Universal GPS Client for Nokia 9210 Communicator
Instruction Manual

Version 1.8 / 10 May 2003
for the SW versions from 1.08(0)

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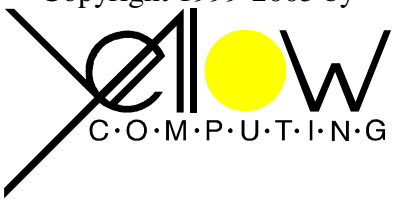

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1 Foreword

GPS locating application described below is a universally applicable solution designed for a fast and easy location of vehicles with the use of a Nokia Communicator.

The basis of the location system is a Nokia 9200 series communicator, which is connected to a GPS receiver. The whole system is built into a vehicle. In this way one has the most important parts of the location system, which is very easy to use with this application.

The application can be used with every GPS receiver providing the latter has a serial port. Precise requirements of the receiver are given subsequently.

The application was thoroughly tested with Garmin GPS 35 LP (model GPS35-HVS) as well as with Garmin eMap, eTrex Summit; Leadtek GPS-910; Holux GM-200BK;
Emtac CRUX II / NK92 and Nokia LAM-1. The test was successful.

2 Features

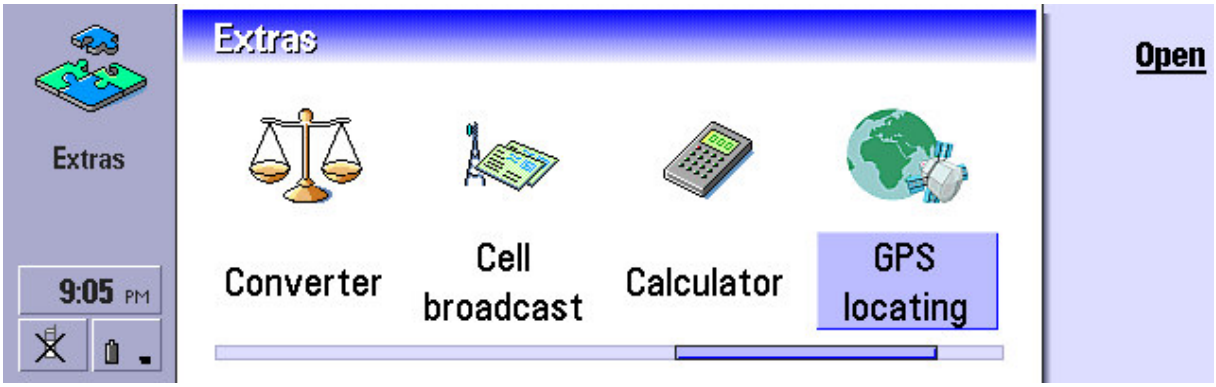
- Continuous readout of an approximate location, speed, direction of movement and UTC time on the Nokia 9210 PDA's display.
- A selectable display of the direction of movement either as movement on a map (the arrow shows the direction on a map) or as a compass (the arrow shows north) or a course and distance to a destination.
- Location, speed, direction as well as information on satellites availability (number and validity flag) are sent as an SMS message when an SMS request message is received.
- Continuous data gathering and automatic sending as a "compressed" SMS (five position fixes per an SMS).
- Adjustable cycle of data acquisition (i.e. how often should the five position fixes for the compressed SMS be specified). It can be selected separate for movement and standstill.
- Selectable baud rate and GPS sending cycle.
- Precise recognition of the beginning and the end of a standstill.
- Validation flag of position fix (recognition if the GPS is plugged in and working properly).
- An SMS notification message when a specified area is reached or left.
- Possibility to define 2 areas (location and radius with hysterese).
- Emergency call button – when pressed an SMS alarm message with current location and validity flag is sent.
- Sending predefined or self – created notifications.
- Received SMS message – request for current or last location.
- Received SMS message – request for current or last location to another mobile phone, if server is not working.
- Received SMS message – display of predefined text notifications.
- Received SMS message – display of received text notifications.
- Received SMS message – configuration and initialisation of GPS receiver.
- Received SMS message – configuration of an area.
- Received SMS message – configuration of the receiver and SMS centre.

- Received SMS message – configuration of the beginning and end of a standstill.
- Received SMS message – configuration of GPS receiver serial baud rate and sending cycle.
- Received SMS message – configuration of movement direction displaying.
- Autostart option – the application is automatically activated when 9210 is switched on.
- Remote start option – the application is activated by an SMS message.
- Smart communicator clock correction functionality, time zone independent
- Configuration modifications are reported to the recipient by an SMS message.
- Configuration data can be copied or installed from the installation package.

3 Operating

3.1 Activation of the application

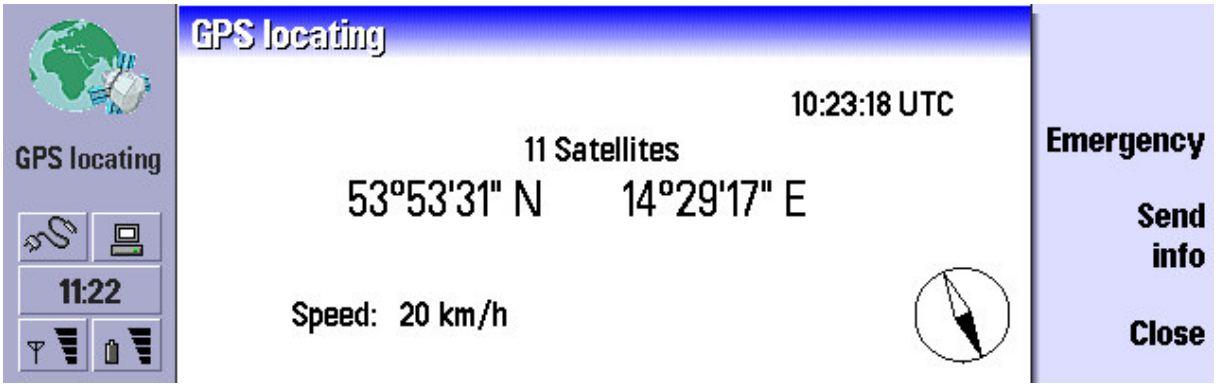
The GPS application can be installed in the main memory or in a memory card of a Nokia 9210 device. It is displayed as an ‘Extras’ application.



In order to start the application press the ‘Extras’ button and mark ‘GPS locating’ on application list. Press 'Open' or confirm your choice pressing 'Enter'.

As soon as the application is started, it runs a test checking if the serial port is not occupied. Should the serial port be already occupied, the application cannot be used (the GPS antenna cannot communicate with the application).
After the serial port was successfully opened, connectivity icon is displayed in status pane.

3.2 Main view



The most important information of the GPS receiver is displayed on the screen in the main view. The current location is shown in the middle of the screen. The information about course i.e. current speed and direction of movement is shown in the bottom part of the screen.

Direction of movement can be shown in three ways:

- as movement on a map oriented to the north (by movement from east to west the arrow shall turn left)
- as a compass needle (by movement from east to west the black arrow shall turn right)
- as destination navigation (an arrow shows direction to the destination, distance to the destination is shown nearby; colour of the arrow may changes indicating correctness of movement: from green – correct course to red, when moving in opposite direction)

See also corresponding settings in chapter 3.3.4.

