GNSS LEA-6T and LEA-M8T in iSync devices

spectratime
iPrecision Timing Solutions®

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Introduction

Current situation (2019):

GNSS integrated

The GNSS u-Blox LEA-M8T is hardware integrated in the following iSync product:

- GXClok-500

The GNSS u-Blox LEA-6T is integrated as mezzanine in the following iSync products:

- LNRClok-1500, can be integrated
- GRClok-1500, is always integrated
- GNSSource-2500. (GRClok-1500 inside)

GNSS on GDK-2

The GNSS u-Blox LEA-6T is integrated in the following iSync products:

- GDK-2
- GPSReference 2000. (GDK-2 inside)
- GPS PicoReference. (GDK-2 inside)

The communication with the GNSS of these products is special.
See Application Note "GNSS and GDK-2".
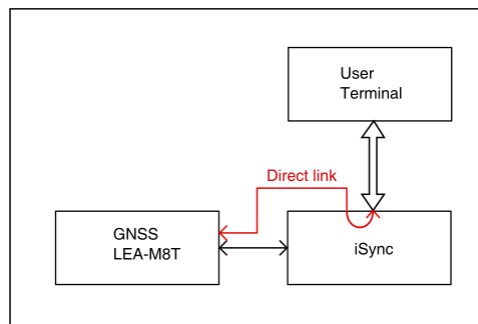
Communication scheme between user, iSync and GNSS

Figure 1

(iSync means GXClok-500, LNRClok-1500 or GRClok-1500)
Usually the User communicates to the iSync with no access to the GNSS.
With the debugging command "@@@@GPS", a direct link can be established to the GNSS.
In such situation the iSync device doesn't listen to the user.
To cancel this direct link, send "@@@@".

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Configuration of the GNSS with the iSyncMgr

Recent iSyncMgr's have a GNSS configuration module that take advantage of the debugging commands @@@@GPS and @@@@ to configure the GNSS. iSyncMgr_GXClok_2018-03-16.exe is taken to illustrate the following description.
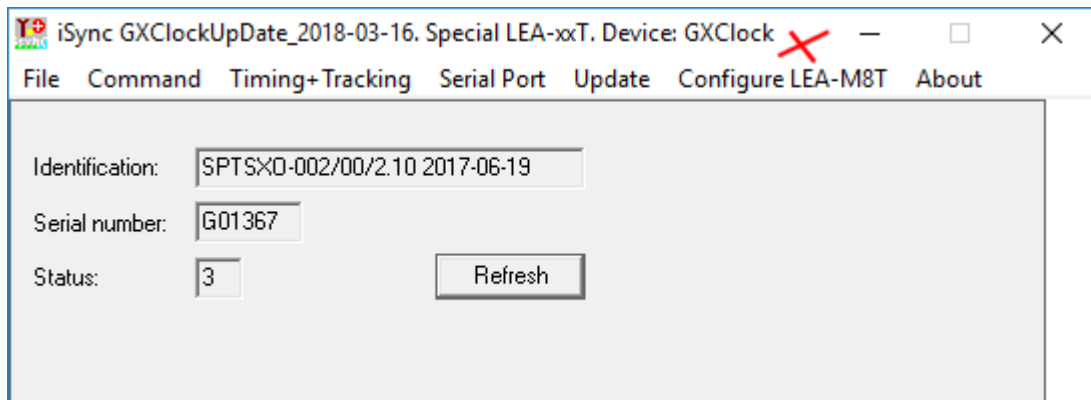To launch the GNSS configuration, choose "Configure GNSS" on the Menu.
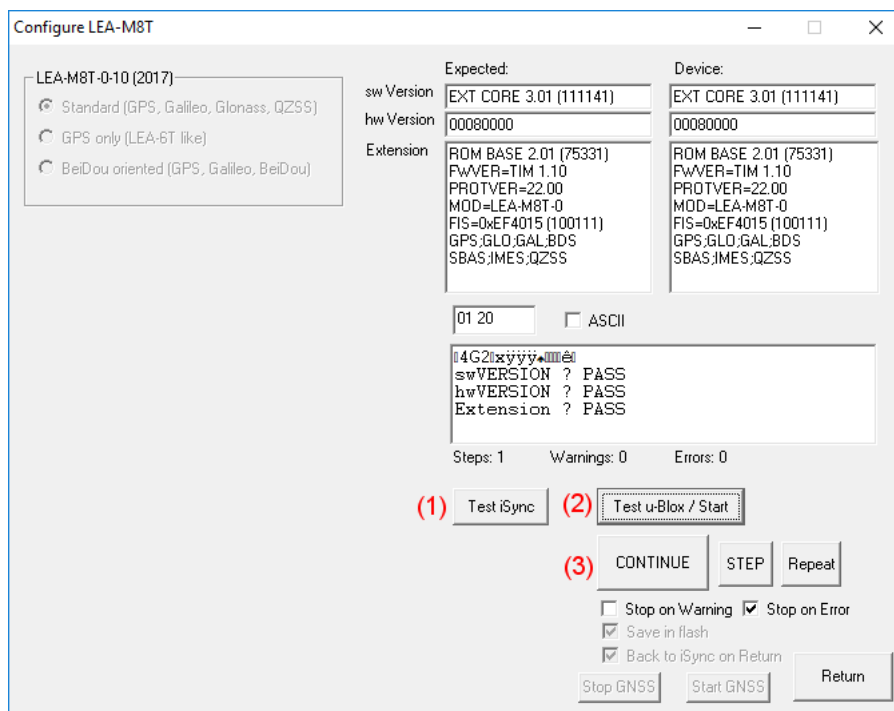

