper Office will allow you to compare the data you collect in the field with existing GIS data sets all in the same system/datum.

Print Function

MobileMapper Office's Print function allows you to print the content of the Map Display area. What will be printed will therefore depend on which layers you will check in the Layers List. As most Windows applications, the **Print Preview** and **Print Setup** functions are available from the **File** menu.

Use **Print Preview** to adjust the map scale. The map scale control looks like a linear pot. You set the map scale by dragging the cursor to the desired position. The resulting scale value is then displayed and the content of the Map Display area is updated to reflect the change of scale.

Use **Print Setup** to set the page format and orientation and choose your printer.

3. Appendices

Specifications

Receiver

Performance

- 12 parallel-channel technology, tracks up to 12 satellites to compute positions and update information with quadrifilar antenna

Acquisition times (under optimal conditions):

- Warm: approximately 15 seconds
- Cold: approximately 1 minute
- Update Rate: 1 second continuous

Accuracy:

- Position: 7 meters, 95% 2D RMS
- With WAAS/EGNOS <3 meters, 95% 2D RMS
- Velocity: 5.1 cm/s RMS (0.1 knot) steady state

Limits:

- Speed: 1500 km/h (951 mph)
- Altitude: 17,500 meters

Physical

Size: 6.5" x 2.9" x 1.2" (16.5 x 7.4 x 3.05 cm) (H x W x D)

Weight: 8 ounces (227 grams) with 2 AA batteries installed

Display:

- Size: 2.2"x1.75" (5.59 cm x 4.44 cm) (H x W)
- High contrast LCD with EL backlit display

Housing:

- Weather: IEC-529 IPX7 Standard (withstands water immersion for >30 min. at depth of 1 m)
- Wraparound rubber armor

Temperature Ranges:

- Operating: 14°F to 140°F (-10°C to 60°C)
- Storage: -4°F to 158°F (-20°C to 70°C)

Power

2 AA batteries or 9-35 VDC with power cable

Battery life: 8 hours with backlight and Li-ion batteries @25 deg. C (77 deg F); 16 hours with no backlight.

Installing a Memory Card

To remove and insert an SD card:

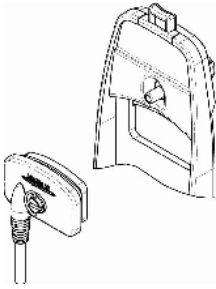
- Turn the MobileMapper off
- Remove the battery door and then the AA batteries
- To remove the card, push the card slightly towards the top of the MobileMapper. You will feel a slight click which is the locking mechanism disconnecting and then you will feel the memory card pushing against your finger. Allow the SD card to slide back towards the battery compartment. Now carefully continue to slide the memory card out of the channel it is in and lift it out.
- To install the card, hold it with two fingers with the label facing you. Place the top of the SD card in the channel provided in the battery compartment. Carefully push the SD card towards the top of the unit until you feel it lock into place. Do not force the SD card.
- Reinstall the batteries into the battery compartment. Be sure to observe the proper polarity.
- Replace the battery compartment door.
- Turn on the MobileMapper unit.

MobileMapper ships with a 16 MB SD card, but you can use SD cards of any size. The addition of the memory card to your MobileMapper will increase the amount of data that can be uploaded to it from CD-ROM products

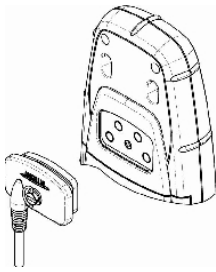
Connecting MobileMapper to an External Device

The Data cable can be connected to MobileMapper in two different ways:

- MobileMapper mounted to the Mounting Cradle: Place the receiver in the cradle, bottom end first. Snap MobileMapper down until the release latch locks it in place. Attach the cable through the opening in the back of the mounting cradle. It is not necessary to tighten the captive screw to the receiver, although you may do so for added security.
- Direct connection to MobileMapper: Using the captive screw that is attached to the plug, tighten into the back of the receiver.



**Connection to
Mounting Cradle**



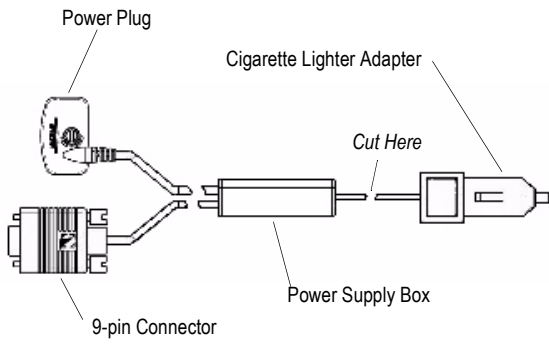
**Direct Connection to
MobileMapper**

Connecting MobileMapper to an External Power Source

If using the cable that comes with the cigarette lighter adapter, simply connect it to the cigarette lighter outlet. If you wish to make a permanent mount to a power supply, cut the cable between the power supply box and the cigarette lighter adapter. Attach the red (+) and black (-) wires to your external power source. The input voltage range for external power is 9-16 VDC.

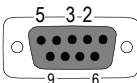


Do not bypass the power supply box or you will damage your unit and void the warranty.



Data connection pinout is as shown opposite if you look into the 9-pin female connector:

- Pin 2: Data Out
- Pin 3: Data In
- Pin 5: Ground



9-Pin Connector Pinout

Cable Wiring Color Code

Plug	Color	Signal
Power	Red	Power +
	Black	GND
Data	Yellow	Data In
	Orange	Data Out
	Black	GND

Glossary

Field: Any area on MobileMapper's screen dedicated to displaying the value of a parameter. Some fields are user-editable, some others are not.

Feature: Any element located in the field that you wish to record for further uploading into a GIS database for example. A feature can represent a real object (streetlight, park, electrical transformer, etc.) or on the contrary, something invisible or impalpable (gas, noise level, dose of fertilizer, etc.). In addition, there are four different types of features and each of them has its own logging procedure:

To log a feature: Means to save the characteristics of a feature into MobileMapper's memory. The user is in charge of entering the description of this feature whereas the receiver is responsible for saving the GPS position(s) it has determined on this feature.

To describe a feature: Means to give each attribute of the feature one of the prompted values for this feature.

Attribute: A description item of a feature.

Attribute value: One of the possible values that can be ascribed to a feature.

Feature library: A file containing all the features relevant to a given job. Each feature is defined by a name, a certain number of possible attributes and the list of possible values for each attribute.

Nesting: This word is used to describe a feature that you are logging whereas another feature is already being logged.

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Thales Navigation, Inc.

Corporate Headquarters, Santa Clara, CA, USA

+1 408 615 5100 • Fax +1 408 615 5200

Toll Free (Sales in USA/Canada) 1 800 922 2401

Email professionalsales@thalesnavigation.com

In South America +56 2 234 56 43 • Fax +56 2 234 56 47

In China +86 10 6566 9866 • Fax +86 10 6566 0246

European Headquarters, Carquefou, France

+33 2 28 09 38 00 • Fax +33 2 28 09 39 39

Email professionalsalesemea@thalesnavigation.com

In Germany +49 81 6564 7930 • Fax +49 81 6564 7950

In Russia +7 095 956 5400 • Fax +7 095 956 5360

In UK +44 870 601 0000 • Fax +44 208 391 1672

In the Netherlands +31 78 61 57 988 • Fax +31 78 61 52 027

Web site www.thalesnavigation.com

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