LX 1606

Vario navigation system

Contents:

Important system highlights

-Always set COM 1 and 38400 bps on PDA or Mini Map* and COM 4 by Oudie

-Always run navigation program first and switch LX 1606 on afterwards

-After declaration transfer to Flarm, obligatory switch LX 1606 OFF otherwise GPS connection will not be restored

-The unit is capable to adapt to different baud rate of GPS source, so GPS source baud rate absolutely doesn't matter

-Reconnection of GPS source during flight doesn't need any pilot action, eventually different baud rate will be recognized automatically

*using of LX MM requests also cable set with wired COM 1

> **Note!**
> Refer also manuals for individual PDA/PNA programs, to get informed about the complete system.

1 General

LX 1606 is a logical replacement of well known LX 1600. The functions meet all important features of LX 1600. The system philosophy has been slightly changed and the system consists now of two units, one black box and a Vario unit. Exclusively **USB –D** vario units should be used. This configuration makes connection of interfaces much easier than before. The **black box** unit isn't part of the panel, so the benefit of LX 1600, only one 57 mm cut out remained. For direct control of vario unit one rotary switch with integrated push button is used. This makes also possible to operate LX 1606 as stand alone unit without PDA connected.

1.1 HW description
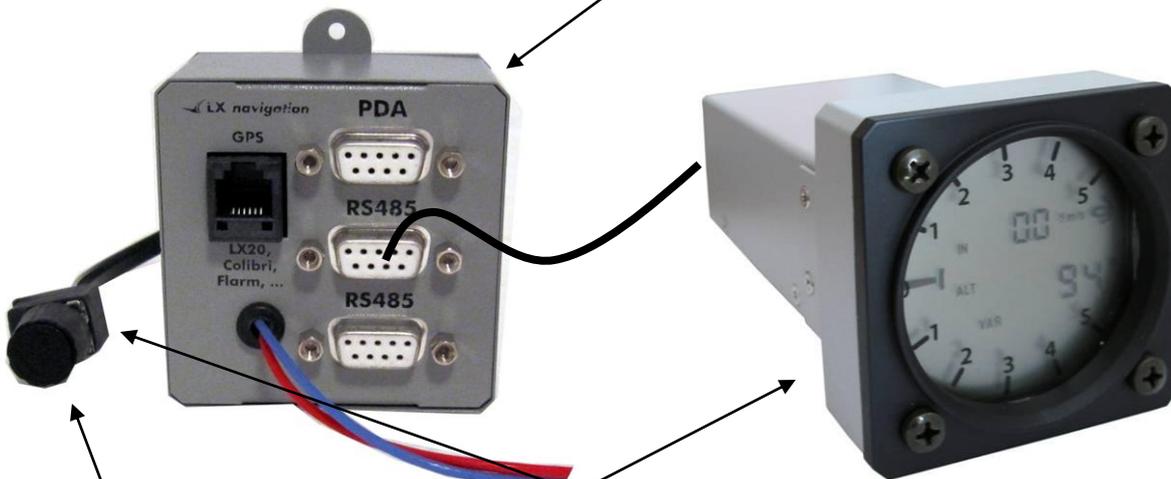
- Power is applied via **two wires**; the power will be applied to the unit after **press on rotary** switch push button.
- **Vario unit** is connected via LX 485 system bus, there are two connectors situated on the back side of the unit. The not occupied connector can be used for secondary vario display or for LX Remote connection, as the unit can also be controlled by LX Remote control stick.
- The **rotary switch** is connected via telephone type cable and 6P connectors; the plug is situated on the front side of LX 1606. The rotary switch is also equipped with a **push button** and this makes inputs very easy. The switch can be installed wherever in the cockpit. Using of rotary switch solution makes possible to operate LX 1606 also as stand alone. In that case Audio volume, MC, Ballast, Bugs and Vario filter can be adjusted by the knob.
- **PDA output** makes possible to connect PDA or PNA units, 5V power is also supplied. PDA port is bidirectional, so the commands can be also sent from PDA into LX 1606.
- **GPS input** is capable to receive NMEA data and is plug and play compatible to flight recorders which connectors corresponds to IGC standard. There is also power for the recorder. An automatic baud rate adaptation function makes using of different GPS sources very easy.