Figure 2

Default configuration

Figure 3

If everything goes normal, the window should look like on Figure 3.

- If there is no data under "Device:", click more time on (2) "Test u-Blox/Start"
- It is heavily recommended that the 3 tests, sw VERSION, hw VERSION, Extension, pass. If not, contact SpectraTime.
- After clicking on (3) "CONTINUE", sometime later, the configuration should end with "0 Error"

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Specific configuration

A more specific configuration can be chosen:

- Click on (1) "Test iSync" and then choose another configuration.
- Then click on (2) and (3)

Getting more information from GNSS receiver

The GXClock has a reduced set of standard NMEA messages limited to $GPZDA and $GPRMC. It is possible to take profit of the rich messaging system of the LEA-xT by sending them out through the micro-Controller.
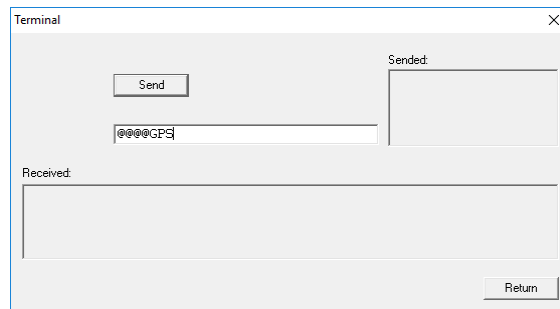

Figure 4

To initiate the link between the internal GPS port and the external serial port, send the debug command "@@@@GPS" from the "Terminal" window of an iSync Manager program. Immediately after the setting of the link, strange characters may be displayed in the "Received" box. It is binary from the GPS. To continue, close the "Terminal" window as well the iSync Manager program.

With the u-center program from U-Blox it is now possible to control the GNSS LEA-xT.
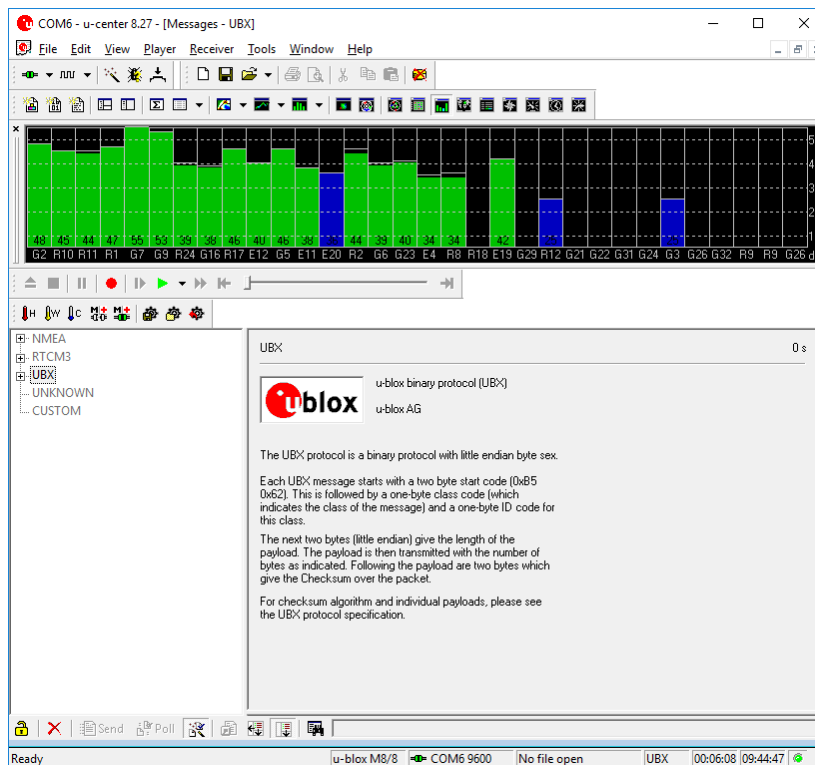

