NMEA message ( query and answer ) available on Family Board N0xx Heol Design

NMEA 0183 Message Options

The N101 GPS Receiver can output any or all of the messages listed in

Table C.3 and Table C.4. In its default configuration (as shipped from the factory), the GPS Receiver outputs two messages: GGA and VTG. These messages are output at a 1 second interval with the “GP” ID and checksums. These messages are output at all times during operation, with or without a fix. If a different set of messages has been selected (using Packet 0x7A), and this setting has been stored in Flash memory (using Packet 0x8E-26), the default messages are permanently replaced until the receiver is returned to the factory default settings.

Another methodology for changing NMEA output messages is using the NMEA commands listed in Table C.4. Use the NM command to select the NMEA message, and the RT command to store the message in Flash Memory.

***Note –*** *The user can configure a custom mix of the messages listed in* Table C.4*. See the NM and RT command descriptions in this Appendix for details on configuring NMEA output*

Table C.3 GPS Receiver NMEA 0183 Messages

|  |  |  |
| --- | --- | --- |
|  | Message | Description |
| Default  Output | GGA | GPS fix data |
|  | GLL | Geographic position - Latitude/Longitude |
|  | GSA | GPS DOP and active satellites |
|  | GSV | GPS satellites in view |
|  | RMC | Recommended minimum specific GPS/Transit data |
| Default  Output | VTG | Track made good and ground speed |
|  | ZDA | Time & Date |

Table C.4 NMEA Messages

|  |  |
| --- | --- |
| Message | Description |
| AH | Query or set Almanac Health |
| AL | Query or set almanac data for a specific satellite |
| AS | Query or set almanac status |
| BA | Query and response to antenna status |
| CR | Query or set GPS receiver configuration information |
| EM | Set receiver into Monitor Mode. Set only. |
| EP | Query or set ephemeris data for a specific satellite |
| IO | Query or set ionosphere data. |
| KG | Set initial position and time info data for to aid navigation startup |
| NM | Query or set NMEA automatic message output control |
| PS | Query or set PPS configuration |
| PT | Query or set serial port configuration |
| RT | Set Reset type (cold |
| TF | Query or set receiver status and position fix information |
| UT | Query or set UTC data |
| VR | Query and response to version information |

NMEA 0183 Message Formats

GGA - GPS Fix Data

The GGA message includes time, position and fix related data for the GPS receiver.

$GPGGA,hhmmss.ss,llll.lllll,a,nnnnn.nnnnn,b,t,uu, v.v,w.w,M,x.x,M,y.y,zzzz\*hh <CR><LF>

Table C.5 GGA - GPS Fix Data Message Parameters

|  |  |
| --- | --- |
| Field # | Description |
| 1 | UTC of Position (when UTC offset has been decoded by the receiver) |
| 2,3 | Latitude, N (North) or S (South) |
| 4,5 | Longitude, E (East) or W (West) |
| 6 | GPS Quality Indicator: 0=invalid fix, 1=GPS fix, no SBAS correction, 2=SBAS  corrected fix |
| 7 | Number of Satellites in Use |
| 8 | Horizontal Dilution of Precision (HDOP) |
| 9, 10 | Antenna Altitude in Meters, M = Meters |
| 11, 12 | Geoidal Separation in Meters, M=Meters. Geoidal separation is the difference between the WGS-84 earth ellipsoid and mean-sea-level. “-” = mean-sea-level surface below WG-84 ellipsoid surface |
| 13 | Age of Differential GPS Data. Time in seconds since the last Type 1 or 9 Update |
| 14 | Differential Reference Station ID (0000 to 1023) |
| hh | Checksum |

GLL - Geographic Position - Latitude/Longitude

The GLL message contains the latitude and longitude of the present vessel position, the time of the position fix and the status.