The information about UTC time as well as the number of available satellites obtained by GPS receiver is shown in the upper part of the screen.

All the information is displayed in grey, if there is no GPS receiver plugged in (or when there is no data exchange between the GPS receiver and the Nokia 9210 device). In such cases the most recently received information as well as the 'No antenna' message are presented.
When the GPS receiver is connected or disconnected, a beep is played.

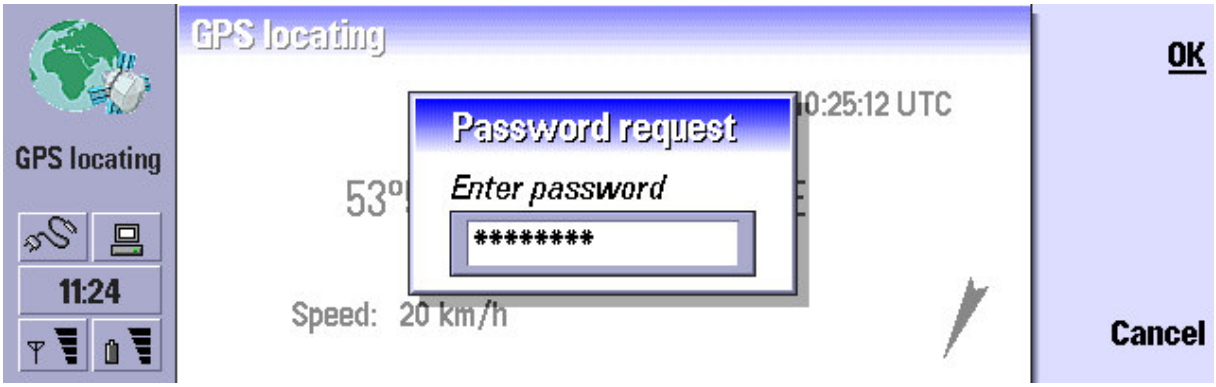
When the 'Emergency' button is pressed, the Nokia 9210 device sends an emergency SMS message with current location and time (the exact structure of this SMS message will be described below). If connection between the 9210 device and GPS receiver was broken, the most recent location and time are sent.
See also definition of these messages in 9.2.3.

Pressing the 'Send info' button allows sending a text notification by an SMS message. This functionality is presented in detail below (8).

Pressing the 'Close' button removes the application from the main screen and makes it work in the background.
It is also possible to exit completely the application, for example if serial port is necessary for another tasks (for example PC connection).

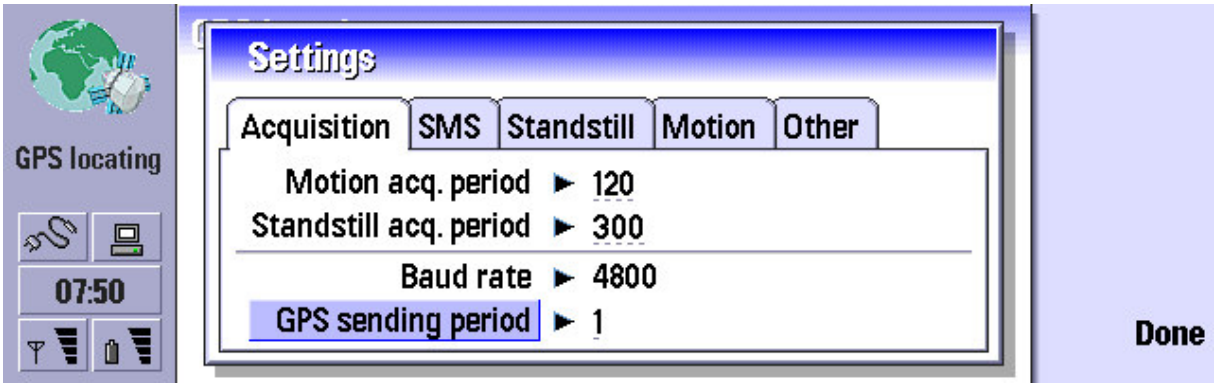
3.3 Settings

Application settings are accessible either via Ctrl + K shortcut or by a menu.
Application settings are protected by a password (up to 8 characters).



Password must be set when accessing setting for first time. There is a possibility to change the password later.

3.3.1 Acquisition page



Settings fields are grouped functionally on couple dialog pages.
Use cursor keys to navigate between fields.
The 'Change' button changes choice list item, if a list is currently marked.
The 'Close' button brings you back to the main view.

The data acquisition timer will be reset, whenever settings dialog is closed.

Acquisition page contains four fields responsible for data gathering.
First two fields determine the period of time between successive data gatherings for movement and for standstill. The period can last from 12 up to 9999 seconds.
See also corresponding outgoing message definition in chapter 9.2.2.

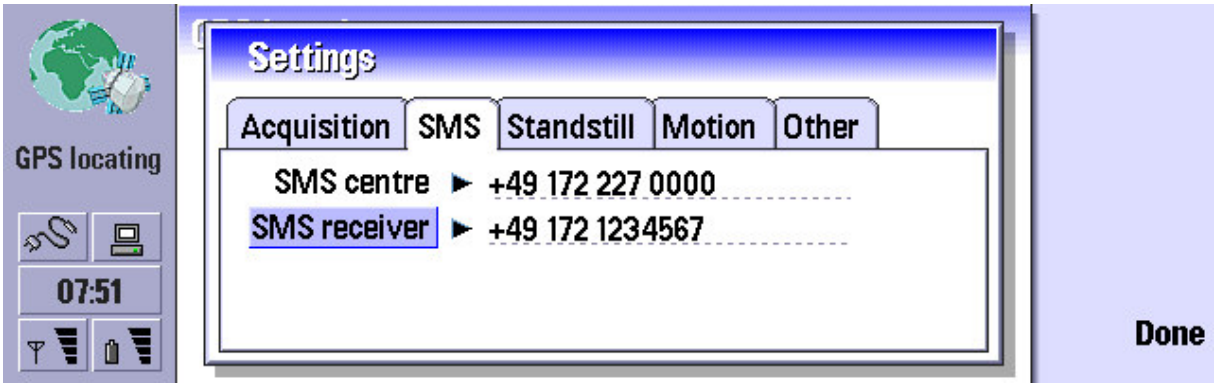
When there is special value 0 in a field, the 9210 device will send no condensed location SMS messages. In such case the current position fix can be obtained from the 9210 device only on a request (see 9.1.6 and 9.1.7).

'Baud rate' field defines baud rate, which the data will be listening from GPS receiver. The 4800 bps is standard NMEA speed.

'GPS sending period' determines how often GPS sends information via serial port.

