GPS Map 1.0

Demo Version

User Manual

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The demo version may be freely distributed as far as it contains the *GPS Map* package, the *Map Container* package, this manual and the ReadMe file.

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May 1995

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Introduction

GPS Map   makes your *Apple Newton* or compatible in combination with almost every receiver to a simple to operate navigation system with digital map display. The power of this system was formerly only available with special developed hardware or with powerful PCs, both much more expensive. Compared to the specialised hardware which may be used for navigation purposes only and to PCs which are unmanageable and heavy, your PDA is handy, has almost the same features and still can be used for your daily work.

Having only a black and white display on actual PDAs needs not to be a disadvantage, because a colour display always needs background illumination, much more energy, and has a very bad readability at day light. A colour PDA would be much more unmanageable and much more heavy. Because of the storage size of colour maps it would need a micro hard disk it would need even more energy. It would be nearly a portable PC then.

The *GPS Map* demo version has all the functionality of the full version but there is no GPS interface included. Instead a circle flight above Friedrichshafen in Germany is simulated. The demo Map Container contains ICAO maps in different scales and a (geographically not very exact) road Map for that region.

GPS Map is available for pilots within Germany and bordering countries through:

Eisenschmidt GmbH
Postfach 11 07 61
D-60042 Frankfurt
Phone: (..49)69-7306040
Fax: (..49)69-7391321

If you have further questions not discussed within this manual you may contact the author via AppleLink DORNIER.STA or via phone (..49)7545-911322 at evening. Please remember German local time and call between 6:00 PM and 10:00 PM.

PDA Requirements

GPS Map   runs on all *Apple Newton* compatible PDAs. Your PDA should have firmware revision 1.3 or later.

We commend using a PDA with large internal memory and large battery capacity such as *Apple MP120*.

Because of the internal memory may contain small map regions only you will need an additional PCMCIA 2.0 compatible . Memory cards are offered in a range of one megabyte up to 40 megabytes.
Unfortunately memory cards are still expensive. The needed size depends on the size of the map region and number of scales you permanently need. You can calculate as follows: one average paper map sheet in two scales needs about 1,8 megabytes of memory.

GPS Requirements

Note: for running the demo version you don't need a GPS receiver!

There are no special requirements to the because of it is only used as a position sensor. You could use one of the new "intelligent" GPS antennas which are cheaper than hand held receivers.

The receiver must have a serial interface with the following specification:

– or level, 4800 baud, 8 bits, 1 stop bit
– NMEA 183 software protocol

The NMEA protocol has different implementations, but *GPS Map* will adapt to them automatically.

GPS Map supports the following message combinations:

1. $GPGGA and $GPVTG
2. $GPGGA and $GPRMC
3. $GPGLL and $GPVTG
4. $GPRMC only

Because of the many different connectors for GPS receivers it is not possible to deliver a ready made cable. Therefore a cable with PDA connector and a free connectable end is included to solder it with the matching data cable available from the manufacturer of your GPS receiver.

Ground Station

For loading *GPS Map* and Map Containers to the PDA and its storage card you need access to a *Apple Macintosh* computer or PC running *MS-Windows 3.1*, and an adequate connection cable, which you will get at your PDA dealer. For loading the software you may use the installation software included or better, the optional *2.x.* The *Newton Connection Kit* may be used for both installing new software and for backing up the data stored on your PDA to the PC's hard disk

Installation

Please read your PDA's manual first before beginning the installation.
Some files on the delivered disks may be compressed.

–   Please read the file "Readme" stored on the program disk. There you will find installation hints dependent on your disk type (Apple or DOS).

–   Check the storage settings within the built in application "card" and set it to "store new objects on card"
.

–   Then load *GPS Map* and the Map Containers as described within the "Readme" file into the PDA by using the installer or the "*Newton Connection Kit*".

GPS Map   is a very complex application which needs a maximum of free working memory (heap). Please remove all unused applications from your PDA because they also need heap memory even if they do not run. Don't run other applications in parallel to *GPS Map* for the same reason.

Checking *GPS Map* and Components

Tap onto your PDA's . Dependant of the Map Containers installed you should see your *Extras* folder similar as on the following picture (the shareware tool *ScrollEx"* has hidden all other applications).

