



GeoS[®] NMEA Data Protocol v3.0

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Revision History

#	Updates	Notes
Release from 09/06/2012		
1	Original release	
Release from 16/09/2015		
1	Input messages added: ELEV-, DATP90, DATW84, NVSGPS, NVSGLN, NVSMIX	
2	Receiver Configuration Register changed (output message RQUERY)	
3	Editorial corrections	
Release from 16/12/2015		
1	Checksum for the messages GLL ON, GLLOFF, RMC ON, RMCOFF corrected	

Scope

The document is the description of GeoS® NMEA Data Protocol v3.0 supported by GeoS-3, GeoS-3M, GeoS-3R, GeoS-3MR, and GeoS-3E GNSS modules.

The document contains four chapters as follows:

- [Chapter 1](#): list of abbreviations
- [Chapter 2](#): data formats
- [Chapter 3](#): output messages
- [Chapter 4](#): input messages.

1. Abbreviations

1PPS:	One Pulse Per Second
2D:	Two-dimensional
3D:	Three-dimensional
AGC:	Auto Gain Control
E/W:	East/West
FW:	Firmware
GNSS:	Global Navigation Satellite System
HDOP:	Horizontal Dilution of Precision
ID:	Identifier
N/S:	North/South
PDOP:	Positional Dilution of Precision
PLL:	Phase Lock Loop
PRN:	Pseudo Random Noise
RTC:	Real Time Clock
SRAM:	Static Random Access Memory
SV:	Space Vehicle
UTC:	Universal Time Coordinated
VDOP:	Vertical Dilution of Precision

2. Data Formats

The following provides a summary explanation of the NMEA approved parametric sentence structure:

\$aacc,c--c*hh<CR><LF>

1. "\$" Start of Sentence
2. "aacc" Address Field. Alphanumeric characters identifying type of TALKER, and Sentence Formatter. The first two characters identify the TALKER which depend on satellite system being used:

v3.x: "GP": GPS; "GL": GLONASS; "GN": GPS+GLONASS

v2.x: always "GP" regardless other GNSS system being used.

The last three are the Sentence Formatter mnemonic code identifying the data type and the string format of the successive fields. Mnemonics will be used as far as possible to facilitate readouts by users.

For proprietary messages, the Address Field is "GPSGG".

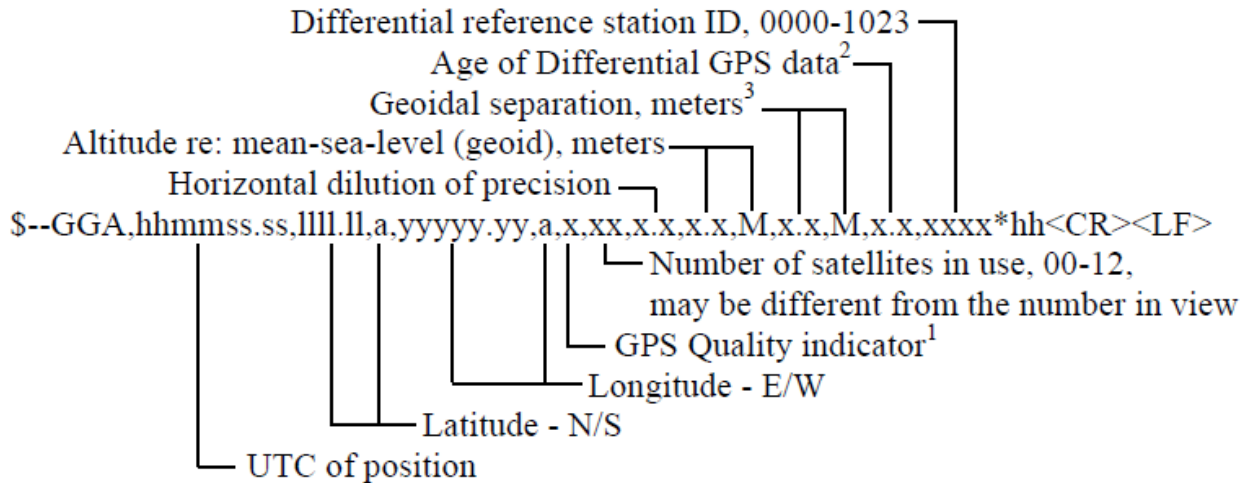
3. "," Field delimiter. Starts each field except address and checksum fields. If it is followed by a null field, it is all that remains to indicate no data in a field
4. "c--c" Data Sentence block. Follows address field and is a series of data fields containing all of the data to be transmitted. Data field sequence is fixed and identified by 3rd and subsequent characters of the address field (the "Sentence Formatter"). Data fields may be of variable length and are preceded by delimiters ","
5. "*" Checksum Delimiter. Follows last data field of the sentence. It indicates that the following two alphanumeric characters show the HEX value of the Checksum.
6. "hh" Checksum Field. The absolute value calculated by exclusive-OR'ing the 8 data bits (no start bits or stop bits) of each character in the Sentence, between, but excluding "\$" and "*". The hexadecimal value of the most significant and least significant 4 bits of the result are converted to two ASCII characters (0-9, A-F (upper case)) for transmission. The most significant character is transmitted first. The Checksum field is required in all transmitted sentences. Example: \$GPGSV,5,5,17,77,71,048,53*43.
7. <CR><LF> Terminates Sentence.