2　Modes of operation

The unit is designed to be operated in conjunction with PDA or PNA. A stand alone operation is also possible, but in that case with some function limitation.

2.1　Stand alone operation

Stand alone means operation **without PDA/PNA** connected. GPS connection doesn't matter, as no navigation functions are available in this mode. The unit will operate as vario/SC system where some limited inputs are available by Rotary switch and it's Push Button. The change over from vario to SC should be activated by external switch connected to vario unit.

Function	Rotary switch	Rematks
Power on	Press button	
Audio Volume adjustment	Rotate left/right	
MC setting	1x press/rotate	
Ballast*	2x press/ rotate	
Bugs**	3x press/rotate	
Filter***	4x press/rotate	

*overload (glider+pilot **/** glider+pilot+ballst)
**percentage of glide ratio degradation
***vario signal filter, min 0.2 max 5.0
The inputs will remain also after power off.

Note!
All above listed actions are displayed on the vario display, function in the **upper** and the **value** in the lower row of the vario display.

2.1.1　Vario unit connection

The vario unit connection can be done after using of wiring which is delivered with the vario unit. A15 P connector should be inserted into vario unit connector and 9P connector into 485 marked plug of LX 1606. The power for vario unit also comes from LX 1606.

2.1.1.1 Connection of pneumatic tubes

There are three pneumatic inlets at the back side of the unit.

Pst………………..static for speed
Ptot….……………total pressure for speed
TE*………………total energy probe
*if electronic manner of TE compensation is used, than apply static pressure.

2.2 PDA/PNA operation

To ensure an authoritative PDA/PNA operation it is necessary to connect PDA/PNA and also GPS to LX 1606.
A cable (1638) which can be plugged into majority of PDA units is delivery included.

2.2.1 GPS connection

For GPS connection is used a **6p telephone** type connector which is also marked as GPS.
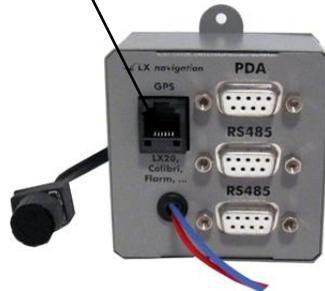
The connector pin out matches **IGC standard**, so all flight recorders having IGC standard connectors can be connected to LX 1606 simple plug and play. The cable should meet so called 1:1 configuration, means no twisted Tx and Rx. A suitable cable is delivery included. The flight recorder receives also its power from LX 1606. Some other devices can be connected via open wire cable. GND and NMEA lines should be wired as a minimum.

Note!
GPS source **baud rate doesn't matter**, as LX 1606 adapts the baud rate automatically during booting process. GGA and RMC NMEA data strings are necessary to be sent towards LX 1606, as a minimum.

After eventually reconnection of GPS source during flight, the possible new baud rate will be detected automatically without any pilot assistance after maximal 30 seconds.

2.2.1.1 Connection of Flarm units

Any Flarm unit can be used as a GPS source for LX 1606. It is important that Flarm units are preset to send also position data additionally to Flarm data. All LX Flarm units send mentioned combination of data as default. LX 1606 is capable to receive Flarm data and also to forward Flarm data towards PDA.

Connection highlights:
LX Flarm Red box, plug and play via Flarm splitter
LX Flarm Mini Box, plug and play (no splitter necessary)
Original Flarm units, plug and play via Power Data input

2.2.2 Declaration transfer from SeeYou Mobile into Flarm

A direct way is realized after using of SeeYou Mobile Task Menu. All what you need is to activate task menu and to start the procedure with **Upload** command, after command as follows:

-COM 1
-Device: Flarm, connection will be established automatically, but sometimes it may take some time (up to 30 seconds)
-declaration transfer bar will show execution of the process
-switch off LX 1606 and new on to restore com port

2.2.3 PDA/PNA connection

PDA/PNA connector is a 9P connector which is clearly marked as **PDA.** The connector pin out correspond to LX 1638 cable standard and makes possible to supply PDA with power and data (Tx and Rx).

