Preliminary

LX Mini Map

Vario navigation system
Users manual V1.4

<div align="center"><u>***Contents***</u></div>

1   General description

LX Mini map is **Windows CE 5.0** running device which is supported by a **sunshine readable** color display with **backlight** and **touch panel**. Aluminum housing makes the unit extremely robust and reliable. One back mounted 9P SUB D type connector is used for power and also for data input. The unit hasn't build in GPS receiver and therefore needs an external GPS source.

The unit is **designed and produced** by LX navigation and therefore meets all glider pilot requirements. Only high quality materials and components are used and this fact guaranties a long life time and also availability for many years.

SD card solution makes possible to run navigation programs **directly from S**D card, after using of auto run function, which is factory implemented. Immediately after power on, the unit is ready for use, without any pilot manipulation and inputs.

Different versions of **mounting frames** are available and those devices makes possible to realize a panel integral solutions and also panel external solutions, after using of gooseneck flexible extenders.

1.1   Running programs

The programs which can be used as navigation programs are listed below:
-SeeYou Mobile
-Strepla after November 2010
-Winpilot
-Pocket FMS
-Free ware programs: XCsoar, LK8000 see also para 8.

1.2   LX Mini Map versions

The unit comes in three versions which all use the same base unit. This design approach makes possible upgrades to any version also after the unit has been already in operation.

1.2.1   LX Mini Map (Base unit)

The unit consists of one block and has no controls; the manipulation is done exclusively via touch pad.
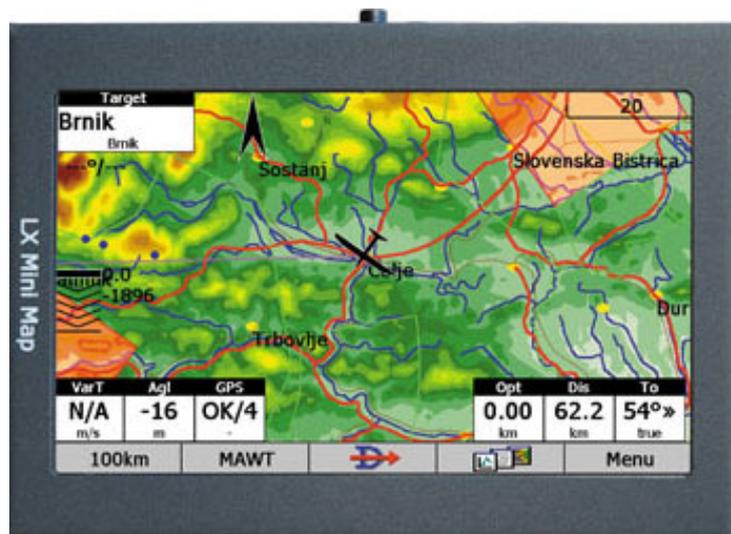
The display orientation can be adjusted under customer personal requirement to landscape or portrait. See also 2.4.

Note!
It is possible to use LX Remote to control the unit.

LX Mini Map Technical data:
Size: **80 x110 x 27** mm
Weight: **350 g** without cable set
Display: **4,3 inch** (10.9 cm) 800x480 pixel, with touch panel
Power supply: **12V** DC
Consumption: **380 mA** @12 V DC

CPU:
Marvell PXA320 **806 MHz**
Connectivity:
2x RS232
1x SD Card
1x USB 1.1 device

1.2.2 LX Mini Map KB

A plug and play **keyboard module** can be added to any LX Mini Map base unit, the unit becomes two **rotary switches** and **5 push buttons**. This solution simplifies operation significant, especially during flight. Two push buttons are integrated into rotary switches.
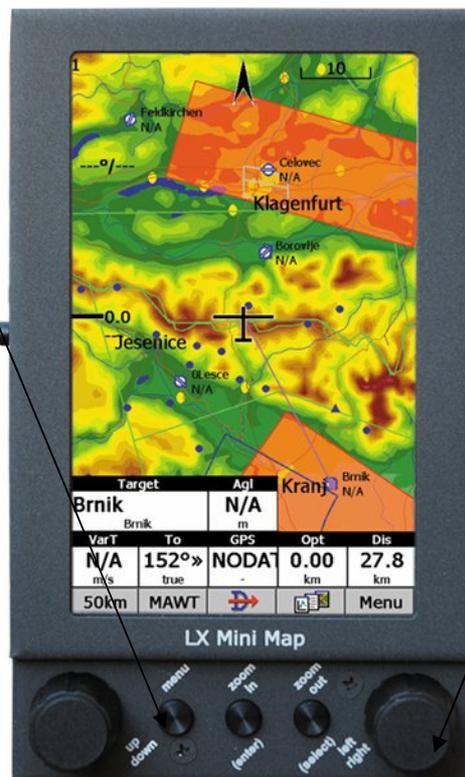
The function of rotary switches and push buttons depends on running program.

Note!
It is possible to use additionally to Keyboard also LX Remote, both units will control Mini Map independent and no collision will happen.

LX Mini Map KB technical data:
Size: **80x133 x27** mm
Weight: **360 g** without cable set
Display: **4,3 inch** (10.9 cm) 800x480 pixel, with touch panel
Power supply: **12V** DC
Consumption: **380 mA** @12 V DC
Keyboard module (5 push buttons, 2 rotary switches)
CPU:
Marvell PXA320 **806 MHz**
Connectivity:
2x RS232
1x SD Card
1x USB 1.1 device

1.2.2.1   Description of rotary switches and push buttons

After activation of individually rotary switch or a push button following commands are sent to the main computer:

Mark on Keyboard module	Function / character	Remarks
Up/ Down	Up/Down	
Up/ Down push button	Character "c"	
Menu	Character "d"	
Zoom out	Space	
Zoom in	Enter	
Left/Right	Left/Right	
Left/Right push button	Not active	Reserved for Vario conrtol

1.2.3 LX Mini Map KB / V

An **extension to LX system bus** makes possible to connect LX Navigation **Vario module** as a part of the system. Such a configuration builds a real **Vario/Navigation** system. Vario unit is controlled by knobs and rotary switches, which are built into LX Mini Map **keyboard module** and therefore the Vario module doesn't need any input devices.   **Junction Box** is a part of the system and makes possible to connect Vario unit, GPS source and some other bus participants to the LX Mini Map.

1.2.3.1   LX Mini Map KB / V controlled by LX Remote

LX Remote is capable to control LX Mini Map and also vario unit. In a such configuration is keyboard module not any more necessary, but may be also used.

Note!
LX Remote can be used in any LX Mini Map configuration.

1.2.3.2   LX Mini Map in double seater configuration

After using of LX system bus, two LX Mini Map units can also build a vario navigation system for double seated gliders. The unit installed in the second seat should **be factory prepared** for such a configuration. The same is with LX Remote stick, if used also in the second seat.
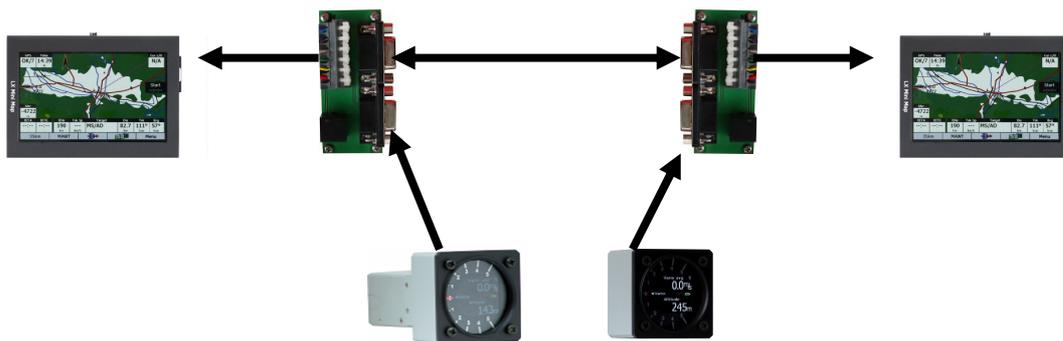
The data send from the first seat includes:
-GPS information
-altitude and speed information
-information for secondary vario unit

Generally both unit works independent and there is no update of data base between the units. The secondary vario indicator is also controlled by first seat unit.

1.3 LX Mini Map Junction Box

1.3.1 Junction box with 484 bus

To make installation and connection of interface units as simple as possible a suitable Junction box is added to any unit. The box consists of:

-6P telephone type connector which makes possible a direct connection of Colibri, LX 20-2000, VL and Flarm
-6 pole **spring terminal blocks,** for main power, GPS data and system bus connection of Min Map
-2x **SUB D 9p** for system bus extension (vario unit and other 485 bus participants)
See also chapter Installation.
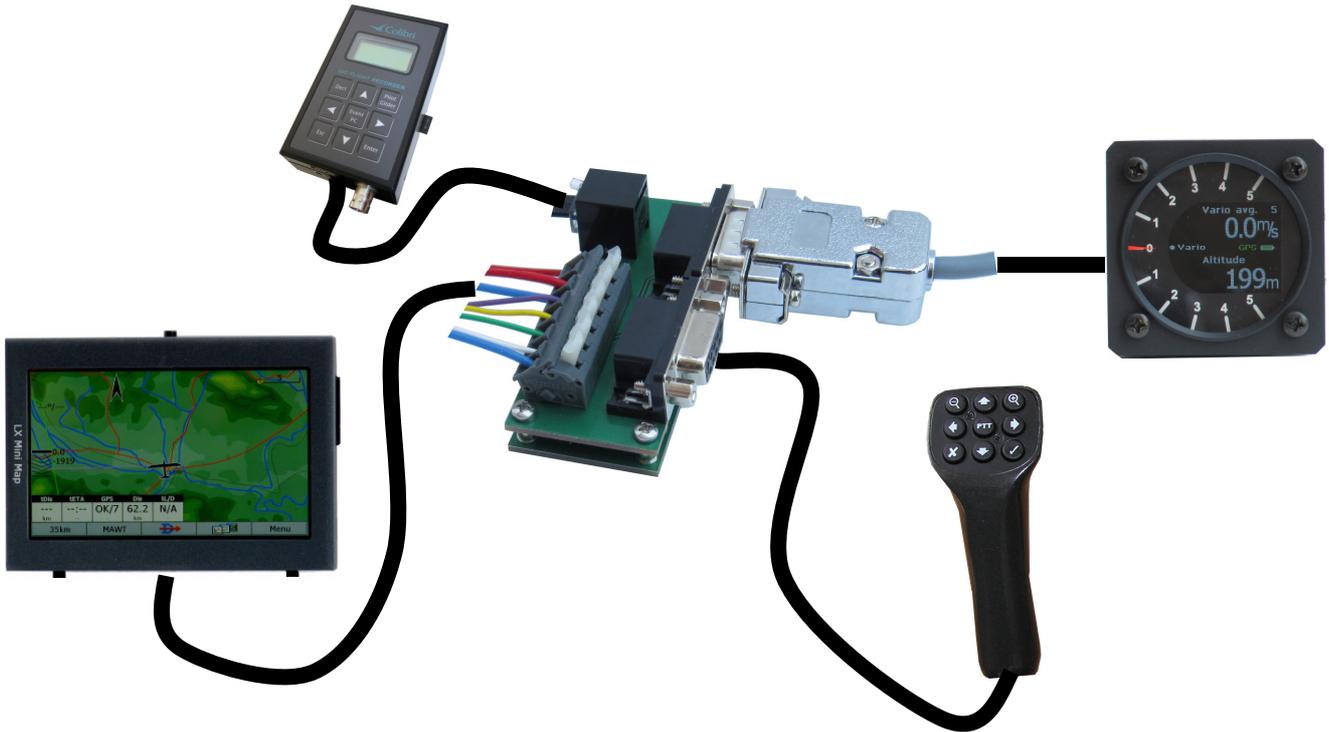
1.3.2 Basic Junction box

The unit makes possible to connect GPS source via 6P telephone type connector or after using of two spring terminals. On another side the unit connects LX Mini Map.
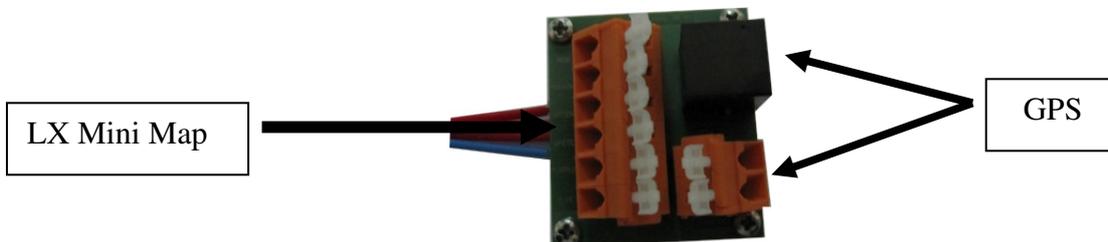
Note!
Basic Junction box isn't cable to be used by Mini Map KB/V, or by remote control solution.

2 Getting started

The unit is ready to operate after successful installation and is powered on by master switch.The unit doesn't use internal memory to store program files; all program files are stored on SD cards.

Note!
Eventually delivered programs are **not licensed**, so the owner is obliged to arrange licensing by his own.

The **auto run** function makes possible that the navigation program will start automatically after power on; under condition that SD card is present during booting. This reduces customer manipulation to a minimum.