3. Output Messages

Table 1: List of output messages

Mnemonics	Message
Standard	
GGA	Global Positioning System Fix Data
GLL	Geographic Position – Latitude/Longitude
GNS	GNSS Fix Data
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
RMC	Recommended Minimum Specific GNSS Data
VTG	Course Over Ground and Ground Speed
ZDA	Time and Date
Proprietary	
RQUERY	FW Version, Receiver Telemetry and Configuration
NQUERY	Enabled NMEA Messages

3.1. GGA: Global Positioning System Fix Data



Notes:

1) GPS Quality Indicator:

- 0 = Fix not available or invalid
- 1 = GPS SPS Mode, fix valid
- 2 = Differential GPS, SPS Mode, fix valid
- 3 = GPS PPS Mode, fix valid
- 4 = Real Time Kinematic
- 5 = Float RTK
- 6 = Estimated (dead reckoning) Mode
- 7 = Manual Input Mode
- 8 = Simulator Mode

The GPS Quality Indicator field shall not be a null field.

2) Time in seconds since last SC104 Type 1 or 9 update, null field when DGPS is not used

3) Geoidal Separation: the difference between the WGS-84 earth ellipsoid surface and mean-sea-level

Example:

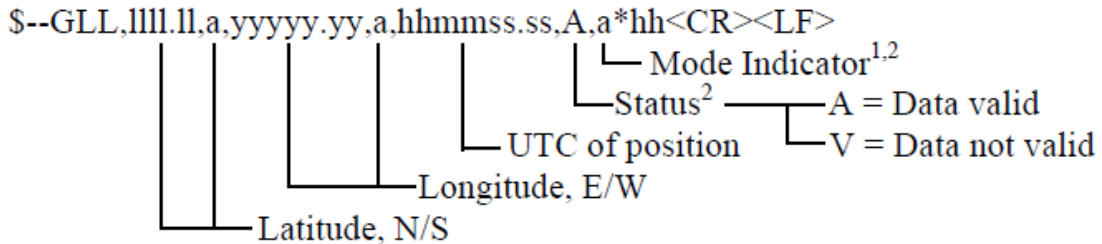
After receiver power-up, no fix:

```
$GPGGA,072316.00,,,,,0,,,,,,,,*49
```

Fix valid:

```
$GPGGA,072319.00,5544.6975,N,03743.7345,E,1,07,1.3,00198.1,M,0014.2,M,,*6A
```


3.2. GLL: Geographic Position - Latitude/Longitude



Notes:

- 1) Positioning system Mode Indicator:
- A = Autonomous mode
 - D = Differential mode
 - E = Estimated (dead reckoning) mode
 - M = Manual input mode
 - S = Simulator mode
 - N = Data not valid

2) The positioning system Mode Indicator field supplements the positioning system Status field, the Status field shall be set to V=Invalid for all values of Indicator mode except for A=Autonomous and D=Differential. The positioning system Mode Indicator and Status fields shall not be null fields.

Example:

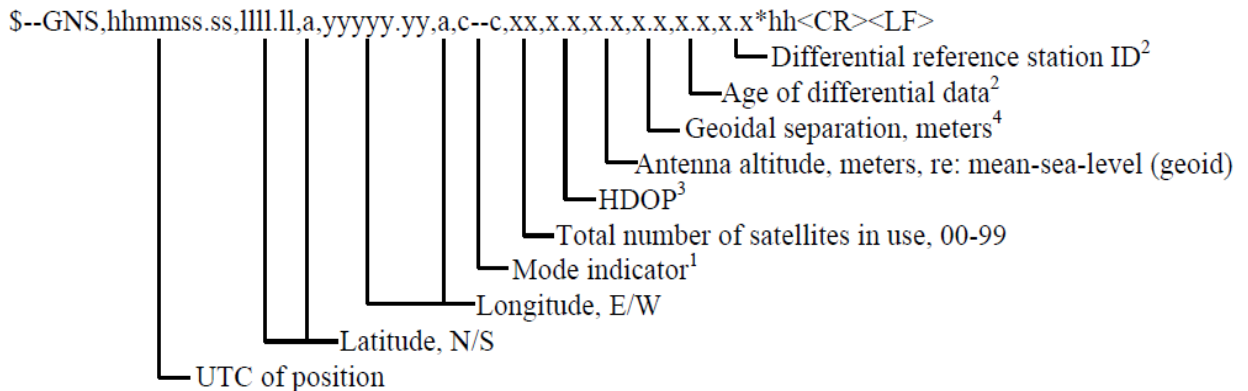
Receiver power-up, no fix:

```
$GNGLL,,,,,073120.00,V,N*53
```

Fix valid:

```
$GNGLL,5544.7049,N,03743.7405,E,073121.00,A,A*7E
```

3.3. GNS: GNSS Fix Data



Notes:

1) Mode Indicator:

A variable length valid character field type with the first two characters currently defined. The first character indicates the use of GPS satellites, the second character indicates the use of GLONASS satellites. If another satellite system is added to the standard, the mode indicator will be extended to three characters, new satellite systems shall always be added on the right, so the order of characters in the Mode Indicator is: GPS, GLONASS, other satellite systems in the future.