Important!
Never insert PDA cable into 485 plug, to prevent damage of PDA.

Note!
Always set **COM 1 and 38400 bps** on PDA/PNA, **no other setting** will connect LX 1606 and PDA/PNA. It is important to set and **save** setting 38400 and COM 1 on PDA/PNA before PDA will be connected to LX 1606. Some other baud rate setting will activate data transfer function as described in 2.4.
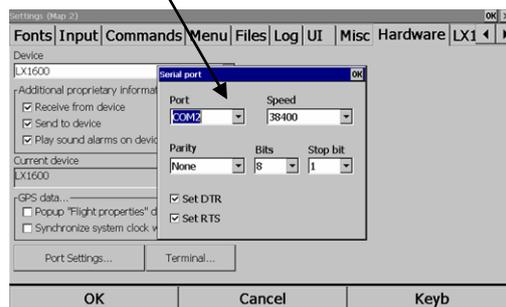
2.3 Cooperation LX 1606-PDA/PNA

LX 1606 plays in fact an interface which makes possible to operate vario from PDA after using of different programs. Complete set up of vario unit can be done exclusively after using of PDA. Stand alone operation offers only a small range of inputs.

The programs which support LX 1606 are:
-SeeYou Mobile, full compatible
-Winpilot Pro
-LK 800 and XcSoar, as free ware programs, with limited functioning

Using of bidirectional data exchange LX 1606 – PDA feature offers a high pilot comfort, as all changes done on PDA side will be sent to vario and also vice versa.

Note!
It is important to activate special settings in PDA program which will set up vario unit under pilot personal requirements (usually they are called LX 1600 1 and LX 1600 2).

2.3.1 X 1606 configuration set up by PDA

Following set up parameters of vario unit can be done by PDA:
-Units
-Vario filter, range, averager, time constant
-TE level and filter by electronic TE compensation solution
-Speed to fly mode and switch style
-Dead audio zone by SC
-Change over speed, if auto mode is used
-Audio style adaptation
-LCD indicator setup

Important!
Use **Save Settings** command after using of LX Mini Map after any change; otherwise you will loose settings after power off.
Command **Write setting to EEPROM** in SeeYou Mobile (LX 1600 (1)) isn't active so there is no need to be executed. All updated settings are stored immediately after changed.

2.4 Communication PDA/PNA – Flight Recorder

LX 1606 is capable to arrange a direct connection between PDA/PNA and the flight recorder which is connected as a GPS source to LX 1606. This makes possible to arrange downloading of flights and declaration transfer as a most common tasks. The communication way is established automatically after a communication request sent from PDA is detected. Useable features are flight downloading and declaration transfer.

Note!
The communication speed (baud rate) should be the same on flight recorder and also on PDA/PNA.

The communication Colibri-PDA after using of ConnectMe was factory tested. Also a direct declaration from SeeYou mobile task mode is possible.

Note!
After data transfer to Colibri, Flarm…., it is recommended to switch LX 16006 OFF, as otherwise GPS connection may be lost.

3 Examples

3.1 SeeYou Mobile

SeeYou Mobilen is capable to communicate with LX 1606 bidirectional, this makes possible that LX 1606 also receives commands from PDA/PNA. The commands related to vario unit are forwarded via LX 485 bus to the vario unit. After any change the new setting will be memorized and will be active also after power off.
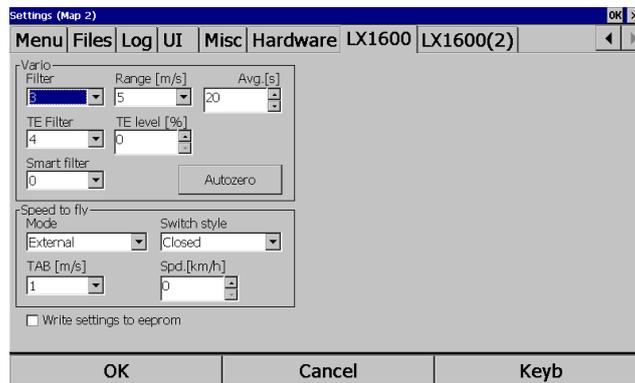
Vario settings

