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26 sentenças interpretadas que são transmitidas por um GPS

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$GPAAM

Waypoint Arrival Alarm

This sentence is generated by some units to indicate the Status of arrival (entering the arrival circle, or passing the perpendicular of the course line) at the destination waypoint.

```
  $GPAAM,A,A,0.10,N,WPTNME*43

Where:
    AAM    Arrival Alarm
    A      Arrival circle entered
    A      Perpendicular passed
    0.10   Circle radius
    N      Nautical miles
    WPTNME Waypoint name
    *43    Checksum data
```

$GPALM

GPS Almanac Data

A set of sentences transmitted by some Garmin units in response to a received $PGRMO,GPALM,1 sentence. It can also be received by some GPS units (eg. Garmin GPS 16 and GPS 17) to initialize the stored almanac information in the unit.

Example 1: $GPALM,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,*CC

```
1 = Total number of sentences in set
2 = Sentence sequence number in set
3 = Satellite number
4 = GPS week number
5 = Bits 17 to 24 of almanac page indicating SV health
6 = Eccentricity
7 = Reference time of almanac
8 = Inclination angle
9 = Right ascension rate
10 = Semi major axis route
11 = Argument of perigee (omega)
12 = Ascension node longitude
13 = Mean anomaly
14 = af0 clock parameter
15 = af1 clock parameter
```

Example 2: $GPALM,1,1,15,1159,00,441d,4e,16be,fd5e,a10c9f,4a2da4,686e81,58cbe1,0a4,001*5B

Field	Example	Comments
Sentence ID	$GPALM	
Number of messages	1	Total number of messages in sequence
Sequence number	1	This is first message in sequence
Satellite PRN	15	Unique ID (PRN) of satellite message relates to
GPS week number	1159	
SV health	00	Bits 17-24 of almanac page
Eccentricity	441d	
Reference time	4e	Almanac reference time
Inclination angle	16be	
Rate of right ascension	fd5e	
Roor of semi-major axis	a10c9f	
Argument of perigee	4a2da4	
Longitude of ascension node	686e81	
Mean anomoly	58cbe1	
F0 clock parameter	0a4	
F1 clock parameter	001	
Checksum	*5B	

$GPAPB

Autopilot format "B"

This sentence is sent by some GPS receivers to allow them to be used to control an autopilot unit. This sentence is commonly used by autopilots and contains navigation receiver warning flag status,

cross-track-error, waypoint arrival status, initial bearing from origin waypoint to the destination, continuous bearing from present position to destination and recommended heading-to-steer to destination waypoint for the active navigation leg of the journey.

Note: Some autopilots, Robertson in particular, misinterpret "bearing from origin to destination" as "bearing from present position to destination". This is likely due to the difference between the APB sentence and the APA sentence. for the APA sentence this would be the correct thing to do for the data in the same field. APA only differs from APB in this one field and APA leaves off the last two fields where this distinction is clearly spelled out. This will result in poor performance if the boat is sufficiently off-course that the two bearings are different.

```
  $GPAPB,A,A,0.10,R,N,V,V,011,M,DEST,011,M,011,M*82

where:
    APB     Autopilot format B
    A       Loran-C blink/SNR warning, general warning
    A       Loran-C cycle warning
    0.10    cross-track error distance
    R       steer Right to correct (or L for Left)
    N       cross-track error units - nautical miles (K for kilometers)
    V       arrival alarm - circle
    V       arrival alarm - perpendicular
    011,M   magnetic bearing, origin to destination
    DEST    destination waypoint ID
    011,M   magnetic bearing, present position to destination
    011,M   magnetic heading to steer (bearings could True as 033,T)
```

$GPBOD

Bearing Origin to Destination

```
eg.  BOD,045.,T,023.,M,DEST,START
           045.,T       bearing 045 degrees True from "START" to "DEST"
           023.,M       breaing 023 degrees Magnetic from "START" to "DEST"
           DEST         destination waypoint ID
           START        origin waypoint ID
```

Example 1: $GPBOD,099.3,T,105.6,M,POINTB,*01
Waypoint ID: "POINTB" Bearing 99.3 True, 105.6 Magnetic
This sentence is transmitted in the GOTO mode, without an active route on your GPS. WARNING: this is the bearing from the moment you press enter in the GOTO page to the destination waypoint and is NOT updated dynamically! To update the information, (current bearing to waypoint), you will have to press enter in the GOTO page again.

