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Build your own outdoor and road navigation GPS

James

- Skills and guides - DIY, Making things. -



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Description :

An alternative new look at outdoor GPS. Cheaper, and much more efficient than most, but computer skills required.

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I have owned over the years two Garmin GPS for the outdoors, and while they were good, both suffered from old time disease, one not sensible enough to find anything in a small valley or under a tree, the other one also without mapping died because of the battery case being too fragile...

Since some time now, I have been looking at the market for a new GPS with preferably integrated land and marine mapping and car navigation, and I found nothing of real interest.

The state of the market

The market is split in mainly 4 kinds of GPS:

Marine, Road navigation, Offroad map plotting and routing, Sports counters.

Very few systems can combine more than two of these functions. A few have tried to do 3, with in my opinion very little success.

I even bought a Magellan Crossroad (road, land, marine) that I kept for a week before reselling: Only the road navigation of France was in it, sad I live near a border, topographical maps were either unavailable (to be released next month for the last 2 years!) or at 99Euros the region, and I need 8 regions to cover France ! Marine charts totally out of price (200Euros my chunk of sea!). In a few words, on the marketing paper it looks good, a unit under 300 Euros that will enable you to do anything, but in reality, a car navigation software that does not give speed, and is really poorly designed, a topographic software that only takes one coordinate system (not even UTM!) , when each country has its own. You'll have to spend a few times the price of the unit to get anything near useful, it is ridiculous.

I had a look at the Garmin, and they are not really better, they do not even provide systems that do both car navigation and land navigation perfectly — Indeed, it is a way to sell you more stuff !... Garmin are not too closed for topographic maps, and they are those that provide the best coverage, but yet, there is space for improvement. There are other makers, like IGN in France with their Evadeo and Ushuaia models, and a system to download tiles of 25K topo, which may as well ruin you, at "only" 50 cent (or similar) the 10 square kilometres tile— and anyway only France !... In brief, everything is proprietary or limited and when you get a system, you are stuck with it.

The market is blocked by proprietary systems, because it is a good way to be sure to continue to sell you more after selling you the main hardware. A map file standard whether topographical or navigational, would mean the death of a big chunk of their incomes. And maps are not cheap. So they maintain their system proprietary and as closed as possible. Some systems (Magellan—avoid magellan!) are so blocked that you cannot even backup the flash memory that contains the map, or copy it to a bigger SD card ! You will find for common brands, conversion and import software developed by third parties to allow to import maps on these proprietary maps representation (garmin IMG maps buy example).

The market prefers to sell you a car navigation system and a different outdoor system, because it makes more money. But there is no technical impossibility, just lack of will and lust for profit.

PDA systems are big, power consuming, expensive, and, well, who needs email and wifi in the middle of a forest !

They are urban devices without a doubt.

Well, my needs are simple, I want the outdoor mapping and plotting and sports counters, and the car/pedestrian road navigation for the occasional use, and I want the best of them !

The revelation

In my searches I found a little car navigation unit, the Fujitsu-Siemens Loox N100. It is a PNA (Personal Navigation Assistant— a road navigating unit) and in noway a PDA (a pocket PC or palm pilot), but



Small, light and powerful Not big, is'nt it?

The Fujitsu Siemens Loox n100 is small (2.8" touch screen), it runs Windows CE in reduced version, it runs Navigating software Navigon (the slowest of all I tried, but also the one with the best database), it weights 114 grammes, it runs between 4 and 8 hours on a changeable li-ion battery, it charges on a USB port (nowadays they are converters from everything to USB), it has a mini SD card port which takes the 4GB cards, It has a built in SIRF III GPS chip, among the best and most sensitive GPS chips of the moment, and more than anything, it is old enough and can be found between 60 and 120 Euros on Ebay and other discounts/second hands. The screen works in landscape or portrait mode.

This makes it a great contender, for any modern specialised outdoor system, if only we could unlock it's software and get access to the underlying Windows CE OS, in order to install what we need!

Hey, but wait, do you know this magical thing called internet ? Type "unlock loox n100" in Google, and here it is, information pops up, it is possible to modify it very simply in order to unlock it from the proprietary application, and make it run whatever you wish! ah ah !



The loox N100 The Loox N100, here unlocked and customised.

Let's go !

The unlocking is done by placing a cab file on the SD card, and after 2 resets, magically the OS, WinCe will appear, and ActiveSynch mode be enabled, giving you easy access to the whole OS from a PC.

Then, a few more tricks to install the missing DLLs on the simplified OS, an it can run whatever you wish (it installs like on any pocket PC running ActiveSync, but not all software may run, because the OS is not a full version, but a tailored version for Navigon).

It has to be noted, that the unit can be cold reset. a cold reset will update the RAM from the ROM which has been flashed in by Fujitsu, or by the flash update mechanism. All changes will be lost in such a case, and the system will revert to the proprietary behaviour, as for a brand new unit. But this is an exceptional behaviour that is not needed, it is not even documented anywhere, but it it a good way to revert any thing you did, in order to have the unit serviced, if needed ! Good news, you may not even loose the Guaranty !