-GPS auto change over to SC isn't active by LX 1606.
-Item write settings to eeprom doesn't matter
-Smart filter option isn't active
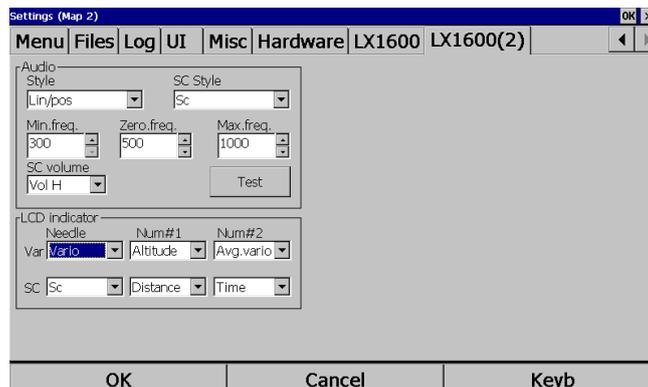
Audio and LCD settings
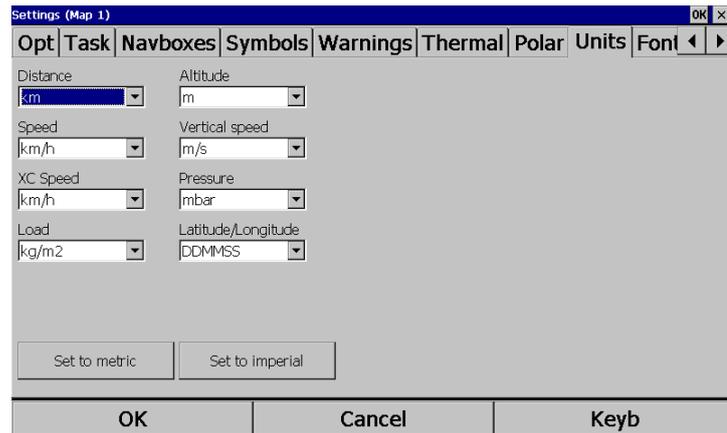
Units
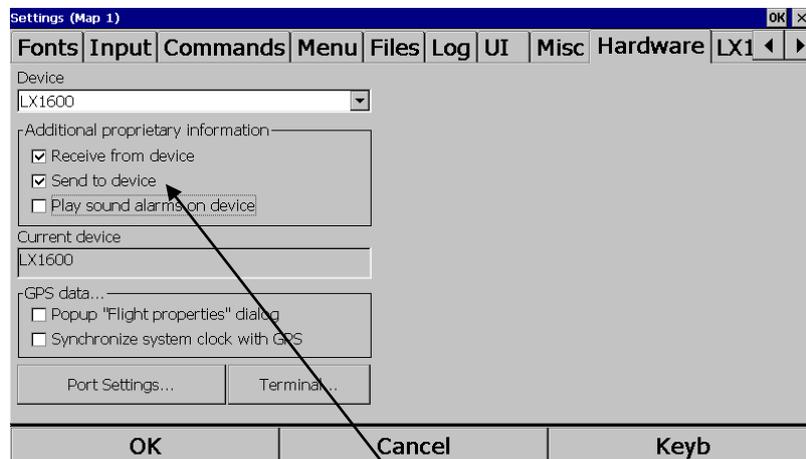
Important setting to ensure bidirectional communication

Important!
Use **Save Settings** command on PDA after any change; otherwise you will loose settings after power off.

4 Flying with LX 1606

LX 1606 is mainly designed to be operated in conjunction with PDA and GPS source. Stand alone operation is expected just limited.