Start *GPS Map* by tapping onto its symbol. As soon as the application has initialised and simulated GPS data is available, *GPS Map*   will react a bit slacky to your inputs. That is normal and is a result of background processing for simulating GPS and of the limited performance of the PDA processor

.After initialising you should see a screen like this:

Screen Layout

Almost all of the usable screen area is used for displaying the map. If the upper screen part is not covered by the you will see the application name in the centre, the name of the (if any) at the left side and the scale of the at the right side. The value in brackets shows the in relation to the original paper based map.

At the lower end of the screen there are menu buttons for operating the system.

At the left and bottom side of the map there are for distance estimation similar to those found on paper maps. The unit used depends on the selection made for distance within the "Preferences" window. The smallest division represents (depending on unit) 100 meters, 0,1 nautical miles, or 0,1 statute miles. Each ten divisions the divisions are 10 times larger and so on. If the smallest division can not be shown because of a high map scale the system retries with the next higher value (times ten).

Window Details

All windows within *GPS Map* may be moved freely. Tap at the boarder of a window and drag it away without releasing the pen.

Each window has a .. After tapping the window will be closed and inputs made by the user will be executed.

Some windows have an additional .. Tapping this button will also close the window, but all inputs will be rejected.

The upper screen area is normally used for showing a window with navigational information.

The display at the top left side shows the quality of the actual GPS data. It depends on the number of satellites available and their relative positions at the firmament. GPS satellites are not at a fixed position but are orbiting, and therefore the quality will change permanently. The GPS position should be usable as far as the black bar covers more than half of the maximum sized grey bar.

The "" field () shows the track over ground relative to geographic north. Please don't mistake this value with your compass course, because of the compass course is magnetic north relative and does not regard the drift p.e. because of wind. "TRK" is calculated from the relative position change per measuring cycle and is only valid if you are moving faster than approximately 5 kilometres per hour!

The "" field () shows the current height over sea level. Please remember that this value is not exact enough for relying on. This value will be shown only if the GPS receiver is in (if it is tracking more than 3 satellites).

The "" field () shows the speed over ground. Similar to "TRK" it is not the speed displayed by your speed measuring system because that is adulterated by drifting.

If a route has been activated the name of the next waypoint will be displayed in the "" field (). The field "" () will show the direction to, the field "" () will show the distance to, and the field "" (TIME TO GOAL) will show the estimated time until the selected waypoint.

The time shown at "TTG" is displayed in hours and minutes if the time is more than one hour (p. e. 01:32h) and in minutes and seconds if the time is less (p. e. 01:12m).

Only the converge part of the speed vector is used for calculating "TTG".

The buttons   "" and "" may be used to select the next or previous waypoint within the current route. If the last waypoint of the route is selected and you press "Next" the first waypoint will be selected. Similar happens if you press

"Prev" if the first waypoint is selected.

GPS Map Operation Modes

The application distinguishes between three user selectable operation modes:

This mode is used for navigation only. The map is under control of the GPS receiver and will be moved in relation to your position change. The present position will be always in the centre of the screen and is marked with the (Present Position). The pointer out of the symbol represents your current track.

The map may be moved limited by the user for a better orientation, and jumps back to the real position after some seconds. For moving the map with the pen, tap onto the map and then drag it in the desired direction. Don't release the pen until the originally tapped position is below the pen again.
If the symbol reaches the border of a map region *GPS Map* will load a new map region with same scale and magnification automatically.(if one exists). You may enforce a premature map change by dragging the map in the movement direction.

This mode may be used for both navigation and planning. Map positioning is controlled totally by the user. In contrast to NAV mode the map is fixed and the PPOS symbol will move. Use PLAN mode for defining routes or displaying maps of other regions without loosing the present position.

The map may be moved either with the pen as in NAV mode or by using the shown below.

If you scroll over the the next map region will be loaded as in NAV mode.

This mode is nearly identical to PLAN mode, but GPS data will not be displayed. Therefore all processor performance is available for doing the user interface and the system will not be as slacky as in the other modes. If the mission recorder is running it will be continued during OFFLINE mode. This mode should be preferred for doing mission planning with or without connected GPS receiver.