$GPGLL,llll.lllll,a,yyyyy.yyyyy,a,hhmmss.ss,A,i\*hh<CR>

<LF>

Table C.6 GLL - Geographic Position - Latitude / Longitude Message Parameters

|  |  |
| --- | --- |
| Field | Description |
| 1,2 | Latitude, N (North) or S (South) |
| 3,4 | Longitude, E (East) or W (West) |
| 5 | UTC of position (when UTC offset has been decoded by the receiver) |
| 6 | Status: A = Valid, V= Invalid |
| 7 | Mode Indicator  A=Autonomous Mode  D=Differential Mode  E=Estimated (dead reckoning) Mode  M=Manual Input Mode  S=Simulated Mode  N-Data Not Valid |
| hh | Checksum |

GSA - GPS DOP and Active Satellites

The GSA messages indicates the GPS receiver's operating mode and lists the satellites used for navigation and the DOP values of the position solution.

$GPGSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx, xx,x.x,x.x,x.x\*hh<CR><LF>

Table C.7 GSA - GPS DOP and Active Satellites Message Parameters

|  |  |
| --- | --- |
| Field # | Description |
| 1 | Mode: M = Manual, A = Automatic. In manual mode, the receiver is forced to operate in either 2D or 3D mode. In automatic mode, the receiver is allowed to switch between 2D and 3D modes subject to the PDOP and satellite masks. |
| 2 | Current Mode: 1 = fix not available, 2 = 2D, 3 = 3D |
| 3 to 14 | PRN numbers of the satellites used in the position solution. When less than 12 satellites are used, the unused fields are null |
| 15 | Position dilution of precision (PDOP) |
| 16 | Horizontal dilution of precision (HDOP) |
| 17 | Vertical dilution of precision (VDOP) |
| hh | Checksum |

GSV - GPS Satellites in View

The GSV message identifies the GPS satellites in view, including their PRN number, elevation, azimuth and SNR value. Each message contains data for four satellites. Second and third messages are sent when more than 4 satellites are in view. Fields #1 and #2 indicate the total number of messages being sent and the number of each message respectively.

$GPGSV,x,x,xx,xx,xx,xxx,xx,xx,xx,xxx,xx,xx,xx, xxx,xx,xx,xx,xxx,xx\*hh<CR><LF>

Table C.8 GSV - GPS Satellites in View Message Parameters

|  |  |
| --- | --- |
| Field # | Description |
| 1 | Total number of GSV messages |
| 2 | Message number: 1 to 3 |
| 3 | Total number of satellites in view |
| 4 | Satellite PRN number |
| 5 | Satellite elevation in degrees (90° Maximum) |
| 6 | Satellite azimuth in degrees true (000 to 359) |
| 7 | Satellite SNR (C/No), null when not tracking |
| 8,9,10,11 | PRN, elevation, azimuth and SNR for second satellite |
| 12,13,14,15 | PRN, elevation, azimuth and SNR for third satellite |
| 16,17,18,19 | PRN, elevation, azimuth and SNR for fourth satellite |
| hh | Checksum |

RMC - Recommended Minimum Specific GPS/Transit Data

The RMC message contains the time, date, position, course, and speed data provided by the GPS navigation receiver. A checksum is mandatory for this message and the transmission interval may not exceed 2 seconds. All data fields must be provided unless the data is temporarily unavailable. Null fields may be used when data is temporarily unavailable.

$GPRMC,hhmmss.ss,A,llll.lllll,a,yyyyy.yyyyy,a, x.x,x.x,xxxxxx,x.x,a,i\*hh<CR><LF>

Table C.9 RMC - Recommended Minimum Specific GPS / Transit Data Message

Parameters

|  |  |
| --- | --- |
| Field # | Description |
| 1 | UTC of Position Fix (when UTC offset has been decoded by the receiver). |
| 2 | Status: A = Valid, V = navigation receiver warning |
| 3,4 | Latitude, N (North) or S (South). |
| 5,6 | Longitude, E (East) or W (West). |
| 7 | Speed over the ground (SOG) in knots |
| 8 | Track made good in degrees true. |
| 9 | Date: dd/mm/yy |
| 10,11 | Magnetic variation in degrees, E = East / W= West |
| 12 | Position System Mode Indicator; A=Autonomous, D=Differential, E=Estimated (Dead Reckoning), M=Manual Input, S=Simulation Mode, N=Data Not Valid |
| hh | Checksum (Mandatory for RMC) |

VTG - Track Made Good and Ground Speed

The VTG message conveys the actual track made good (COG) and the speed relative to the ground (SOG).

