



smart
positioning

REV 1.1

High Measurement Data Rate

iSuite03

This design document describes the high measurement data rate feature for iSuite03 in iTrax03 and iTrax100 families of receivers.

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Fastrax Oy

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Change log

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COMPLEMENTARY READING

The following reference documents are complementary reading for this document:

Ref. #	File name	Document name
1.	PRO_NMEA.html	NMEA protocol description
2.	GPS_Navigation.html	GPS Navigation
3.	GPS_Tracking.html	GPS Tracking

1. **DEFAULT MEASUREMENT DATA RATE**

Measurement data rate is the rate at which the tracker outputs measurements to the observation task which in turn determines the navigation fix rate. Default measurement rate for iTrax03 and iTrax100 family of receivers is 1Hz and it is possible to obtain a higher measurement data rate in both the receivers by changing different parameters. Increasing the measurement data rate does different things on both the receivers. In iTrax03 receivers, measurements are sent out at a higher data rate until the measurement data rate is changed back to default while in iTrax100 receivers, the measurements are sent out at a higher rate only until a navigation fix is obtained and after getting a fix the measurement data rate is set to default 1Hz automatically until the fix is lost and navigation is reinitialized. Refer to the following sections for more detailed platform specific information about this feature.

2. HIGH MEASUREMENT DATA RATE IN ITRAX03 FAMILY OF RECEIVERS

It is possible to obtain measurement data at a higher rate in iTrax03 receivers. A measurement data rate of 2Hz can be obtained by simply changing the parameter TRACK_MEAS_INTERVAL to 500ms either using GPS Workbench or NMEA. By doing so the navigation fix rate is also increased to 2HZ resulting in a navigation fix every half a second. The receiver continues to operate at this rate until the measurement data rate is changed back to the default value. However if one desires to obtain a data rate higher than 2 HZ, the navigation load can very quickly increase significantly causing undesirable watch dog resets. In iTrax03 receiver measurement data rate greater than 2Hz can be obtained by routing TRACK and SUBFRAME messages from iTrax03 directly to a serial port instead of sending to the OBS task. Consequently, navigation is not performed in iTrax03. However, a navigation solution can be calculated off-line or in real-time on another processor from the TRACK and SUBFRAME messages.

It is possible to obtain a measurement data rate of 100Hz with 12 tracked satellites in iTrax03 receivers. Because of high measurement data rate, the iTalk serial port speed must be high and hence serial port speed must be increased to 921600. Instructions to obtain measurement data rate greater than 2Hz are given in the following sections.

2.1 Configuring the high rate mode with iTalk

To set the high rate mode to obtain a measurement data rate greater than 2Hz, the following actions must be performed.

- Route TRACK and SUBFRAME messages directly to serial port.
- Set iTalk message mask to allow outputting only TRACK and SUBFRAME messages.
- Configure iTalk serial port speed to 921600 bps.
- Change track measurement interval to the desired data rate.

The correct order of actions is important. For example, if you change the track measurement rate before routing the TRACK and SUBFRAME messages, the navigation task is executed at a higher interval leading to CPU overload and eventually a watchdog reset. Use the following step-by-step instructions to set the mode correctly.

1. Change the parameter TRACK_ALT_MSG_ROUTING to hex value 4004 (bitmask for TRACK and SUBFRAME messages).
2. Change the parameter SYS_ITALK_MASK to hex value 4004 (bitmask for TRACK and SUBFRAME messages).
3. Change the parameter SYS_ITALK_SPEED to 921600.
4. If you are using GPS Workbench, disconnect from iTrax03 and change the iTalk speed in Tools / Options... / Communication settings.
5. Reset iTrax. The new iTalk speed will be used after reset.
6. Connect GPS Workbench to iTrax with the new speed.
7. Change the parameter TRACK_MEAS_INTERVAL to achieve the desired data rate (e.g. 100Hz => 10 ms).

To change the data rate back to default, change the track measurement interval first and after that iTalk speed etc.

When all 12 channels are tracked, the CPU load is very close to 100%. This may cause sporadic watchdog resets. If resets occur, the maximum number of tracked channels can be decreased by changing the parameter TRACK_CHANNELS (parameter key 0x041D).

2.2 Configuring high data rate with NMEA

The following NMEA commands can be used to perform the actions described above.

1. Change routing of TRACK and SUBFRAME messages:
\$PFST,CONF,47F,\$4004

2. Change iTalk message mask: **\$PFST,CONF,12,\$4004**
3. Change iTalk port speed to 921600 bauds:
\$PFST,CONF,11,921600
4. Change track measurement interval to 10 ms (reboot iTrax03 before this command to activate the new iTalk speed): **\$PFST,CONF,420,10**
5. Change the number of channels to 6:
\$PFST,CONF,41D,6

3. HIGH MEASUREMENT DATA RATE IN ITRAX100 FAMILY OF RECEIVERS

High measurement data rate definition is slightly different in iTrax100 receivers than on iTrax03 receivers. In iTrax100 measurement data rate can be increased only when there is no navigation fix available yet. Measurement data at a high rate is used during navigation initialization resulting in an accurate first fix and an improved time to first fix. This feature is on by default and can be turned off by setting the parameter TRACK_FAST_TRACK_INIT to FALSE using GPS Workbench or NMEA. This parameter can be found on the OBS tab on the GPS Workbench. By default in iTrax100 receivers, the measurement data rate is 5Hz until a navigation fix is obtained and then is changed back to the default rate of 1Hz automatically. Unlike in iTrax03 receivers, there is no need to route the TRACK and SUBFRAME messages to the serial port since the measurements are produced at a high rate not during the entire time when the receiver is on but only until the navigation fix is obtained which is typically between 3-50 seconds depending on if it is a hot start or a cold start. The measurement data rate before getting a navigation fix can be increased to greater than 5Hz by changing the parameter TRACK_MEASUREMENT_INTERVAL_HIGH to the number of milliseconds as desired.

3.1 Configuring the high rate mode with iTalk

The high measurement data rate is controlled by two parameters in iTrax100 receivers:

- TRACK_FAST_TRACK_INIT: Has to be set to FALSE to turn off the high rate mode.
- TRACK_MEASUREMENT_INTERVAL_HIGH: Has to be changed to obtain a rate other than default 5Hz (200ms). This parameter has a unit of milliseconds. Note that this will have no effect if TRACK_FAST_TRACK_INIT is set to FALSE.

3.2 Configuring the high rate mode with NMEA

- To turn off the high rate mode: **\$PFST,CONF,F81,0**

- To change the measurement data rate from 5Hz to 10Hz:
\$PFST,CONF,42C,100