2.1 GPS connection

GPS data in form of NMEA should be applied to **6P telephone** type connector of junction box. GGA and RMC data sentences are required as a minimum. See further captures for details. The pin organization of the connector corresponds to IGC standard. That means that any approved flight recorder can be connected plug and play to the Junction box, after using of a cable delivered with LX Mini Map. The cable specification is so called **1:1** and that means no twisted wires. An open wire cable variant is also delivery included.
Power for the flight recorder is also available via 6P telephone type connector.

Note!
GPS source baud rate **doesn't matter** as the build in microcontroller searches on different baud rates for GPS signal after each power on. Even after a GPS source change during flight the unit will adapt to new baud rate after approximately 30 seconds.
The navigation program baud rate should always be set to **com 2** and **38400 bps**. In some special cases **com 1** is also used, but this needs a special not standard wiring.

GPS at any baud rate and power via 1:1 cable

Colibri, LX 20, VL, LX Flarm, Flarm………
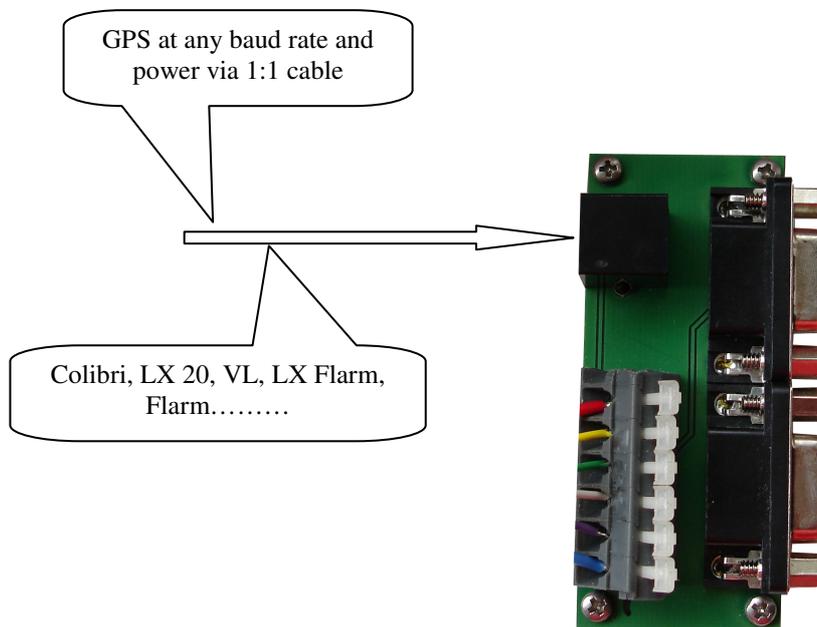
GPS connection is **two wire** connection, that means **Tx and also Rx** from GPS source are provided to the LX Mini Map and this makes possible communication with Flight recorder. For instance downloading of flights or uploading of turn points and declaration.

2.2 Using of COM 1 and COM 2

LX MM offers two com ports which are named COM 1 and Com 2. The most important difference between com 1 and com 2 variant is that after using of com 1 the GPS source becomes a direct connection with LX Mini Map **main computer**. In that case COM 1 setting in navigation program should be preset and also the baud rate should match. Cable sets are **clearly** marked as COM and COM 2. So after decision to change com port a new cable set should be used.

2.2.1 COM 1 highlights

-**cable set** marked as **COM 1** should be used
-COM 1 should be set in **navigation program**
-baud rate setting in navigation program **should match** baud rate of GPS source
-COM 1 could be generally used and exception is **LX MM KB/V** version which requests COM 2

2.2.2 COM 2 highlights

In that case GPS source isn't connected directly to MM main computer. This solution uses an indirect way via LX MM microcontroller which receives GPS data at any baud rate, converts to **38400** and sends towards MM main computer. After using of COM 2 the baud rate of GPS signal doesn't matter, as MM microcontroller will search on different baud rates and adapt automatically.
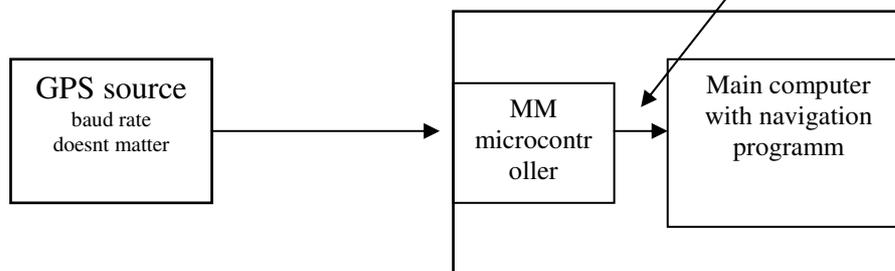
-**cable set COM 2** required (written on the label)
-GPS source **baud rate doesn't matter,** due to automatic adaptation
-navigation program setting **COM 2 38400** is absolutely necessary
-**MM KB/V** requires COM 2

2.2.3 Suggested COM solutions

GPS source	LX 20	Colibri	VL	LX 160/166	LX 1600/6	CAI 302
COM 1	Y	Y	Y	Y	Y	Y
COM 2	Y	Y	Y	N	N	N

GPS source	Flarm RB	Flarm MB	Flarm	Others
COM 1	Y	Y	Y	Y
COM 2	Y	Y	Y	N

Note!
LX MM KB/V requires always COM 2, GPS source doesn't matter.

2.3 Vario unit connection

LX Vario unit can be plug_and_play connected via Junction box. The connection includes power and also LX system bus. The system bus wires are yellow and green. After the connection is realized the cooperation between navigation program running on LX Mini Map and Vario unit is possible. The data exchange capability depends on navigation program. See table below.

Navigation program	Setting of vario parameters	Receiving of altitude and IAS data	Adjustment of audio volume	Input of MC ballst and Bugs
SeeYou Mobile	Y	Y	Y	Y
Winpilot Pro	N	N	N	N
LK 8000 LX version*	Y	Y	Y	Y

*the vario settings should be defined in LX MM Service program see 2.5.1.

Second LX system bus connector
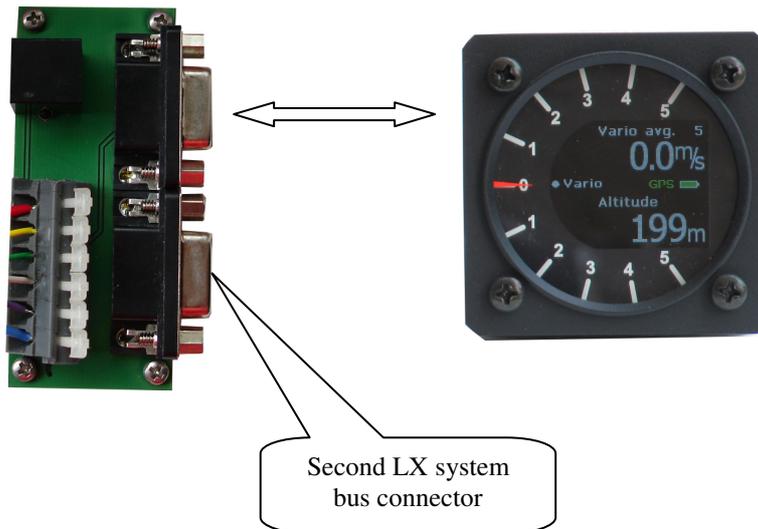
2.3.1 Controlling of Vario unit

The unit can be controlled by **left/right rotary** switch of keyboard module and also by **remote control stick,** if installed. Both units can execute only limited number of commands as follows:

- Audio volume adjustment
- MC adjustment
- Ballast adjustment
- Bugs adjustment
- Vario filter adjustment

The action always starts by **pressing** on push button of the **left/right** knob or **enter** of remote. After sequenced pressings above mentioned items will be listed on vario display **lower row**. Adjustment is made by **rotary switch** or up/down arrows of the remote. During adjustment process the value is temporary displayed in the lower **right corner** of the display and will disappear automatically after no further commands will be detected.

After a time out with no further commands, the unit will switch back to normal mode automatically.
All other inputs and settings should be done by navigation program. See also captures 3.2.1, 3.2.2 and 3.2.3.

2.4 Connection of System bus participants

Some other LX Navigation interfaces can be also bus connected.

Version	LX Remote	Secondary vario	Second seat unit
LX Mini Map	Y	N	Y
LX Mini Map KB	Y	N	Y
LX Mini Map KB/V	Y	Y	Y

2.5 LX Mini Map system setup

Every unit comes from the factory with preloaded **LX Service** program which makes possible to define some system parameters. The access is absolute simple after click on short cut which is available on the desk top of the unit. To access desk top **remove SD card** and power on Mini Map, or simple exit from navigation program.
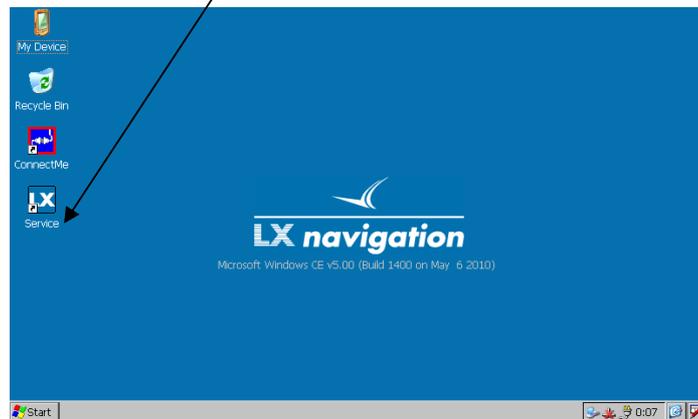
2.5.1 Mini Map Setup

Mentioned setup should be used exclusively after LX **Mini Map KB/V** version will be operated and following programs will be in use: LK 8000, Winpilot Strepla. After using of SeeYouMobile all settings could be done in SeeYouMobile (LX 1600 2 and 2) and this setting doesn't matter at all.

2.5.1.1   Vario/Speed
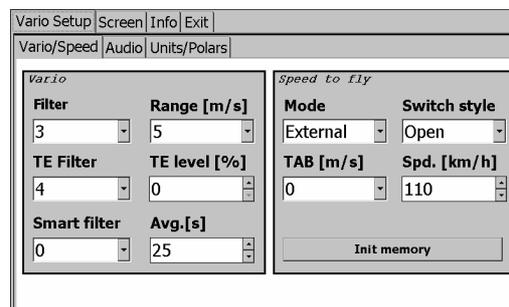
Filter: Vario needle dumping
Range: Vario range
TE filter: filter which is active only after using of electronic compensation, after using of TE tube should be set to 0%
TE level: adjustment of electronic TE compensation
The TE compensation can be fine tuned during flight with the following procedure. It is essential that this is only done in smooth air; it is not possible to tune the TE accurately when it is thermic.

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- Select 100 % and default TEF
- Accelerate up to approximately 160 km/h (75 kts) and keep the speed stable for a few seconds
- Gently reduce the speed to 80 km/h (45 kts)

Observe the vario indicator during the manoeuvre. At 160 km/h the vario will indicate about –2 m/s (-4kts). During the speed reduction the vario should move towards zero and should never exceed zero (slightly positive indications are acceptable). If the vario shows a climb, then the compensation is too low, increase the TE%; and vice versa. Try another zoomie to assess the change and make further adjustments if necessary.

Smart filter: the LX system incorporates two configurable electronic filters in the circuitry. The first filter adjusts the time constant and is adjustable between 0.5 and 5 seconds. The 0.5 setting is the fastest while the 5 setting provides maximum damping.

The second filter, called the Smart Vario, is a dynamic filter and controls the rate at which the vario indication moves. When set to OFF, there is no restriction on the rate of movement of the vario indication other than the setting of the time constant filter. When set to 1, the vario indication will not move faster than 1 m/s (2 kts) per second, while when set to 4, the vario indication will not move faster than 4 m/s (8kts) per second. It should be noted that when set to 4, the vario indication will move four times faster than when set to 1.

Summary:
- The Smart Vario should not be used in isolation but in conjunction with the setting of the time constant filter. When the Smart Vario is activated, the time constant filter may need further adjustment to provide optimum indications.

RAW VARIO → FILTER 0.5 to 5 → FILTERED VARIO → SmartVario FILTER 1 to 4 or OFF → VARIO INDICATION

Averager: definition of averages time constant in seconds

Speed to fly:
Mode: *external* will enable SC command input via external switch (connected to Vario unit), *On circling* means auto change over Vario SC after detection of circling and vice versa, *Auto speed* automatic change over after under IAS control
Switch style: defines external switch status which will cause SC, taster means change over after every push of the button
Spd: defines IAS by which a change over from vario into SC will happen, is active only after setting *Auto speed* has been selected
TAB: preset **no** audio zone around zero by speed command

2.5.1.2   Audio
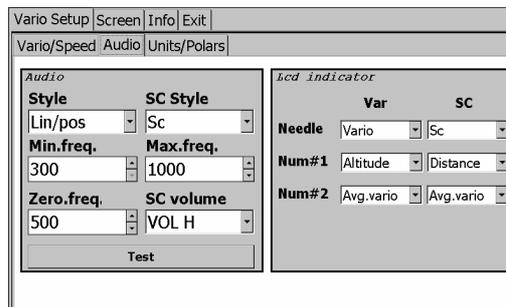
Style: 6 different types of audio variants can be preset (use *Test* to hear the melodies)
Frequencies: set minimum, maximum and zero audio frequencies
SC Volume: L variant reduce audio by speed command and vice versa

LCD Indicator
Settings of this menu define Variometer needle function and also numeric indications. There are two sets of settings with respect to vario mode and SC.

