

// Neo-6 GPS

Ref: - Page 49-65, http://www.u-blox.com/images/downloads/Product_Docs/u-blox6_ReceiverDescriptionProtocolSpec_%28GPS.G6-SW-10018%29.pdf
 - <http://www.gpsinformation.org/da/nmea.htm>

// Sentences

NMEA 0183 v2.3
 Default output: GGA, GLL, GSA, GSV, RMC, VTG, TXT
 Input: GPQ

Real data from U-Blox Neo-6M GPS module over Arduino serial.

// GGA

Description: Global positioning system fix data
 Type: Output
 Comment:

Structure: \$GPGGA, hhhmss.ss, Latitude, N, Longitude, E, FS, NoSV, HDOP, msl, uMsl, Altref, uSep, DiffAge, DiffStation *cs <CR><LF>
 Example: \$GPGGA, 092725.00, 4717.11399, N, 00833.91590, E, 1, 8, 1.01, 499.6, M, 48.0, M, , 0 *5B
 Real: \$GPGGA, 190428.00, 4604.81231, N, 01429.42196, E, 2, 05, 9.66, 328.4, M, 42.9, M, , 0000 *5E

No.	Example	Format	Name	Unit	Description
0	\$GPGGA	string	\$GPGGA	-	Message ID, GGA protocol header
1	092725.00	hhmmss.sss	hhmmss.ss	-	UTC Time, Current time
2	4717.11399	ddmm.mmmmm	Latitude	-	Latitude, Degrees + minutes, dd° mm', mmmmm
3	N	character	N	-	N/S Indicator, N=north or S=south
4	00833.91590	dddmm.mmmmm	Longitude	-	Longitude, Degrees + minutes, dd° mm', mmmmm
5	E	character	E	-	E/W indicator, E=east or W=west
6	1	digit	FS	-	Position Fix Status Indicator: 0 = No fix / Invalid 1 = Standard GPS (2D/3D) 2 = DGPS - differential GPS 6 = DR - Estimated (dead reckoning) fix
7	8	numeric	NoSV	-	Satellites Used, Range 0 to 12
8	1.01	numeric	HDOP	-	HDOP, Horizontal Dilution of Precision
9	499.6	numeric	msl	m	MSL Altitude (Mean Sea Level altitude)
10	M	character	uMsl	-	Units, Meters (fixed field)
11	48.0	numeric	Altref	m	Geoid Separation (Height of geoid above WGS84 ellipsoid)
12	M	character	uSep	-	Units, Meters (fixed field)
13	-	numeric	DiffAge	s	DGPS - Age of Differential Corrections, Blank (Null) fields when DGPS is not used
14	0	numeric	DiffStation	-	DGPS - Diff. Reference Station ID
15	*5B	hexadecimal	cs	-	Checksum
16	-	character	<CR><LF>	-	Carriage Return and Line Feed (CR - 0d13/0x0D, LF - 0d10/0x0A)

// GLL

Description: Latitude and longitude, with time of position fix and status
 Type: Output
 Comment:

Structure: \$GPGLL, Latitude, N, Longitude, E, hhhmss.ss, Valid, Mode *cs <CR><LF>
 Example: \$GPGLL, 4717.11364, N, 00833.91565, E, 092321.00, A, A *60
 Real*: \$GGLL, 604.117, N, 0129.4361, , 19013.00 A, D *5
 *: also \$PGLL, \$PGL, \$GGLL (strange behaviour)

No.	Example	Format	Name	Unit	Description
0	\$GPGLL	string	\$GPGLL	-	Message ID, GLL protocol header
1	4717.11364	ddmm.mmmmm	Latitude	-	Latitude, Degrees + minutes, dd° mm', mmmmm
2	N	character	N	-	N/S Indicator, hemisphere N=north or S=south
3	00833.91565	dddmm.mmmmm	Longitude	-	Longitude, Degrees + minutes, dd° mm', mmmmm
4	E	character	E	-	E/W indicator, E=east or W=west
5	092321.00	hhmmss.sss	hhmmss.ss	-	UTC Time, Current time
6	A	character	Valid	-	V = Data invalid or receiver warning, A = Data valid
7	A	character	Mode	-	Positioning Mode: N = No fix A = Autonomous fix (valid) D = Differential fix (valid) E = Estimated/Dead reckoning fix
8	*60	hexadecimal	cs	-	Checksum
9	-	character	<CR><LF>	-	Carriage Return and Line Feed (CR - 0d13/0x0D, LF - 0d10/0x0A)