$GPVTG,x.x,T,x.x,M,x.x,N,x.x,K,i\*hh<CR><LF>

Table C.10 VTG - Track Made Good and Ground Speed Message Parameters

|  |  |
| --- | --- |
| Field # | Description |
| 1 | Track made good in degrees true. |
| 2 | Track made good in degrees magnetic. |
| 3,4 | Speed over the ground (SOG) in knots. |
| 5,6 | Speed over the ground (SOG) in kilometer per hour. |
| 7 | Mode Indicator: A=Autonomous Mode, D=Differential Mode, E=Estimated (dead reckoning) Mode, M=Manual Input Mode, S=Simulated Mode, N-Data Not Valid |
| hh | Checksum |

ZDA - Time & Date

The ZDA message contains Time of Day in UTC: the day, the month, the year and the local time zone.

$GPZDA,hhmmss.ss,xx,xx,xxxx,,\*hh<CR><LF>

Table C.11 ZDA - Time & Date Message Parameters

|  |  |
| --- | --- |
| Field # | Description |
| 1 | UTC (when UTC offset has been decoded by the receiver) |
| 2 | Day (01 to 31) |
| 3 | Month (01 to 12) |
| 4 | Year |
| 5 | Null (empty) |
| 6 | Null (empty) |
| hh | Checksum |

***Note –*** *Fields #5 and #6 are null fields in the GPS Receiver output. A GPS receiver cannot independently identify the local time zone offsets.*

***Note –*** *The time can be used as a timetag for the 1PPS. The ZDA message comes out*

*100-500 msec after the PPS*

AH - Almanac Health

This sentence can be used to query or set almanac health data. Since the maximum number of bytes that can be contained in a single NMEA sentence is less than the total almanac health length, the almanac health must be sent in two sentences. The two sentences have to be sent or received together in correct sequence. After receiving the query, the receiver sends out two messages.

Message 1

$PTNLaAH,1,hh,hhhhhhhh,hhhhhhhh,hhhhhhhh,hhhhhhhh, hh,hh,x.x\*hh<CR><LF>

Table C.12 Almanac Health, Message 1

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = set; R = Response) |
| hh | Week number for health, variable length integer, 4 digits maximum |
| hhhhhhhh | Satellite 1 - 4 health, one byte for each satellite, HEX data conforming to  GPS ICD 200. |
| hhhhhhhh | Satellite 5 - 8 health, one byte for each satellite, HEX data conforming to  GPS ICD 200. |
| hhhhhhhh | Satellite 9 - 12 health, one byte for each satellite, HEX data conforming to GPS ICD 200. |
| hhhhhhhh | Satellite 13 - 16 health, one byte for each satellite, HEX data conforming to GPS ICD 200. |
| hh | t\_oa, HEX data conforming to GPS ICD 200. |

Message 2

$PTNLaAH,2,hh,hhhhhhhh,hhhhhhhh,hhhhhhhh,hhhhhhhh,hh,hh,x.x\*hh<CR><LF>

Table C.13 Almanac Health, Message 2

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = set; R = Response) |
| hh | Week number for health, variable length integer, 4 digits maximum |
| hhhhhhhh | Satellite 17 - 20 health, one byte for each satellite, HEX data conforming to GPS ICD 200. |
| hhhhhhhh | Satellite 21 - 24 health, one byte for each satellite, HEX data conforming to GPS ICD 200. |
| hhhhhhhh | Satellite 25 - 28 health, one byte for each satellite, HEX data conforming to GPS ICD 200. |
| hhhhhhhh | Satellite 29 - 32 health, one byte for each satellite, HEX data conforming to GPS ICD 200. |
| hh | t\_oa, HEX data conforming to GPS ICD 200. |

AL - Almanac Page

This sentence can be used to query or set almanac data for a specific satellite. Following is the query format:

$PTNLQAL,xx\*hh<CR><LF>

Table C.14 Almanac Page

|  |  |
| --- | --- |
| Field | Description |
| xx | Satellite ID |

Following is the set or response format.

