Topcon GB-1000 - Receiver Board Firmware Version 3.4

Topcon has recently released GNSS receiver board firmware version 3.4 (.zip) for GB-1000 and NetG3 receivers. This firmware has been tested and accepted for use by UNAVCO's Development and Testing group.

Release notes:

User visible changes in the firmware version 3.4 since version 3.3 p6

     Highlights.

For G3-based boards only (GR-3, Net-G3, GMS-X, Net-G3A):

N.1 The number of simultaneously tracked satellites has been increased
   to up to 20. The influence of L2C signal tracking on the number of
   simultaneously tracked satellites has been reduced.

N.2 Functionality connected with C/A code multipath reduction has been
   re-designed.

N.3 Tracking of GPS P-code has been tuned.

N.4 Independent turning on/off GPS L2CL and L2CM signals has been
   implemented.

N.5 Raw measurements generation for SBAS satellites has been corrected.

N.6 Net-G3 hardware revision 4 has been supported.

N.7 DGPS performances when using SBAS have been tuned.

N.8 Support of commands /par/lock/elm, /par/lock/notvis has been added.

N.9 New options USB host ("USBA") and Web-browser ("WEB") have been
   added for E2G3 boards (Net-G3A).

N.10 2Gb flash cards and up to 1024 files have been supported.

N.11 Support of SDHC card for GR-3 has been implemented.

N.12 File name conventions have been made the same for all G3-based
   boards.

N.13 Problem connected with the lost of file system information, if flash
   card have been updated with the one having different card capacity,
   has been resolved.

N.14 The parameter "set,/par/dev/blk/a/verify,slow" has been made working
   properly.

N.15 Improved logic of using GLONASS-M navigation data has been
   implemented.

N.16 Support of [GD] and [LD] messages (GPS/GLONASS raw navigation data)
   has been implemented.

For all boards (including GR-3, Net-G3, GMS-X, Net-G3A):

A.1 Parameters for improving compatibility with GNSS receivers when
   working in RTK mode have been added.

A.2 USB driver has been improved: USB connection remains working
   properly over long periods of time.

A.3 Problem connected with the remote firmware upgrade has been resolved.

A.4 Network RTK GPS messages (MAC) have been supported.

A.5 Internal logic of RTK-2 engine has been modified in order to optimize performance when processing GLONASS observables.

A.6 Problem connected with receiving RTK corrections at high baud rates has been resolved.

A.7 Now RTK can get fixed solution when the first of incoming RTCM 2.x messages contains GLONASS data.

A.8 Troposphere parameters, which are used in RTK, have been made user-configurable.

A.9 Modifications connected with the output of pre-defined date, if there is no valid RTC time, have been implemented.

A.10 [RN] message that contains the receiver and antenna types received from the base station has been added to the default set of messages.

A.11 If RTCM 3 RTK messages contained L1-only data, such satellites could not be used for RTK positioning. This problem has been resolved.

A.12 Internal logic of RTCM 2/CMR/RTCM 3 decoders has been modified to make it more robust to data link dropouts.

A.13 [PI] message that contains additional positioning information has   been added.

A.14 [RP] message has been extended with information about the receiver type and firmware version.

A.15 Parameter /par/pos/useref has been added. It helps in cases when there is a need to get RTCM 3 data stream from the moving receiver.

A.16 Internal logic of GSM connection establishment has been improved.

A.17 Problem with PPP stability has been resolved.

A.18 If NTRIP mode was switched off, the input mode and decoder of used port were not restored correctly. This problem has been resolved.

A.19 NTRIP engine could take 30 seconds or more before receiving corrections, under certain update rate restrictions. This problem has been resolved.

A.20 New RTCM 2 message has been added ("59t"). This message needs to be enabled when configuring the base station that sends RTCM 2 RTK data.

A.21 New CMR message has been added ("5"). This message needs to be enabled when configuring the base station that sends CMR RTK data.