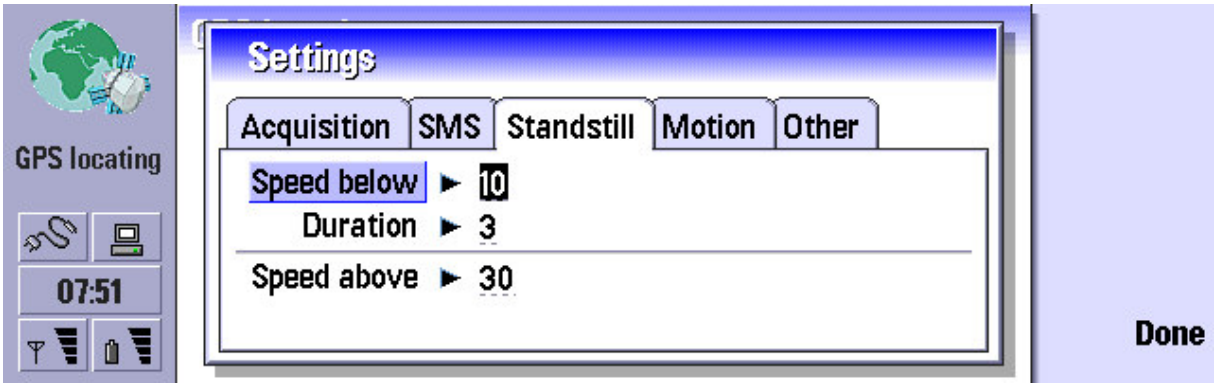
Most of GPS receivers send data every second, but some of them every 2 seconds, if they are not able to fit all NMEA sequences in 1 second slot.

3.3.2 SMS page



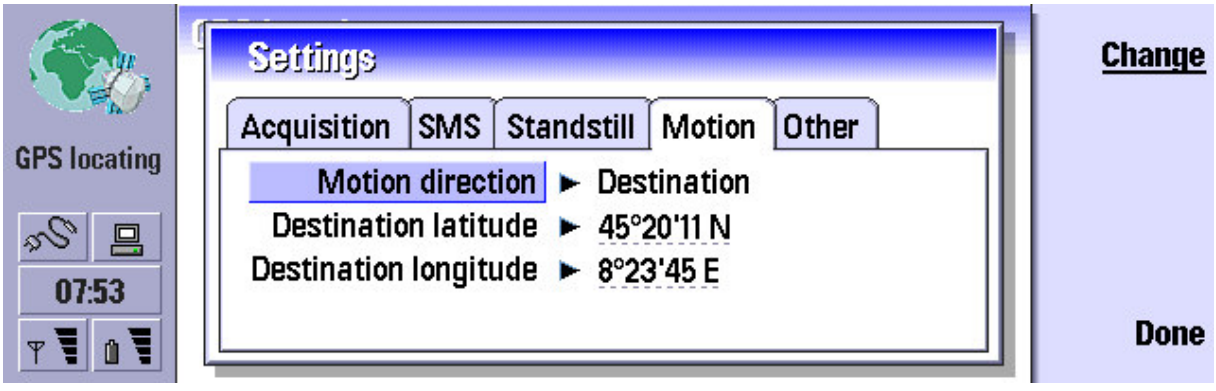
SMS page allows configuring SMS centre and receiver for messages sent from application.

3.3.3 Standstill page



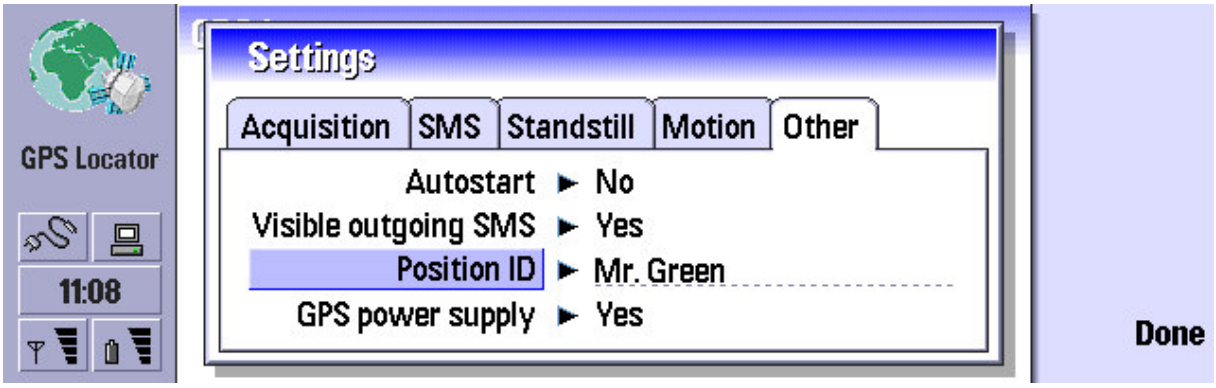
Standstill page contains fields determining beginning and end of a standstill.
Begin of a standstill is detected when ‘Speed below’ value exists for number of minutes given in ‘Duration’ field.
Application will identify the end of a standstill, if current speed exceeds the value given in ‘Speed above’ field. This value has to be bigger than the one given in the ‘Speed below’ field.

3.3.4 Motion page



'Motion direction' offers you Map / Compass / Destination choices. The field specifies the way in which direction of movement will be displayed.
If Destination is chosen, then destination latitude and longitude can be set.

3.3.5 Other page



The last page contains miscellaneous settings.
The field 'Autostart' offers you a Yes / No choice.
When the autostart function is activated, the application will load automatically as soon as the system is booted up.

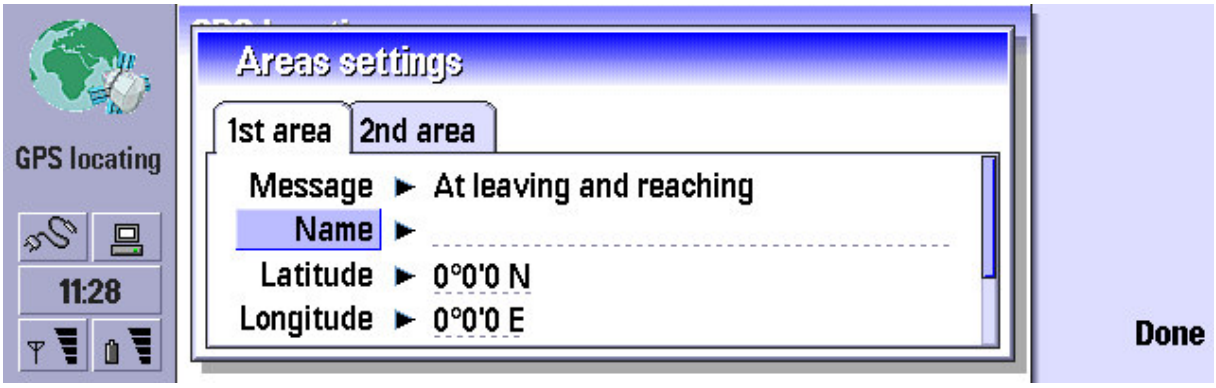
'Visible outgoing SMS' offers possibility to make all SMS sent by application visible to the user in Messaging. This option is disabled by default to avoid incidental deleting of outgoing SMS.

'Position ID' is a user description. Content of this field is added to response for position request (see 9.2.1).