Defining a Reference Position

Many _GPS Map_ functions depend on a . A reference position may be defined by three different methods and will then be shown within the map as a small circle:

Defining by Tapping onto the Map

The map may be dragged with the pen in each operation mode (limited in NAV mode). To define a reference position drag the map until the desired position is visible and then tap onto the position. GPS Map will mark the position with a small circle and then calculate and store the geographic position for later use.

Defining by Numerical Entry

Use "Go to Position" within the "Map" menu for entering the desired position as and . Dependent of the "..." settings the entry may be done by decimal degrees or by degrees and decimal minutes. You can also decide if the entered values should be interpreted as WGS84 or reference coordinates. If there is already a reference position it will be shown as default value. Tap onto the . and . buttons for changing the signs.

Defining by using a NAV Point

Use "Go to NAV Point" within the "Map" menu to select an entry from within a list with already stored positions. You may define s from within *GPS Map* or load them from an external database by using the .

This window is the first example for using an indexed list. Indexed lists make it possible to quickly select an entry out of thousands of entries. First tap onto the first letter of the searched name at the alphabet. The list will position to all entries beginning with that letter. Then tap onto the next letter and so on until you will see the desired entry. For correcting a mistake tap onto . . To clear the entry line simply strike through the line. The arrow buttons may be used for manually scrolling the list. Tap into the entry line after scrolling for positioning the list back to the first matching entry. For selecting an item and doing an action tap onto an entry within the list and then tap onto the Close button. The Cancel button may be used to leave the window without doing a selection.

Loading a Map and Changing the Scale

The arrow buttons below the screen may be used for a quick scale change. The upper button will load a map with more details, the lower button loads a map with less details if an adequate map region is available. Changing scale is dependent on the current operation mode. In NAV mode the new map will be

loaded in such a way that the Present Position is in the centre of the screen.

In PLAN and OFFLINE mode the map will be loaded in such a way that a defined reference position shows up at the centre of the screen. If there is no reference position the map will load in such a way that the old screen centre position will be conserved.

Press the overview button for directly loading a map out of a map list window. If you try to load a map in NAV mode only maps covering the Present Position will be displayed.

<u>Menus</u>

Info Menu

Tap onto . for displaying the following menu:.

About *GPS Map*

Tap onto "About GPS Map" to see the and copyright information. The window may be closed by tapping into it. This window may be also shown by tapping the application title of the map screen.

Preferences

Tap onto "..." to get a window for changing default settings for your special needs.

For entering and displaying position data you may select the widely used format or the European format. You will see the difference only at very high resolution maps below 1:100000.

Positions may be entered or displayed either as or as . The is selectable as knots or kilometres per hour. Distances may be displayed as kilometres, nautical or statute miles. The height may be displayed as feet or meters. For changing a setting simply tap onto the adequate line and select the new unit from the popup menu.

GPS Map is able to support nearly all thinkable navigation receivers with different interface protocols. Each specific protocol needs a special driver software for handling it.

If you have purchased GPS Map with an extra interface option you may select that option instead of NMEA 183 by tapping onto the   "GPS Driver" line.

Note: The demo version does not support GPS drivers!

The PDA supports a "sleep mode" setting in its standard configurations. If you define a specific time there the PDA will shut down itself after this time has expired. That is useful for daily work but not for navigation. Therefore you may prevent the PDA from going to sleep mode while GPS Map is running by selecting the "Disable Sleep Mode" box.

Prepare the Removing of *GPS Map*

If you ever intend to delete the GPS Map application you should first check the "Prep. removing GPS Map" box. During exitting *GPS Map* will remove all preferences, defaults, routes, NAV points and mission log soups from the PDA memory. Then you may delete the application as described in the PDA's user manual.

Mode Menu

Tap onto ˌ to check the current operation mode, select a new mode or show or hide the NAV information window.

Map Menu

Tap onto . to get a menu with map functions.

Load Map

Use this item will open a list window for directly loading a specific map. While in NAV mode only maps covering the present position will be displayed. The function is identical to tapping the "overview" button below the screen.

Go to PPOS

Tapping this item while in PLAN mode will scroll the map to the present position. The PPOS symbol will be in the centre of the screen afterwards. If the is not within the current map a new map covering the position will be loaded. In addition the present position will be stored as current

Go to

Use this item to position the map to a predefined position and for defining that position as reference position. If the desired position is not covered by the current map a new map is loaded containing that position (if available).
If this item is selected while in NAV mode the map will not move but the selected position will be stored as .