Needle in vario mode:
-Vario
-SC (speed command)
-Netto
-Relativ
Needle in SC: the same choice as in

Num#2

Num#1
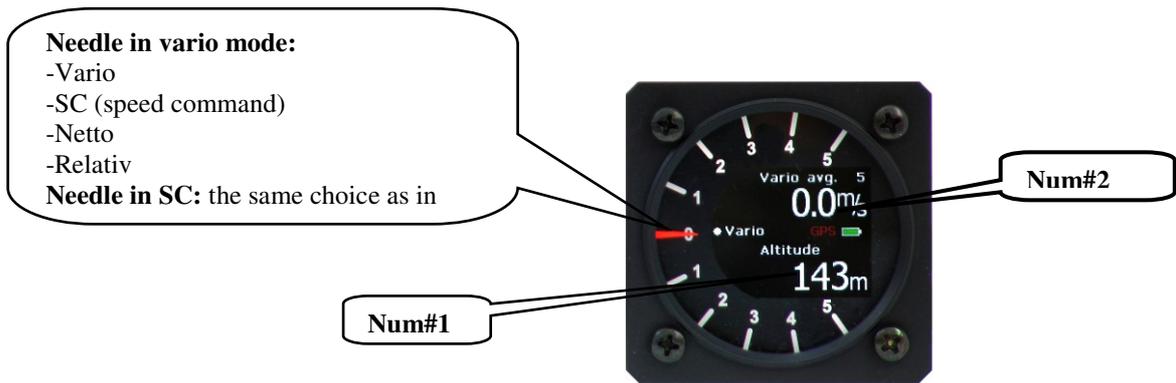
2.5.1.3   Units/Polars

Any combination of units which will be used in Vario (USB- d) can be selected; there are also two defaults, metric and imperial.
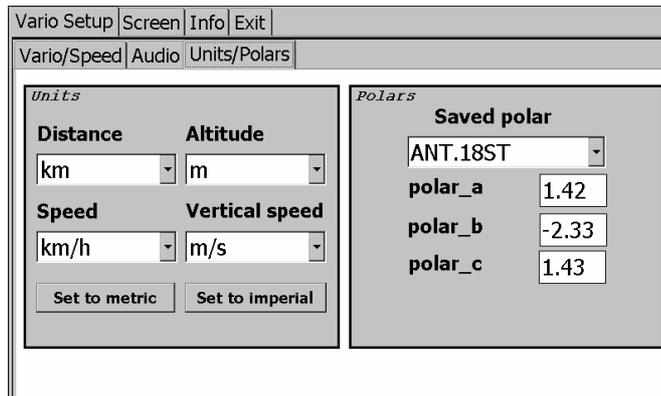
Item **Polars** makes possible to input any polar from the library. User polar selection enables customer polar inputs.

Note!
Setting of polar will not set polar in LK 8000, so the polar should be selected in LK 8000 separately.

By all versions of MM except KB/V this message shows that vario unit is not connected and therefore no vario settings possible.

2.5.2 Setting Screen

To enter LX Mini Map preferred orientation use Landscape or Portrait function. To recalibrate the screen, run Calibrate and follow instructions.
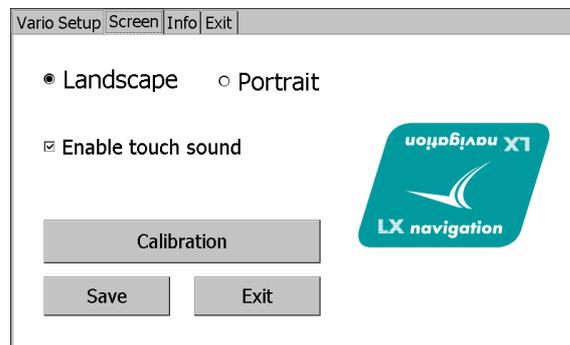
Note!
Not necessary by programs which support mentioned option.

Enable touch sound command will activate or deactivate sound which will appear after every touch.

2.5.3 Info
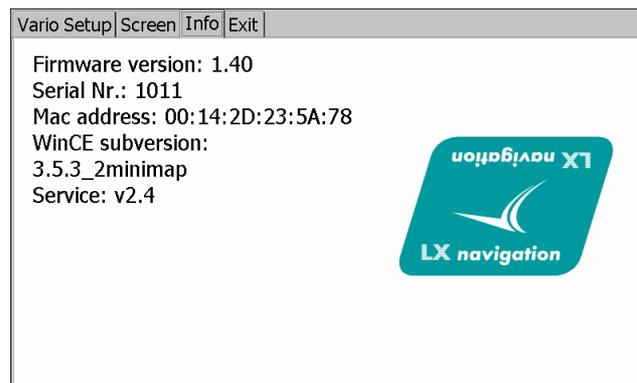
Shows firm ware version of LX MM microcontroller and service program version.

3 Interaction LX Mini Map and SeeYou Mobile

See you mobile can be used in all three versions of LX Mini Map.

Important!
After changes in setup have been provided, is absolute necessary to save changes, by Save Settings command, otherwise the settings will be lost after power off.

3.1 LX mini Map/ LX Mini Map KB and SeeYou Mobile

Please refer SeeYou Mobile manual to get informed about SeeYou fetures, this capture will inform only about important settings which are necessary for operation.

3.1.1 GPS settings
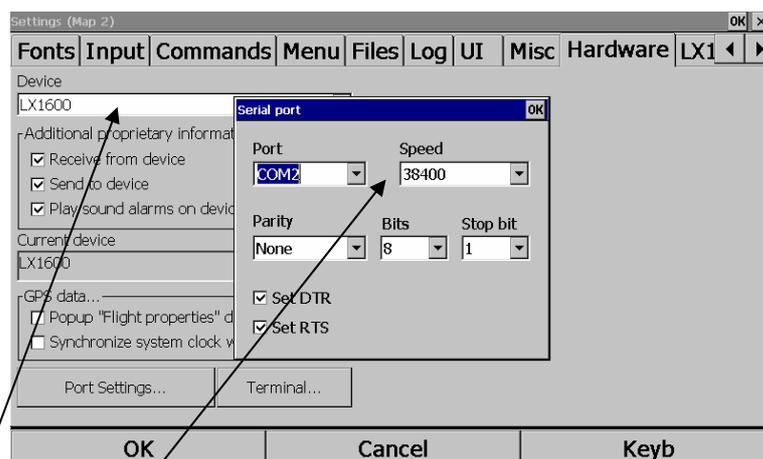
- **COM 2* 38400 bps**, obligatory no variation possible
- **COM 1** set to match GPS source baud rate setting see also
- **Select device** which is connected to Mini Map as a GPS source, for instance LX

*LX Mini Map has build in microcontroller which is positioned between GPS source and Mini Map computer. The microcontroller listen GPS source, converts data into 38400 and transfers GPS data exclusively at 38400

bps towards Mini Map. The baud rate of GPS source is detected automatically and therefore its baud rate doesn't matter.

Note!
Enable additionally data sent by recorder to supply altitude and other data towards LX Mini Map (for instance LXWp by LX Navigation devices).

3.1.2 Keyboard customization

SeeYou Mobile menu **Commands** makes possible to customize LX Mini Map keyboard regarding to customer personal requirements.

3.1.2.1   Keyboard Module

arrow up/arrow down
press: TAB*

Character: d

Enter

Space
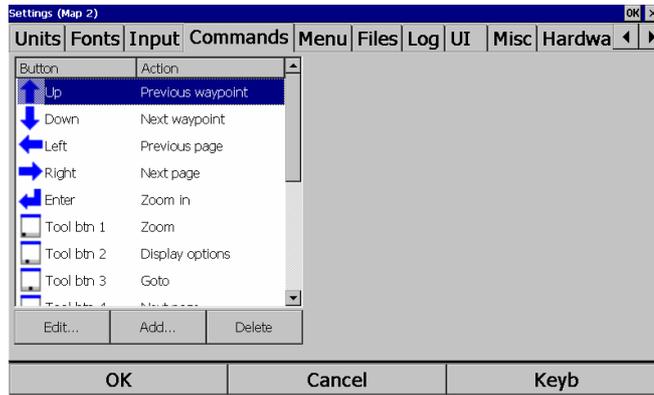
arrow left/arrow right
press: not active**
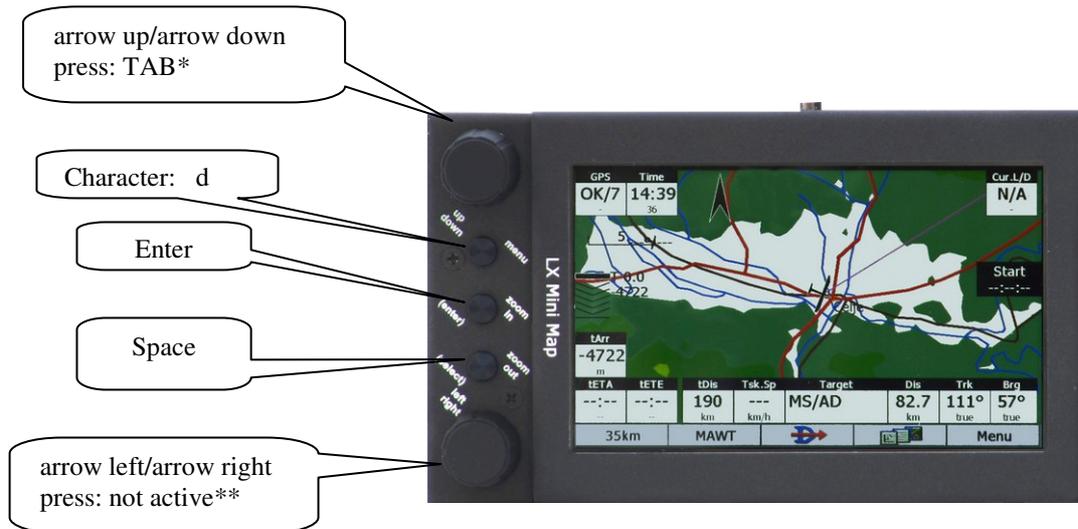
* versions 1.0 and higher character "c"
** reserved for Vario unit control

3.1.2.2   LX remote

3.2 LX Mini Map KB/V and SeeYou Mobile

The configuration builds a real Vario Navigation system, which consists of GPS source delivering GGA and RMC NMEA data sentences. LX Mini Map and LX Vario unit are connected via LX system bus. As mentioned before LX Mini Map includes also a microcontroller which main functions is to arrange data exchange between interfaces and main computer. That's the reason why com2 and 38400 bps should be initialized obligatory.

Note!
It is important to enable **Device** as LX 1600 in Hardware option. After activation of this option two new setup options of SeeYou Mobile will open, (**LX 1600 (1)** and **LX 1600 (2)**). Using of **COM 2** is obligatory

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3.2.1 Units

SeeYou Mobile is capable to use different sets of units. To adapt also Vario unit to the same set, it is necessary to enable data transfer towards vario unit in **Hardware** setup, check **Send to device** option.
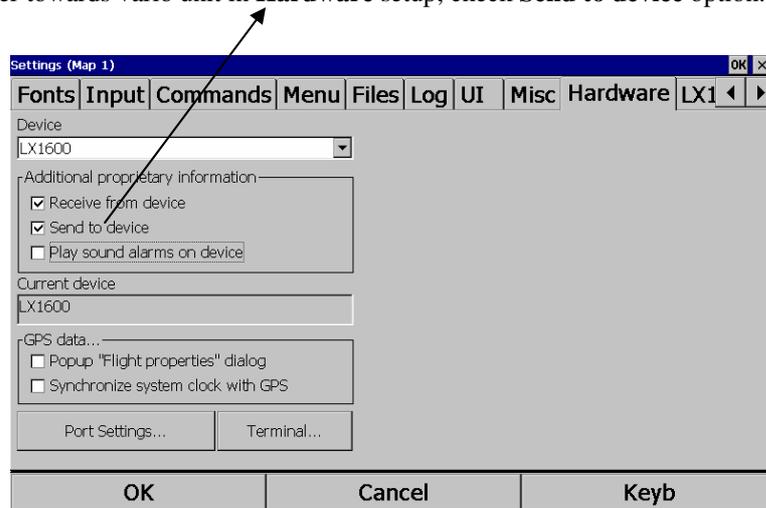
The units' adaptation is done in menu **Units**.
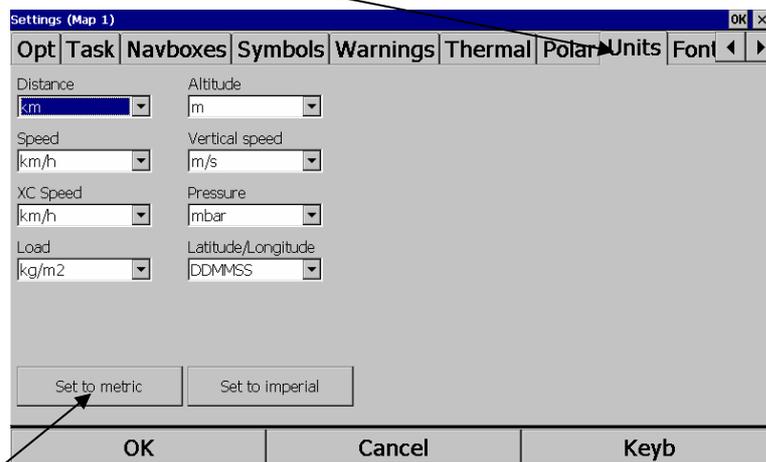
Option **metric** will set metric and the option **imperial** will set to British Commonwealth units.