// GSA

Description: GNSS DOP and Active Satellites
 Type: Output
 Comment: - If less than 12 SVs are used for navigation, the remaining fields are left empty. If more than 12 SVs are used for navigation, only the IDs of the first 12 are output.
 - The SV Numbers (Fields 'Sv') are in the range of 1 to 32 for GPS satellites, and 33 to 64 for SBAS satellites (33 = SBAS PRN 120, 34 = SBAS PRN 121, and so on)

Structure: \$GPGSA, Smode, FS, {sv}, PDOP, HDOP, VDOP *cs <CR><LF>
 Example: \$GPGSA, A, 3, 23,29,07,08,09,18,26,28,,,,, 1.94, 1.18, 1.54 *0D
 Real: \$GPGSA, A, 3, 26,02,05,07,08,,,,,, 14.56, 9.66, 10.89 *01

No.	Example	Format	Name	Unit	Description
0	\$GPGSA	string	\$GPGSA	-	Message ID, GSA protocol header
1	A	character	Smode	-	Smode: A = Auto selection of 2D or 3D mode M = Forced to operate in 2D or 3D mode
2	3	digit	FS	-	Fix status: 0 = no fix 1 = 2D fix 2 = 3D fix
3+N	29	numeric	sv	-	Satellite number
15	1.94	numeric	PDOP	-	PDOP - Position dilution of precision
16	1.18	numeric	HDOP	-	HDOP - Horizontal dilution of precision
17	1.54	numeric	VDOP	-	VDOP - Vertical dilution of precision
18	*0D	hexadecimal	cs	-	Checksum
19	-	character	<CR><LF>	-	Carriage Return and Line Feed (CR - 0d13/0x0D, LF - 0d10/0x0A)

// GSV

Description: GNSS Satellites in View
 Type: Output
 Comment: Only four satellite details are transmitted in one message.

Structure: \$GPGSV, NoMsg, MsgNo, NoSv, {sv, elv, az, cno} *cs <CR><LF>
 Example: \$GPGSV, 3, 1, 10, 23, 38, 230, 44, 29, 71, 156, 47, 07, 29, 116, 41, 08, 09, 081, 36 *7F
 \$GPGSV, 3, 2, 10, 10, 07, 189, , 05, 05, 220, , 09, 34, 274, 42, 18, 25, 309, 44 *72
 \$GPGSV, 3, 3, 10, 26, 82, 187, 47, 28, 43, 056, 46 *77
 Real*: \$GPGSV, 3, 1, 12, 02, 15, 234, 43, 03, 03, 042, 25, 04, 01, 202, , 05, 54, 292, 43 *72
 \$GPGSV, 3, 2, 1, 06, 1, 03, , 07, 7, 05, 24, 8, 86, 209, 3, 10, 0, 17, 32 *6
 \$GGSV 3, 3, 2, 13, 24, 09, 30, 6, 29, 287, 6, 33, 9, 21, 37, 7, 37, 70, *1

*: Last header also PGSV, PGSV3 (3 is number of messages), GGSV (strange behaviour)

N = 1-4 (depends on how many satellites are visible)

No.	Example	Format	Name	Unit	Description
0	\$GPGSV	string	\$GPGSV	-	Message ID, GSV protocol header
1	3	digit	NoMsg	-	Number of messages, total number of GPGSV messages being output
2	1	digit	MsgNo	-	Number of this message
3	10	numeric	NoSv	-	Satellites in View
4 + 4*N	23	numeric	sv	-	Satellite ID
5 + 4*N	38	numeric	elv	degrees	Elevation, range 0..90
6 + 4*N	230	numeric	az	degrees	Azimuth, range 0..359
7 + 4*N	44	numeric	cno	dBHz	C/N0, range 0..99, null when not tracking
5..16	*7F	hexadecimal	cs	-	Checksum
6..16	-	character	<CR><LF>	-	Carriage Return and Line Feed (CR - 0d13/0x0D, LF - 0d10/0x0A)

// RMC

Description: Recommended Minimum data
 Type: Output
 Comment:

Structure: \$GPRMC, hhhmss, status, latitude, N, longitude, E, spd, cog, ddmm yy, mv, mvE, mode *cs <CR><LF>
 Example: \$GPRMC, 083559.00, A, 4717.11437, N, 00833.91522, E, 0.004, 77.52, 091202, , , A *57
 Real: \$GPRMC, 190428.00, A, 4604.81231, N, 01429.42196, E, 2.349, , 050112, , , D *71

No.	Example	Format	Name	Unit	Description
0	\$GPRMC	string	\$GPRMC	-	Message ID, RMC protocol header
1	083559.00	hhmmss.sss	hhmmss.ss	-	UTC Time, Time of position fix
2	A	character	Status	-	Status, V = Navigation receiver warning, A = Data valid
3	4717.11437	ddmm.mmmmm	Latitude	-	Latitude, Degrees + minutes, dd° mm',mmmm
4	N	character	N	-	N/S Indicator, hemisphere N=north or S=south
5	00833.91522	dddmm.mmmmm	Longitude	-	Longitude, Degrees + minutes, dd° mm',mmmm
6	E	character	E	-	E/W indicator, E=east or W=west
7	0.004	numeric	Spd	knots	Speed over ground
8	77.52	numeric	Cog	degrees	Track angle in degrees (from true North)
9	091202	ddmm yy	date	-	Date in day, month, year format
10	-	numeric	mv	degrees	Magnetic variation value, not being output by receiver
11	-	character	mvE	-	Magnetic variation E/W indicator, not being output by receiver
12	A	character	mode	-	Mode Indicator: N = No fix A = Autonomous fix (valid) D = Differential fix (valid) E = Estimated/Dead reckoning fix
13	*57	hexadecimal	cs	-	Checksum
14	-	character	<CR><LF>	-	Carriage Return and Line Feed

// VTG

Description: Course over ground and Ground speed
 Type: Output
 Comment:

Structure: \$GPVTG, cogt, T, cogm, M, sog, N, kph, K, mode *cs <CR><LF>
 Example: \$GPVTG, 77.52, T, , M, 0.004, N, 0.008, K, A *06
 Real: \$GPVTG, , T, , M, 2.349, N, 4.351, K, D *29

No.	Example	Format	Name	Unit	Description
0	\$GPVTG	string	\$GPVTG	-	Message ID, VTG protocol header
1	77.52	numeric	cogt	degrees	Course over ground (true)
2	T	character	T	-	Fixed field: true
3	-	numeric	cogm	degrees	Course over ground (magnetic), not output
4	M	character	M	-	Fixed field: magnetic
5	0.004	numeric	sog	knots	Speed over ground
6	N	character	N	-	Fixed field: knots
7	0.008	numeric	kph	km/h	Speed over ground
8	K	character	K	-	Fixed field: kilometers per hour
9	A	character	mode	-	Mode Indicator: N = No fix A = Autonomous fix (valid) D = Differential fix (valid) E = Estimated/Dead reckoning fix
10	*06	hexadecimal	cs	-	Checksum
11	-	character	<CR><LF>	-	Carriage Return and Line Feed

// TXT

Description: Text Transmission
 Type: Output
 Comment:

Structure: \$GPTXT, xx, yy, zz, ascii data *cs <CR><LF>
 Example: \$GPTXT, 01, 01, 02, u-blox ag - www.u-blox.com *50
 Real:

No.	Example	Format	Name	Unit	Description
0	\$GPTXT	string	\$GPTXT	-	Message ID, TXT protocol header
1	01	numeric	xx	-	Total number of messages in this transmission, 01..99
2	01	numeric	yy	-	Message number in this transmission, range 01..xx
3	02	numeric	zz	-	Text identifier, u-blox GPS receivers specify the severity of the message with this number: 00 = ERROR 01 = WARNING 02 = NOTICE 07 = USER
4	www.u-b...	string	string	-	Any ASCII text
5	*67	hexadecimal	cs	-	Checksum
6	-	character	<CR><LF>	-	Carriage Return and Line Feed

// GPQ

Description: Poll message
 Type: Input
 Comment:

Structure: \$xxGPQ, sid *cs <CR><LF>
 Example: \$EIGPQ, RMC *3A
 Real:

No.	Example	Format	Name	Unit	Description
0	\$EIGPQ	string	\$xxGPQ	-	Message ID, GPQ protocol header, xx = talker identifier
1	RMC	string	sid	-	NMEA sentence identifier
2	*3A	hexadecimal	cs	-	Checksum
3	-	character	<CR><LF>	-	Carriage Return and Line Feed