Default Interface Here showing the interface before unlocking.

Road navigating software

The unit is small, so even with a 320x240 pixels screens, it may be difficult sometimes to use the touch screen to perfection without a stylus. But then, we wanted a small unit, isn't it, so we cannot complain.

The original Navigon Europe is slow to charge, and a bit clunky. It works, but it is terribly slow to start, and the maps are very big (But they seem to contain more information, streets names and POI that none of the others can find!). Funny that this unit is provided with the slowest navigating software that runs on it ! It is somehow a pain to use because sooooo slow to load ! Nevertheless, it does it's job, and once started, does it well enough that you do not really need another navigating software.



Navigon

The following are reported to run from different sources:

Miomaps 3.2, 3.3, is a good looking road navigation software with impressive 3D effects, An European map and software would fit on 1GB SD card, excellent look and quick, but complicated menus where it is easy to get lost.

IGO 2006 which is very similar to Miomaps shall work too, as both are based on IGO engine, .

TomTom 6.10, 6.20 fastest and easiest to use, European maps would fit a 1GB SD. It is a great soft, very open (the only one where it is easy (and free) to add POI (Points of Interest). It provides a good simple interface with no overcharge, just what is needed, and the menus are intuitive.

TwoNav from CompeGPS , inovative Road and outdoor combined software, seems to run also on the loox.

Attention to the versions given, they are reported working, other may not.

So this is a good point You can buy the navigation system you want, and have it running on this device.

Outdoor maps routing, plotting and tracing

The difficulty is to find a software that will do everything you come about, and reuse existing maps you may already own. All of the couples "PC / PDA" software will provide different import/export possibilities, and none will be able to import everything. You will need to check what works best for you.

OZIExplorerCE, A map plotting and offroad navigating shareware which is very open (a little less interesting as it takes only a proprietary map format on Windows CE, but there is translating software). There is also an OZI explorer on PC so they can exchange information. A great option for displaying maps that can be obtained for free, or created quite easily from scans or extracted from different online systems).

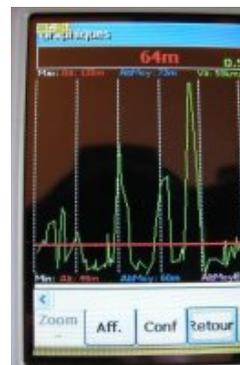
NoniGPSPlot, a Similar small French freeware, certainly the best of all I tried, it exists in French and English. It plots on OZIExplorer calibrated Jpeg maps, which can be extracted from online maps or scanned, they only need to be fragmented in small squares (using freeware programs). The software will cleverly find the appropriate tiles, and zoom in and out through resolutions if there are many. Lots of options, traces directly exportable to Google earth, all sort of graphs, and useful counters, everything saved in memory to survive resets and lack of battery power, it is just brilliant. It has been designed to be used with touch screens, with big buttons.



NoniGPSplot Map



NoniGPSplot counters each of them can be customised!



NoniGPSplot Graphs



NoniGPSPlot more detailed Map

Memory Map V5, is a paying software, and is great, (specially, for me, the 1:25K French topos are available at very interesting prices). There is a PC version to communicate with and build routes. The French topo for my region costs 45 Euros, half of all other publishers prices, and for that price I also get the 3D PC software and the PDA version, a good deal ! It allows to plot tracks and follow routes. The raster maps have very good details, and the file compression used for the .qct proprietary format is efficient. A good little software.



MemoryMap

Among the things I did not try:

Apparently, Pathaway GPS (V3—Not V4) from Mustokatech also runs.

Also some versions of Fugawi seems to run on the device.

Cartoexplorer from Bayo may or may not work

Utilities

Sirftech is a tool to tune the GPS chipset: These chips come with the "static navigation" mode set to on. Static Navigation is a complex algorithm which will maintain you position and direction on small variations. It is good for road navigation, as it avoids the screen turning round when you stop, but is a pain for walking traces, as it will create 10 to 50 meters jumps in your positions and traces, with inconsistent bearings, because the speed of a walking man is inside the correction parameters of the algorithm. This freeware (now possibly shareware) tool allows to change a whole range of parameters.

A registry editor (regeditce).

A port splitter, to enable two of these fine applications to run simultaneously.

The base screen was redesigned with SystemInformation, using a simple ini file and icons. Access was given back to the proprietary screens, so nothing is lost, just the unit strongly enhanced.

PC Soft

Obtaining Maps:

GoogleMV (google Map viewer), a free Russian soft to download , merge and calibrate google maps.

gMapMaker, another similar, less graphical, but more stable.

Both extract maps in OZI/Noni compatible format.

Please note that excess of Google maps downloading leads to blacklisting your IP adress from google for a day or so. gmMapMaker turns around this by using a list of free net proxys. Looking at google's reaction of not indexing this article, it is clear that they do not like people doing this, on the other side, I have not read them stating that they formally forbid this kind of use.