A.22 New RTCM 3 message has been added ("1033"). This message needs to be enabled when configuring the base station that sends RTCM 3 RTK data.

A.23 Internal logic of RTCM2 / CMR / RTCM3 decoders has been modified to make it more robust and reliable under some special conditions.

A.25 New version of power board firmware for HiPer receivers has been prepared. In "Auto" mode, the algorithm of battery charging has been modified.

A.26 The problem related to [LD] message has been corrected (wrong satellite IDs were seen for negative frequency channel numbers).

A.27 Possibility to exclude L2 observables from BINEX messages has been added.

0. Compatibility Notes

0.1 The command /par/lock/glo/pcode,{P1,P2} has been made valid for all

possible combinations of P1 and P2 values (G3-based boards only).

0.2 The command /par/lock/gps/l2c,{L2CL,L2CM} has been made valid for
     following combinations: {on,on}, (on,off}, {off,off}.

0.3 File name conventions for GR-3 board have been changed.

0.4 Command print,/par/pwr/a5v is not supported for E2G3 board.

0.5 The default value of the parameter /par/lock/notvis has been set to
     "on" for G3-based boards. In this case the parameter /par/lock/elm
     works for satellite locking only. If the parameter /par/lock/notvis
     is set to "off", all the boards work in the same way.

0.6 [RN] message has been added to the default set of messages.

0.7 [RP] message has been extended with information about the receiver
     type and firmware version (two new strings are added to the end of
     this message).

0.8 The default value of the parameter /par/cmr/base/rcv/type is set to
     250.

0.9 It is not recommended using E_GGD boards in RTK mode because of too
     high processor loading. E_GGD boards can be used as reference   stations.

1. Messages.

1.1 [RN] Reference station information

This message contains information about the antenna type and receiver type which are received from the base station.

```
struct RefStation {
+ u1      ant; // Counter that defines number of bytes related to
              // the antenna name
+ u1    aname[ant]; // Antena name
+ u1      rcv; // Counter that defines number of bytes related to
              // the receiver name
+ u1    rname[rcv]; // Receiver name
+ u1     cs;     // Checksum
};
```

1.2 [PI] Additional positioning information

```
struct PosInfo {
+ u1      bfield; // Bit field. If LSB is set (=1), it means Network RTK
                 // messages were used for computing RTK solution.
                 // Bits 7-1 are reserved;
+ u1       cs; // Checksum
};
```

2. Parameters.

2.1 Low level control of raw measurements output for G3-based boards

```
Name:         /par/raw/out/check
Access:       rw
Type:         boolean
Values:       on | off
Default:      on
Description:   Turn on/off blocking raw measurements output on channel
       indicators alarm. Span of alarm ignoring can be
          set by using parameter "/par/raw/out/tspan".
```

```
Name:         /par/raw/out/tspan
Access:       rw
Type:         integer
Values:       [0..500],step 5
Default:      0
Description:   Time in ms of ignoring channel indicators alarm. It
       connected with parameter "/par/raw/out/check", and
          Influences the receiver functionality if
```

/par/raw/out/check" is set to "off".

2.2 Advanced setting of PLL for G3-based boards

Name: par/raw/pll/damp
Access: rw
Type: float
Values:]0.001..10]
Default: 0.707
Description: This parameter sets the value of damping factor.

2.3 Optimization of obtaining differential data (RTK, DGPS etc.) from TCP ports (high priority has been set for given task)

Name: /par/net/tcp/highprio
Access: rw
Type: boolean
Values: on | off
Default: off
Description: Being set to "on" this parameter helps in obtaining
                differential data from TCP ports.

2.4 Turn on/off using Network RTK corrections

Name: /par/pos/pd/netrtk
Access: rw
Type: boolean
Values: on | off
Default: off
Description: Turn on/off using Network RTK corrections (RTCM 3
                Message Types 1014-1017) in RTK mode.