Figure 5

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First, connect the right serial port with the corresponding icon or from the menu Receiver/Port. Then open the Message window with the short key F9 and make it big. The messages needed by the iSync for stationary timing are highlighted. With the help of the U-Blox documentation, it is now possible to cancel messages, make other messages active or fully change the LEA-6T configuration.

Important notes:

- The changes made "on the fly" are not saved in eeprom. By power down / Power ON the iSync, the old configuration comes back. But there is a way to save the current configuration in eeprom. (CFG/CFG). SpectraTime is not responsible of malfunction due to changes in the GPS configuration.
- With the standard configuration, the iSync will go in holdover, if it was in tracking, after the setting of the direct link to the GNSS. In fact the messages are no more decoded by the iSync in such situation. But it is possible to consider the GPS just as a "PPSREF generator" and to configure the iSync accordingly, see the Chapter: Tracking the internal GNSS while in communication with it.

To break the direct link to the GPS, run the iSync Manager, window "Terminal" and send "@@@@".

Tracking the internal GPS while in communication with it.

It is possible to track the PPSREF of the internal GPS while staying in communication with it.:
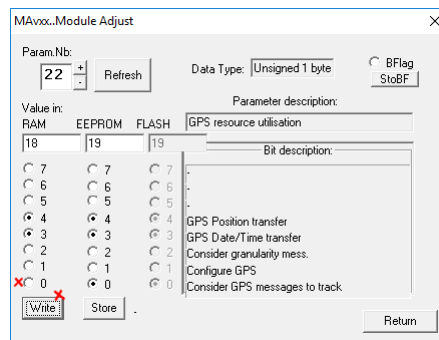

Figure 6

To activate this option at power ON, cancel MAv parameter 0x22, bit 0.
In such situation, it is also recommended to avoid any regular message from iSync by cancelling MAv parameters 0x0B and 0x0C. .

Choosing the GNSS constellation

This Chapter is not applicable to the LEA-6T.

The LEA-M8T is able to decode position information from different constellations.
One or a mix of constellations can be chosen with u-center. From message window, activate UBX-CFG-GNSS.

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Standard configuration

In this configuration, the 3 main constellations, GPS, Glonass and Galileo are activated. This configuration is settled by default in SpectraTime.
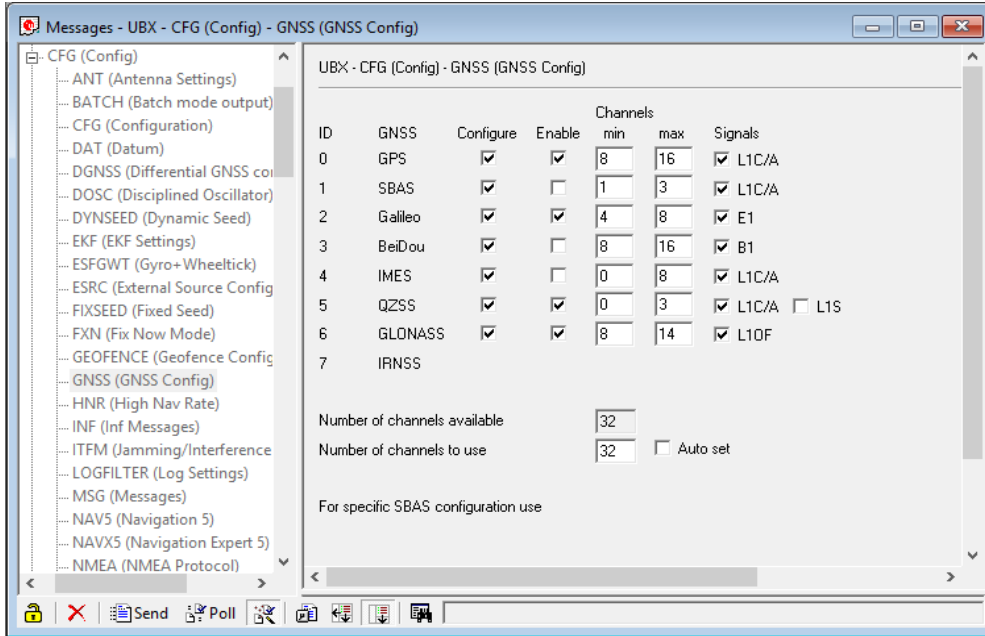

