

GPS handset's Communication Protocol

The GPS handset has two kinds of communication protocols:

Normal NMEA0183 (please, refer correlative document about NMEA0183, this document only lists the typical output protocol). This document expatiates the HandSet-PC COM Communication Protocol. In actual operation, GPS handset adopts default NMEA0183 protocol (the baud rate is 4800bps), and selects **HandSet-PC COM** Communication Protocol which baud rate is 38400bps in communication menu when communicating to PC.

NMEA0183 Communication Protocol

1.GGA—Global Positioning System Fixed Data

Example:

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

Name	Description	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Time	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 Table4-3
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision

Name	Description	Units	Description
MSL Altitude	9.0	Meters	
Units	M	Meters	
Geoid Separation		Meters	
Units	M	Meters	
Age of Diff. Corr.		Second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		

2.GLL—Geographic Position - Latitude/Longitude

Example:

\$GPGLL,3723.2475,N,12158.3416,W,161229.487,A,A*41

Name	Example	Units	Description
Message ID	\$GPGLL		GLL protocol header
Latitude	3723.2475		dd mm.mmmm
N/S Indicator	N		N = north or S = south
Longitude	12158.3416		ddd mm.mmmm
E/W Indicator	W		E = east or W = west
UTC Position	161229.487		hh mm ss.sss
Status	A		A = data valid or V = data not valid
Checksum	*2C		

3. GSA—GNSS DOP and Active Satellites

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 4-6
Mode 2	3		See Table 4-7
Satellite Used *1	07		SV on Channel 1
Satellite Used *1			SV on Channel 2

.....		
Satellite Used *1			SV on Channel N
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		

4. GSV—GNSS Satellites in View

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 Number 1	1		Range 1 to 3
Satellites in View	07		Range 1 to 12
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		

5.MSS—MSK Receiver Signal

Example:

\$GPMSS,55,27,318.0,100,1,*57

Name	Example	Units	Description
Message ID	\$GPMSS		MSS protocol header
Signal Strength	55	dB	SS of tracked frequency
Signal-to-Noise Ratio	27	dB	SNR of tracked frequency
Beacon Frequency	318.0	kHz	Currently tracked frequency
Beacon Bit Rate	100		bits per second
<i>Channel Number</i>	<i>1</i>		<i>The channel of the beacon being used if a multi-channel beacon receiver is used</i>
Checksum	*57		
<CR> <LF>			End of message termination

6.RMC—Recommended Minimum Specific GNSS Data

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		Hh mm ss.sss
Status	A		A = data valid or V = data not valid
Latitude	3723.2475		dd mm.mmmm
N/S Indicator	N		N = north or S = south
Longitude	12158.3416		ddd mm.mmmm
E/W Indicator	W		E = east or W = west

Name	Example	Units	Description
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		dd mm yy
Magnetic Variation ¹	02.6	degrees	
E/W Indicator	W		E = east or W = west
Checksum	*10		

7.VTG—Course Over Ground and Ground Speed

Example:

\$GPVTG, 309.62,T,, M, 0.13,N, 0.2,K, A*23

Name	Example	Units	Description
Message ID	\$GPVTG		VTG protocol header
Course	309.62	Degrees	Measured heading
Reference	T		
Course		Degrees	Measured heading
Reference	M		Magnetic ¹
Speed	0.13	Knots	Measured horizontal speed
Units	N		
Speed	0.2	Km/hr	Measured horizontal speed
Units	K		Kilometer per hour
Checksum	*6E		

8.ZDA—SiRF Timing Message

Example:

\$GPZDA, 181813,14,10,2003,00,00*4F

Name	Example	Units	Description
Message ID	\$GPZDA		ZDA protocol header
Hour, Min, Sec, Sub Sec	114523.62		Hhmmss.ss
Day	12		day in UTC, 01 to 31
Month	4		month in UTC, 01 to 12
Year	2001		year in UTC
Local Zone Hours	10		local zone hours, +/- 13 hours
Local Zone Minutes	34		local zone minutes, 0 to +59
Checksum	*6E		