'GPS power supply' enables power supply of a GPS receiver from the communicator.
The Emtac and Nokia dedicated receivers are supplied from the phone battery.
Refer to chapter 10.8 for more details regarding power supply issues for dedicated receivers.

3.3.6 Area settings

Notifications of a location reaching or leaving are configured via 'Area settings'.
This dialog can be displayed either via Shift + Ctrl + K shortcut or by the menu. Access to this information is protected by same password as above settings.



The following are determinants of location: notification type, name, latitude, longitude, radius and hysterese. In the ‘Message’ field you can choose when an SMS message shall be created. The field ‘Name’ contains a description of an area.
Latitude and Longitude fields consist of 4 values each: degree, minute, second (each consisting of 2 digits except the longitude degree number, which can consist of 3 digits) and hemisphere (either N / S or W / E)
The radius can be specified from 0,1 km up to 99,9 km in 0,1 steps.
The hysterese can be specified from 0,1 km to 99,9 km in 0,1 steps.
The hysterese is necessary in order to not create several messages during movement along the border of the area (it is dependant on the inaccuracy of a position fix).
See also corresponding message definition in chapter 9.2.4.

4 Review of the application

The application can be automatically activated as soon as the system is started, providing that this option (see 3.3.5) has been turned on.

Starting other applications and moving between them will not be restricted.

Pressing the 'Close' button removes application from the screen and makes it work in the background. This does not affect the operability of the application.

The application functions fully, if a GPS Receiver is connected to the 9210 device.

The last GPS location will be retained even in case of a discharged battery.
Application uses always most current position fix got, when GPS receiver was connected, independently of validation flag of this fix.

So-called great circle formulas are taken for distance calculations.

Application sends SMS messages, when SMS centre and receiver where configured (see 3.3.2).

5 Communication between GPS - Receiver and Nokia 9210

Communication between a Nokia 9210 device and a GPS Receiver is based on NMEA 0183 standard.

Information is exchanged through an RS-232C interface. The application default speed and communication settings are 4800,N,8,1. This is also the default baud rate of the NMEA Standard. The baud rate can be changed via settings, if necessary.
Please note the Nokia LAM-1 default speed is 19200.

Application analyses the following sets of data (sequences):
- GPRMC for time, date, location, speed, direction, receiver status (validity flag).
- GPGGA for the number of satellites.

The above sets of data belong to NMEA standard set. Therefore, the majority of GPS receivers use them.

Only several models that are not produced any longer may not have these sequences. Application will ignore any other sequences of data.

Application reads the checksum of every sentence received and compares it with calculated one. If they are different or there was no checksum in received sequence, the sequence is ignored.

The application should also function properly without the GPGGA sequence. In this case the number of satellites used will be 0.

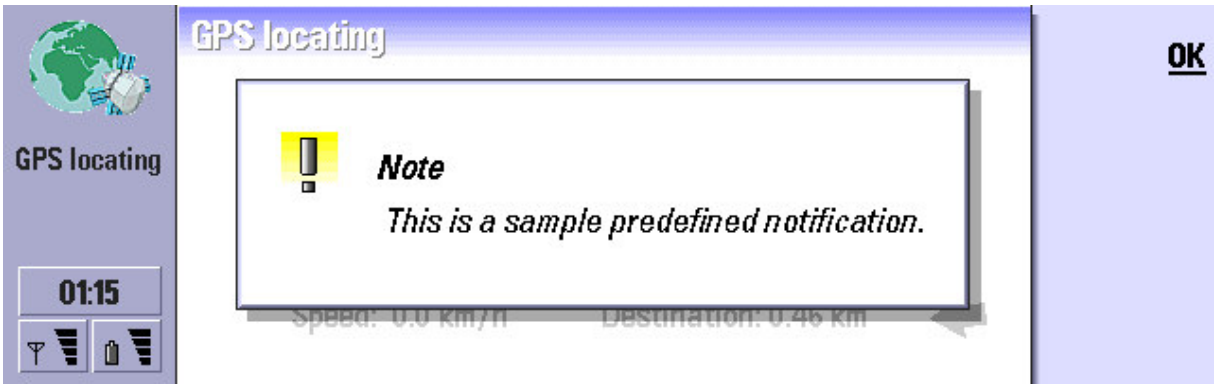
6 Configuring of GPS receiver

It is advised to disable sending other sequences than used ones in order to avoid superfluous data exchanges. It minimises also battery drain.

Application automatically configures in such way the Garmin GPS 35 LP, Leadtek, Holux, Emtac and Nokia receivers. Other receivers should be configured locally or remotely for that. Remote configuration of GPS receivers is presented further in SMS messages section.
The installation package contains GPS_CONFIGURATION.TXT file. This file contains local configuration commands for above receiver types. This file must be stored as an ANSI text file (not Unicode one as the other text files in this package).

7 Displaying SMS text messages

The application offers a possibility of displaying various texts. They can be either predefined texts or texts received in SMS messages. Format of text notification is described in the section on SMS messages (see 9.1.8 and 9.1.9).



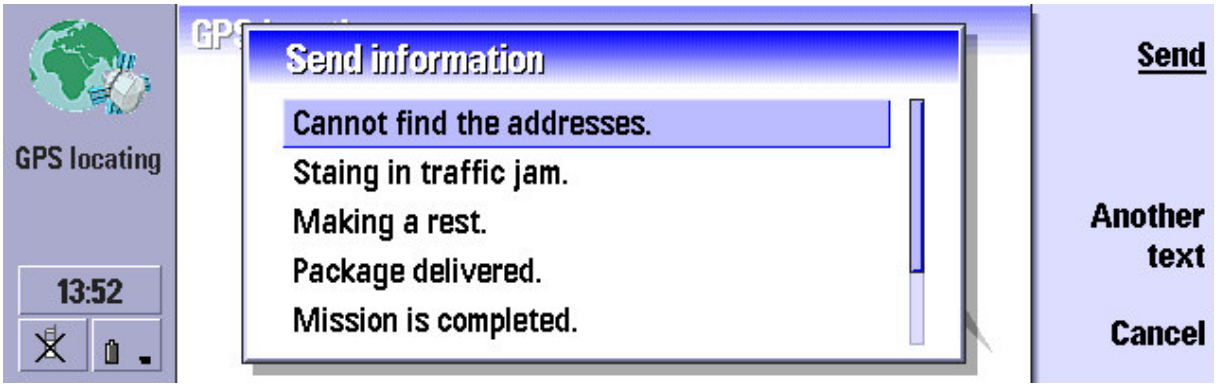
Displaying of a text does not stop normal application work
Application will play a beep and switch on the screen illumination before the dialog will be displayed.

Predefined texts to be displayed are saved in INCOMING.TXT file. This file must be stored as an Unicode text file.

When it is necessary to introduce a new line, the $ character must be entered.
The installation package contains a sample file showing the exact file format needed.

8 Sending SMS text messages

The application also offers the user a possibility to send various texts.



The dialog box displays a list of texts. The user can send one of them choosing it with the use of arrow keys and pressing the 'Send' button.

When the list does not contain the required message, the user can press the 'Another text' button. In the dialog box that will appear an own message can be written.