$PTNLaAL,xx,x.x,hh,hhhh,hh,hhhh,hhhh,hhhhhh,hhhhhh,hhhhhh,hhhhhh,hhh,hhh\*

hh<CR><LF>

Table C.15 Almanac Page, Set or Response Format

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (S = set; R = Response). |
| xx | Satellite ID, 01-32. |
| x.x | GPS week number, variable length integer, 4 digits maximum. |
| hh | SV health, HEX data conforming to GPS ICD 200. |
| hhhh | Eccentricity, HEX data conforming to GPS ICD 200. |
| hh | t\_oa, almanac reference time, HEX data conforming to GPS ICD 200. |
| hhhh | sigma\_I,HEX data conforming to GPS ICD 200. |
| hhhh | OMEGADOT, HEX data conforming to GPS ICD 200. |
| hhhhhh | root\_a, HEX data conforming to GPS ICD 200. |
| hhhhhh | Omega, HEX data conforming to GPS ICD 200. |
| hhhhhh | Omega\_0, HEX data conforming to GPS ICD 200. |
| hhhhhh | M\_O, HEX data conforming to GPS ICD 200. |
| hhh | a\_fO, HEX data conforming to GPS ICD 200. |
| hhh | a\_fl, HEX data conforming to GPS ICD 200. |

AS - Almanac Status

This sentence can be used to query or set almanac status. The format is:

$PTNLaAS,hh,xxxx,hh,hh,hh,hh,hh\*hh<CR><LF>

Table C.16 Query Almanac Status

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = Set) |
| Hh | TimeOfAlm. Time of almanac. |
| xxxx | Week number of almanac |
| hh | HaveTimeOfAlm |
| hh | HaveAlmHealth |
| hh | NeedAlmHealth. Need Almanac Health. |
| hh | NeedIonUtc. |
| hh | HaveAlm |

The corresponding response for the Set is:

$PTNLRAS,a\*hh<CR><LF>

where 'a' means action status: A = success; V= failure

BA - Antenna Status

This sentence can be used to query the antenna connection status. This sentence should only be issued when the antenna detection circuit is implemented.

The Query sentence format is:

$PTNLQBA\*hh<CR><LF>

The Response to query sentence format is:

$PTNLARBA,a,b\*hh<CR><LF>

Table C.17 Antenna Status

|  |  |
| --- | --- |
| Field | Description |
| a | Status (0 = status unavailable, 1 = status available) |
| b | Antenna feedline fault:  0 = normal  1 = open  2 = short |

CR - Configure Receiver

This sentence can query or set NMEA receiver configuration information.

$PTNLaCR,x.x,x.x,x.x,x.x,x.x,a,a,a,a\*hh<CR><LF>

Table C.18 Configure Receiver

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = set; R = Response) |
| x.x | Reserved |
| x.x | Elevation mask in degrees (default = 5 degrees) |
| x.x | Reserved |
| x.x | Reserved |
| x.x | Reserved |
| a | Constellation Mode, default is 0  0 - AUTO |
| a | Dynamics, default is 1  1=land  2=sea  3=air |
| a | Reserved. |
| a | 0=WAAS\_OFF, 1=WAAS\_AUTO (this applies to all SBAS) |

EM - Enter Monitor Mode

This sentence is used to set the GPS Receiver into Monitor Mode. This is

Set only, no query supported. The sentence format is:

$PTNLSEM\*hh<CR><LF>

This sentence will be used by the Firmware Uploading Program.