9.150—*OkToSend*

Examples:

\$PSRF150,1*3F

Name	Example	Units	Description
Message ID	\$PSRF150		PSRF150 protocol header
OkToSend	1		1=OK to send, 0=not OK to send
Checksum	*3F		
<CR> <LF>			End of message termination

HandSet-PC Com Communication Protocol

The communication protocol between PC and handset is shown by hex, and spaced by "blank symbol" among every bit

Connecting handset, reading the version info of handset

Send command : A0 A2 00 02 B6 30 00 E6 B0 B3

Response info : A0 A2 00 16 B5 30 30 33 2C 54 41 54 4F 30 36 31 34 31 32 35
35 30 35 43 4C 2C 05 64 B0 B3

Area"54 41 54 4F 30 36 31 34 31 32 35 35 30 35 43 4C" is the version info of handset (deal as algorithm)

Disconnect

A0 A2 00 02 B6 32 00 E8 B0 B3

Response normally : A0 A2 00 03 B5 32 30 01 17 B0 B3

Response in the condition of disconnect : A0 A2 00 03 B5 32 31 01 18 B0 B3

Reading the total of WPT

Send command : A0 A2 00 02 B6 33 00 E9 B0 B3

Response info :

Firstly ,finding the seventh bit of response info from the zero bit, then reading the data until the next ",",fetching the integer in gained data (deal as algorithm) , the gained integer by this is the total of WPT.

Reading WPT data

Send command : A0 A2 xx xx B6 38 ii yy yy B0 B3 (xx xx :the byte length

from B6 to ii ; yy yy : the sum from B6 to ii , the high position of sum is 0 ; ii:

the index of route , index begins from 1)

Response info :

Firstly ,finding the seventh bit of response info from the zero bit, then reading the data until the next “;”, the gained data is the name of WPT ; again to the next “;” is the LAT of WPT ; again to the next “;” is the LON of WPT ; again to the next “;” is altitude ; Again to the next “;” is the type of WPT ; again to the next “;” is the time of WPT ; again to the next “;” is the index of WPT。 Attention: when you read the time ,please deal the data as hex (the time transferred will use the format of “capitalization+ number”)

[Reading the total of route](#)

Send command : A0 A2 00 02 B6 34 00 EA B0 B3

Response info :

Firstly ,finding the seventh bit of response info from the zero bit, then reading the data until the next “;”,fetching the integer in gained data (deal as algorism) , the gained integer by this is the total of route.

[Reading route \(name, total of route WPT, number\)](#)

Send command : A0 A2 xx xx B6 36 ii yy yy B0 B3 (the unknown byte is deal as WPT , please reference WPT)

Response info :

Firstly ,finding the seventh bit of response info from the zero bit, then reading

the data until the next “;”,the gained string is the name of route ; Again to the next “;” is the total of route WPT; again to the next “;” is the number of route WPT

Reading route (number, the index of begin route WPT, the index of other route WPT)

Send command : A0 A2 xx xx B6 39 route index num yy yy B0 B3

Response info :

xx and yy please reference the similar previous part

The number of route: route

the index of begin route WPT : index

the total of route WPT : num

but the value of index and num is relating to the total of current route

WPT ,valued as following :

if the total of current route WPT is less than 16,then index and num is valued normally(Attention: index and num is valued from 1).if the total of current route

WPT is more than 16,then valued by two steps: firstly , index is valued as the

index of begin route WPT , num is valued as 16,then querying by them , and

saving the gained index (supposed to save in first 16 elements of array

routewpt[100]) ; then ,valuing index as 17,num is valued as “the totaled route

WPT-16”, then querying by them, and saving the gained index in the behind 16 elements of array routewpt[16],after that , finding the seventh bit of response

info from the zero bit, then reading the data until the next “;” , , the integer in the

gained string is the number of route ; Again to the next “;” is the index of begin

route WPT, later, spacing the left route WPT’ index by “;”.