3.2.2 Setting LX 1600 (1)

This is a very important setting which defines global vario operation parameters.
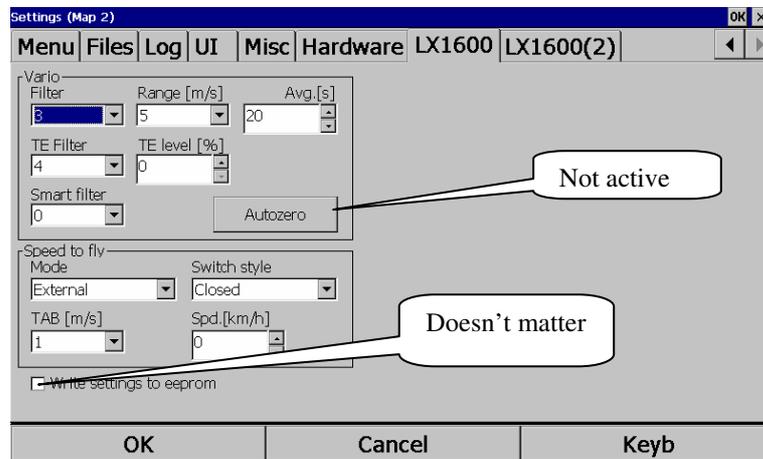
- Vario **needle filter** in steps from 1 to 10.
- Vario **range** 2.5, 5 or 10 m/s or adequate in knots.
- Averager **integration** time.
- **TE filter**, filter of SC indicator in SC mode, no function by TE level 0% setting.
- **TE level** 0% means vario compensation via TE probe and, every setting higher than 0% means electrical TE compensation, default setting is 100%. During a test flight in calm atmosphere adjust the value. In general compensation to low, increase the value and vice versa.
- **Smart filter** is additional filter which could be added after selection of more than 0.
- **Mode** defines manner of change over to SC, external means switch connected to SC wire coming out of Vario unit 15 P connector. Taster variant is also possible in that case a change will happen after each press.
- **Switch style** defines open or closed switch status to get SC.
- TAB, defines **death area of audio** by SC, around zero.
- **Speed** defines change over speed for SC after Auto speed was selected in Mode.

Additional explanations:
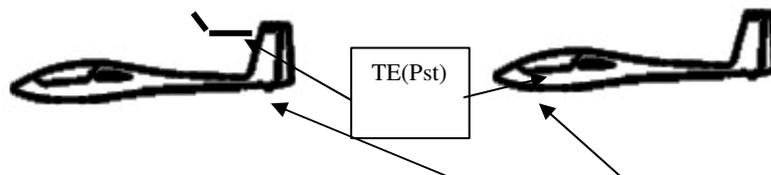
Connection of TE /Pst inlet by tube and by electronic TE compensation
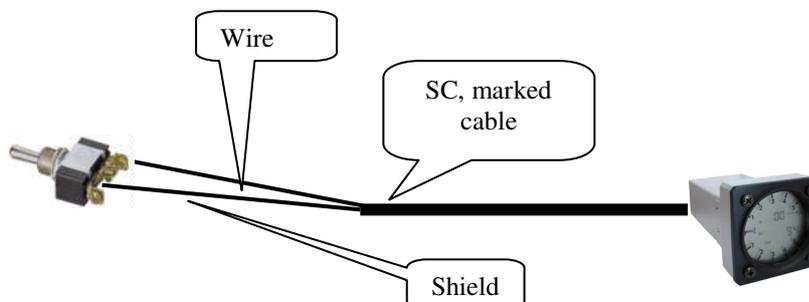
External switch configuration (closed or open active)

Taster configuration
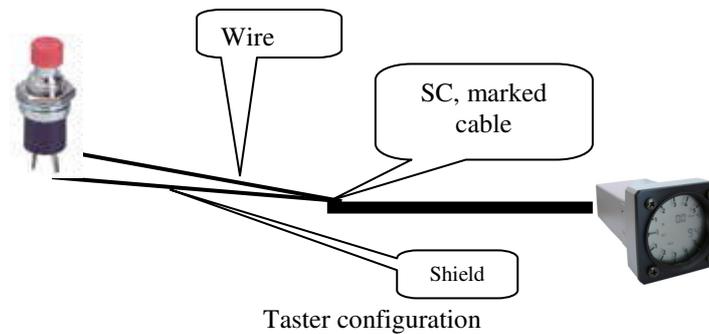
Smart vario:

The LX system incorporates two configurable electronic filters in the circuitry. The first filter adjusts the time constant and is adjustable between 0.5 and 5 seconds. The 0.5 setting is the fastest while the 5 setting provides maximum damping.

The second filter, called the Smart Vario, is a dynamic filter and controls the rate at which the vario indication moves. When set to OFF, there is no restriction on the rate of movement of the vario indication other than the setting of the time constant filter. When set to 1, the vario indication will not move faster than 1 m/s (2 kts) per second, while when set to 4, the vario indication will not move faster than 4 m/s (8kts) per second. It should be noted that when set to 4, the vario indication will move four times faster than when set to 1.

Summary:
- The Smart Vario should not be used in isolation but in conjunction with the setting of the time constant filter. When the Smart Vario is activated, the time constant filter may need further adjustment to provide optimum indications.

Electronic TE compensation:

The TE compensation can be fine tuned during flight with the following procedure. It is essential that this is only done in smooth air; it is not possible to tune the TE accurately when it is thermic.
- Select 100 % and default TEF
- Accelerate up to approximately 160 km/h (75 kts) and keep the speed stable for a few seconds
- Rapidly reduce the speed to 80 km/h (45 kts)

Observe the vario indicator needle during the maneuver. At 160 km/h the vario will indicate about –2 m/s (-4kts). During the speed reduction the vario should move towards zero and should never exceed zero (slightly positive indications are acceptable). If the vario shows a climb, then the compensation is too low, increase the TE%; and vice versa.

The **TEF** (TE filter) is the compensation delay. Larger numbers will increase the delay and vice versa. During the first test is recommended to use TEF 4.

Electronic TE is only effective when the pitot and static sources are co-located and the pneumatic lines to the instrument are approximately the same length. The best sensor to use is the combined pitot/static Prandtl tube. If problems are experienced with the electronic TE compensation, then the most likely cause is the glider's static source. The static source can be checked by plumbing the pneumatic tubes for electronic compensation and then setting the **TE:** to 0%. In still air, accelerate to approximately 160 km/h and slowly reduce the speed. Observe the vario indicator. If the static source is good, then the vario should immediately start to move to show a climb. If the needle firstly shows increased sink and then moves to a climb, the static source of the glider is unsuitable and there is no way to provide successful TE compensation electronically. The use of a dedicated and accurate fin mounted pitot/static source such as a Prandtl tube might help.

3.2.3 Setting LX 1600 (2)

There are two sections; one speaks about audio settings and another about LCD Vario indicator settings.
There are different audio styles offered and also frequency ranges of audio signal, separately for vario and SC
function. After intention not to use default settings it is recommended to run **Test** function and new audio variant
will be demonstrated by loudspeaker. SC Volume setting defines audio volume in SC, H means louder by SC.

Note!
Adjust new settings, confirm with **OK,** enter setup again and run **Test**. Don't forget to run Save settings command
after final decision.

Needle

Num#1

Num#2

Continous SC indicator
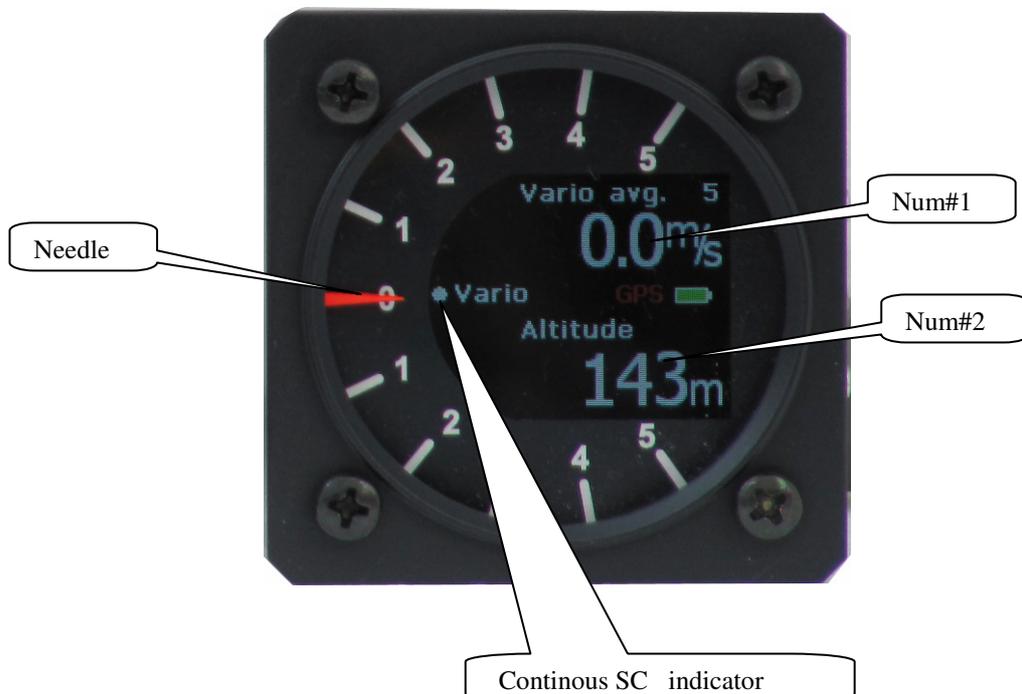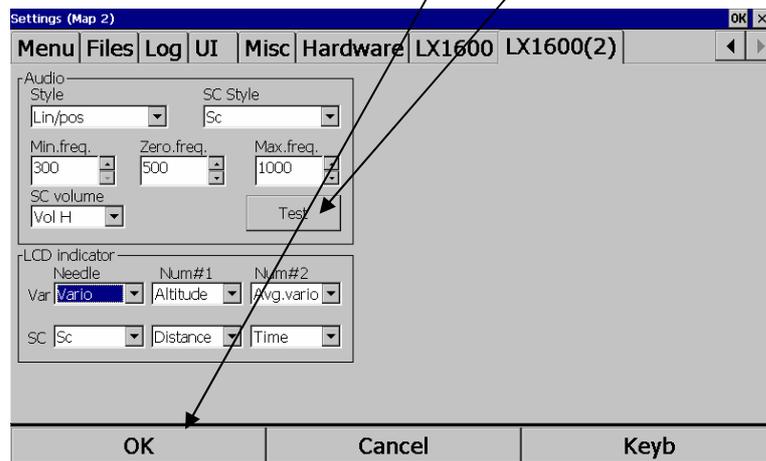
LCD indicator setting defines functions of mechanical needle and upper and lower numerical indicators. One set is valid for **vario** function and another for **SC mode**.

Note!
After final adjustment, close procedure with OK and run **Save settings**.

The **dot positioned** on the left side of the display show continuously SC. Correct speed means dot positioned around zero, plus deflection means speed to high and vice versa.

4   LX Mini Map and CAI 302

CAI 302 can be used as GPS source for LX Mini Map. Please respect following limitations:

- Use cable set marked as **COM1,** this will connect 302 directly to MM com 1 (com1 cable set is an option which should be claimed by ordering)
- Use setting **COM 1/4880 bps** on the program (SeeYou, Winpilot…)

Arrange connection (Tx , Rx and GND) 302 - LX Mini Map after connecting of **9P SUB D** connector of 302 and 6P telephone type of LX Mini Map junction box. After using of basic version of JB two terminal springs can be also **used as 302** connections. LX Navigation is also capable to deliver mentioned a cable.
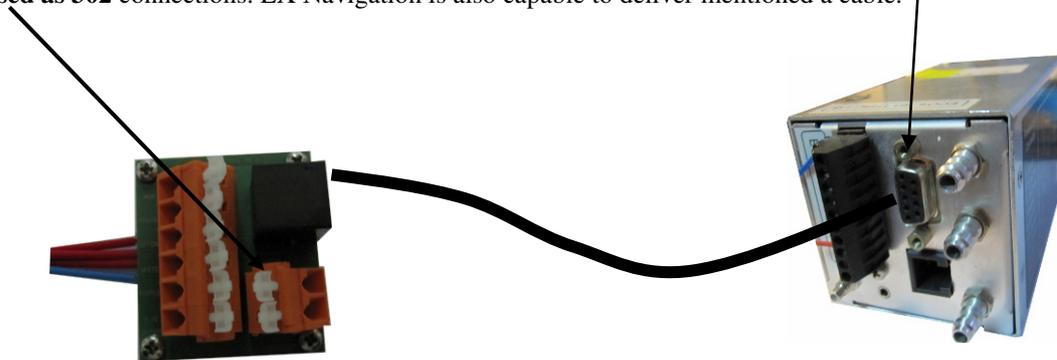
See chapter Cable set for details.