Example 2: $GPBOD,097.0,T,103.2,M,POINTB,POINTA*52
This sentence is transmitted when a route is active. It contains the active leg information: origin waypoint "POINTA" and destination waypoint "POINTB", bearing between the two points 97.0 True, 103.2 Magnetic. It does NOT display the bearing from current location to destination waypoint! WARNING Again this information does not change until you are on the next leg of the route. (The bearing from POINTA to POINTB does not change during the time you are on this leg.)

$GPBWC

Bearing and distance to waypoint, great circle

```
eg1. $GPBWC,081837,,,,,,T,,M,,N,*13

        BWC,225444,4917.24,N,12309.57,W,051.9,T,031.6,M,001.3,N,004*29
```

```
            225444       UTC time of fix 22:54:44
            4917.24,N    Latitude of waypoint
            12309.57,W   Longitude of waypoint
            051.9,T      Bearing to waypoint, degrees true
            031.6,M      Bearing to waypoint, degrees magnetic
            001.3,N      Distance to waypoint, Nautical miles
            004          Waypoint ID


eg2. $GPBWC,220516,5130.02,N,00046.34,W,213.8,T,218.0,M,0004.6,N,EGLM*11
               1      2    3     4    5    6  7   8   9    10  11 12 13


      1    220516    timestamp
      2    5130.02   Latitude of next waypoint
      3    N         North/South
      4    00046.34  Longitude of next waypoint
      5    W         East/West
      6    213.0     True track to waypoint
      7    T         True Track
      8    218.0     Magnetic track to waypoint
      9    M         Magnetic
      10   0004.6    range to waypoint
      11   N         unit of range to waypoint, N = Nautical miles
      12   EGLM      Waypoint name
      13   *11       checksum
```

$GPGGA

Global Positioning System Fix Data

eg1. $GPGGA,170834,4124.8963,N,08151.6838,W,1,05,1.5,280.2,M,-34.0,M,,,*75

Name	Example Data	Description
Sentence Identifier	$GPGGA	Global Positioning System Fix Data
Time	170834	17:08:34 UTC
Latitude	4124.8963, N	41d 24.8963' N or 41d 24' 54" N
Longitude	08151.6838, W	81d 51.6838' W or 81d 51' 41" W
Fix Quality: - 0 = Invalid - 1 = GPS fix - 2 = DGPS fix	1	Data is from a GPS fix
Number of Satellites	05	5 Satellites are in view
Horizontal Dilution of Precision (HDOP)	1.5	Relative accuracy of horizontal position
Altitude	280.2, M	280.2 meters above mean sea level
Height of geoid above WGS84 ellipsoid	-34.0, M	-34.0 meters
Time since last DGPS update	blank	No last update
DGPS reference station id	blank	No station id
Checksum	*75	Used by program to check for transmission errors

Courtesy of Brian McClure, N8PQI.

Global Positioning System Fix Data. Time, position and fix related data for a GPS receiver.

eg2. $GPGGA,hhmmss.ss,ddmm.mmm,a,dddmm.mmm,b,q,xx,p.p,a.b,M,c.d,M,x.x,nnnn

hhmmss.ss = UTC of position
ddmm.mmm = latitude of position
a = N or S, latitutde hemisphere
dddmm.mmm = longitude of position
b = E or W, longitude hemisphere
q = GPS Quality indicator (0=No fix, 1=Non-differential GPS fix, 2=Differential GPS fix, 6=Estimated fix)
xx = number of satellites in use
p.p = horizontal dilution of precision
a.b = Antenna altitude above mean-sea-level
M = units of antenna altitude, meters
c.d = Geoidal height
M = units of geoidal height, meters
x.x = Age of Differential GPS data (seconds since last valid RTCM transmission)
nnnn = Differential reference station ID, 0000 to 1023