The characters shall take one of the following values:

- N = No fix
- A = Autonomous mode
- D = Differential mode
- P = Precise mode is used to compute position fix
- R = Real Time Kinematic
- F = Float RTK
- E = Estimated (dead reckoning) mode
- M = Manual input mode
- S = Simulator mode.

2) Age of differential data and Differential Reference Station ID:

When the talker is “GN” and more than one of the satellite systems are used in differential mode, then the “Age of differential data” and “Differential reference station ID” fields shall be null. In this case, the “Age of differential data” and “Differential reference station ID” fields shall be provided in following GNS sentences with talker IDs of “GP”, “GL”, etc. These following GNS messages shall have the latitude, N/S, longitude, E/W, altitude, geoidal separation, mode, and HDOP fields null. This indicates to the listener that the field is supporting a previous \$GNGNS sentence with the same time tag.

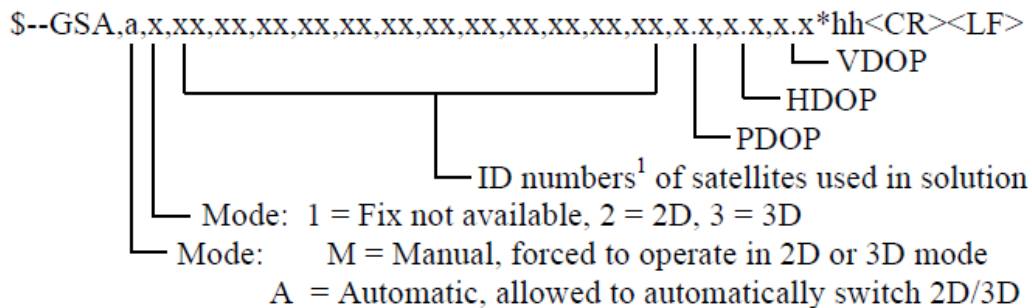
- 3) HDOP calculated using all the satellites (GPS, GLONASS, and any future satellites) used in computing the solution reported in each GNS sentence.
- 4) Geoidal Separation: the difference between the WGS-84 earth ellipsoid surface and mean-sea-level (geoid) surface; “-” = mean-sea-level surface below ellipsoid.

Example:

Receiver power-up, no fix: \$GNGNS,073117.00,,,,,NN,,,,,*7E
Fix valid, autonomous mode: \$GNGNS,073121.00,5544.7049,N,03743.7405,E,AA,05,3.2,00179.5,0014.2,,*58
Fix valid, differential mode, GLONASS only: \$GNGNS,073135.00,5544.7043,N,03743.7390,E,DA,07,1.8,00176.5,0014.2,01.4,0000*59
Fix valid, differential mode, GPS+GLONASS: \$GNGNS,073137.00,5544.7043,N,03743.7390,E,DD,08,1.7,00176.5,0014.2,,*5B \$GPGNS,073137.00,,,,,05,,,,00.4,0000*7D \$GLGNS,073137.00,,,,,03,,,,00.4,0000*67

3.4. GSA: GNSS DOP and Active Satellites

If only GPS, GLONASS, etc. is used for the reported position solution the talker ID is “GP”, “GL”, etc. and the DOP values pertain to the individual system. If GPS, GLONASS, etc. are combined to obtain the reported position solution multiple GSA sentences are produced, one with the GPS satellites, another with the GLONASS satellites, etc. Each of these GSA sentences shall have talker ID “GN”, to indicate that the satellites are used in a combined solution and each shall have the PDOP, HDOP and VDOP for the combined satellites used in the position.



Notes:

Satellite ID numbers. To avoid possible confusion caused by repetition of satellite ID numbers when using multiple satellite systems, the following convention has been adopted:

- a. GPS satellites are identified by their PRN numbers, which range from 1 to 32.

- b. The numbers 33-64 are reserved for WAAS satellites. The WAAS system PRN numbers are 120-138. The offset from NMEA WAAS SV ID to WAAS PRN number is 87. A WAAS PRN number of 120 minus 87 yields the SV ID of 33. The addition of 87 to the SV ID yields the WAAS PRN number.
- c. The numbers 65-96 are reserved for GLONASS satellites. GLONASS satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.