5   Connection of LX 1606 and LX 166

Connection of both units to MM requires **COM1 cable set** and also using of COM1 by the program, baud rate setting should be 38400.
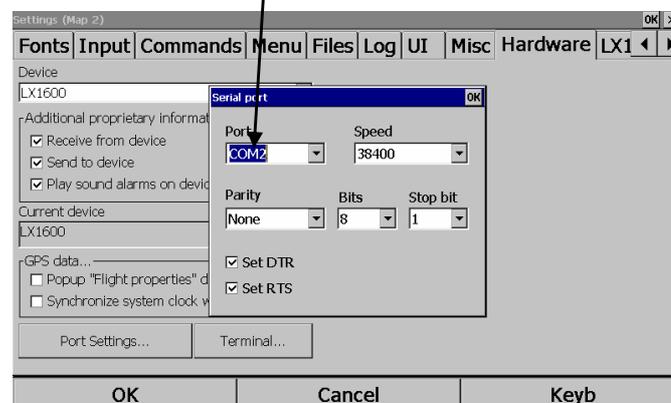
Note!
Use **PDA marked** connector on LX 166/1606 and special cable 9P – 6P (not delivery included), 5V power coming out of LX 1606/166 is not useable for LX MM, so never connect to MM.

Important!
Always run program at first wait until booting will finish and switch LX 166/1606 on.

6   Connection of LX 7007

Connection of LX 7007 family (except Compact) is possible via a special cable (6P 9P). Use LX Mini map cable set prepared for COM2.
See chapter Cable set for details.

7   LX Mini Map and Winpilot

There are two versions of Winpilot, WP pro and WP advanced. WP pro isn't capable to operate in conjunction with LX Vario and WP advanced offers this feature.

7.1   Important settings

It is recommended to set Com 2 and 38400 bps for GPS data input. Under some special conditions also COM 1 can be used.

Important!
After need of **Com 1**, a **special cable set** with wired Com 1 is necessary. Connection of Cambridge CA 302 requires mentioned solution.

7.1.1   WP and LX Mini Map KB/V

Operation of Winpilot Pro and LX Mimi Map KB/V needs following settings:
- Use LX Mini Map setup to define vario parameters
- COM 2/38400 on Winpilot
- COM 2 wiring

7.1.2   WP and 302

It is recommended to use COM1 type of wiring and also setting COM1 4800 on WP. COM 1 wiring is not default, it should be ordered as an option. A special cable which is connecting Junction box and 302 is also necessary.

8   LX Mini Map and LK 8000

LK 8000 is a free ware program developed by Paolo Ventafridda (http://www.lk8000.it). LX Navigation has made some additional development on the program to ensure following:

- Efficient program management after using of Mini Map **keyboard and remote**
- New GPS source selection possibility; LX Mini Map in menu number 8
- LK 8000 program extension which makes possible data exchange with LX Vario, see 8.4.3

Such an upgraded LK 8000 program you can download from www.lxnavigation.si or you can ask for it by LX Navigation.

	LK 8000 version	**Remarks**
LX Mini Map	Regular LK 8000 version	www.lk8000.it
LX Mini Map KB	LX version	www.lxnavigation.si
LX Mini Map KB/V	LX version	www.lxnavigation.si

This short form guide doesn't replace LK 8000 original manual which you can download from www.LK8000.it

8.1   How to identify LX Navigation version

LX navigation version is clearly visible after LK 8000 inscription.

8.2   Selection of new GPS source
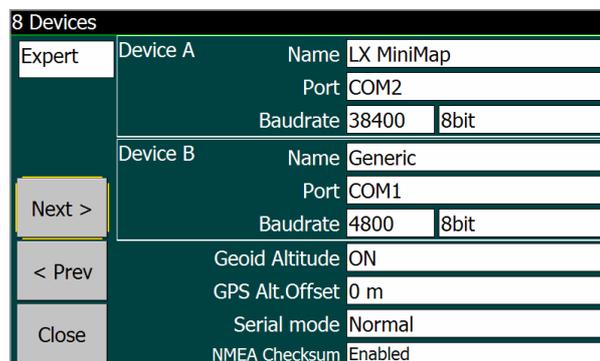
Above mentioned setting is obligatory after LX Mini Map KB/V configuration is used, by Basic and by KB version you can use settings which are listed in menu 8. After using of other GPS sources, it is recommended to use COM1 and appropriate baud rate setting.

Note!
After decision of using COM 1, the appropriate cable set marked as COM 1 is absolute necessary.

8.3 LK 8000 and Mini Map keyboard interaction

Selection of main pages:
1.x to 4.x
after press
Basic setup

Selection of subpages within main page, after press vario* settings
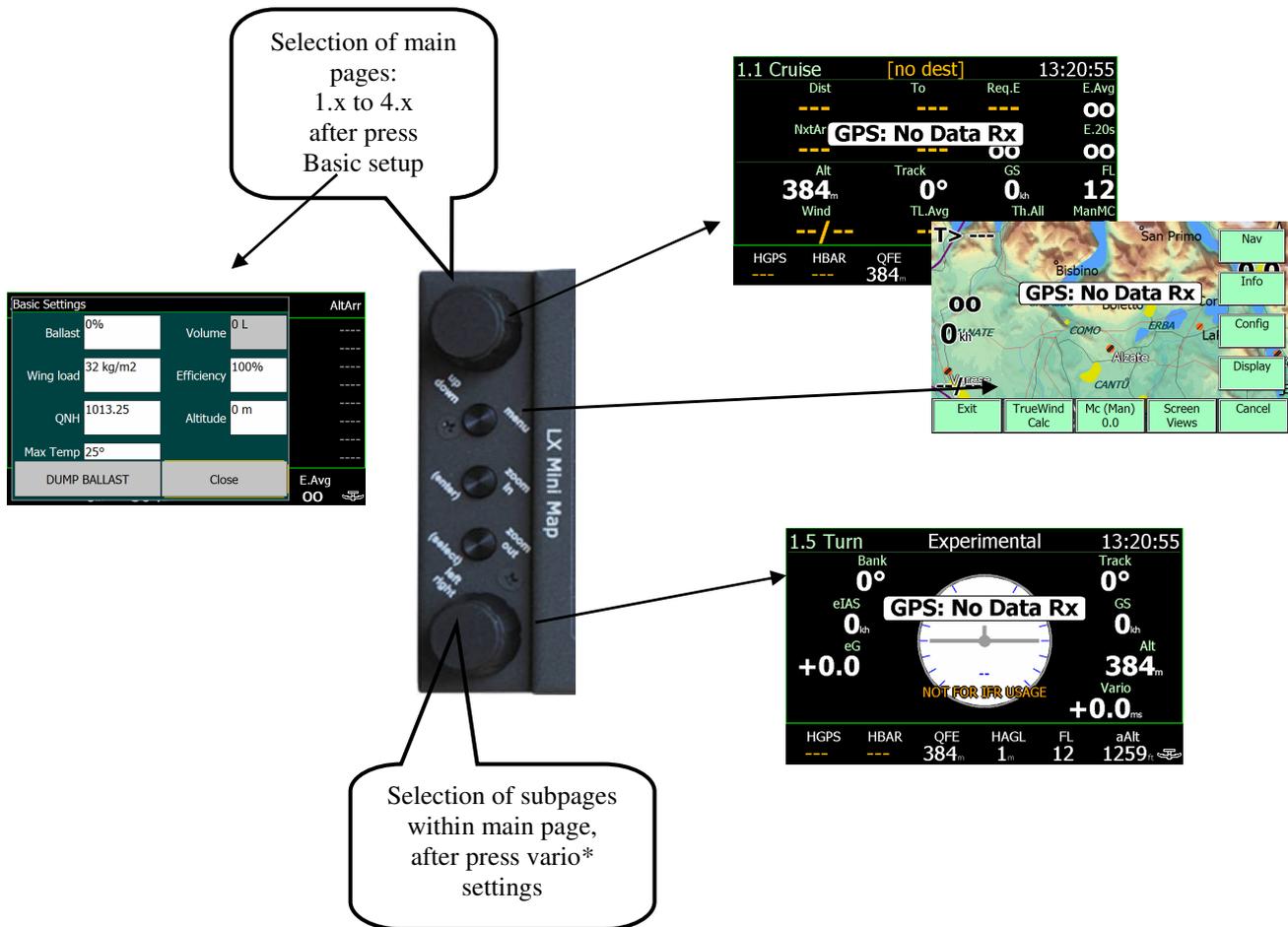
Zoon in and **Zoom out,** changes zoom of the graphic screen, the same button will produce enter in setup
* Audio volume, MC, ballast, bugs and vario filter available after sequenced pressing.

8.3.1 Keyboard operation in details

After using of LX keyboard nearly all commands could be executed via keyboard. During navigation use commands as described in 8.3.

8.3.1.1   Using of Keyboard in System Setup

After press on Menu (**menu** key, **Config 2/3** and **System Setup** by touch), the 23 system setup menus will be offered. The rotary switches and the keys will become following functions.

Setup **number selection**: mark **next** or **previous** (by rotating **up/down**) and after every press on **enter** new setup number will be offered.

8 Devices			
Expert	Device A	Name	LX MiniMap
		Port	COM2
		Baudrate	38400	8bit
	Device B	Name	Generic
Next >		Port	COM1
		Baudrate	4800	8bit
< Prev		Geoid Altitude	ON
		GPS Alt.Offset	0 m
Close		Serial mode	Normal
		NMEA Checksum	Enabled

Menu selection (scroll): use Up/Down **to scroll**
Item change: Left/Right **to change**
Enter: for **confirmation**
Double click on Menu button: **escape** (after using of this command the already made changes will **be lost**.

8 Devices			
	Device A	Name	LX MiniMap
		Port	COM2
		Baudrate	38400	8bit
	Device B	Name	Generic
Next >		Port	COM2
		Baudrate	4800	8bit
< Prev		Geoid Altitude	ON
		GPS Alt.Offset	0 m
Close		Serial mode	Normal
		NMEA Checksum	Enabled

To leave menu: high light **Close** (Up/Down) and press Enter

8.3.1.2   Keyboard in Nav Menu

Activate NAV menu of interest after using of **Menu button** and touch screen.
The philosophy is similar as described in 8.3.1.1.
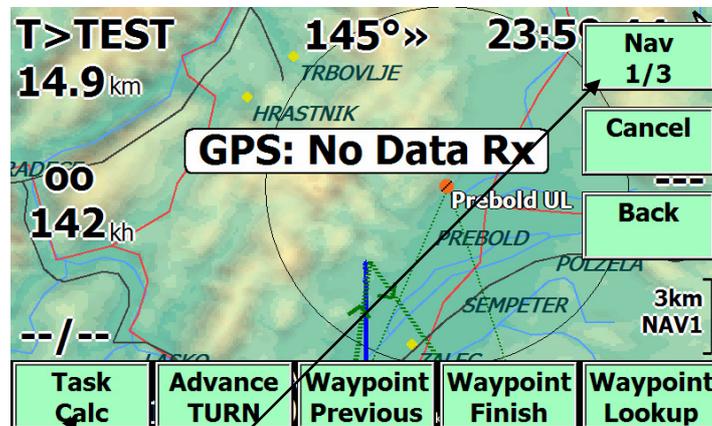
Actions:
Push button: Menu
Touch: to select further **items** (1/2 and 1/3)
Touch: to open **menu** of interest

Note!
It is not possible to activate individual menus after using of Keyboard; this is exclusively possible by Touch.
Within menu all selections are possible after using of Up/Down, Left/Right and Enter.

8.3.2 Using of Remote

All remote keys can be used to control LX Mini Map and at the same time also various, in KB / V variant.

-Zoom **in** and **Enter**
-Zoom **out**

-**left/right**

-**up down**

-**Menu** and after double click **escape**

-**vario** settings

8.4 How to prepare LX Mini Map KB/V to work with LK8000

- Use LX Mini Map Service program to set vario, see 2.4.1.
- Select **Mini Map** and **38400** bps in LK 8000 menu 8 of LK 8000

8.4.1 GPS connection

Connect GPS source to 6P telephone type connector of LX MM junction box. Baud rate doesn't matter as LX MM adapts the baud rate automatic.

8.4.2 Vario connection

Vario should be connected to one of two SU D 9p connectors; the vario gets also its power via this connector. See also 2.2.

8.4.3 Data exchange LK 8000 – LX vario

Both units are able to exchange data as:
-MC*
-Ballast*
-Bugs (efficiency)*
-Altitude respectively QNH
*see also 2.2.1.

FUNCTION	Bidirectional	LK8000 ►Vario	Vario ► LK8000
MC	✓		
Ballast	✓		
Bugs	✓		
Altitude		✓	
QNH		✓	

8.5 Task management

LK 8000 offers a bright spectrum of useable functions connected with task management of a glider pilot task. This capture describes how to input task and also how to execute the task during competition flight.

> **Note!**
> Nearly all activities connected with task management could be carried out by LX Mini Map keyboard or LX Remote.

8.5.1 Task global settings

System setup captures **14 and 15** defines **global task** parameters which will affect all stored tasks. In case of an AAT the AAT parameters should be delegated to individual tasks in **Task Edit** menu of LK 8000.

14 Task	
Auto advance	Arm
Start type	Line
Start radius	1.0 km
Sector type	FAI Sector
Sector radius	10.0 km
Finish type	Line
Finish radius	1.0 km

Next > < Prev Close

15 Task rules	
Start max speed	0 kh
Start maxsp. margin	0 kh
Start max height	0 m
Start maxh. margin	0 m
Start height ref	AGL
Finish min height	0 m
FAI finish height	OFF

Next > < Prev Close

Auto Advance: defines manner of change over in turn point or start sector.