4.1 Power on and off

After a **short push** on rotary switch button the unit will switch on and this is manifested by booting of Vario unit. To switch the unit off, press the button for several seconds and release after **OFF appears** on the display.

4.2 GPS status check

GPS status is continuously present on Vario display.

GPS: red GPS label, data not received
GPS: BAD red label
GPS: OK green GPS label

4.3 Setting of elevation

To keep the altitude indication correct it is necessary to adjust altitude reading to the elevation of the take off airfield. This input could be done exclusively by PDA. After elevation input also the altitude reading on vario display should change.

4.4 During flight

Due to bidirectional communication LX 1606 – PDA, all inputs done on PDA respectively Vario unit will be automatically carried over. For instance Mc change on vario unit will be updated also in PDA and vice versa.

5 Installation

The unit requires one **57 mm** standard cut out in the instrument panel for vario unit installation. LX 1606 electronic is a small black box which can be installed anywhere in the cockpit. Rotary switch has dimensions 15x20 mm and needs a 6 mm hole to be fixed.

Note!
Remove the knob simple **pull the knob**, there are no screws to be released.

5.1 Power installation

Power should be applied via red and blue wires, red is plus and blue is ground. The unit doesn't include fuse, so obligatory use 1A fuse.
Power requirements:
- 10-16 V DC
- Drain apr.150 mA depends on audio

5.1.1 Pin designation of PDA Connector

-pin1: GND
-pin2: NC
-pin3: Tx (data out)
-pin4: Rx (data in)
-pin5: NC

-pin6: NC
-pin7: NC
-pin8: NC
-pin9: +5V out

5.1.2 Pin designation of GPS connector

Pin 1 +12V
Pin 2, 3 NC
Pin 4 NMEA
Pin 5 Tx (data out)
Pin 6 GND

1
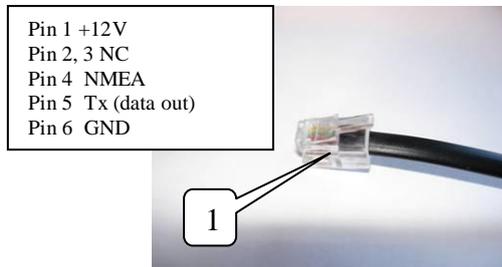
5.2 Installation of encoder

The encoder should be installed to a suitable place on the instrument panel which is comfortable for the pilot. LX 1606 main unit and the encoder are interconnected with a 6P telephone type cable which is appropriate marked. The plug for connection of encoder to LX 1606 is situated on the opposite side of the LX 1606 connector area.

5.3 Installation of repeaters

A vario repeater (Digital Vario) can be simple added to the system. Use free 485 port and appropriate cable.

5.4 Full configuration schematics

4E41B0

Colibri, LX 20, VL, Flarm*….
All plug and play
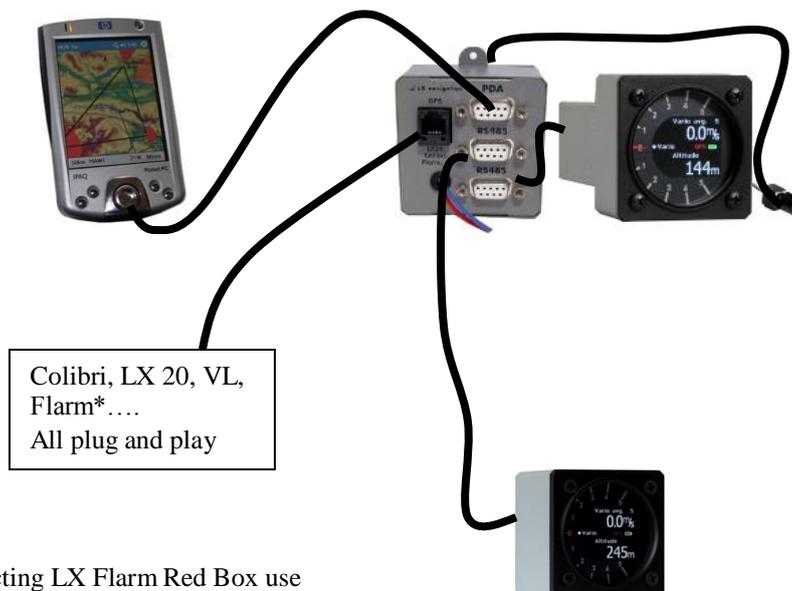
*connecting LX Flarm Red Box use
use LX Flarm splitter

5.4.1 Connection of LX Mini Map

Connection of LX Mini Map requires a special cable which connects LX 1606 PDA output and LX Mini Map junction box.