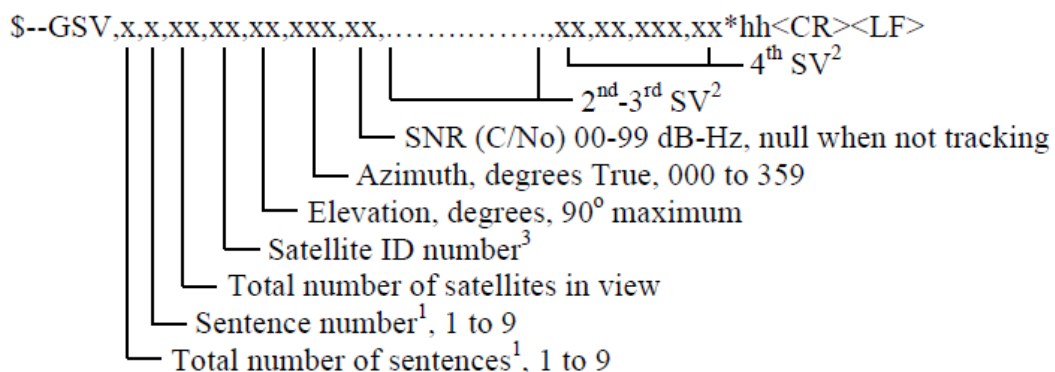
Example:

Receiver power-up, no fix: \$GPGSA,A,1,,,,,,,,,,,,,9.9,9.9,9.9*30
Fix valid, v2.x: \$GPGSA,A,3,31,66,75,65,81,67,72,,,,,2.0,1.3,1.5*38
Fix valid, v3.x: \$GNGSA,A,3,19,20,22,31,17,,,,,2.9,1.7,2.4*29 \$GNGSA,A,3,88,67,72,,,,,2.9,1.7,2.4*23

3.5. GSV: GNSS Satellites in View

Four satellites maximum per transmission. Total number of sentences being transmitted and the number of the sentence being transmitted are indicated in the first two fields.

If multiple GPS, GLONASS, etc. satellites are in view, use separate GSV sentences with talker ID "GP:" to show the GPS satellites in view and talker "GL" to show the GLONASS satellites in view, etc. The "GN" identifier shall not be used with this sentence.



Notes:

- 1) Satellite information may require the transmission of multiple sentences all containing identical field formats when sending a complete message. The first field specifies the total number of sentences, minimum value 1. The second field identifies the order of this sentence (sentence number), minimum value 1. For efficiency it is recommended that null fields be used in the additional sentences when the data is unchanged from the first sentence.
- 2) A variable number of "Satellite ID-Elevation-Azimuth-SNR" sets are allowed up to a maximum of four sets per sentence. Null fields are not required for unused sets when less than four sets are transmitted.
- 3) Satellite ID numbers. To avoid possible confusion caused by repetition of satellite ID numbers when using multiple satellite systems, the following convention has been adopted:
 - a. GPS satellites are identified by their PRN numbers, which range from 1 to 32.
 - b. The numbers 33-64 are reserved for WAAS satellites. The WAAS system PRN numbers are 120-138. The offset from NMEA WAAS SV ID to WAAS PRN number is 87. A WAAS PRN number of 120 minus 87 yields the SV ID of 33. The addition of 87 to the SV ID yields the WAAS PRN number.
 - c. The numbers 65-96 are reserved for GLONASS satellites. GLONASS satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.

Example:**Fix valid, v2.x:**

```
$GPGSV,4,1,16,09,01,012,,11,58,224,,12,01,038,,14,53,069,*7C
```

```
$GPGSV,4,2,16,31,20,132,,32,57,261,,65,60,057,,66,55,273,*7F
```

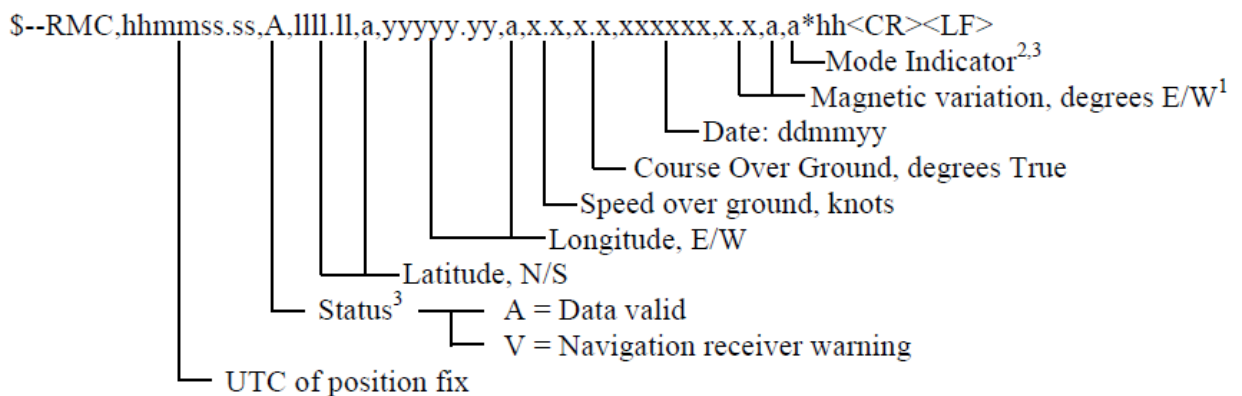
```
$GPGSV,4,3,16,67,07,260,,72,09,074,,73,03,355,,74,29,037,50*79
```

```
$GPGSV,4,4,16,75,28,099,,81,50,256,,82,29,326,,88,18,199,*75
```