8.5.2 How to input a new task?

Task Edit menu is a sub page of NAV menu in fact **NAV 2/3** menu. The menu will become operative after click on **TASK EDIT** button of touch screen.

```
Task Overview *
 ┌───────────┐  (add waypoint)
 │   Close   │
 ├───────────┤
 │ETE 0min   │
 ├───────────┤
 │   Clear   │
 ├───────────┤
 │   Calc    │
 ├───────────┤
 │   Load    │
 ├───────────┤
 │   Save    │
 ├───────────┤
 │  Declare  │
 ├───────────┤
 │  Analysis │
 └───────────┘
```
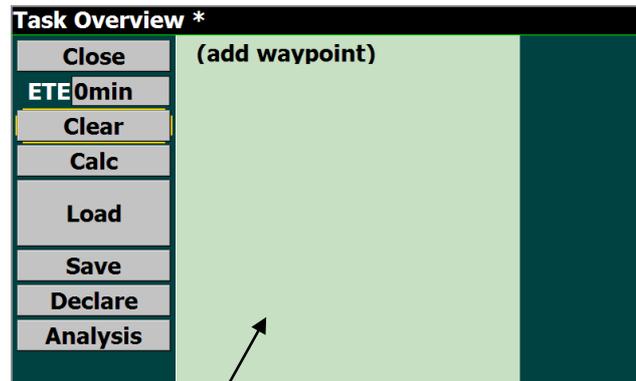
After press on Task Button, **Task Overview** window will open and last flown task will be listed. By no task only (**add waypoint**) will be offered. Double click on add waypoint will open the dialog and waypoint selection could start. The first selected point is task **start point**. During selection process the pilot should define if a conventional speed task or an **AAT** will be flown. After AAT selection (AAT ON), **AAT time** given by competition director should be entered. AAT sector geometry can be annotated to correspond to individual sectors of the task. Flying an AAT makes change over philosophy of high importance, so define in **Auto advance**.

-**Manual:**   change over will happen promptly after command execution

-**Auto:**   change over will happen automatically after sector will be reached (suggested for racing task)

-**Arm:**   the pilot is able to arm task start before reaching the line, after reaching the line, start will be executed automatically, change over to next turn point inside point sector is manual

-**Arm Start:**   arm is valid only for start

```
Start: Celje
 ┌───────────┐              Start type Line
 │           │             Start radius 1.0 km
 │   Close   │   Alternate start point OFF
 ├───────────┤
 │  Select   │
 ├───────────┤
 │  Remove   │                     AAT ON
 ├───────────┤               AAT min time 50 min
 │  Details  │
 │           │
 │           │
 │ Move wp   │
 │  down     │              Auto advance Arm
 └───────────┘                       Task
                                     Rules
```
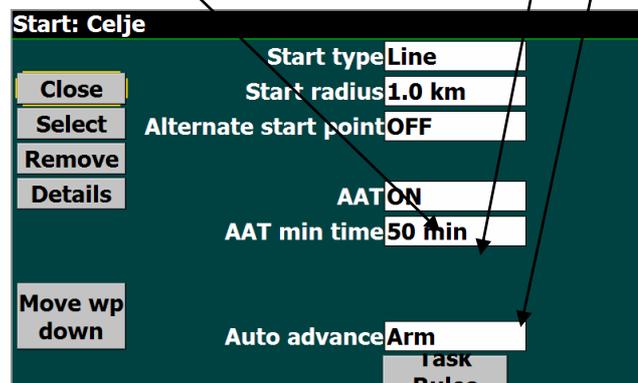
> **Note!**
> It is important to select a turn point file which includes turn points of interest in **System setup** under **number 1** (Site). Remember that LK 8000 is also capable to use .**CUP** files as a turn point data base. The turn point files should be simple copied into **Waypoints** folder of LK 8000.

The last point is **finish line** and this should be declared before point selection.

Rest commands:

Clear: will **clear** all points of the task

Calc: offers **task calculate** menu, described separately

Load: will **load** an already stored task

Save: will **save** active task

Declare: will **send** declaration to flight recorder

Analyses: will open flight analysis

ETE: time elapsed is connected with settings done in **Calc** and couldn't be edit from this menu
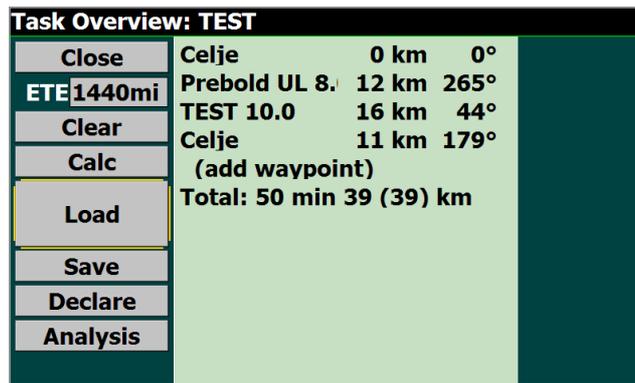
Example of a finally ready task

After start, all turn points finish and all individual sectors are entered, the task is ready to be flown. Close the procedure with **Close** command.

8.5.2.1   Edit of AAT sectors

After click on TP name a window will open where sector geometry can be preset.
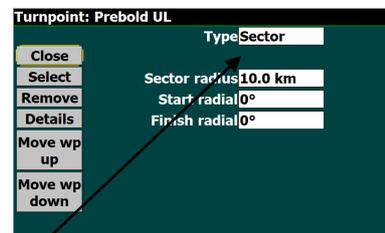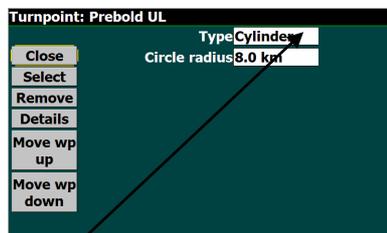
Using of **cylinder** option offers sector diameter input and **secto**r makes possible to enter two radials and also radios.

8.5.3 Task Calculate Menu

This menu is available via **Task Edit** menu or from **NAV 1/3**.
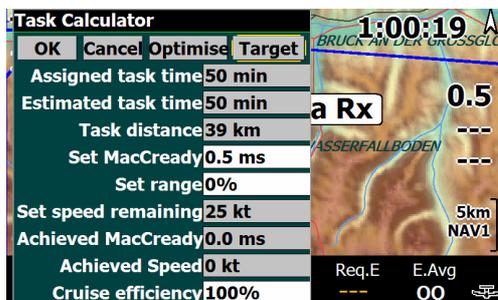
Following important task parameters can be entered that way:

Assigned task time: correspond to the time input done in Task edit AAT Time, no adjustment possible, the time will count down after task start

Estimated task time: depends on, MC, Range and Cruise efficiency, this is the time which the pilot will need to Complete the task under above mentioned conditions

Task distance: distance to go from start until finish

Set MC Cready: setting should match predicted weather conditions

Set range: the task default distance can be varied in %, after using of this function the turn points will moved by the program automatic way

Cruise efficiency: the input value is between 75 and 150%, values higher than 100% will reduce task estimated time and vice versa

8.5.3.1   Optimize

An automatic task optimization will follow after using of this function. Estimated task time will be set 5 minutes more than AAT time this is a safety measure to prevent early arrivals. The task distance will be also adapted.

8.5.3.2   Target

Makes possible to move turn points inside sectors of the actual task regarding to pilot personal prediction. More about see 8.6.1.

8.6 Flying a task

It is recommended to make all inputs connected to a task on ground. Flying a racing task, which have small sectors, what the entire pilot has to do is to manage start and turn point change over in case of a not automatic option has been selected in System Setup. AAT makes all mentioned procedures more complex, due to big sectors and quite a lot of freedom where to switch to next point.

8.6.1 AAT Management

AAT management consists of strategy how deep the pilot will fly into individual sector to reach optimal task speed and not to arrive too early.

8.6.1.1   Equidistant arc

In every sector a **blue arc** which is going through the centre of the sector defines two areas where the distance will be **less** than default and the area which will **increase** the task distance. So it is not rentable to fly along the arc, the distance will not increase, but the time will be spent.
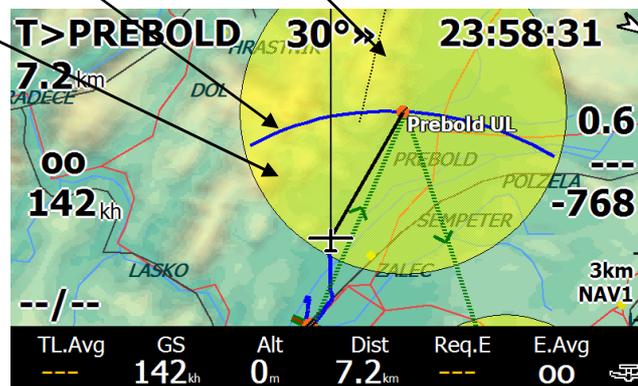
8.6.1.2   Automatic Move Function

LK 8000 offers a very sophisticated method which is running fully automatic without any pilot assistance.
There are two different approaches. The pilot should choose Lock ON or Lock OFF option. **Lock OFF** will adapt
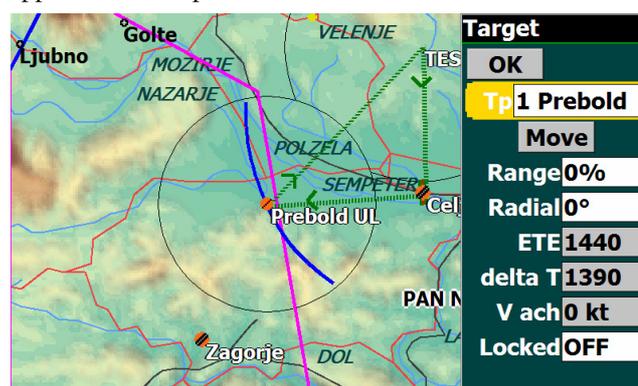
8.6.1.2.1   Using of Lock ON option

The task point will remain tight to TP default position even after the glider will enter the sector. As the glider will reach the arc, the arc will be moved up synchronized with glider position. Selection of next turn point will cause an automatic task modification, glider present position will, be taken as new turn point. Mentioned will happen also before reaching of blue arc. A significant task distance jump is expected if the change over to next TP happens quite far from original TP.

8.6.1.2.2   Using of Lock OFF option

Lock OFF option makes task progress even more sophisticated and easy. Immediately as the glider enters the sector a **moved turn** point is offered. The position of such a hypothetical point is defined automatically and is based on position and actual track. During staying in "minus" distance area the point is positioned on the blue arc and after reaching of blue arc, the arc and hypothetical point are **moving symphonized** with the glider.
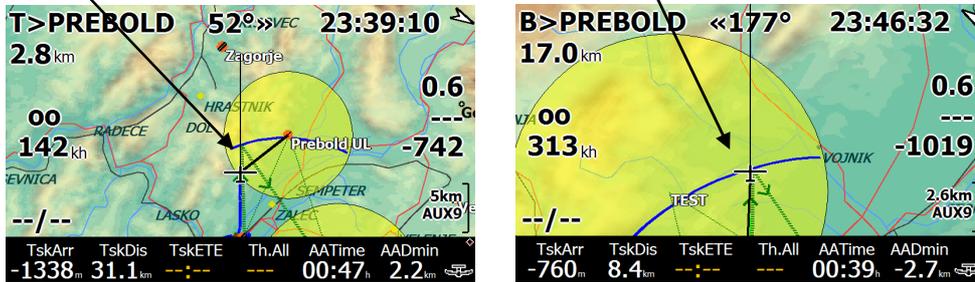
Note!
Flying along blue arc will not increase the distance, to increase the distance fly perpendicular against arc.

8.6.1.3   Manual Move

Manual move can be done on ground and also during flight. There are two parameters which the pilot is able to vary: the range and the radial. Both mentioned adaptations are available in **Target** menu. **Target** can be run from Task Calc menu.
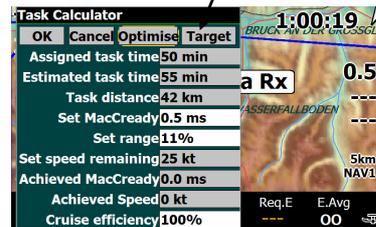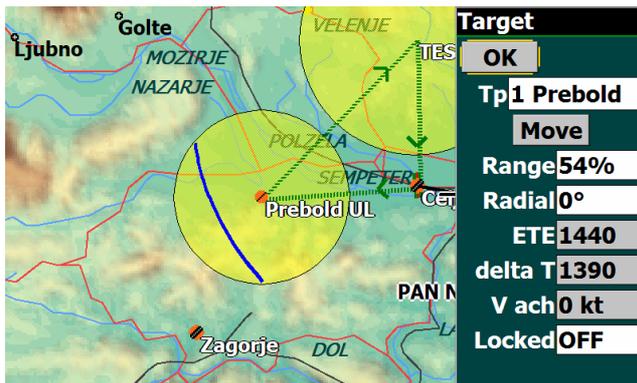
Range: -% decreases the distance and vice versa
Radial: - moves left and + moves right
Delta T: defines early or delayed arrival in minutes

8.6.2 Preparing of FIN 8 and AUX 9 pages of the bottom bar

The pilot is able to prepare above mentioned pages of bottom bar under his personal requirements, after using of System Setup **items 18 and 19**. Preparation of FIN 8 or AUX 9 is nearly mandatory as AAT is intended to be flown. Thre is also page TSK4 which speaks about task statistics, but there are some important AAT data missing for instance AAT time. All missing data can be incorporated into FIN 8 or AUX 9.