$GPGLL

Geographic Position, Latitude / Longitude and time.

```
eg1. $GPGLL,3751.65,S,14507.36,E*77
eg2. $GPGLL,4916.45,N,12311.12,W,225444,A


           4916.46,N    Latitude 49 deg. 16.45 min. North
           12311.12,W   Longitude 123 deg. 11.12 min. West
           225444       Fix taken at 22:54:44 UTC
           A            Data valid


eg3. $GPGLL,5133.81,N,00042.25,W*75
                1    2     3    4 5

      1    5133.81   Current latitude
      2    N         North/South
      3    00042.25  Current longitude
      4    W         East/West
      5    *75       checksum
```

$--GLL,lll.ll,a,yyyyy.yy,a,hhmmss.ss,A llll.ll = Latitude of position

a = N or S
yyyyy.yy = Longitude of position
a = E or W
hhmmss.ss = UTC of position
A = status: A = valid data

$GPGRS

GPS Range Residuals

Example: $GPGRS,024603.00,1,-1.8,-2.7,0.3,,,,,,,,*6C

Field	Example	Comments
Sentence ID	$GPGRS	
UTC Time	024603.00	UTC time of associated GGA fix
Mode	1	0 = Residuals used in GGA, 1 = residuals calculated after GGA
Sat 1 residual	-1.8	Residual (meters) of satellite 1 in solution
Sat 2 residual	-2.7	The order matches the PRN numbers in the GSA sentence
Sat 3 residual	0.3	
Sat 4 residual		Unused entries are blank
Sat 5 residual		
Sat 6 residual		
Sat 7 residual		
Sat 8 residual		
Sat 9 residual		
Sat 10 residual		
Sat 11 residual		
Sat 12 residual		
Checksum	*6C	

$GPGSA

GPS DOP and active satellites

```
eg1. $GPGSA,A,3,,,,,,16,18,,22,24,,,3.6,2.1,2.2*3C
eg2. $GPGSA,A,3,19,28,14,18,27,22,31,39,,,,,1.7,1.0,1.3*34


1    = Mode:
       M=Manual, forced to operate in 2D or 3D
       A=Automatic, 3D/2D
2    = Mode:
       1=Fix not available
       2=2D
       3=3D
3-14 = PRN's of Satellite Vechicles (SV's) used in position fix (null for unused fields)
15   = Position Dilution of Precision (PDOP)
16   = Horizontal Dilution of Precision (HDOP)
17   = Vertical Dilution of Precision (VDOP)
```

$GPGST

GPS Pseudorange Noise Statistics

Example: $GPGST,024603.00,3.2,6.6,4.7,47.3,5.8,5.6,22.0*58

Field	Example	Comments
Sentence ID	$GPGST	
UTC Time	024603.00	UTC time of associated GGA fix

RMS deviation	3.2	Total RMS standard deviation of ranges inputs to the navigation solution
Semi-major deviation	6.6	Standard deviation (meters) of semi-major axis of error ellipse
Semi-minor deviation	4.7	Standard deviation (meters) of semi-minor axis of error ellipse
Semi-major orientation	47.3	Orientation of semi-major axis of error ellipse (true north degrees)
Latitude error deviation	5.8	Standard deviation (meters) of latitude error
Longitude error deviation	5.6	Standard deviation (meters) of longitude error
Altitude error deviation	22.0	Standard deviation (meters) of latitude error
Checksum	*58	

$GPGSV

GPS Satellites in view

```
eg. $GPGSV,3,1,11,03,03,111,00,04,15,270,00,06,01,010,00,13,06,292,00*74
    $GPGSV,3,2,11,14,25,170,00,16,57,208,39,18,67,296,40,19,40,246,00*74
    $GPGSV,3,3,11,22,42,067,42,24,14,311,43,27,05,244,00,,,,*4D


    $GPGSV,1,1,13,02,02,213,,03,-3,000,,11,00,121,,14,13,172,05*62


1    = Total number of messages of this type in this cycle
2    = Message number
3    = Total number of SVs in view
4    = SV PRN number
5    = Elevation in degrees, 90 maximum
6    = Azimuth, degrees from true north, 000 to 359
7    = SNR, 00-99 dB (null when not tracking)
8-11 = Information about second SV, same as field 4-7
12-15= Information about third SV, same as field 4-7
16-19= Information about fourth SV, same as field 4-7
```

$GPHDT

Heading, True.