Figure 7

US GPS oriented configuration

The US GPS being the basis constellation of this receiver, it is in fact currently (2018) safer to work with this constellation only:

- Strong signal with a multitude of space vehicles
- No problem of time mitigation
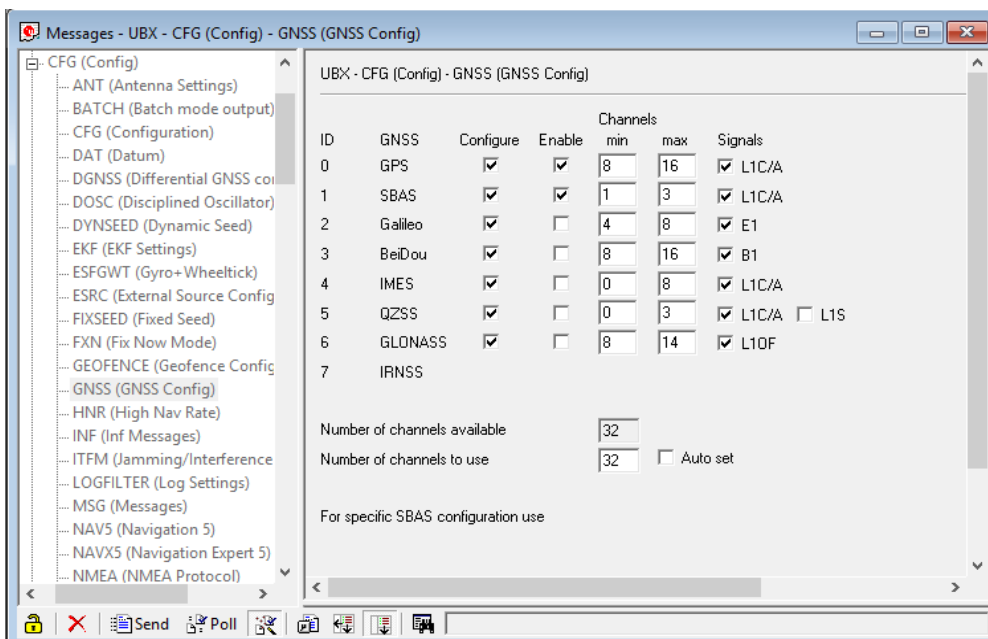- The built in jamming indicator is not working if another constellation is active

Figure 8

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Asian customer configuration

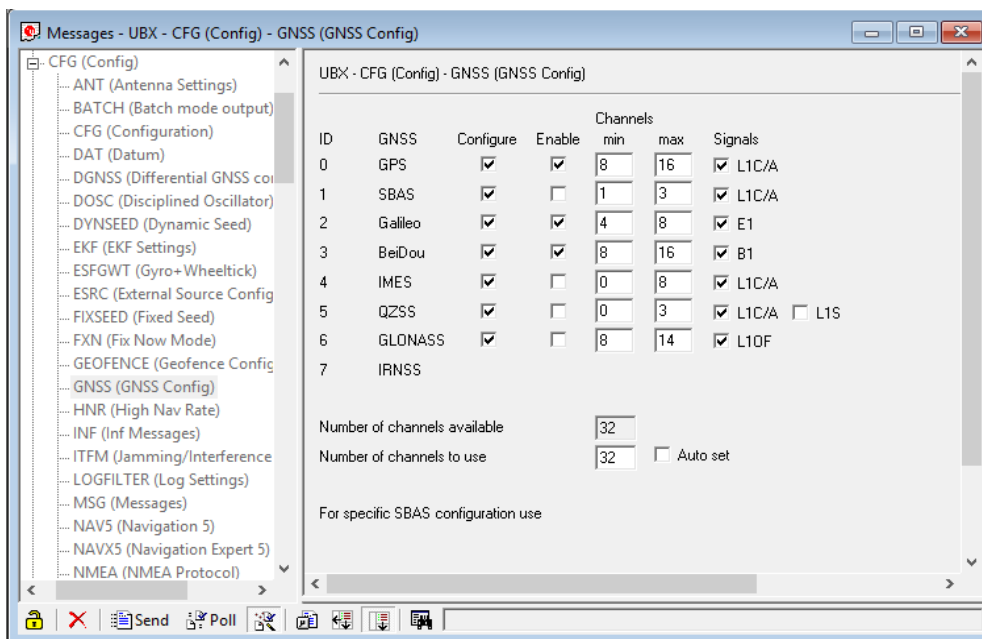This configuration, which includes Beidou, is for user located in Asia.