EP - Ephemeris

This sentence can be used to query or set ephemeris data for a specific satellite. Since the maximum number of bytes that can be contained in a single NMEA sentence is less than the total ephemeris data length, the ephemeris data must be sent in three sentences. The three sentences have to be sent or received together in correct sequence.

Following is the query format:

$PTNLQEP,xx\*hh<CR><LF>

Table C.19 Ephemeris Query Format

|  |  |
| --- | --- |
| Field | Description |
| Q | Query |
| xx | Satellite |

After receiving the query, the receiver should send out three messages. Following is the first message of ephemeris format:

$PTNLaEP,1,xx,x.x,x.x,hh,hh,hh,hh,hhh,hh,hhhh,hh,h hhh,hhhhhh,x.x\*hh<CR><LF>

Table C.20 Ephemeris Message Format

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (S = set; R = Response) |
| 1 | Message number for EP, message 1 must be sent or received before message 2, and message 2 must be sent or received before message 3, and all three messages must be sent together with correct sequence |
| xx | Satellite id |
| x.x | T\_ephem, This is a double precision floating point number. |
| x.x | Week number for health, variable length integer, 4 digits maximum. |
| hh | CodeL2, HEX data conforming to GPS ICD 200. |
| hh | L2Pdata, HEX data conforming to GPS ICD 200. |
| hh | Svacc\_raw, HEX data conforming to GPS ICD 200. |
| hh | SV\_health, HEX data conforming to GPS ICD 200. |
| hhh | IODC, HEX data conforming to GPS ICD 200. |
| hh | T\_GD, HEX data conforming to GPS ICD 200. |
| hhhh | T\_oc, HEX data conforming to GPS ICD 200. |
| hh | A\_f2, HEX data conforming to GPS ICD 200. |
| hhhh | A\_f1, HEX data conforming to GPS ICD 200. |
| hhhhhh | A\_f0, HEX data conforming to GPS ICD 200. |

Following is the second sentence of ephemeris format:

**$PTNL**a**EP,2**,xx,hh,hh,hhhh,hhhh,hhhhhhhh,hhhh,hhhhhhhh,hhhh,hhhhhhhh,hhhh\*

hh<CR><LF>

Table C.21 Ephemeris Message Format

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (S = set; R = Response) |
| 2 | Sentence number for EP, sentence 1 must be sent or received before sentence 2, and sentence 2 must be sent or received before sentence 3, and all three sentences must be sent together |
| xx | Satellite id |
| hh | IODE, Hex data conforming to GPS ICD 200 |
| hh | Fit\_interval, Hex data conforming to GPS ICD 200 |
| hhhh | C\_rs, Hex data conforming to GPS ICD 200 |
| hhhh | Delta\_n, Hex data conforming to GPS ICD 200 |
| hhhhhhhh | M\_0, Hex data conforming to GPS ICD 200 |
| hhhh | C\_uc, Hex data conforming to GPS ICD 200 |
| hhhhhhhh | E, Hex data conforming to GPS ICD 200 |
| hhhh | C\_us, Hex data conforming to GPS ICD 200 |

Following is the third sentence of ephemeris format

**$PTNL**a**EP,3**,xx,hhhh,hhhhhhhh,hhhh,hhhhhhhh,hhhh,hhhhhhhh,hhhhhh,hhhh\*hh< CR><LF>

Table C.22 Ephemeris Message Format

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (S = set; R = Response) |
| 3 | Sentence number for EP, sentence 1 must be sent or received before sentence 2, and sentence 2 must be sent or received before sentence 3, and all three sentences must be sent together |
| xx | Satellite id |
| hh | C\_ic, Hex data conforming to GPS ICD 200 |
| hh | OMEGA\_0, Hex data conforming to GPS ICD 200 |
| hhhh | C\_ri, Hex data conforming to GPS ICD 200 |
| hhhh | I\_O, Hex data conforming to GPS ICD 200 |
| hhhhhhhh | C\_rc, Hex data conforming to GPS ICD 200 |
| hhhh | OMEGA, Hex data conforming to GPS ICD 200 |
| hhhhhhhh | OMEGA\_DOT, Hex data conforming to GPS ICD 200 |
| hhhh | IDOT, Hex data conforming to GPS ICD 200 |

IO Ionosphere

This sentence can be used to query or set ionosphere data.