19 InfoBox Auxiliary	
	1 Task Alt.Arrival
Copy	2 Task Distance
Paste	3 Task Time To Go
	4 Thermal All
Next >	5 AA Time
	6 AA Distance Min
< Prev	7 Altitude BARO
	8 Task Covered distance
Close	9 Time local
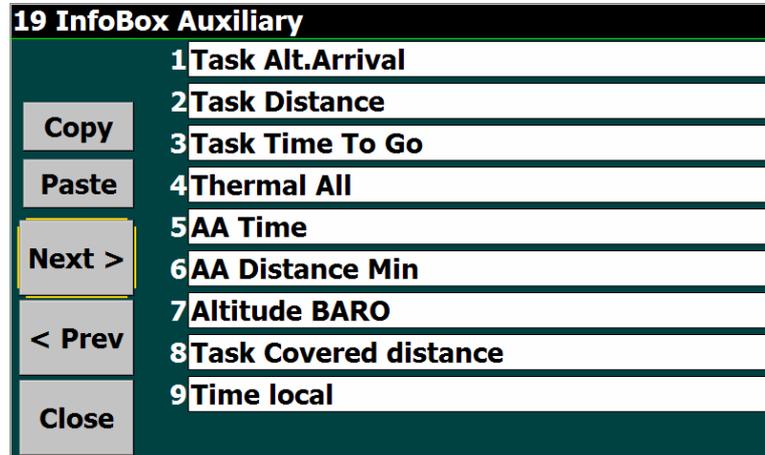
8.7 Airspace and colours

Airspace format in LK 8000 is exclusive Open Air format having extension .txt. This a most common format for gliding use.

8.7.1 Loading of new airspace file

The airspace files should be copied into Airspace Folder of LK 8000.
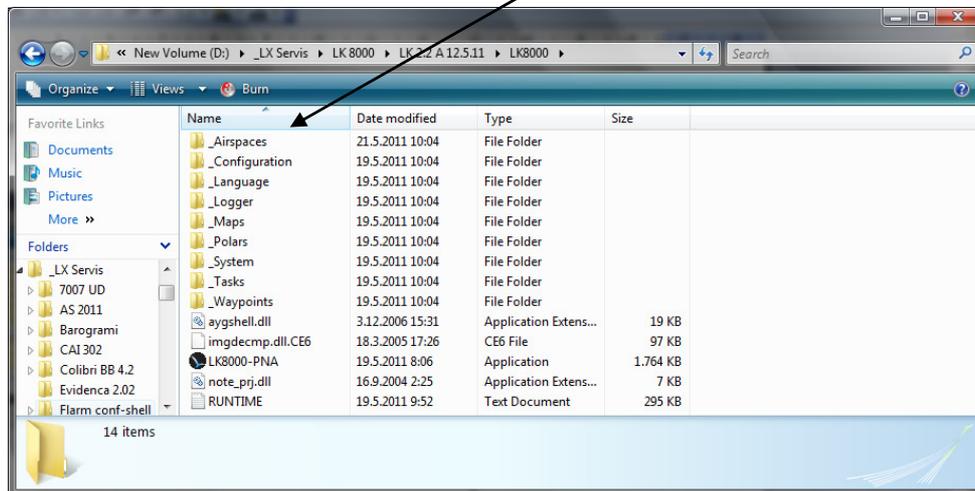
An indirect way can be used after the file is copied into My Documents and after to LK 8000. This procedure doesn't need to take away LK 8000 original card. The pilot is able to prepare his file on PC and copy to another SD card. **Actual file** should be enabled in System Setup 1.

34
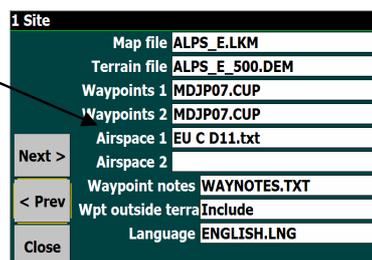
8.7.2 Airspace colours

To any airspace a colour can be delegated. The airspace patterns could be also filled or only lines will represent the airspace. A special option **outline only** will designate airspace sections only with a thin black line. Suggested setting is Patterns.
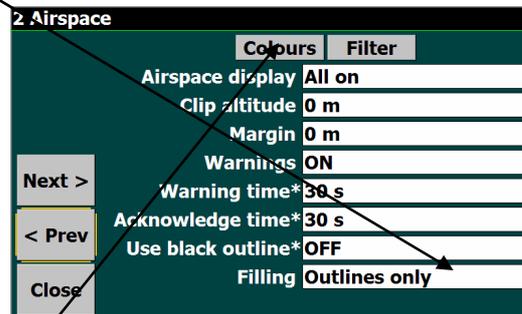
8.7.2.1   Determination of colours

The coulurs are connected to airspace classification (A,B, C …). So the pilot is able to add any colur from the palette to any class. Some special items are added to the classes as Glider sites, AAT sector and some other options.

Note!
CTR is defined as class in LK 8000, so if you want to use a special colour for CTR this shouldn't have a class designation, otherwise will be threaded as all other items of the class. Unknown as class designator will also solve the problem.

After click on **Colours** following window will open:
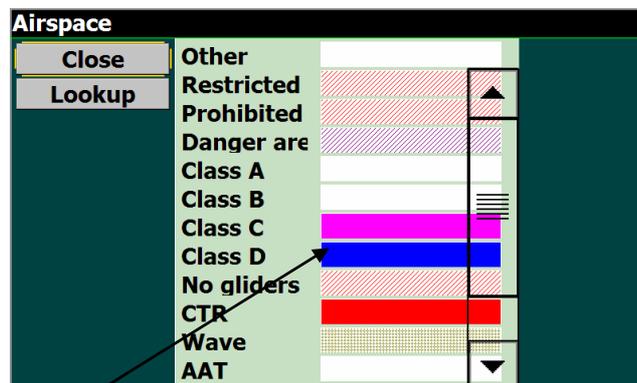
To alter colour click on the **bar** and the whole **palette** will be offered. After click on colour a pattern selection will follow, select **pattern**. To remove patterns and to use only colored airspace borders, define any colour from the palette and select white field in pattern.
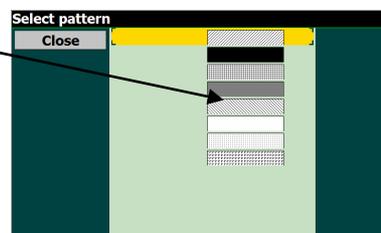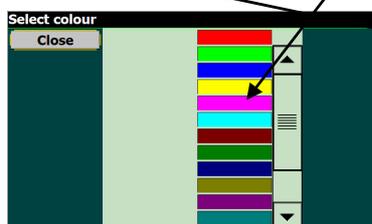
9   Using of ConnectMe

ConnectMe is free ware program which makes possible to download data stored in the flight recorder which is connected to the Mini Map. Uploading of declaration and TP data base is also possible.
The program is factory preloaded and should be started from **LX Mini Map desk top**.
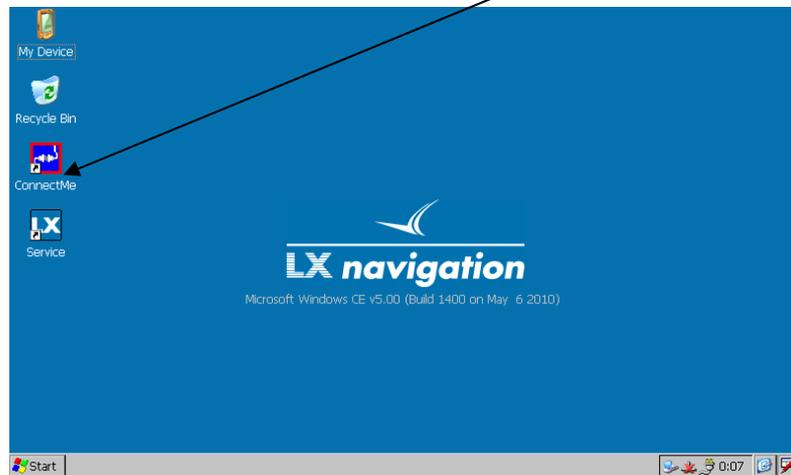
Use **Exit** function of navigation program to access desk top. SeeYou Moile 4.01 makes possible to start Connect me from Menu page.
After click on ConnectMe icon the program will start.
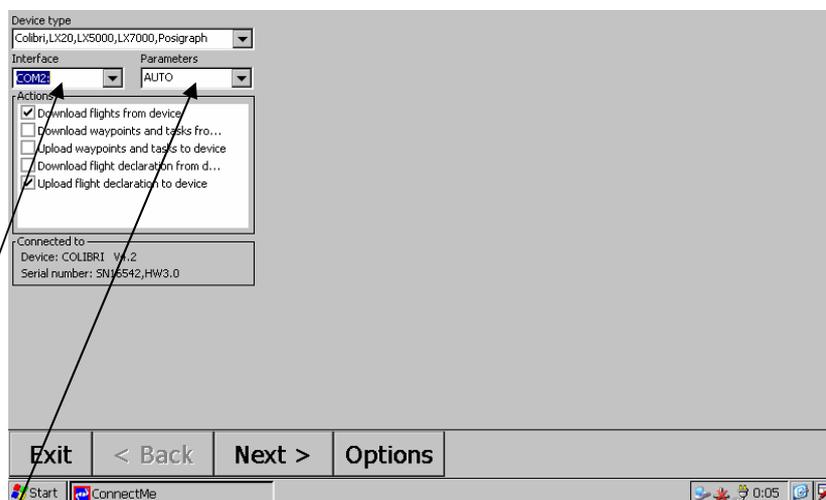
To establish communication following settings should be adapted as minimum:
-device selection
-COM 2
-Baud rate selection (this should meet flight recorder type) or auto

Note!
In some configurations is exceptionally used com 1, so select com 1 having such a configuration. Com port designation you find on the label of the wiring.

The destination to SD card is factory set, so all downloads will be stored to the SD card.

Note!
Never use destination **My Documents**, as the unit hasn't internal back up battery and the data will be lost after power off of the Mini Map.
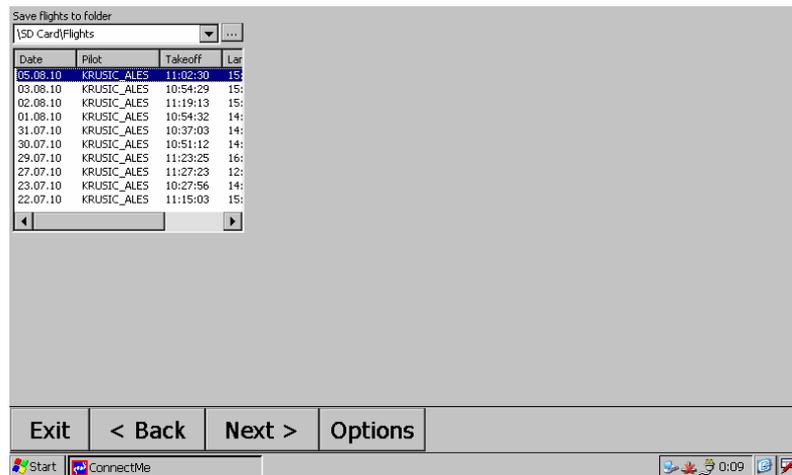
It is recommended to use an **additionally SD** card for downloads and uploads; this will prevent unpleasant situations due to loosing of SD card with navigation program.

Important!
It is recommended to restart (power off) LX Mini Map after communication with ConnectMe, this will guarantee correct com port setting of the navigation program.

---

10 Installation

The installation of any LX Mini Map version is simple and doesn't require any soldering works, as all connections are plug_and_play.

10.1 Power supply

The power supply should be applied to the junction box and the junction box splits power to LX Mini Map and also to all devices connected to the junction box. Connect **red** wire to plus and **blue** wire to GND. A master switch is a part of wiring.
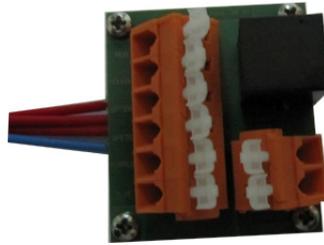
Note!
There is no **fuse built** into the LX Mini Map electronic, so it is recommended to use an external fuse, not less than 1A. A power on/off switch is a part of wiring.

Power specification:
LX Mini Map 8-28 V DC

Note!
Respect also power limitations of interfaces connected to the system.

After a short power break, the LX Mini Map computer will start new and some unsaved data will get lost. So it is recommended to use **no break** switches for change over from main to spare battery.

10.2 Mechanical installation

The unit comes with a suitable **mounting frame** which makes possible to install the unit in any cockpit. A **snap in fixation** system makes insertion and also reinsertion very easy. Delivery included is also a suitable **harness** which depends on mounting frame type. A part of harness is also a Junction Box and this device enables an absolutely plug and play installation of electrical connections.

10.2.1 Mounting frames

The mounting frames are black colored aluminum parts which are coming in several variants; the variant depends on installation intentions.

10.2.1.1 Basic mounting frame

Consist of an aluminum black painted plate with snap in **fixation device** and four holes which makes possible to install the unit over **one 80 mm** standard panel cut out.
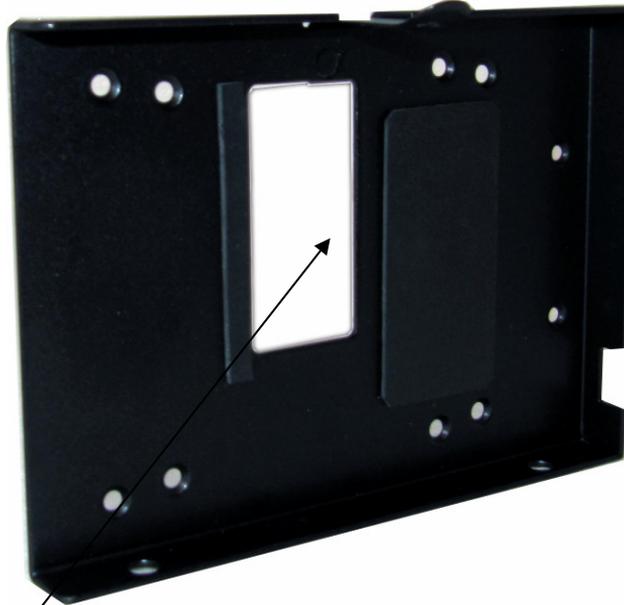
A cut out for 9 **P connector** is situated in the central part of the frame.
Landscape and also **portrait** orientation is possible.