Predefined texts to be sent are saved in OUTGOING.TXT file. This file must be stored as an Unicode text file.
There should be no line breaks in messages.
Each message can contain up to 105 characters.
The installation package contains a sample file showing the exact file format needed.

See also corresponding message definition in chapter 9.2.6.

9 SMS format

9.1 Incoming messages

Following header must be used to address an SMS message to the application:

```
//GPDF16461\r
```

`\r` is a character with the 0xd code. Instead of `\r` other separators can be also used (e.g. `\n`, `\t` or a space).

The header occupies the first 12 characters of each message.

The header is followed by a 4-character command name. An exception is an SMS - location request (look at 9.1.6).
The first character of the command name describes the usage of a given SMS message.

Character	Usage
C	Configuration of the device
P	Parameterising the settings
S	Sending of notifications
in the future other possible as well	

9.1.1 NMEA configuration commands

The NMEA commands are transmitted directly to the serial port. Such an SMS should look like the following:

```
//GPDF16461\rCNME<NMEA command>...
```

e.g.
```
//GPDF16461\rCNME$PGRMI,something,something,something\r\n
```

In principle more NMEA commands can be loaded into an SMS message because they occupy up to 82 characters (according to NMEA Standard) and 144 characters per an SMS message are at the user's disposal.

9.1.2 Configuration of the SMS centre and the recipient

An SMS message can configure the following: the number of the SMS centre as well as the telephone number of the SMS recipient.
Such a message should look like the one below:

```
//GPDF16461\rCNRX,<SMS centre>,<recipient>
```

e.g.
```
//GPDF16461\rCNRX,+491722270000,+491721234567
```

Estimated length (it can be longer, if spaces are used inside phone numbers):
12 (header) + 4 (command) + 1 (comma) + 13 (phone number) + 1 (comma) + 13 (phone number) = 44 characters

9.1.3 Defining the area

The following SMS message defines an area.

It should look like the one below (X can have the value of either 1 or 2):

```
//GPDF16461\rPAEX,<direction flag area X [nn]>,
<latitude area X [ddmm.mmm]>,
<latitude hemisphere area X [N/S]>,
<longitude area X [dddmm.mmm]>,
<longitude hemisphere area X [E/W]>,
```

```
<radius area X in 100m [nnn]>,
<hysterese area X in 100m [nn]>,<name area X>
```

The direction flag can have the following values:

Value	Description
00	no message
10	message only by an arrival
01	message only by a departure
11	message by both an arrival and a departure

When such a message is received, current location is verified and an appropriate SMS message is created (see 9.2.4).

e.g.
```
//GPDF16461\rPAE2,10,5525.200,N,01444.033,E,102,2,Warehouse
```

Maximal length:
12 (header) + 4 (command) + 1 (comma) + 2 (direction flag) + 1 (comma) + 23 (location) + 3 (radius) + 1 (comma) + 2 (hysterese) + 1 (comma) + (name of the area) = 50 characters + (name of the area)

9.1.4 Defining cycles of data acquisition

The following SMS message defines cycles of data acquisition during movement and standstill.

It should look like the one below:

```
//GPDF16461\rPSEQ,<cycle movement in sec>,
<cycle standstill in sec>
```

The cycle can be defined to last from 12 up to 9999 seconds.
Furthermore, it is possible to enter the value 0. In this case the automatic gathering and sending location data is switched off.

When such a message is received, the acquisition timer is reset.

e.g.
```
//GPDF16461\rPSEQ,20,60
```

Maximal length:
12 (header) + 4 (command) + 1 (comma) + 4 (cycle) + 1 (comma) + 4 (cycle)
= 26 characters

9.1.5 Defining standstill

The following SMS message defines values for the recognition of standstill.

It should look like the one below:

```
//GPDF16461\rPSTL,<standstill beginning speed under in km/h>,
<beginning of standstill duration in min>,
<end of standstill speed over in km/h>
```

The speed values should be specified between 1 and 100 km/h. The speed at the end of a standstill should be bigger than the speed at the beginning of a standstill. The duration value should be specified between 1 and 10 minutes. Should the values exceed the specified range, they will be corrected automatically.

e.g.
```
//GPDF16461\rPSTL,10,5,25
```

Maximal length:
12 (header) + 4 (command) + 1 (comma) + 2 (speed) + 1 (comma) + 2 (duration) + 1 (comma) + 3 (speed) = 26 characters

9.1.6 Location request

This SMS message is very easy and has always the same form:

```
//GPDF16461\rPOS
```

Length:
12 (header) + 3 (command) = 15 characters

Location request does not affect the normal cycle of data acquisition.

9.1.7 Location request during server malfunction

If a web server normally receiving the SMS messages is not responding, there is still a possibility to access current position fix of the device.
If such messages is received, a reply will not be send to the recipient given in application settings, but to the originator of the request.

This SMS message is very easy and has always the same form:

```
//GPDF16461\rXPOS
```

Length:
12 (header) + 3 (command) = 16 characters

Location request does not affect the normal cycle of data acquisition.

9.1.8 Displaying a predefined text

When such an SMS message is received, application displays a predefined text with a specified number.

Such an SMS message should look like the one below:
```
//GPDF16461\rSSTX,<text number [nn]>
```

e.g.
```
//GPDF16461\rSSTX,01
```

Length:
12 (header) + 4 (command) + 1 (comma) + 2 (number) = 19 characters

9.1.9 Displaying a received text

This SMS message enables displaying a non-predefined message.

It should look like the one below:
`//GPDF16461\rSFTX,<text>`

e.g.
`//GPDF16461\rSFTX,A new text.`

This option allows displaying texts consisting of up to 143 characters.

Length: from 17 characters.

9.1.10 Defining movement display

This SMS message defines displaying of movement direction.

Such an SMS message should look like the one below:
```
//GPDF16461\rPFRI,<displaying kind [n]>,
<destination latitude [ddmm.mmm]>,<latitude hemisphere [N/S]>,
<destination longitude [dddmm.mmm]>,<longitude hemisphere
[E/W]>
```

The displaying kind can have following values:

Value	Description
0	Map
1	Compass
2	Destination navigation

For destination navigation a valid destination co-ordinates must be given in the message.

e.g.
`//GPDF16461\rPFRI,2,5525.00,N,01444.033,E`

For the other displaying kinds co-ordinates are ignored and can be not given, i.e. it is enough to set displaying kind parameter.

Maximal length:
12 (header) + 4 (command) + 1 (comma) + 1 (displaying kind) + 1 (comma) + 23 (location) = 42 characters

9.1.11 Defining GPS receiver communication

Communication between GPS receiver and the 9210 device can be defined by an SMS message.

Such an SMS message should look like the one below:
`//GPDF16461\rPKOM,<baud rate [nnnnn]>,<sending cycle [nn]>`

The baud rate can have following values: 1200, 2400, 4800, 9600, 19200. Sequences sending cycle of GPS receiver can have values between 1 and 10 seconds.
For GPS receivers, which follow strictly NMEA rules, 4800 and 1 should be set respectively.