Fix valid, v3.x:

```
$GPGSV,3,1,10,01,65,268,49,11,56,218,54,12,03,036,39,14,50,066,*7F
$GPGSV,3,2,10,17,20,321,49,19,12,203,43,20,32,270,50,22,19,091,43*79
$GPGSV,3,3,10,31,24,130,49,32,61,263,51*76
$GLGSV,3,1,11,65,56,062,53,66,58,278,55,67,10,263,48,72,06,076,44*6C
$GLGSV,3,2,11,73,00,353,25,74,28,032,36,75,31,095,46,76,02,141,33*66
$GLGSV,3,3,11,81,48,250,53,82,32,323,51,88,14,198,44*59
```

3.6. RMC: Recommended Minimum Specific GNSS Data



Notes:

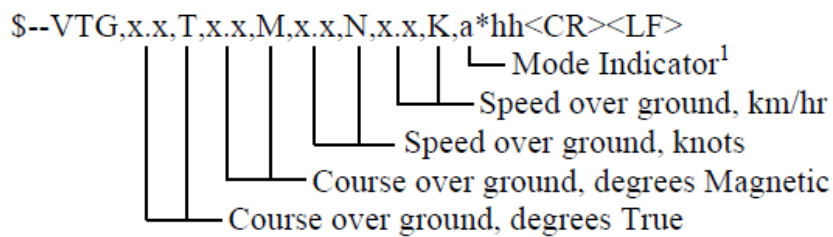
- 1) Easterly variation (E) subtracts from True course. Westerly variation (W) adds to True course
- 2) Positioning system Mode Indicator:
 - A = Autonomous mode
 - D = Differential mode
 - E = Estimated (dead reckoning) mode
 - M = Manual input mode
 - S = Simulator mode
 - N = Data not valid
- 3) The positioning system Mode Indicator field supplements the positioning system Status field, the Status field shall be set to V=Invalid for all values of Indicator mode except for A=Autonomous and D=Differential. The positioning system Mode Indicator and Status fields shall not be null fields.

Example:

```
Receiver power-up, no fix:
$GPRMC,072317.00,V,,,,,,,,,190312,,,N*75

Fix valid:
$GNRMC,073121.00,A,5544.7049,N,03743.7405,E,000.02626,301.4,190312,,,A*47
```

3.7. VTG: Course Over Ground and Ground Speed



Notes:

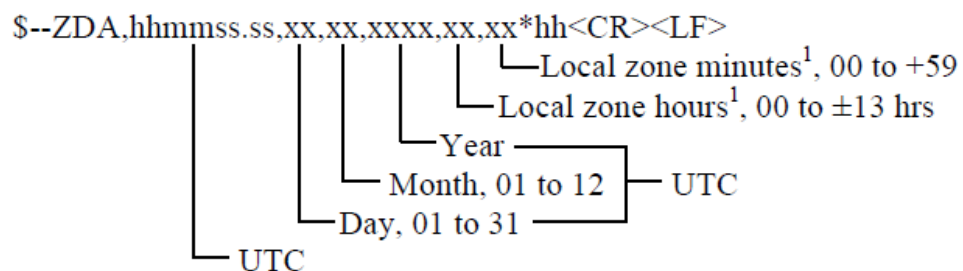
- 1) Positioning system Mode Indicator:
- A = Autonomous mode
 - D = Differential mode
 - E = Estimated (dead reckoning) mode
 - M = Manual input mode
 - S = Simulator mode
 - N = Data not valid

The positioning system Mode Indicator shall not be a null field.

Example:

```
$GNVTG,301.4,T,,,0000.0,N,0000.0,K,A*58
```

3.8. ZDA: Time & Date



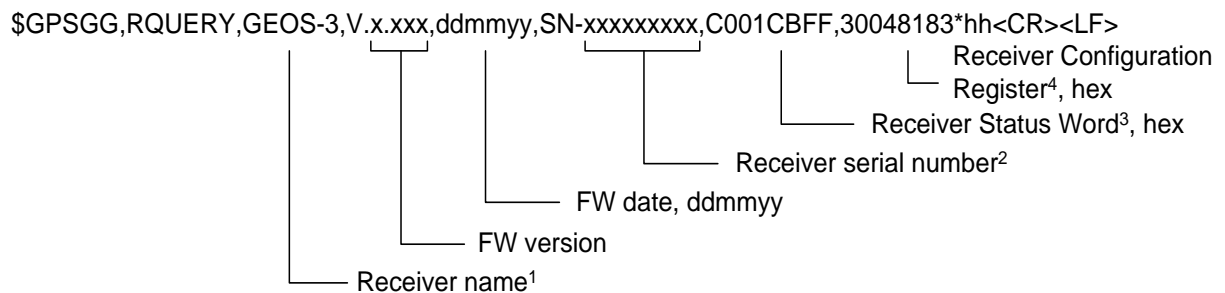
Notes:

- 1) Local time zone is the magnitude of hours plus the magnitude of minutes added, with the sign of local zone hours, to local time to obtain UTC. Local zone is generally negative for East longitudes with local exceptions near the International Date Line.

Example:

```
$GNZDA,073121.00,19,03,2012,+00,00*5F
```

3.9. RQUERY: FW Version, Receiver Telemetry and Configuration



Notes:

- 1) Receiver name: the field is filled with “GEOS-3” for all types of modules from GeoS-3 family
- 2) Receiver serial number: alphanumeric combination such as T03000001
- 3) Receiver Status Word: the field is the hexadecimal notation of the data from Table 2
- 4) Receiver Configuration Register: the field is the hexadecimal notation of the data from Table 3.