Figure 9

Testing the GPS jamming

If the iSync is placed near RF emitting devices, it can be helpful to see how the embedded GNSS receiver is jammed. The LEA-6T and LEA-M8T have useful tools to make some tests.

- First initiate a direct link to the GPS, with the debugging command "@@@@GPS", See Chapter before.
- Currently (2018), the jamming indicator works fine only if the constellation US GPS is selected alone. See the Chapter "Choosing the GNSS constellation".

Messages enabling the jamming indicator must be eventually activated, depending on how the LEA-xT is configured :

- From UBX / NAV / SVINFO, activate the SV level indication. Right click / Enable message.
- From UBX / MON / HW, activate the jamming indication. Right click / Enable message

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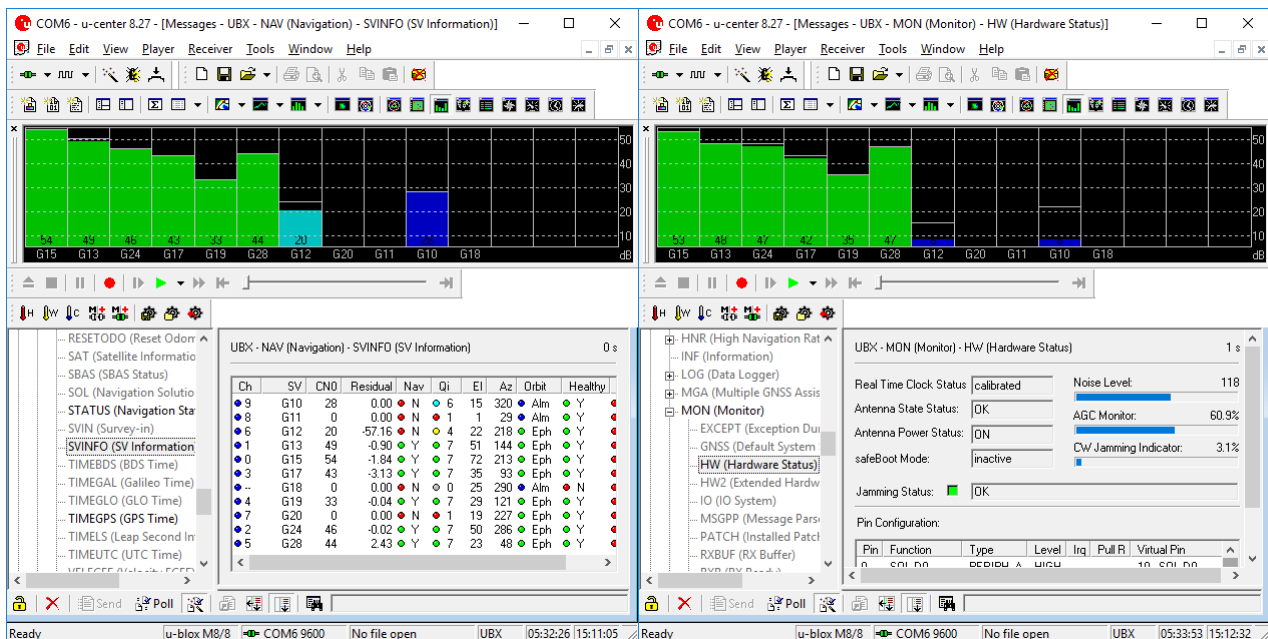+41.32.732.16.66
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Figure 10

Figure 11

In SpectraTime we have 3 criteria to evaluate the jamming:

1. Regarding the signal level, it must be said that our GNSS antenna is not well located. Therefore we estimate that 1 SV with signal strength over 50 dBHz and 3 SV over 48 dBHz is a really good situation.
2. The "Jamming Status" is the most important criteria. It must be "Green, OK".
3. The "CW Jamming Indicator" is always under 4% in a not jamming situation. Values up to 10% are acceptable as long the "Jamming Status" is staying "Green, OK".

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