You may define NAV points from within *GPS Map* or load them from an external data base by using the .

Go to Position

Use this item to move the map to a position entered by and and for defining that position as . In "..." you can change the entry format to decimal degrees or degrees and decimal minutes and chose the or reference system. You may use the keyboard for entry by double tapping into an input field.
If the desired position is not covered by the current map a new map containing that position is loaded (if available).
If this item is selected while in NAV mode the map will not move but the selected position will be stored as reference position.

Define NAV Point

Tap this item to store the current by name for later use as . You will see a window opening for entering a NAV point name. The name may be up to 25 characters in length. Double tap into the input field for using the keyboard.

You may decide if the NAV point should be stored in internal PDA memory or on the PCMCIA card by checking the "store objects on card" button in the standard application "Card".

Delete NAV Point

Use this item to delete a previously defined which is wrong or not longer needed.

NAV Calculations

This item opens a window for getting the distance and course between two points.

The calculator needs two s which you may enter while this window is open. After entering the first position tap the upper . button and the reference position will be displayed. The define the second reference position and press the lower . button. The calculator will show the second reference position and the distance and course (geographic north relative) between both positions.

Route Menu

Tap onto to get a menu with route planning functions.

Load Route

This item opens a list window for selecting a predefined . The route name then will be displayed at the upper left side of the map window.

New Route

If you want to define a new tap onto this item. If a route was already loaded it will be removed from screen. A window will appear for entering a route name. Route names may be up to 25 characters in length. You may use the keyboard by double tapping into the input field.
If the Cancel button is pressed a temporary route will be created. This route will be not stored permanently and will be lost after a reset or PCMCIA memory card change.

You may decide if the NAV point should be stored in internal PDA memory or on the PCMCIA card by checking the "store objects on card" button in the standard application "Card".

Direct Route

This is the fastest way for defining a simple with two waypoints and works only in NAV and PLAN mode. First define a reference position and then tap onto the "Direct Route" item. You will get a route where "WP 0" is the current position and "WP 1" is the reference point. Please remember that this route is created temporary only!

Clone Route

If you want to copy an existing and loaded for modifying that copy or if you want to change a temporary route into a permanently stored route tap onto this item. You will get the same window for entering a route name like you already know from "New Route". If you tap Cancel there will be no new route and the old one will remain unchanged.

Delete Route

If you want to permanently delete a stored tap onto this item to get a selection window.

Edit Route

Tapping this item opens the window.

If a is loaded its s will be displayed in the list. To enter a new waypoint first define a and the tap . for appending the new waypoint or . for inserting the waypoint before the waypoint currently selected in the list.

To change an existing first define a new , then select the waypoint to change in the list by tapping it and then tap the . button.

To delete a select it in the list and then tap the . button.

You can also use the for . Select a waypoint within the list and tap the . button. The map will be positioned for seeing the waypoint in the centre of the screen. If the is not covered by the current map an adequate map will be loaded if available.

A may contain up to 100 waypoints but you may then see some limitations with other functions due to a lack of heap memory. An usual route has up to 20 waypoints.

During entering waypoints will be named automatically starting with "WP 0" and then incrementing.   These automatic names will be renumbered automatically if waypoints will be inserted appended or deleted.

If necessary you may enter your own names for waypoints directly before pressing one of the buttons. Your own names will be not affected by renumbering. Waypoint names may be up to 8 characters in length. For entering you may use the keyboard by double tapping into the input field.

All manipulations on the will be automatically saved (will be temporary for temporary routes). If you want to use an existing route as a template for a new route use "Clone Route" to make a copy first.

The two last executed functions are undoable while the editor window is open by using the "Undo" button below the PDA screen.

Set next Waypoint

Use this item to select the next waypoint from a list window. This function is only needed if you want to select a waypoint in the middle of the route because of normally you will use the "" and "" buttons found in the NAV information window.

Position Line functions

In addition to routes you may define a to a or to a . The position line works similar to a rubber ribbon between your present position and the selected

target point.

Free Pos. Line

First define a and then tap onto this item to define the .