10.2.1.2   Advanced mounting frame

This is an extension of basic version and can be used in cases where the Mini Map won't be installed on the panel surface. Another back mounted **aluminum part** is added to the basic version, where a 9P connector and a **gooseneck** are mounted. As the unit is snapped in also all electric connection are done automatically. This makes possible to use LX Mini Map in different gliders.
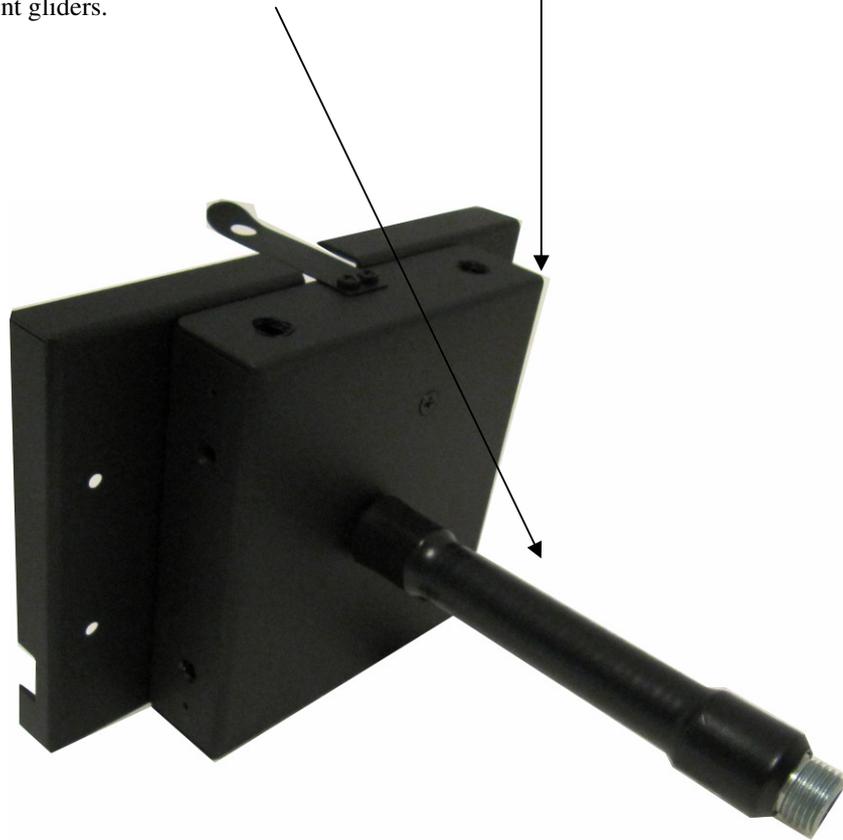
Landscape and also **portrait** orientation is possible.

There are two lengths of gooseneck available, 90 and 170 mm.
The holder comes in two parts; the base plate is a part of MM package, the back, gooseneck nut and gaskets are parts of accessories box.
To fix the holder successfully it is necessary to respect succession of the parts, see picture below.

For finally fixation use M6 nut.

Junction Box connection

Every unit comes with **Junction box**; this is in fact a printed circuit board with one 6P telephone type connector for **GPS connection**, two **9P SUB D** connectors for connection of vario unit and possible interfaces and a **spring terminal block**. The spring terminal block terminates the **wires** coming out of LX Mini Map.

red

yellow

green

blue

violet

white
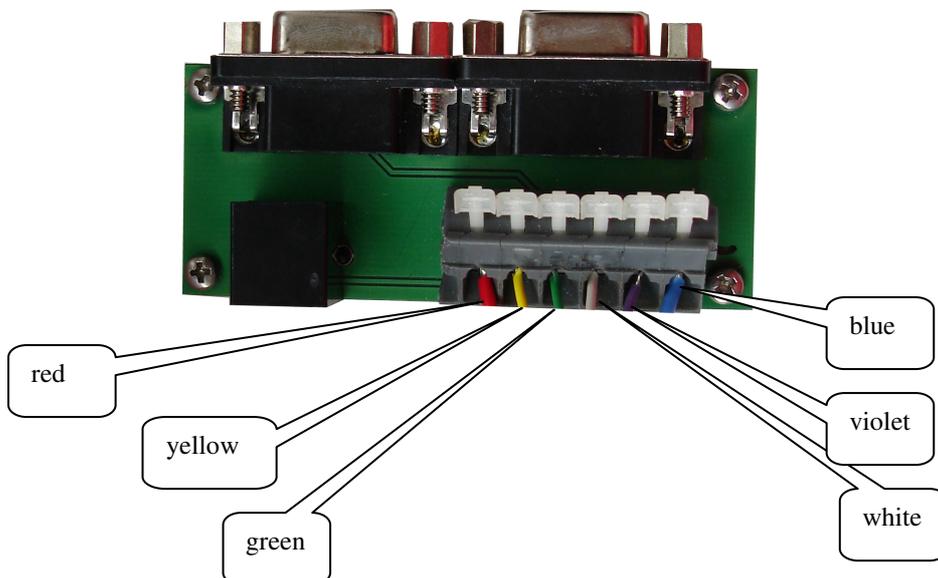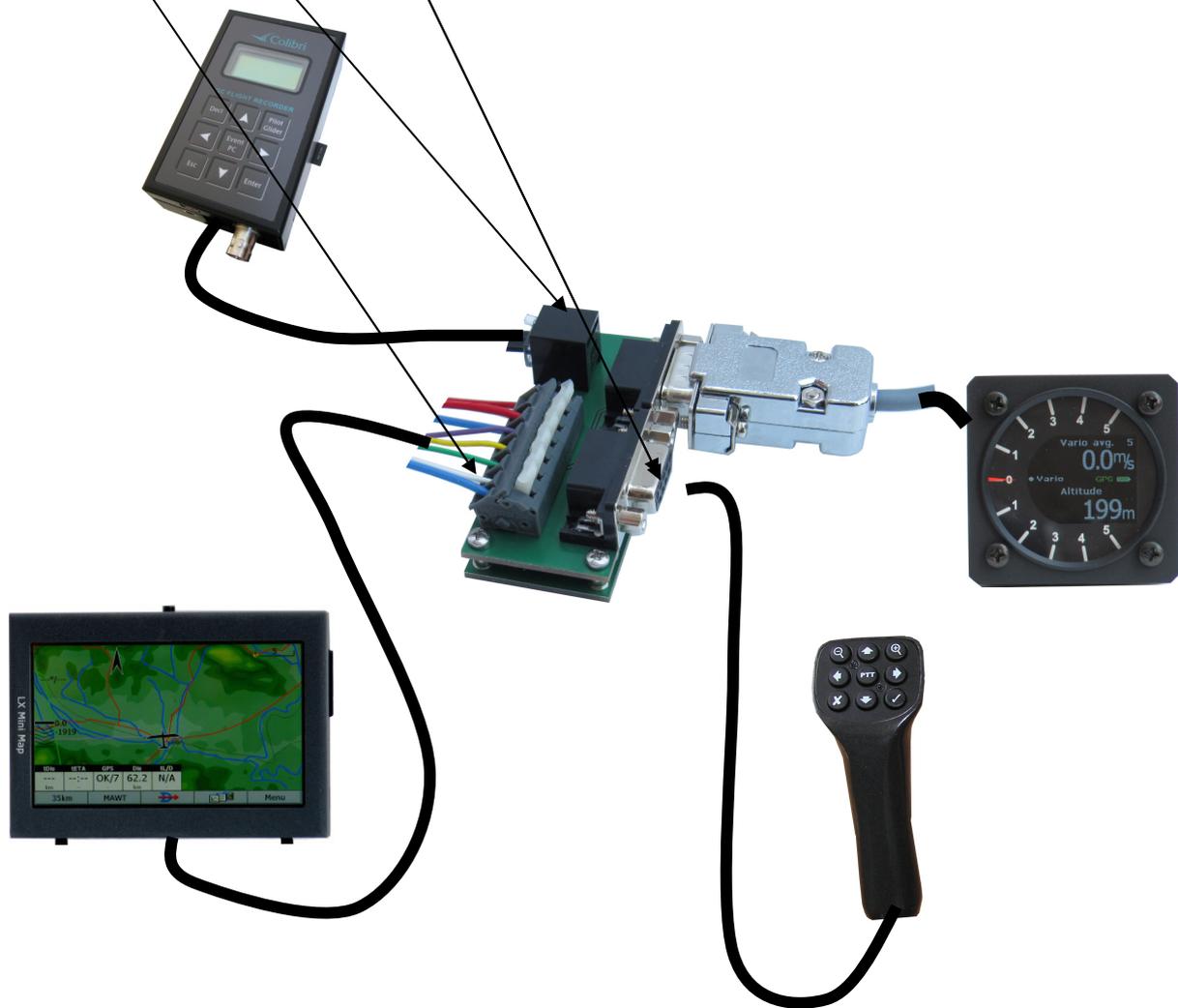
Every junction box is equipped with an on/off switch which applies power to Mini Map and also to all connected interfaces.

Units connectable plug and play to Junction Box:
- LX 20 old version, ask for cable
- LX 20 2000
- Colibri, all versions
- LX 5000, LX 7000, LX 7007, ask for cable
- LX Flarm Red Box, LX Flarm splitter necessary
- LX Flarm Mini box
- Orignal Flarm
- Volksloger, only versions with telephone type connector

Note!
All units which have IGC compatible connector should be connected via so called 1:1 6P telephone type cable, means no twisted wires.

10.2.2 Basic Junction box connection

Basic Junction box doesn't have 9P connectors and makes only possible to connect GPS to the LX Mini Map. Connection of GPS is also possible via **two terminals** marked as Data In and Data out, Data In means NMEA input for LX Mini Map.
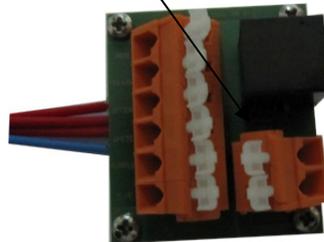
Note!
Use ground terminal for data ground, if data source and LX Mini map don't use the same GND.

10.3 Connection of Flarm units

Connection of Flarm units is in some cases a little bit specific. In general Flarm units offer an IGC compatible connector and that means connection to Junction box should be done via 1:1 6P telephone type cable.

10.3.1 LX Mini Map and LX Flarm Red Box

As LX Flarm Red Box have only one data output connector, the connection to Mini Map should be realized after insertion of LX Flarm spliter.
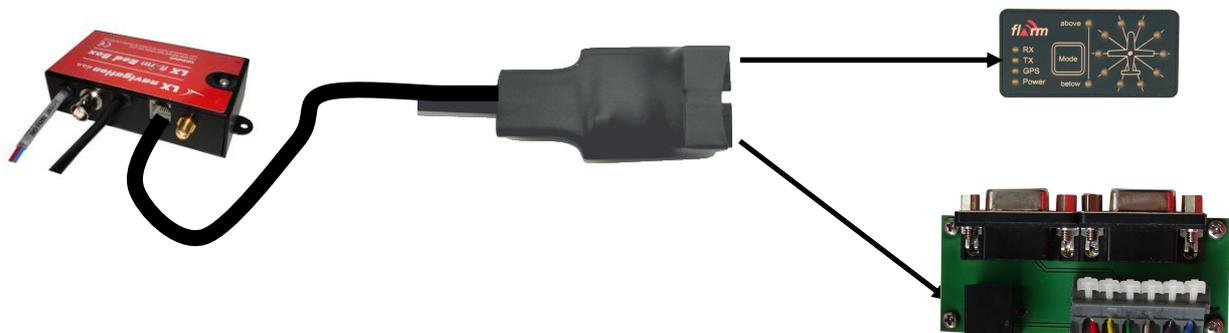
> **Note!**
> All connections plug and play, all cables delivery included no power for RB out of Mini Map. RB should be separately connected to power supply.

10.3.2 LX Mini Map and LX Flarm Mini Box

Connection LX Flarm Mini Box to Mini Map is simple plug and play after using of 6P/6P 1:1 telephone type cable delivered with LX Mini Map.

10.3.3 Original Flarm units

The connection should be done exclusively after using of Flarm 8P main connector (power data) and 1:1 6P telephone type cable. In that case Flarm will also receive power from Junction box. Having requirements for separate Flarm power, ask LX Navigation for solution.

10.4 Installation of LX Vario unit

All connections are plug_and_play and one two 9P connectors of Junction box should be used, see 6.3. It is important to connect pneumatic tubes correct.

TE input should be connected to TE probe, or to statics, if **electronic TE compensation** is intended to be used. Electronic TE compensation should be enabled after using of appropriate setting in navigation program. See also 3.2.2.
Pst is static for speed measuring and should be always connected to glider statics source.
Ptot is total pressure input (pitot)

If external Vario/SC switch will be installed use wire marked as SC and connects a switch or key to its ends. See also 3.2.2.

11 Appendix