Reading the total of trace

Send Command : A0 A2 00 02 B6 35 00 EB B0 B3

Response info :

Firstly ,finding the seventh bit of response info from the zero bit, then reading the data until the next “,”,fetching the integer in gained data (deal as algorism) , the gained integer by this is the total of trace.

Reading the parameter of trace (name、 starttime、 endtime、 distance 、 total、 maxspeed、 the number of trace)

Send Command : A0 A2 xx xx B6 37 index yy yy B0 B3

The index of route : index

Response info :

Firstly ,finding the seventh bit of response info from the zero bit, then counting the data until the next “,”,the gained string is the name of trace ; again to the next “,” is start time ; (regarded as hex data) ; again to the next “,” is end time(regarded as hex data;) ; again to the next “,” is the distance of trace (regarded as double) ; again to the next “,” is the total of trace WPT; again to the next “,” is the max speed (regarded as double) ; Again to the next “,” is index.

Reading the parameter of trace WPT (LAT、 LON、 speed、 time)

Send Command : A0 A2 xx xx B6 3A trace index yy yy B0 B3

The number of trace : trace

The index of trace WPT : index

Response info :

Firstly ,finding the seventh bit of response info from the zero bit, then counting the data until the next “,” ,the integer in gained string is trace; again to the next “,” is index; again to the next “,” is the LAT of trace WPT ; again to the next “,” is the LON of trace WPT ; again to the next “,” is the speed of trace WPT ; again to the next “,” is the time of trace WPT ; (regarded as hex data; the time transferred will use the format of “capitalization+ number”)

The parse about time :

The time data should be received by 32bit , the means of these data bit is shown as following (from high to low) :

Thereinto, adding 2000 to year is true year ,adding 8 to time is Beijing time , then adjust it.
year(6bit) month(4bit) day(5bit)hour(5bit) minute(6bit)second (6bit)

Create a WPT

Send Command : A0 A2 xx xx B6 3C index name lat lon alt type time yy yy B0 B3

Length : xx xx , Check Sum :yy yy。

The index of WPT : Index

The name of WPT : name

The LAT of WPT : lat

The LON of WPT : lon

The altitude of WPT : alt

The type of WPT : type

The time of WPT : time

Create a route

Send Command : A0 A2 xx xx B6 3D name wptnum valid yy yy B0 B3

Length : xx xx , Check Sum :yy yy。

The name of route : name

The count of WPT : wptnum

The validity of route : valid

Download route WPT

Send Command : A0 A2 xx xx B6 3e routeindex startindex routewptnum index1
index2 ... indexn yy
yy B0 B3

Length : xx xx , Check Sum :yy yy。

The index of route : routeindex

The position index of route WPT in route : startindex

The count of route WPT : routewptnum

The index of route WPT in WPT list : index1.....indexn

Create a trace

Send Command : A0 A2 xx xx B6 40 name starttime endtime distance count
maxspeed yy yy B0 B3

Length : xx xx , Check Sum :yy yy。

The name of trace : name

The start time of trace : starttime

The end time of trace : endtime

The distance of trace : distance

The count of trace : count

The maxspeed of trace : maxspeed

Download trace WPT

A0 A2 xx xx B6 41 index num lat1 lon1 speed1 lat2 lon2 speed2 ... latn lonn
speedn yy yy B0
B3

Length : xx xx , Check Sum :yy yy。

Trace index : index

The total of trace WPT : num

The WPT n's LAT: latn

The WPT n'sLON: lonn

The WPT n's speed: speedn

Attention:

If you want to send a command which contains more than one subentries (For example, a command contains subentries about "name", "starttime", "endtime"), you should space them by " ; " .