Actual vessel heading in degrees Ture produced by any device or system producing true heading.

$--HDT,x.x,T
x.x = Heading, degrees True

$GPMSK

Control for a Beacon Receiver

```
  $GPMSK,318.0,A,100,M,2*45

where:
       318.0      Frequency to use
       A          Frequency mode, A=auto, M=manual
```

```
       100         Beacon bit rate
       M           Bitrate, A=auto, M=manual
       2           frequency for MSS message status (null for no status)
       *45         checksum
```

$GPMSS

Beacon Receiver Status

Example 1: $GPMSS,55,27,318.0,100,*66

```
where:
       55          signal strength in dB
       27          signal to noise ratio in dB
       318.0       Beacon Frequency in KHz
       100         Beacon bitrate in bps
       *66         checksum
```

Example 2: $GPMSS,0.0,0.0,0.0,25,2*6D

Field	Example	Comments
Sentence ID	$GPMSS	
Signal strength	0.0	Signal strength (dB 1uV)
SNR	0.0	Signal to noise ratio (dB)
Frequency	0.0	Beacon frequency (kHz)
Data rate	25	Beacon data rate (BPS)
Unknown field	2	Unknown field sent by GPS receiver used for test
Checksum	*6D	

$GPR00

List of waypoint IDs in currently active route

```
eg1. $GPR00,EGLL,EGLM,EGTB,EGUB,EGTK,MBOT,EGTB,,,,,,,*58
eg2. $GPR00,MINST,CHATN,CHAT1,CHATW,CHATM,CHATE,003,004,005,006,007,,,*05


List of waypoints. This alternates with $GPWPL cycle
which itself cycles waypoints.
```

$GPRMA

Recommended minimum specific Loran-C data

```
eg. $GPRMA,A,lll,N,lll,W,x,y,ss.s,ccc,vv.v,W*hh
A    = Data status
lll  = Latitude
N    = N/S
lll  = longitude
S    = W/E
x    = not used
y    = not used
ss.s = Speed over ground in knots
```

```
ccc  = Course over ground
vv.v = Variation
W    = Direction of variation E/W
hh   = Checksum
```

$GPRMB

Recommended minimum navigation information (sent by nav. receiver when a destination waypoint is active)

```
eg1. $GPRMB,A,0.66,L,003,004,4917.24,N,12309.57,W,001.3,052.5,000.5,V*0B


           A            Data status A = OK, V = warning
           0.66,L       Cross-track error (nautical miles, 9.9 max.),
                                steer Left to correct (or R = right)
           003          Origin waypoint ID
           004          Destination waypoint ID
           4917.24,N    Destination waypoint latitude 49 deg. 17.24 min. N
           12309.57,W   Destination waypoint longitude 123 deg. 09.57 min. W
           001.3        Range to destination, nautical miles
           052.5        True bearing to destination
           000.5        Velocity towards destination, knots
           V            Arrival alarm  A = arrived, V = not arrived
           *0B          mandatory checksum


eg2. $GPRMB,A,4.08,L,EGLL,EGLM,5130.02,N,00046.34,W,004.6,213.9,122.9,A*3D
            1   2  3   4    5    6     7   8      9   10    11    12   13


      1    A         validity
      2    4.08      off track
      3    L         Steer Left (L/R)
      4    EGLL      last waypoint
      5    EGLM      next waypoint
      6    5130.02   Latitude of Next waypoint
      7    N         North/South
      8    00046.34  Longitude of next waypoint
      9    W         East/West
      10   004.6     Range
      11   213.9     bearing to waypt.
      12   122.9     closing velocity
      13   A         validity
      14   *3D       checksum


eg3. $GPRMB,A,x.x,a,c--c,d--d,llll.ll,e,yyyyy.yy,f,g.g,h.h,i.i,j*kk
1    = Data Status (V=navigation receiver warning)
2    = Crosstrack error in nautical miles
3    = Direction to steer (L or R) to correct error
4    = Origin waypoint ID#
5    = Destination waypoint ID#
6    = Destination waypoint latitude
7    = N or S
8    = Destination waypoint longitude
9    = E or W
10   = Range to destination in nautical miles
11   = Bearing to destination, degrees True
12   = Destination closing velocity in knots
13   = Arrival status; (A=entered or perpendicular passed)
14   = Checksum
```