$PTNLaIO,hh,hh,hh,hh,hh,hh,hh,hh\*hh,<CR><LF>

Table C.23 Ionosphere

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = set; R = Response) |
| hh | Alpha\_0, HEX data conforming to GPS ICD 200. |
| hh | Alpha\_1, HEX data conforming to GPS ICD 200. |
| hh | Alpha\_2, HEX data conforming to GPS ICD 200. |
| hh | Alpha\_3, HEX data conforming to GPS ICD 200. |
| hh | Beta\_0, HEX data conforming to GPS ICD 200. |
| hh | Beta\_1, HEX data conforming to GPS ICD 200. |
| hh | Beta\_2, HEX data conforming to GPS ICD 200. |
| hh | Beta\_3, HEX data conforming to GPS ICD 200. |

KG - Set Initial Position

This sentence can be used to set initial position or time info data or both for accelerating navigation startup. To set time only, send valid time fields and NULL position fields. To set position only, send valid position fields and NULL time fields. Query is not supported.

$PTNLaKG,x.x,x.x,llll.lllll,a,yyyyy.yyyyy,a,x.x\*hh

<CR><LF>

Table C.24 Set Initial Position

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (S = set; R = Response) |
| x.x | GPS week number, maximum 4 digits |
| x.x | GPS time of week in milliseconds |
| llll.lllll | Latitude |
| a | N | S |
| yyyyy.yyyyy | Longitude |
| a | E | W |
| x.x | Altitude from the sea level in meters (maximum 5 digits) |

***Note –*** *When uploading a position, it should be within 100 Km of the actual position and time within 5 minutes of UTC.*

NM - Automatic Message Output

This sentence may be issued by the user to configure automatic message output. The Query sentence format is:

$PTNLQNM\*hh<CR><LF>

The Response to query sentence or Set sentence format is:

$PTNLaNM,hhhh,xx\*hh<CR><LF>

Table C.25 Automatic Message Output

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = set; R = Response) |
| hhhh | Bit 0 - GGA Bit 1 - GLL Bit 2 - VTG Bit 3 - GSV Bit 4 - GSA Bit 5 - ZDA Bit 8 - RMC Bit 9 - TF  Bit 13 - BA |
| xx | Automatic Report Interval (1 - 99) |

Examples

GGA Only 0001

GLL Only0002

VTG Only0004

GSV Only0008

GSA Only0010

ZDA Only0020

RMC Only0100

TF Only0200

BA Only2000

GGA and GLL0003

GGA and TF0201

RMC and TF0300

GGA, GLL and TF0203

PS - PPS Configuration

This sentence can query or set PPS configuration data.

$PTNLaPS,b,x...x,6,x...x\*hh<CR><LF>

Table C.26 PPS Configuration

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = set; R = Response) |
| b | PPS mode, default is 1:  0 - PPS\_OFF (Always Off)  1 - PPS\_ON (Always On or Early PPS)  2 - PPS\_FIX\_BASED |
| x...x | Output pulse length in 100 nanoseconds, default is 42 corresponding to 4200 nanoseconds. Pulse length range is  100ns to 500ms. Field value range is 1 to 5000000. |
| c | Output pulse polarity, default is 1:  0 - output pulse is active low  1 - output pulse is active high |
| x...x | Antenna Cable Length Compensation. Default = 0, Units in nanoseconds. Can be positive or negative. Negative value will mean PPS comes out earlier, e.g. to compensate for cable delay. |

PT - Serial Port Configuration

This sentence may be issued by the user for configuring the current serial port. The Query sentence format is:

$PTNLQPT\*hh<CR><LF>

The Response to query or Set sentence format is:

$PTNLRPT,xxxxxx,b,b,b,h,h\*hh<CR><LF>

When the Set is issued, the first Response sentence will be sent using the old parameters and the second response sentence will be sent using the new parameters. If there is an error, there will be an error response sent. If there is no error, no additional response is sent.