The message is generated in following cases:

- As a response to \$GPSGG,RQUERY*70
- Once at power-up
- In power-save modes: once during transition from “SLEEP” to “ACTIVE” and from “ACTIVE” to “SLEEP”
- Every second if all NMEA messages are disabled.

Table 2: Receiver Status Word

Bit #	Description
31	Reserved
30	RF PLL status: 0: failed 1: OK
29:28	Receiver operation mode: 0: normal 1: test 2: FW update 3: saving data to Flash
27	Reserved
26	Reserved
25	Reserved
24	DR mode indicator: 0: fix calculated 1: fix extrapolated
23	Reserved
22	Assisted mode indicator: 0: autonomous 1: assisted
21	"ACTIVE"/"SLEEP" indicator: 0: "SLEEP" 1: "ACTIVE"
20	Differential mode indicator: 0: autonomous mode 1: differential mode
19	Actual RTCM corrections availability indicator: 0: not available 1: available
18	Actual SBAS corrections availability indicator: 0: not available 1: available
17	SBAS SV tracking indicator: 0: no SBAS SV in tracking 1: at least one SBAS SV in tracking
16	Ionosphere corrections/UTC data decoded from GPS message availability indicator: 0: not available 1: available
15	Position fix indicator: 0: fix not available 1: fix available
14	Indicator that at least one position fix has been available after receiver start: 0: not available 1: available
13	Reserved
12	2D fix indicator: 0: 3D fix 1: 2D fix

11, 10	Antenna status: 0: not measured 1: overload 2: open 3: OK
9	GLONASS AGC: 0: failed 1: OK
8	GPS AGC: 0: failed 1: OK
7	Reserved
6	Reserved
5	Date decoded from navigation message availability indicator: 0: not available 1: available
4	Time decoded from navigation message availability indicator: 0: not available 1: available
3	GLONASS almanac availability indicator: 0: not available 1: available
2	GPS almanac availability indicator: 0: not available 1: available
1	RTC test results: 0: failed 1: OK
0	Backup SRAM test results: 0: failed 1: OK

Table 3: Receiver Configuration Register

Bit #	Description
31:30	Diff corrections source: 0: auto select 1: RTCM 2: SBAS
29	PRN SBAS: 0: user defined 1: auto select
28	Differential mode: 0: disabled 1: enabled
27	Using SVs in position fix in diff mode: 0: only those SVs for which diff corrections are available 1: all available SVs
26	Pseudorange measurements in message 0x10: 0: unsmoothed 1: smoothed
25	Power-save mode: 0: RELAXED FIX® 1: FIX-BY-REQUEST®

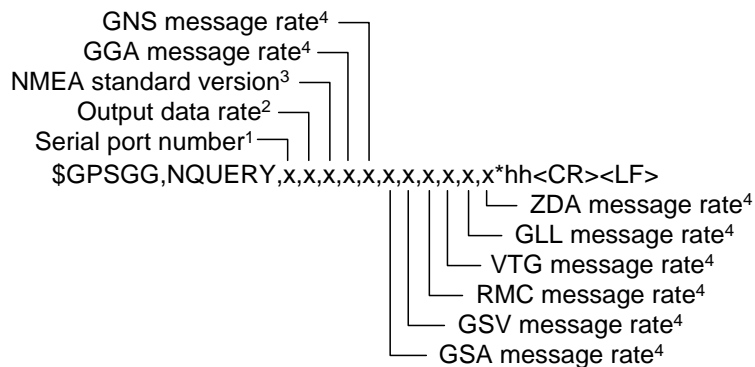
24	Power-save mode: 0: disabled 1: enabled
23:21	User dynamics profile: 0: auto select 1: pedestrian-car 2: marine 3: airborne
20:19	Output data rate, Hz: 0: 10 1: 5 2: 2 3: 1
18	Dynamic filtering: 0: disabled 1: enabled
17	Pseudorange smoothing: 0: disabled 1: enabled
16	2D for the first fix: 0: enabled 1: disabled
15	2D mode: 0: disabled 1: enabled
14	Coordinates hold mode: 0: disabled 1: enabled
13	Reserved
12	Datum: 0: WGS-84 1: PZ-90.11
11:10	1PPS synchronization time scale: 0: GPS 1: UTC 2: GLONASS 3: UTC(SU)
9	1PPS polarity: 0: positive 1: negative
8	1PPS output: 0: disabled 1: enabled
7	Antenna power: 0: disabled 1: enabled
6	Reserved
5	Reserved
4	Reserved
3	Reserved
2	Reserved

1	GPS system: 0: disabled 1: enabled
0	GLONASS system: 0: disabled 1: enabled

Example:

Name: GeoS-3; FW version: 3.201; FW date: 20.02.2012; Serial number: T03345678:
 \$GPGG,RQUERY,GEOS-3,V.3.201,200212,SN-T03345678,C001CBFF,30048183*2C

3.10. NQUERY: Enabled NMEA Messages



Notes:

- 1) Serial port number:
0: Port #0
1: Port #1
- 2) Output data rate, Hz:
0: 10
1: 5
2: 2
3: 1
- 3) NMEA standard version:
2: v2.x
3: v3.x
- 4) Message data rate:
0: disabled
1: once a second
2: once a 2 seconds

3: once a 20 seconds
R: as per output data rate

The message is transmitted in following cases:

- As a response to \$GPSGG,NQUERY*6C
- Once at power-up
- Every second if all NMEA messages are disabled.