9.2 Outgoing messages

9.2.1 Location data reply after "POS" request

Such SMS message should contain the following data:

```
POS,<UTC date [DDMMYY]>,<UTC time [HHMMSS]>,
<latitude [ddmm.mmm]>,<latitude hemisphere [N/S]>,
<longitude [dddmm.mmm]>,<longitude hemisphere [E/W]>,
<speed [sss]>, <direction [ddd]>,
<satellites number [nn]>,<validity flag>,<id>
```

The validity flag can assume the following values:

Value	Description
A	Validity (see NMEA Standard)
V	NAV receiver – warning (see NMEA Standard)
L	Most recent location, the antenna disconnected, i.e. last saved location

Id is an optional info, it is added only, if something was typed into 'Position Id' in settings.

e.g.
`POS,270598,173622,5220.123,N,01250.421,E,053,096,06,A,Mr. Green`

If a device is queried, which was never connected to a GPS receiver, NO DATA will be placed directly after the command instead of the location data.

If id is not given, message looks as follows:
`POS,270598,173622,5220.123,N,01250.421,E,053,096,06,A`

Length:
3 (command) + 1 (comma) + 6 (date) + 1 (comma) + 6 (time) + 1 (comma) + 8 (latitude) + 1 (comma) + 1 (latitude hemisphere) + 1 (comma) + 9 (longitude) + 1 (comma) + 1 (longitude hemisphere) + 1 (comma) + 3 (speed) + 1 (comma) + 3 (direction) + 1 (comma) + 2 (satellites number) + 1 (comma) + 1 (validity flag) = 53 characters

9.2.2 Location data by cyclic sending

An SMS message should contain the following data:

```
SEQ,<cycle time in sec.[SSSS]>,
<UTC date of first position fix [DDMMYY]>,
<UTC time of first position fix [HHMMSS]>,
<PosBlock1>,<PosBlock2>, ... ,<PosBlock5>
```

Each SMS message contains 5 identical position fix blocks, each block looking like the one below:

```
<latitude [ddmmmmm]><latitude hemisphere [N/S]>
<longitude [dddmmmmm]><longitude hemisphere [E/W]>
<speed [sss]><direction [ddd]><satellites number [nn]>
<validity flag>
```

mmmmm – minutes (2 digits) and decimal minutes (3 digits)

Application creates and sends the message as soon as the full number of position fixes (5) has been collected or the vehicle status has changed (from movement into standstill or in the reverse order).

When the GPS receiver has been disconnected, application sends the already collected fixes.

Block length:
7 (latitude) + 1 (hemisphere) + 8 (longitude) + 1 (hemisphere) + 3 (speed) + 3 (direction) + 2 (satellites number) + 1 (validity flag) = 26 characters

Length:
3 (command) + 1 (comma) + 4 (cycle) + 1 (comma) + 6 (date) + 1 (comma) + 6 (time) + 1 (comma) + 5 * 26 (block length) + 4 (commas between blocks) = 23 + 5 *26 + 4 = 157 characters

9.2.3 Emergency notification

When the user presses the 'Emergency' button (see 3.1), application sends an SMS message

Such SMS message should contain the following data:

```
ALM,<UTC date[DDMMYY]>,<UTC time [HHMMSS]>,<latitude
[ddmm.mmm]>,<latitude hemisphere[N/S]>,<longitude [dddmm.mmm]>,
<longitude hemisphere [E/W]>,<speed [sss]>, <direction
[ddd]>,<satellites number [nn]>,<validity flag>
```

e.g.
```
ALM,270598,173622,5220.123,N,01250.421,E,053,096,06,A
```

If a device is queried, which was never connected to a GPS receiver, NO DATA will be placed directly after the command instead of the location data.

Length:
3 (command) + 1 (comma) + 6 (date) + 1 (comma) + 6 (time) + 1 (comma)
+ 8 (latitude) + 1 (comma) + 1 (latitude hemisphere) + 1 (comma) + 9 (longitude) + 1 (comma) + 1 (longitude hemisphere) + 1 (comma) + 3 (speed) + 1 (comma) + 3 (direction) + 1 (comma) + 2 (satellites number) + 1 (comma) + 1 (validity flag) = 53 characters

9.2.4 Arrival at / departure from an area

When the vehicle arrives at or departs from the defined area, application sends the following SMS message.

Format of this SMS message:

```
Axy,<UTC date [DDMMYY]>,<UTC time[HHMMSS]>,
<latitude [ddmm.mmm]>,<latitude hemisphere[N/S]>,
<longitude [dddmm.mmm]>,<longitude hemisphere [E/W]>,
<speed [sss]>,<direction [ddd]>,<satellites number [nn]>,
<validity flag>,<area name>
```

The meaning of symbols:
x - area number (can be either 1 or 2)
y = `1` - arrival at an area
y = `0` - departure from an area

e.g.
`A21,120699,132245,1221.545,N,00510.878,E,06,A,Warehouse`

Length:
3 (command) + 1 (comma) + 6 (date) + 1 (comma) + 6 (time) + 1 (comma) + 8 (latitude) + 1 (comma) + 1 (hemisphere) + 1 (comma) + 9 (longitude) + 1 (comma) + 1 (hemisphere) + 3 (speed) + 1 (comma) + 3 (direction) + 1 (comma) + 2 (satellites number) + 1 (comma) + 1 (validity flag) + 1 (comma) + (area name)
= 54 characters + (area name)

9.2.5 Notifying configuration changes

When a configuration SMS message has been received, application creates and sends an SMS message like the one below.

```
KAE,<configuration type>
```

Configuration type is the command name of the received message.

e.g.
`KAE,PSEQ`

Length:
3 (command) + 1 (comma) + 4 (configuration type) = 8 characters

9.2.6 Sending texts

When the user has chosen a predefined text or created a new one, application sends an SMS message like the one below.

SMS format:

```
TXT,<UTC date [DDMMYY]>,<UTC time[HHMMSS]>,<latitude
[ddmm.mmm]>, <latitude-hemisphere N/S]>, <longitude
[dddmm.mmm]>, <longitude - hemisphere[E/W]>, <speed [sss]>,
<direction [ddd]>,<satellites number>,<validity flag>,<text>
```

e.g.

```
TXT,120699,132245,1221.545,N,00510.878,E,06,A,I am making a
break
```

If a device is queried, which was never connected to a GPS receiver, NO DATA will be placed directly after the command instead of the location data.

Length:
3 (command) + 1 (comma) + 6 (date) + 1 comma) + 6 (time) + 1 (comma) + 8 (latitude) + 1 (comma) + 1 (hemisphere) + 1 (comma) + 9 (longitude) + 1 (comma) + 1 (hemisphere) + 3 (speed) + 1 (comma) + 3 (direction) + 1 (comma) + 2 (satellites number) + 1 (comma) + 1 (validity flag) + 1 (comma) + (text)
= 54 characters + (text)

10 Electric connection

For the successful data exchanges between the 9210 Nokia Communicator and the GPS receiver the following three conditions must be fulfilled:

- the GPS receiver must have a serial port,
- corresponding signal lines between these two devices must be connected,
- the electronics inside the original Nokia 9210 serial cable (model DLR-2L) must be powered.