Table C.27 Serial Port Configuration

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; R = Response; S = Set) |
| xxxxxx | Baud rate (4800, 9600, 19200, 38400). Default baud rate is 4800. |
| h | input protocol, hex value (bit 0: TAIP, bit1: TSIP, bit2: NMEA). Bits can be combined to enable multiple input protocols. This field may not be 0. |
| h | output protocol, hex value (bit 0: TAIP, bit1: TSIP, bit2: NMEA). It is not recommended to combine multiple output protocols. |
| b | Reserved |
| b | Reserved |
| b | Reserved |

PT - Serial Port Configuration

This sentence may be issued by the user for configuring the current serial port. The Query sentence format is:

$PTNLQPT\*hh<CR><LF>

The Response to query or Set sentence format is:

$PTNLRPT,xxxxxx,b,b,b,h,h\*hh<CR><LF>

When the Set is issued, the first Response sentence will be sent using the old parameters and the second response sentence will be sent using the new parameters. If there is an error, there will be an error response sent. If there is no error, no additional response is sent.

Table C.27 Serial Port Configuration

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; R = Response; S = Set) |
| xxxxxx | Baud rate (4800, 9600, 19200, 38400). Default baud rate is 4800. |
| h | input protocol, hex value (bit 0: TAIP, bit1: TSIP, bit2: NMEA). Bits can be combined to enable multiple input protocols. This field may not be 0. |
| h | output protocol, hex value (bit 0: TAIP, bit1: TSIP, bit2: NMEA). It is not recommended to combine multiple output protocols. |
| b | Reserved |
| b | Reserved |
| b | Reserved |

TF - Receiver Status and Position Fix

This sentence may be issued by the user to get receiver status and position fix. The Query

sentence format is:

$PTNLQTF\*hh<CR><LF>

The Response to query sentence format is:

$PTNLaTF,b,c,xxxxxx,xx,x,llll.lllll,d,yyyyy.yyyyy, e,xxxxx,x.x,x.x,x.x\*hh<CR><LF>

Table C.30 Receiver Status and Position Fix

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; R = Response) |
| b | BBRAM status on startup (A = valid; V = invalid) |
| c | Almanac completion status (A = complete; V = incomplete) |
| xxxxxx | GPS time of week (in seconds) |
| xx | Number of satellites in use, 00 - 12, may be different from the number in view. |
| x | Position fix source (0 = no fix; 2 = 2D fix; 3 = 3D fix) |
| llll.lllll | Latitude of the current position fix |
| d | N | S |
| yyyyy.yyyyy | Longitude of the current position fix |
| e | E | W |
| xxxxx | Antenna altitude re: mean-sea-level (MSL geoid, meters) |
| x.x | 'East' component of ENU velocity (m/s) |
| x.x | 'North' component of ENU velocity (m/s) |
| x.x | 'Up' component of ENU velocity (m/s) |

UT - UTC

This sentence can be used to query or set UTC data.

$PTNLaUT,hhhhhhhh,hhhhhh,hh,hh,hhhh,hhhh,hh,hh\*hh< CR><LF>

Table C.31 UTC

|  |  |
| --- | --- |
| Field | Description |
| a | Mode (Q = query; S = set; R = Response) |
| hhhhhhhh | A\_0, HEX data conforming to GPS ICD 200. |
| hhhhhh | A\_1, HEX data conforming to GPS ICD 200. |
| hh | Delta\_t\_ls, HEX data conforming to GPS ICD 200. |
| hh | T\_oa, HEX data conforming to GPS ICD 200. |
| hhhh | Wn\_t, HEX data conforming to GPS ICD 200. |
| hhhh | Wn\_LSF, HEX data conforming to GPS ICD 200. |
| hh | DN, HEX data conforming to GPS ICD 200. |
| hh | Delta\_t\_LSF, HEX data conforming to GPS ICD 200. |