Example:

Port number: #0; Output data rate: 5Hz; NMEA standard version: v2.x; GGA, GSA, RMC message rate: once a second; GGV message rate: once a 20 seconds; GNS, VTG, GLL, ZDA: disabled

```
$GPSGG,NQUERY,0,1,2,1,0,1,3,1,0,0,0*71
```

4. Input Messages

Table 4: List of input messages

Mnemonics	Message
Proprietary	
SWPROT	Switch to Binary Protocol
SAVEFL	Save Almanacs to Flash
CSTART	Cold Start
WSTART	Warm Start
HSTART	Hot Start
RQUERY	Request FW Version, Receiver Telemetry and Configuration
NQUERY	Request Enabled NMEA Messages
BDR---	Set Serial Port Baud Rate
STOP--	Set Serial Port Stop Bits
GGA ON, GGAOFF	Enable/Disable GGA/GNS Message
GLL ON, GLL OFF	Enable/Disable GLL Message
GSA ON, GSAOFF	Enable/Disable GSA Message
GSV ON, GSVOFF	Enable/Disable GSV Message
RMC ON, RMC OFF	Enable/Disable RMC Message
VTG ON, VTG OFF	Enable/Disable VTG Message
ZDA ON, ZDA OFF	Enable/Disable ZDA Message
NMEA V2, NMEA V3	Select NMEA Standard Version
GNSOUT, GGAOUT	Select GGA or GNS
RATE--	Set Output Data Rate
PSM ON, PSM OFF	Enter/Quit Power-save Mode/Wake-up
ELEV--	Set Elevation Angle Mask
DATP90	Set PZ-90.11 Datum
DATW84	Set WGS-84 Datum
NVSGPS	Set GPS only Mode
NVSGLN	Set GLONASS only Mode
NVSMIX	Set Mixed GLONASS+GPS Mode

4.1. SWPROT: Switch to Binary Protocol

Switches the port to binary protocol.

Format: \$GPGSGG,SWPROT*75.

4.2. SAVEFL: Save Almanacs to Flash

Initiates saving almanacs to the receiver's Flash memory.

Format: \$GPGSGG,SAVEFL*63.

4.3. CSTART: Cold Start

Initiates cold start of the receiver.

Format: \$GPGSGG,CSTART*6B.

4.4. WSTART: Warm Start

Initiates warm start of the receiver.

Format: \$GPGSGG,WSTART*7F.

4.5. HSTART: Hot Start

Initiates hot start of the receiver.

Format: \$GPGSGG,HSTART*60.

4.6. RQUERY: Request FW Version, Receiver Telemetry and Configuration

Requests the receiver FW version, hardware telemetry and configuration.

Format: \$GPSGG,RQUERY*70.

4.7. NQUERY: Request Enabled NMEA Messages

The command requests enable/disable status and the rate of output NMEA messages.

Format: \$GPSGG,NQUERY*6C.

4.8. BDR---: Set Serial Port Baud Rate

Sets the baud rate of the serial port working on NMEA protocol.

Format: \$GPSGG,BDR---*.

Format	Baud rate, bit/s
\$GPSGG,BDR004*08	4800
\$GPSGG,BDR009*05	9600
\$GPSGG,BDR019*04	19200
\$GPSGG,BDR038*07	38400
\$GPSGG,BDR057*0E	57600
\$GPSGG,BDR115*09	115200
\$GPSGG,BDR230*0D	230400
\$GPSGG,BDR460*0E	460800
\$GPSGG,BDR921*06	921600

4.9. STOP--: Set Serial Port Stop Bits

Sets the number of stop bits of the serial port working on NMEA protocol.

Format: \$GPSGG,STOP--*.

Format	Stop bits
\$GPSGG,STOP01*71	1
\$GPSGG,STOP02*72	2

4.10. GGA ON, GGAOFF: Enable/Disable GGA/GNS Message

Enables/disables GGA/GNS message.

Format: \$GPSGG,GGA ON*08, \$GPSGG,GGAOFF*66.

Format	Description
\$GPSGG,GGA ON*08	GGA/GNS enabled
\$GPSGG,GGAOFF*66	GGA/GNS disabled

4.11. GLL ON, GLLOFF: Enable/Disable GLL Message

Enables/disables GLL message.

Format: \$GPSGG,GLL ON*0E, \$GPSGG,GLLOFF*60.

Format	Description
\$GPSGG,GLL ON*0E	GLL enabled
\$GPSGG,GLLOFF*60	GLL disabled

4.12. GSA ON, GSAOFF: Enable/Disable GSA Message

Enables/disables GSA message.

Format: \$GPSGG,GSA ON*1C, \$GPSGG,GSAOFF*72.