The above conditions are meaningless for GPS receivers dedicated for Nokia 9200 series communicators. Please refer to chapter 10.8 for information regarding dedicated receivers.

The first condition should be clear – no communication between the two devices is possible without the RS-232C interface. If it would be possible to connect the GPS receiver by a serial port to a PC, it should possible to connect it to the Nokia 9210 device as well. The solutions given below should be helpful.

There are some devices on the market that have the serial interface but it is not compatible with the RS-232C standard. These devices are usually built-in ones. Connecting such a device to a Nokia 9210 Communicator is also possible but in such a case a special interface is necessary. Since the interface in question has not been described in the present manual, you are asked to get in touch with Yellow Computing in case you should use such a device.

It is relatively easy to fulfil the second condition: the Nokia 9210 cable and the majority of GPS receivers have the DB9F plug. Two such plugs can be connected by an interface that consists of two DB9Ms and a few cables.
The GPS device with a DB25F plugs (instead of a DB9F one) can be also used. In case of such a device, however, other pins have to be used. Altogether, such devices are seldom.

Fulfilment of the third condition is a little more difficult: only few GPS receivers have control lines in their serial plug. Such control lines are used for the powering of 9210 cable electronics (e.g. when 9210 is connected to a PC). When the GPS receiver has no control lines on its serial port, an external power supply for the 9210 cable has to be used.

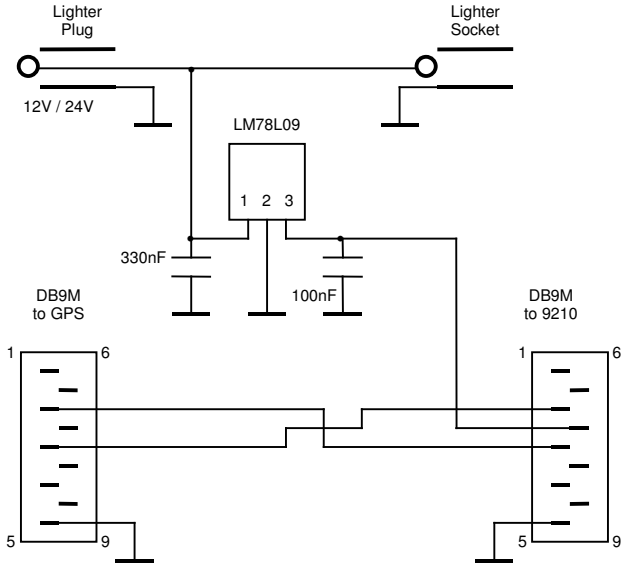
Usually it is not a problem because the application has been designed for the vehicle environment. In each vehicle there is a cigarettes lighter by which power can be supplied.

In the following chapters several interfaces are presented in detail. The first one is a universal one and should work in all cases. The other solutions can be used in peculiar case. Therefore, they are a little simpler than the universal one.

The solutions described below are given without any guarantee. Should you have any doubts, you are asked to contact Yellow Computing or your Nokia System Center.

10.1 Universal interface

This interface should work in all cases. It supplies the 9210 cable with power using the vehicle's power supply. It also connects appropriate pins of the two devices.
The interface can be used both with 12V power supply (cars) and 24V one (lorries). According to some semiconductors' producers (e.g. National Semiconductors), the components used function properly up to 35V of an input voltage at the most.

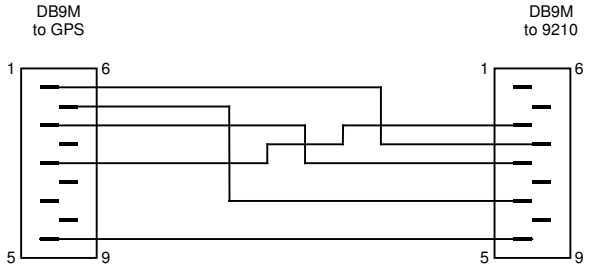


The above diagram shows also the lighter socket, which is necessary when other devices are to be powered from this source (e.g. the GPS receiver's charger).

It is possible to remove the voltage stabiliser by the 12V installation. This, however, increases the risk of damage of the 9210 DLR-2L cables due to an overvoltage, especially in old vehicles.

10.2 Passive interface

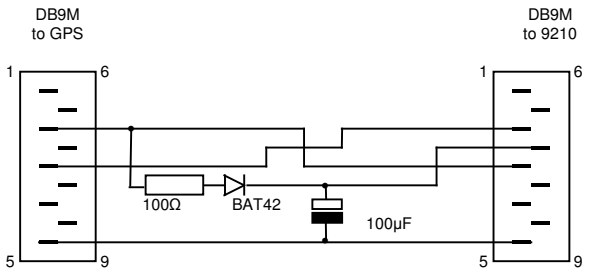
This interface can be used when the GPS receiver has control lines on its serial port.



In principle this is the so-called null - modem cable. In the above figure, however, there are presented only the cords that are indispensable.

10.3 Smart interface

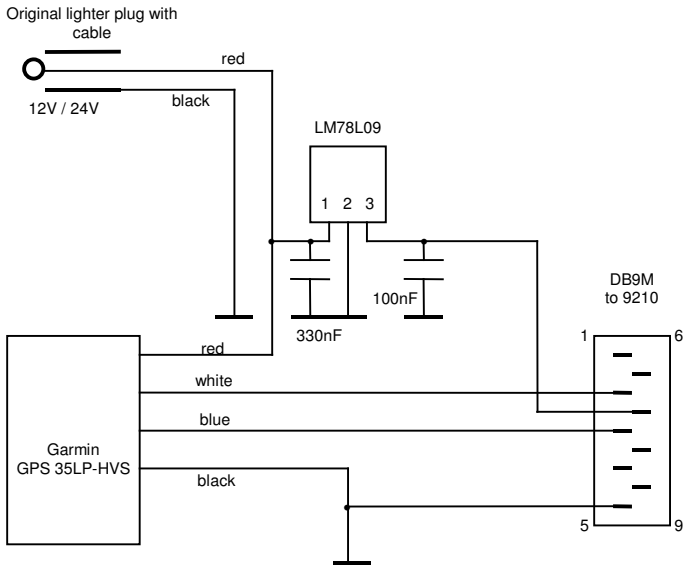
This interface powers 9210 cable from data line of GPS serial port and none external power supply is needed, even when GPS receiver has none control lines on its serial port.
Using of this interface is not suggested with battery powered GPS receivers, because this interface shortens battery life of the GPS receiver.
This interface does not work with 3V operating GPS receivers.