Pos. Line to WP

Tapping onto this item will open a list window to select a as target for the . This function works only if a route has been loaded.

If a position line is already defined there will be more selectable items in the menu:

Remove Pos. Line

Tapping this item will remove the from the screen.

Change Pos. Line

To change an existing free first define a new and then tap onto this item.

Pos. Line as Route

This function works similar to "Direct Route" and changes an existing to a with two waypoints. It may be a good help for emergency procedures. Please remember that this route will be a temporary route and must be stored   with "Clone Route" to get a permanently stored route.

Record Menu

Tap onto . to get a menu with specific functions.

Show / Hide

A very interesting feature is available through this item. After selecting it *GPS Map* will plot your movement as a tail fitted at the PPOS symbol. The tail will grow up to a maximum length of some minutes history. It may be a big aid for staying on course or curving back into the route.

Because of the recording depends from the actual map and scale it will be erased during map change, either manual or automatic. The function needs much storage space and performance. You should stop it by tapping the meanwhile changed item "Hide Track History" if it is not longer needed.

Start / Stop

Another very interesting feature is available through the remaining items. You may store your mission for later displaying it as a curve within   a map. The actual position is saved approx. every 15 seconds. After selecting the "Start Recorder" item there will be an input box for entering the mission name. You may enter up to   25 characters there, and you may use the keyboard by double tapping into the input field.
To stop recording simply select the item again which has changed its text to "Stop Recorder".

Stored missions needs a lot of memory! Please delete missions if they are no longer needed.

Show / Hide a Mission

Use this item for displaying a stored mission as a curve within the current map. This function needs much memory and calculation time because it has to check for each stored point if it is covered by the current map and then has to clip the connection vectors. It should be used in OFFLINE mode only and it is disabled in NAV mode. It may need up to several minutes until the curve is shown within the map. When finished the map is positioned in that way that the start point of the mission will be in the centre of the screen.

If you do a scale change you will have to wait the same time again because of all points have to be recalculated for then new map.
For cancelling the mission display tap the meanwhile changed item "Hide Mission".

You may decide if the mission should be stored in internal PDA memory or on the PCMCIA card by checking the "store objects on card" button in the standard application "Card".

Save Window

Tapping onto this item will either save the (if open) or the window (if open) to the notebook. You may append a header with up to 25 characters in length.

Loading s from External Source

The *Newton Connection Kit* 's import and export functions can be used to import NAV points as WGS84 coordinates from a database file to your PDA or to export NAV points to another application.

<u>Map Support</u>

Normally you will purchase *GPS Map* together with map material. Ask your dealer for available maps and different scales.

With adequate tools you will be able to produce your own maps, but please acknowledge the copyright conditions of the paper map suppliers! You may purchase paper maps and produce Map Packages only for your private needs. For making commercial Map Packages you will need the written permission of the map supplier and you will have to pay a royality fee to him.

For producing *GPS Map* compatible Map Container packages you will need:

–   a fast *Apple Macintosh* computer with at least 16 megabytes of RAM and a big hard disk.
    As soon as the *Newton Toolkit* is available as *Windows* version it will be possible do do the work on a *Windows* machine, too (estimated summer 95).

–   image processing software such as *Adobe Photoshop*

–   the development system *Newton Toolkit* from *Apple*

–   the available through the author

–   and access to a scanner (should be A3 or bigger). This is also offered as a service by DTP studios.

<u>Miscellaneous</u>

Most important functions, but only the latest two are undoable by using the "" button below the screen.

If you find problems such as error messages caused by the operating system or malfunctioning within *GPS Map* try pressing the PDA's reset button for reinitialising the memory management. Thst will help in common.

Abbreviations

Altitude, height relative to sea level

Course to Goal, course to next waypoint relative to geographic north

Distance to Goal, distance to next waypoint

Coordinate reference system, used in Europe

Global Positioning System

Standard for marine electronics interfaces

Personal Computer

Standard for credit cards sized memory and I/O expansion cards

Personal Digital Assistant

Present Position, where you currently are

Standard for serial computer interfaces

Speed over ground

Track, course over ground. geographic north relative

Time to Goal, time until arriving at next waypoint

Coordinate reference system, used by GPS systems

Waypoint