Format	Description
\$GPSGG,GSA ON*1C	GSA enabled
\$GPSGG,GSAOFF*72	GSA disabled

4.13. GSV ON, GSVOFF: Enable/Disable GSV Message

Enables/disables GSV message.

Format: \$GPSGG,GSV ON*0B, \$GPSGG,GSVOFF*65.

Format	Description
\$GPSGG,GSV ON*0B	GSV enabled
\$GPSGG,GSVOFF*65	GSV disabled

4.14. RMC ON, RMCOFF: Enable/Disable RMC Message

Enables/disables RMC message.

Format: \$GPSGG,RMC ON*15, \$GPSGG,RMCOFF*7B.

Format	Description
\$GPSGG,RMC ON*15	RMC enabled
\$GPSGG,RMCOFF*7B	RMC disabled

4.15. VTG ON, VTGOFF: Enable/Disable VTG Message

Enables/disables VTG message.

Format: \$GPGSGG,VTG ON*0C, \$GPGSGG,VTGOFF*62.

Format	Description
\$GPGSGG,VTG ON*0C	VTG enabled
\$GPGSGG,VTGOFF*62	VTG disabled

4.16. ZDA ON, ZDAOFF: Enable/Disable ZDA Message

Enables/disables ZDA message.

Format: \$GPGSGG,ZDA ON*16, \$GPGSGG,ZDAOFF*78.

Format	Description
\$GPGSGG,ZDA ON*16	ZDA enabled
\$GPGSGG,ZDAOFF*78	ZDA disabled

4.17. NMEAV2, NMEAV3: Select NMEA Standard Version

Selects between NMEA versions v2.x and v3.x.

Format: \$GPGSGG,NMEAV2*0B, \$GPGSGG,NMEAV3*0A.

Format	Description
\$GPGSGG,NMEAV2*0B	v2.x
\$GPGSGG,NMEAV3*0A	v3.x

4.18. GNSOUT, GGAOUT: Select GGA or GNS

Selects between GGA and GNS (for NMEA v3.x only).

Format: \$GPGSGG,GNSOUT*7C, \$GPGSGG,GGAOUT*67.

Format	Description
\$GPGSGG,GNSOUT*7C	GNS enabled, GGA disabled
\$GPGSGG,GGAOUT*67	GGA enabled, GNS disabled

4.19. RATE--: Set Output Data Rate

Sets the output data rate.

Format: \$GPGSGG,RATE--*.

Format	Output data rate, Hz
\$GPGSGG,RATE01*6B	1
\$GPGSGG,RATE02*68	2
\$GPGSGG,RATE05*6F	5
\$GPGSGG,RATE10*6B	10

4.20. PSM ON, PSMOFF: Enter/Quit Power-save Mode/Wake-up

Enters/quits power-save mode as well as wakes-up the receiver (for FIX-BY-REQUEST® mode).

Format: \$GPGSGG,PSM ON*07, \$GPGSGG,PSMOFF*69.

Format	Description	
	RELAXED FIX®	FIX-BY-REQUEST®
\$GPGSGG,PSM ON*07	“ACTIVE”: enter the mode “SLEEP”: has no effect	“ACTIVE”: enter the mode “SLEEP”: wake-up
\$GPGSGG,PSMOFF*69	“ACTIVE”: quit the mode “SLEEP”: quit the mode	“ACTIVE”: quit the mode “SLEEP”: quit the mode

4.21. ELEV--: Set Elevation Angle Mask

Sets elevation angle mask (in degrees). The SVs with the elevation angle less than the specified mask are excluded from navigation solution.

Format: GPSGG,ELEV--

Format	Elevation angle mask, degree
\$GPSGG,ELEV05*77	5
\$GPSGG,ELEV06*74	6
\$GPSGG,ELEV07*75	7
\$GPSGG,ELEV08*7A	8
\$GPSGG,ELEV09*7B	9
\$GPSGG,ELEV10*73	10
\$GPSGG,ELEV11*72	11
\$GPSGG,ELEV12*71	12
\$GPSGG,ELEV13*70	13
\$GPSGG,ELEV14*77	14
\$GPSGG,ELEV15*76	15

4.22. DATP90: Set PZ-90.11 Datum; DATW84: Set WGS-84 Datum

Sets datum to PZ-90.11 or WGS-84.

Format: \$GPSGG,DATP90*60, \$GPSGG,DATW84*62

Format	Datum
\$GPSGG,DATP90*60	PZ-90.11
\$GPSGG,DATW84*62	WGS-84

4.23. NVSGPS: Set GPS only Mode; NVSGLN: Set GLONASS only Mode; NVSMIX: Set Mixed GLONASS+GPS Mode

Sets GNSS configuration used by the receiver: GPS only, GLONASS only, mixed GLONASS+GPS.

Format: \$GPSGG,NVSGPS*67, \$GPSGG,NVSGLN*66, \$GPSGG,NVSMIX*7F

Format	GNSS configuration
\$GPSGG,NVSGPS*67	GPS only
\$GPSGG,NVSGLN*66	GLONASS only
\$GPSGG,NVSMIX*7F	Mixed GLONASS+GPS