2.5 RTC validity indicators

Name: /par/dev/rtc/valid
Access: r
Type: boolean
Values: on | off
Default: on
Description: Indicates if value of RTC clock is valid.

Name: /par/dev/rtc/lastwrite
Access: r
Type: int
Values: [0..999999999]
Default: 0
Description: Displays in milliseconds of GPS week last time when RTC
                was synchronized with GNSS time.

2.6 Troposphere parameters used in RTK.

Name: /par/pos/pd/tropo/temp
Access: rw
Type: float
Values: [-50..80]
Default: 20.0
Description: Temperature in Celsius degrees used by RTK engine when
                computing tropospheric delay.

Name: /par/pos/pd/tropo/hum
Access: rw
Type: float
Values: [0..100]
Default: 50.0
Description: Humidity in percent used by RTK engine when computing
                tropospheric delay.

Name: /par/pos/pd/tropo/pres
Access: rw
Type: float

Values: [700..1500]
Default: 1010.0
Description: Atmospheric pressure in mbar used by RTK engine when
        computing tropospheric delay.

2.7 Receiver identification parameters.

Name: /par/rcvdb/id
Access: r
Type: list { [ID] }
Description: For every receiver in the database, this list has entry
        called after the receiver ID.

Name: /par/rcvdb/id/[ID]
Access: r
Type: integer
Values: [0..255]
Default: 0
Description: Prints index of entered receiver identifier in database

Name: /par/rcvdb/ind
Access: r
Type: list { [CMR_ID] }
Description: For every receiver in the database for which CMR_ID is known,
             this list has entry called after the CMR_ID of the
        receiver formatted as decimal.

Name: /par/rcvdb/ind/[CMR_ID]
Access: r
Type: string
Default: ""
Description: Prints receiver identifier description by its index in database.

Name: /par/ref/rcv/id
Access: r
Type: string
Description: Displays receiver identifier

Name: /par/ref/rcv/class
Access: r
Type: string
Description: Displays receiver identifier class

Name: /par/rover/base/rcv/cur
Access: rw
Type: enumerated
Values: got | fix
Default: got
Description: Describes what reference station receiver type to use:
             Entered by user or transmitted via appropriate messages.

Name: /par/rover/base/rcv/fix/id
Access: rw
Type: string
Description: Reference station receiver type as entered by user.
Note: This entered receiver type must comply with IGS
        conventions.

Name: /par/rover/base/rcv/fix/class
Access: r
Type: string
Description: Reference station receiver class as entered by user.

Name: /par/rover/base/rcv/got/id
Access: r
Type: string
Description: Receiver type transmitted by reference station.

Name: /par/rover/base/rcv/got/class
Access: r
Type: string
Description: Receiver class transmitted by reference station.

2.8 Turns on/off using entered coordinates when generating RTCM 3 data.

Name: /par/pos/useref
Access: rw
Type: boolean
Values: [on,off]
Default: on
Description: When generating RTCM 3 data, by default, clock offsets
       are computed with respect to entered coordinates of the reference
       station. However, when the receiver is in motion, it may lead to
       problems. Setting this parameter to "off" allows using computed
       clock offsets (as a result of position computation) instead of
       ones obtained with respect to reference coordinates
          when generating RTCM 3 data stream.

2.9 Enables/disables L2 observables to be available in BINEX

Name: /par/binex/meas/l2
Access: rw
Type: boolean
Values: [on,off]
Default: on
Description: This parameter allows removing L2 measurements from
       BINEX messages 7F-02 and 7F-03.

                  3. Options.

3.1 USB Host (E2G3 boards only)

Name: USBA
Values: [0..1]
Description: Enables USB Host functionality

3.2 Web browser (E2G3 boards only)

Name: _WEB
Values: [0..3]
Description: Enables web browser and SSL connection
          This is a bit-field option.
          bit#0: enables web browser functionality
          bit#1: enables SSL connection