

## NMEA Input/Output Messages 12 KANAL GPS (SIRF Chipset)

### 2.1 NMEA Checksum

All NMEA sentences have an optional checksum. The Checksum can be enabled/disabled when setting up the NMEA Protocol. The optional checksum field consists of a " \* " and two hex digits representing the exclusive OR of all characters between, but not including, the s " and ' \* ". The following pseudo code calculates a checksum over an array of characters line '. The first character in the array is " line [ 0 1

### 2.2 NMEA Output Messages

The Evaluation Unit outputs the following messages as shown in Table 2.1:

#### 2.2.1 GGA -Global Positioning System Fixed Data

Table 2.2 contains the values for the following example:

\$GPGGA,161229.487,3723.2475,N,12158.3416,W,1,07,1.0,9.0,M,0000\*18

NMEA Record	Description
GGA	Global positioning system fixed data
GLL	Geographic position - latitude/longitude
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data
VTG	Course over <u>ground</u> and <u>ground speed</u>

Table 2.1: NMEA-0183 Output Messages

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Position	161229.487		hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	w		E=east or W=west
Position Fix Indicator	1		See Table 2.3
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision

MSL Altitude	9.0	meters	
Units	m	meters	
Geoid Separation		meters	
Units	m	meters	
Age of Diff. Corr.	-	second's	Null field When DGPS is not used -
Diff. Ref. Station ID	0000		
Checksum	*18		
CR LF			End of message termination

Table 2.2: GGA Data Format

*Note - This implementation does not support geoid corrections. Values are WG584 ellipsoid heights.*

Value	Description
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

Table 2.3-. Position Fix Indicator

### 2.2.2 GLL-Geographic Position - Latitude/Longitude Table 2.4 contains the values for the following

example: \$GPGLL,3723.2475,N,12158.3416,W,161229.487,A-2C

Name	Example	Units Description
Message ID	\$GPGLL	GLL protocol header
Latitude	3723.2475	ddmm.mmmm
N/S Indicator	N	N=north or S=south
Longitude	12158.3416	dddmm.mmmm
E/W Indicator	W	E=east or W=west
UTC Position	161229.487	hhmmss.sss
Status	A	A=data valid or V=data not valid
Checksum	*2C	
CR LF		End of message termination

Table 2.4: GLL Data Format

### 2.2.3 GSA-GNSS DOP and Active Satellites

Table 2.5 contains the values for the following example:

\$GPGSA,A,3,07,02,26,27,09,04,15..... 1.8,1.0,1.5\*33

Name	Example Units	Description
Message ID	\$GPGSA	GSA protocol header
Mode 1	A	See Table 2.6
Mode 2	3	See Table 2.7
Satellite Used	07	Sv on Channel 1
Satellite Used	02	Sv on Channel 2
Satellite Used		Sv on Channel 12
PDOP	1.8	Position Dilution of Precision
HDOP	1.0	Horizontal Dilution of Precision
VDOP	1.5	Vertical Dilution of Precision
Checksum	*33	
CR LF		End of message termination

Table 2.5: GSA Data Format

Value	Description
1	Fix not available
2	2D
3	3D

Table 2.6: Mode 1

### 2.2.2 GLL-Geographic Position - Latitude/Longitude Table 2.4 contains the values for the following

example: \$GPGLL,3723.2475,N,12158.3416,W,161229.487,A\*2C

Name	Example	Units Description
Message ID	\$GPGLL	GLL protocol header
Latitude	3723.2475	ddmm.mmmmm
N/S Indicator	N	N=north or S=south

Longitude	12158.3416	dddmm.mmmm
E/W Indicator	W	E=east or W=west
UTC Position	161229.487	hhmmss.sss
Status	A	A=data valid or V=data not valid
Checksum	*2C	
CR LF		End of message termination

Table 2.4: GLL Data Format

### 2.2.3 GSA-GNSS DOP and Active Satellites

Table 2.5 contains the values for the following example:

\$GPGSA,A,3,07,02,26,27,09,04,15..... 1.8,1.0,1.5\*33

Name	Example Units	Description
Message ID	\$GPGSA	GSA protocol header
Mode 1	A	See Table 2.6
Mode 2	3	See Table 2.7
Satellite Used	07	Sv on Channel 1
Satellite Used	02	Sv on Channel 2
Satellite Used		Sv on Channel 12
PDOP	1.8	Position Dilution of Precision
HDOP	1.0	Horizontal Dilution of Precision
VDOP	1.5	Vertical Dilution of Precision
Checksum	*33	
CR LF		End of message termination

Table 2.5: GSA Data Format

<u>Value</u>	<u>Description</u>
1	Fix not available
2	2D
3	3D

Table 2.6: Mode 1

<b>Value</b>	<b><u>Description</u></b>
M	Manual-forced to operate in 2D or 3D mode
A	Automatic-allowed to automatically <u>switch 2D/3D</u>

Table 2.7: Mode 2

## 2.2.4 GSV-GNSS Satellites in View

Table 2.8 contains the values for the following example:

\$GPGSV,2,1,07,07,79,048,42,02,51,062,43,26,36,256,42,27,27,138,42\*71

\$GPGSV,2,2,07,09,23,313,42,04,19,159,41,15,12,041,42\*41

Name	Example Units	Description	
Message ID	\$GPGSV	GSV protocol header	
Number of Messages	2	Range 1 to 3	
Message Number1	1	Range 1 to 3	
Satellites in View	07		
Satellite ID	07	Channel 1 (Range 1 to 32)	
Elevation	79	degrees	Channel 1 (Maximum 90)
Azimuth	048	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Satellite ID	27		Channel 4 (Range 1 to 32)
Elevation	27	degrees	Channel 4 (Maximum 90)
Azimuth	138	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
CR LF			End of message termination

Table 2.8: GSV Data Format

*Note - Depending on the number of satellites tracked multiple messages if **GSV** data may be required. This is reported in the "Number of **Messages**" and "Message Number" fields.*

## 2.2.5 RMC-Recommended,Minimum Specific GNSS Data

Table 2.9 contains the values for the following example:

\$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598, \*10

Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	w		E=east or W=west
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation		degrees	E=east or W=west
Checksum	*10		
CR LF			End of message termination

Table 2.9: RMC Data Format

*Note - Magnetic Declination is not supported. Alt 'course over ground' data are geodetic WGS84 directions.*

## 2.2.6 VTG-Course Over Ground and Ground Speed

Table 2.10 contains the values for the following example:

\$GPVTG,309.62,T, m,0.13,N,0.2,K\*6E

Name	Example	Units	Description
Message ID	\$GPVTG		VTG protocol header
Course	309.62	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	m		Magnetic
Speed	0.13	knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	km/hr	Measured horizontal speed
Units	K		Kilometer per hour
Checksum	*6E		
CR LF			End of <u>message termination</u>