Some others software will extract from other online maps systems, terra server, yahoomaps, geoportail, and others.

It is also possible to scan paper maps and calibrate them, and there are a lot of free maps and map calibrating software on the net.

Splitting in small squares for noni: (from the same site) MaspSplit (free)

OZiexplorerPC (shareware) moving map plotter and calibrating. Imgtoozf transforms a jpeg based ozi map in ozfx3 ozi native format, the only one accepted in the Ce version (free).

MemoryMap (commercial, works with the PDA)

Touratech(commercial, works with PathAway GPS) Apparently Touratech is one of the few to be able to do something with bayo maps and export them to PathAway.

Fugawi (commercial)

MapCalibrator(free)

A LOT of others, search the WEB!

For more details, search on the web, or on gpspassion.com which contains some very good information (some in French some in English), there is also navigating.de in German.

These threads give details on unlocking the loox. Though it is not clear and concise, all information needed is there:

<http://www.gpspassion.com/forumsen/...>

<http://www.gpspassion.com/forumsen/...>

<http://www.gpspassion.com/forumsen/...>

<http://www.gpspassion.com/forumsen/...>

Also in our forums where you will find the unlocking tools. <http://forums.outdoors-magazine.com...>

This kind of modification can be applied to alot of little ce based PNA GPS including cheap Chinese.

Usage, Conclusion

The good points are that this kind of unit is extremely versatile. The fact the maps can be obtained from free sources is non neglectible, even if they are not the best. It is possible also to find THE software you prefer, and THE software adapted for a specific use or country. The ability to scan an existing map and calibrate it, or to obtain maps from different sources while travelling with the simple use of a PC (a common good nowadays) is interesting ! I have

bought additional SD cards and a cheap USB SD card reader for gaining speed of transfer and compatibility.

Another good point is the ability to play MP3 either through the integrated speaker or connecting a head set. Video can also be watched, but hem, that is a bit out of subject.

The unit is extremely capable, the hot fix (time to find satellites from a previously known position) taking a few seconds and a cold fix (time to catch satellites from a previously unknown position) some 2 minutes. It gets a fix behind a car windscreen, so a tree canopy is a moderate problem, the sensitivity, and precision being absolutely brilliant! Charging is simple through a USB plug, the touch screen is easy to use.

Do not worry, there are indeed down sides. The unit is not water resistant nor rugged for careless outdoor use. But this can be fixed by slipping it in a water resistant 4 Euros bag. Battery life at full backlight all the time must be around 4 hours, and longer (6 to 8), if the timer for backlight shutdown is enabled. It may be too short. The touch screen may be a bit small sometimes, and the pen is needed for some manipulations for some software (not all are badly designed for touch screens). Another default is the lack of power off, you can put the unit on stand by, but shot or removing the battery, there is no power off button, the only way is using a timer. It is actually an advantage and a disadvantage, because on the other side, in normal use, the unit is operational with a fix in seconds. Also, there are exceptional and rare crashes and hangs forcing a reset (but you should expect that from the moment I told you there is windows inside ! crashing-and-hanging is a trademark of windows :D).

Still I have used it for car navigation, as a Mountain bike counter, as an aid to hiking, it works extremely well, and it is small and light enough. Just tucked in my shoulder bag, it has traced forest mountain bike tracks without a loss of signal, in places other GPS used to be lost. USB cable charging make it easy to power using solar panels or external battery packs.

The price: to the price of the hardware, you must add the price of the software that you want to add on. The Navigon is usable, even if slow to load, a Tomtom Navigator or a Miomaps or IGO costs around higher 100-120 Euros, memory map around 40Euros, with topos, OZI Explorer 22 Euros, NoniGPSplot gives it best after a donation of 10 Euros, and you need SD cards to store all maps and software, the 4GB HD SD works but needs to be removed prior to resets, and a 2GB SD mini or micro is around 15Euros, a 4 being 10 Euros.

If you buy a PDA to to this, first it will be big and much more expensive, and PDAs are no use in the wilderness where there is no rendez-vous, no mail, no phone.

Here for an average of 160 Euros (Second hand or discount Loox n100 + SD 2GB + Memory Map your region + NoniGPSplot), you will get an excellent outdoor GPS, that will also do good road navigation, and at least you did not waste money ! It is a perfect companion for travelling, powerful, yet small and light.

Yet, all accounting done, it stays much cheaper this way than a specialised unit, which after all may not give you much more in such a small bundle, and will certainly be not so adaptable.

I am dreaming of a similar unit running linux and free software with free maps ! May be one day we shall see that, Meanwhile, this is not bad.

If your knowledge in computers is enough and you want to embark on a similar path, I advise you: to check that the model you will get can be unlocked, and check with people that did it what can run or not, before buying it or any related software.

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Post-scriptum :

Indeed you will need good computer skills to follow this path, this is not an article designed to guide you technically, or an how-to, but an eye opener. Other cheap units and small Windows CE based road navigation GPS, or even smartphones with GPS chips are probably as suitable as this one.

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