5.4.2 Connection of Oudie

Connection of Oudie requires a special cable which is available by Naviter. The connection is also via PDA plug.

5.4.3 Step by step system composition

-Connect LX 1606 to vario unit via 485 marked connector
-Connect GPS source via 6P telephone type connector
-Apply power to LX 1606 and switch the unit on by pressing the knob and wait until GPS label on Vario will become **green** (only by GPS OK). Due to searching for correct baud rate the process my take up to one minute.

-Connect PDA or LX MM, use COM 1 and 38400 bps setting obligatory and COM 4 and 38400 bps on Oudie
-Check GPS status on PDA/PNA or LX MM
-Provide Save settings on MM, after using of MM

5.4.3.1 Connection of Flarm units

Flarm units can be used as a GPS source for the system. The baud rate at which Flarm is sending navigation and Flarm data doesn't matter as LX 1606 will adapt automatically.

Important!
After using of original Flarm units, use exclusively 8P telephone type connector, 6P connector doesn't send navigation data, but only Flarm. Navigation and Flarm option can be enabled by PC and Flarm Tools. LX Flarm units are factors set to send Flarm and Navigation.

LX Flarm
spliter

1: 1 cable

Use 8P telephone type connector on
Flarm side and 6P on LX 1606 side
(1:1 connction).
LX navigation can supply such a cable.

5.4.3.2 Connection of Colibri II

Connection Colibri II LX 1606 is possible after using of:
-Colibri II power and data adapter which converts levels to RS 232 standard
-1: 1 telephone type cable which is delivery included
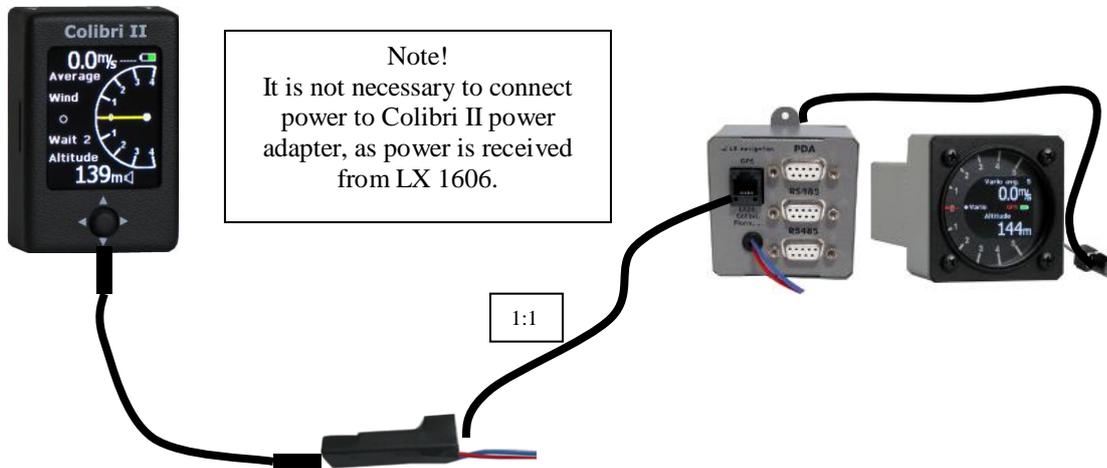
5.4.3.3 Connection of Mini Map II

Mini Map II should be connected to PDA port. It is important to point out that 5V supplied by LX 1606 **couldn't** be used for Mini map supply.