10.4 Modification of the Garmin GPS35-HVS receiver

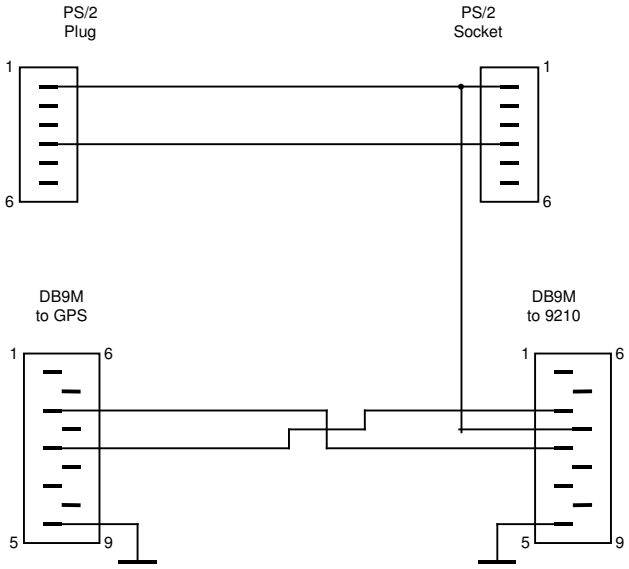
The modification of the Garmin receiver, described below, provides the user with a compact solution for the vehicle environment. Such modified receivers can be used only in 9210 location solutions exclusively. In case when the GPS device should remain unchanged, another interface should be used.

First, the original GPS plug has to be removed. Then, the cords have to be connected to a new DB9M plug together with other parts shown on the diagram below.



10.5 Universal interface PS/2

This interface can be used, when GPS receiver is powered via PS/2 adapter.



10.6 Advanced HF car kit CARK109

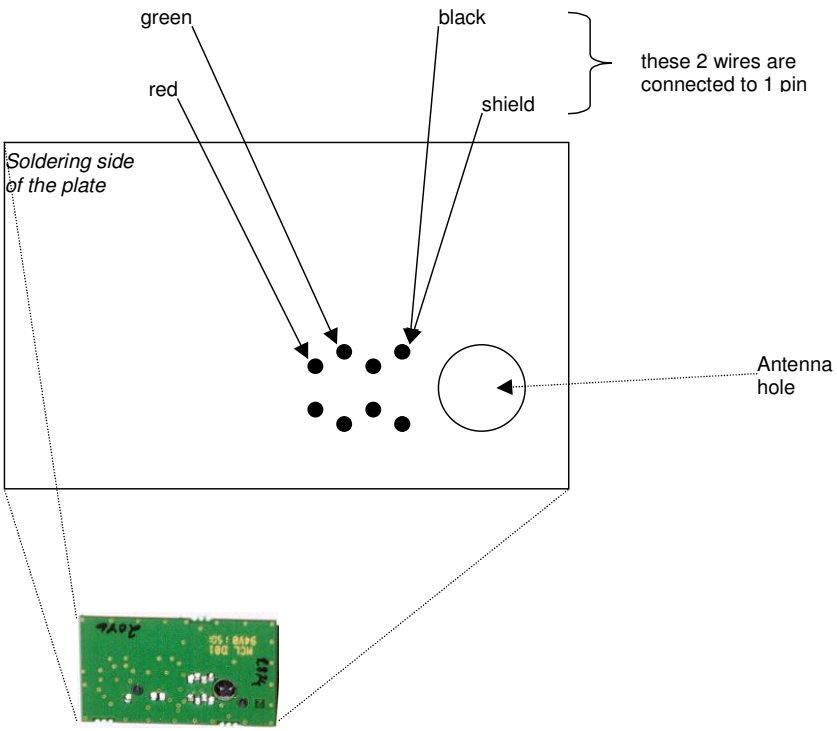
CRM-1 holder (for 9210, unlike CRH-2 for 9110) is provided without a socket in which the 9210 cable could be plugged. There are also no data signals provided in the 'Headset / Data' socket of HFU-2 unit.
This requires connecting the 9210 cable inside the holder, which is described in next chapter. The 9210 cable still needs a power supply provided by one of the solution presented above.

GPS Locating functions properly when the device is kept in the holder. Incoming messages as well as the 'Emergency' or 'Send info' buttons are accessible only when the device is taken out of the holder and opened.

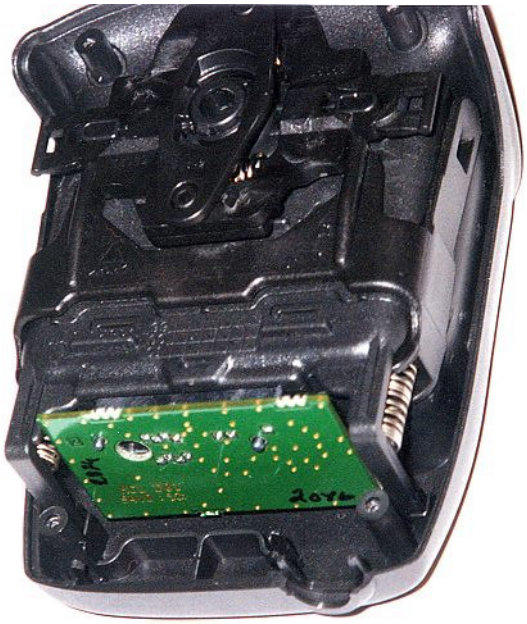
There is also a holder for opened 9210 device available on the market, but this holder requires mounting, which must by designed and manufactured for each car by your-self.

10.6.1 Connecting DLR-2L serial cable to CRM-1 car kit holder

First the holder must be disassembled. Remove the four small screws from the back cover of the holder using special Torx 6 screwdriver. Next carefully lever up and remove the back cover.
Cut off the small plug (from 9210 side) of DLR-2L cable and solder appropriate lines to the green plate removed from the holder.
See diagram below for the proper connection.



Picture below presents properly reassembled holder without back cover and cables. Please note the all cables must be reattached before reassembling.



10.7 Notes on Holux GM-200BK GPS receivers

This receiver activates its serial port circuits internally, only when it detects a logical level (some voltage) on its receive data line.
It means that following interfaces described above cannot be used:

- passive interface,
- smart interface.

One of following ones must be used:

- universal interface (10.1),

- universal interface PS/2 (10.5).

10.8 Using Nokia 9200 series dedicated GPS receivers

Currently two types of dedicated receivers are available:

- Nokia LAM-1
- Emtac CRUX II / NK92

These receivers drains power from phone battery, they requires significant amount of electric energy, hence the phone battery discharges in just a few hours.

Power supply for these receivers must be enabled in application settings (3.3.5).
When application is started, the power supply is automatically turned on, but if the receiver is not connected during the start or if the receiver was disconnected during application life time, the power must be reactivated - use 'Power on' command to do this.
'Power off' command turns off the power without receiver disconnection.

11 Configuration of several devices

There is a possibility to configure identically several devices. Instead of configuring each of them separately, only one of them must be configured and then the configuration file should copied to other devices.

Configuration file is named YGPS.INI and it is placed in \SYSTEM\APPS\YGPS folder of appropriate 9210 storage drive.

Please note that:

- all the devices installed in this manner will have an identical password,
- the active autostart option must be still set manually for all devices.

12 Power consumption

Continuous battery running time of the Nokia 9210 Communicator with application activated was over 8 hours. These specifications are valid in case of using only the indispensable NMEA sequences as well as sending up to 6 SMS messages an hour, providing the network signal is strong and when areas (for arrival / departure) are not defined. The device lid was opened.
Should the device be used on a vehicle, which is recommended, the running time is practically unlimited because the vehicle supplies power.