$GPRMC

Recommended minimum specific GPS/Transit data

```
eg1. $GPRMC,081836,A,3751.65,S,14507.36,E,000.0,360.0,130998,011.3,E*62
eg2. $GPRMC,225446,A,4916.45,N,12311.12,W,000.5,054.7,191194,020.3,E*68


           225446       Time of fix 22:54:46 UTC
           A            Navigation receiver warning A = Valid position, V = Warning
           4916.45,N    Latitude 49 deg. 16.45 min. North
           12311.12,W   Longitude 123 deg. 11.12 min. West
           000.5        Speed over ground, Knots
           054.7        Course Made Good, degrees true
           191194       UTC Date of fix, 19 November 1994
           020.3,E      Magnetic variation, 20.3 deg. East
           *68          mandatory checksum


eg3. $GPRMC,220516,A,5133.82,N,00042.24,W,173.8,231.8,130694,004.2,W*70
             1    2    3    4    5     6    7    8      9     10  11 12


      1   220516     Time Stamp
      2   A          validity - A-ok, V-invalid
      3   5133.82    current Latitude
      4   N          North/South
      5   00042.24   current Longitude
      6   W          East/West
      7   173.8      Speed in knots
      8   231.8      True course
      9   130694     Date Stamp
      10  004.2      Variation
      11  W          East/West
      12  *70        checksum


eg4. for NMEA 0183 version 3.00 active the Mode indicator field is added
     $GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a,m*hh
Field #
1    = UTC time of fix
2    = Data status (A=Valid position, V=navigation receiver warning)
3    = Latitude of fix
4    = N or S of longitude
5    = Longitude of fix
6    = E or W of longitude
7    = Speed over ground in knots
8    = Track made good in degrees True
9    = UTC date of fix
10   = Magnetic variation degrees (Easterly var. subtracts from true course)
11   = E or W of magnetic variation
12   = Mode indicator, (A=Autonomous, D=Differential, E=Estimated, N=Data not valid)
13   = Checksum
```

$GPRTE

Routes

```
eg. $GPRTE,2,1,c,0,PBRCPK,PBRTO,PTELGR,PPLAND,PYAMBU,PPFAIR,PWARRN,PMORTL,PLISMR*73
    $GPRTE,2,2,c,0,PCRESY,GRYRIE,GCORIO,GWERR,GWESTG,7FED*34
           1 2 3 4 5 ..
```

1. Number of sentences in sequence
2. Sentence number
3. 'c' = Current active route, 'w' = waypoint list starts with destination waypoint
4. Name or number of the active route
5. onwards, Names of waypoints in Route

$GPTRF

Transit Fix Data

Time, date, position, and information related to a TRANSIT Fix.

$--TRF,hhmmss.ss,xxxxxx,llll.ll,a,yyyyy.yy,a,x.x,x.x,x.x,x.x,x.x,xxx
hhmmss.ss = UTC of position fix
xxxxxx = Date: dd/mm/yy
llll.ll,a = Latitude of position fix, N/S
yyyyy.yy,a = Longitude of position fix, E/W
x.x = Elevation angle
x.x = Number of iterations
x.x = Number of Doppler intervals
x.x = Update distance, nautical miles
x.x = Satellite ID

$GPSTN

Multiple Data ID.

This sentence is transmitted before each individual sentence where there is a need for the Listener to determine the exact source of data in the system. Examples might include dual-frequency depthsounding equipment or equipment that integrates data from a number of sources and produces a single output.

$--STN,xx
xx = Talker ID number, 00 to 99

$GPVBW

Dual Ground / Water Speed

Water referenced and ground referenced speed data.

$--VBW,x.x,x.x,A,x.x,x.x,A
x.x = Longitudinal water speed, knots
x.x = Transverse water speed, knots
A = Status: Water speed, A = Data valid
x.x = Longitudinal ground speed, knots
x.x = Transverse ground speed, knots
A = Status: Ground speed, A = Data valid

$GPVTG

Track Made Good and Ground Speed.

```
eg1. $GPVTG,360.0,T,348.7,M,000.0,N,000.0,K*43
eg2. $GPVTG,054.7,T,034.4,M,005.5,N,010.2,K*41


           054.7,T      True course made good over ground, degrees
           034.4,M      Magnetic course made good over ground, degrees
           005.5,N      Ground speed, N=Knots
           010.2,K      Ground speed, K=Kilometers per hour
```

```
eg3. for NMEA 0183 version 3.00 active the Mode indicator field
     is added at the end
     $GPVTG,054.7,T,034.4,M,005.5,N,010.2,K,A*53
           A            Mode indicator (A=Autonomous, D=Differential,
                        E=Estimated, N=Data not valid)
```

$GPWPL

Waypoint location

```
eg1. $GPWPL,4917.16,N,12310.64,W,003*65


           4917.16,N    Latitude of waypoint
           12310.64,W   Longitude of waypoint
           003          Waypoint ID


             When a route is active, this sentence is sent once for each
             waypoint in the route, in sequence. When all waypoints have
             been reported, GPR00 is sent in the next data set. In any
             group of sentences, only one WPL sentence, or an R00
             sentence, will be sent.


eg2.  $GPWPL,5128.62,N,00027.58,W,EGLL*59
         1     2     3    4  5   6


      1    5128.62   Latitude of nth waypoint on list
      2    N         North/South
      3    00027.58  Longitude of nth waypoint
      4    W         East/West
      5    EGLL      Ident of nth waypoint
      6    *59       checksum
```

$GPXTE

Cross Track Error, Measured

```
eg1. $GPXTE,A,A,0.67,L,N


           A            General warning flag V = warning
                                (Loran-C Blink or SNR warning)
           A            Not used for GPS (Loran-C cycle lock flag)
           0.67         cross track error distance
           L            Steer left to correct error (or R for right)
           N            Distance units - Nautical miles


eg2. $GPXTE,A,A,4.07,L,N*6D
            1 2  3   4 5 6


      1    A         validity
      2    A         cycle lock
      3    4.07      distance off track
      4    L         steer left (L/R)
      5    N         distance units
      6    *6D       checksum
```

$GPZDA

UTC Date / Time and Local Time Zone Offset

Example 1: $GPZDA,hhmmss.ss,xx,xx,xxxx,xx,xx

```
hhmmss.ss = UTC
xx = Day, 01 to 31
xx = Month, 01 to 12
xxxx = Year
xx = Local zone description, 00 to +/- 13 hours
xx = Local zone minutes description (same sign as hours)
```

Example 2: $GPZDA,024611.08,25,03,2002,00,00*6A

Field	Example	Comments
Sentence ID	$GPZDA	
UTC Time	024611.08	UTC time
UTC Day	25	UTC day (01 to 31)
UTC Month	03	UTC month (01 to 12)
UTC Year	2002	UTC year (4 digit format)
Local zone hours	00	Offset to local time zone in hours (+/- 00 to +/- 59)
Local zone minutes	00	Offset to local time zone in minutes (00 to 59)
Checksum	*6A	

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Format of latitudes and longitudes

Where a numeric latitude or longitude is given, the two digits immediately to the left of the decimal point are whole minutes, to the right are decimals of minutes, and the remaining digits to the left of the whole minutes are whole degrees.

eg. 4533.35 is 45 degrees and 33.35 minutes. ".35" of a minute is exactly 21 seconds.

eg. 16708.033 is 167 degrees and 8.033 minutes. ".033" of a minute is about 2 seconds.

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References

This information on NMEA sentences has been sourced from all over the 'net and I make no apologies for any inaccuracies or errors. Still, it's useful stuff. I wish to thank all the sources, which are listed on my GPS Links page. Please contact me if you know of freely available interpretations of sentences which are not on this page.

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