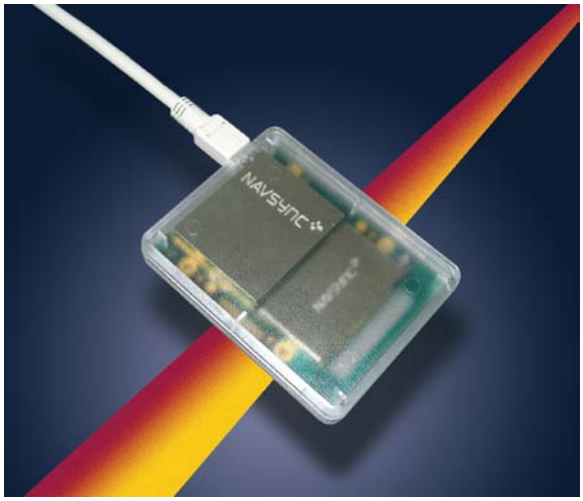
CW19



NAVSYNC

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Revision History of Version 1.0

Revision	Date	Released By	Note
0	4/27/05	Engineering	Initial Release

Table 1 Revision History

Other Documentation

The following additional documentation may be of use in understanding this document.

Document	By	Note
None are available at this time		

Table 2 Additional Documentation List

1 INTRODUCTION

The CW19 is a small size GPS receiver with integrated antenna that has been specifically designed for use in weak signal GPS environments and ease of use with USB connectivity, while maintaining all the features of a standard GPS solution, such as high accuracy.

Normal GPS systems cannot track satellites below -175 dBW (-145 dBm) however the CW19 can track down a further 10 dB resulting in tracking down to -185 dBW (-155 dBm). This makes it possible to track the person, asset or vehicle as they enter buildings, move under dense vegetation, or drive through dense urban canyons. In order to obtain this level of performance the CW19 uses an innovative GPS engine built into its BB25IC, which enables the system to search in parallel 12288 time/frequency bins. Not only does this enable better sensitivity but also makes for very rapid acquisition of the satellites. At outdoor signal levels the time taken to obtain a 'hot' position fix is under 2 seconds.

The CW19's integrated package and USB connectivity adds GPS capability to Windows-based or Mac computers. With a typical power requirement of only 1.1 Watts, the CW19 is well suited for mobile applications. The CW19 supports the NMEA 0183 standard for GPS device communication for compatibility with GPS enabled software.

Key Features of the CW19 include: Key Features of the CW19 include:

- Enables indoor use
  - -173 dBW acquisition and -185 dBW tracking
- Rapid Time To Fix
  - <2 second outdoors
- Stand-alone CW19 Receiver
  - USB connectivity and integrated antenna
- Small Size
  - 66mm x 52mm x 11.1mm

This document, the **CW19 Data Sheet**, provides information on the Performance, Hardware Elements, and Software Interface of the CW19.

Key information includes:

- Performance Specifications
- Physical Characteristics
- Block Diagram
- USB Interface
  - Virtual COM Port driver installation
  - Command Reference
- LED Indicators

The specifications in the following sections refer to the standard software builds of the CW19. The performance and specification of the CW-19 can be modified with the use of customized software builds.

2 SPECIFICATION

2.1 Performance

CW19 GPS RECEIVER SPECIFICATIONS[1]

Physical	Module dimensions	66mm (D) x 52mm (W) x 11.1mm (H)
	Operating Temp Range	-40 to 75°C
	Storage Temp Range	-55 to 125°C
	Humidity	5% to 95% non-condensing
	Max Velocity / Altitude	515ms^{-1} / 18,000m (increased rating version available subject to export license)
	Max Acceleration / Jerk	4g / 1gs^{-1} (sustained for less than 5 seconds)
Sensitivity	Acquisition/Tracking	-173dBW / -185dBW
	Acquisition Time(Outdoor)	Cold: <60s Warm: <45s Hot: <2s Re-acquisition: <0.5s (90%confidence)
Accuracy	Position: Outdoor / Indoor	<5m rms / <50m rms
	Velocity	<0.05ms-1
	Latency	<200ms
	Raw Measurement Accuracy	Pseudorange <0.3m rms, Carrier phase <5mm rms
	Tracking	Code and carrier coherent
Power	Typical/Maximum	1.1W/1.3W
Interfaces	Type	USB2.0 Compliant with Virtual COM Port Driver
General	Receiver Type	12 Parallel Channel x 32 taps up to 32 pointFFT. Channels, taps, and FFT can be switched off to minimize power or simulate simpler designs.
	Processor	ARM 966E-S on a 0.18µ process at 96MHz.
	User Memory	64K loaded from 24K on module EEPROM or external EEPROM.

Table 3 CW19 Specification

Footnotes

This value is based on a software build which has all peripherals powered. For applications where power consumption is an issue some of these may be turned off to provide a saving in this area.

2 SPECIFICATION continued

2.2 Block Diagram

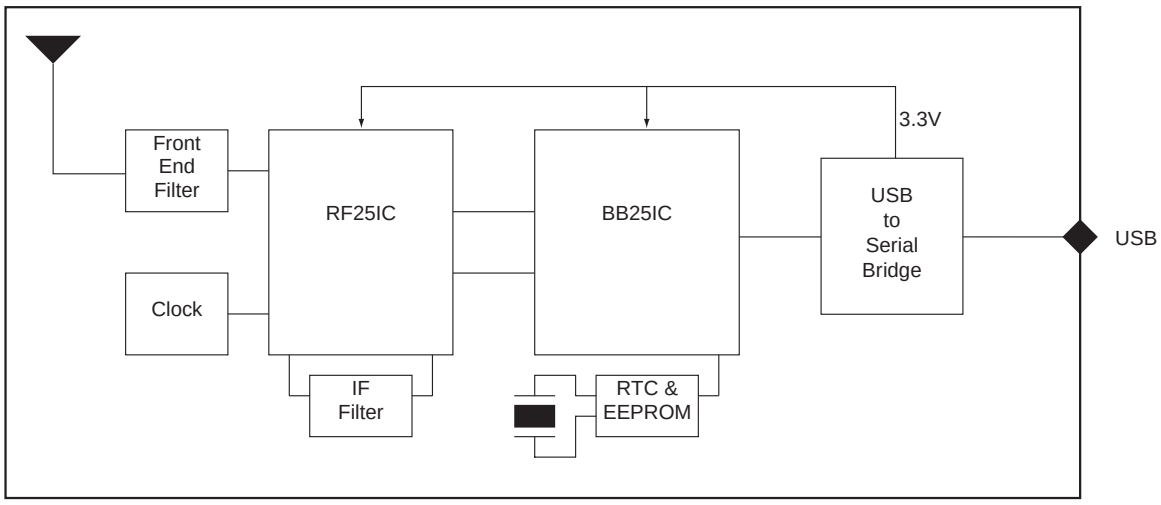

Figure 1 CW19 Block Diagram

2.3 Physical Characteristics

The CW19 is a multi-chip device built on a fiberglass PCB which is mounted in a clear plastic case. The dimensions of the CW19 are shown in Figure 2 below.

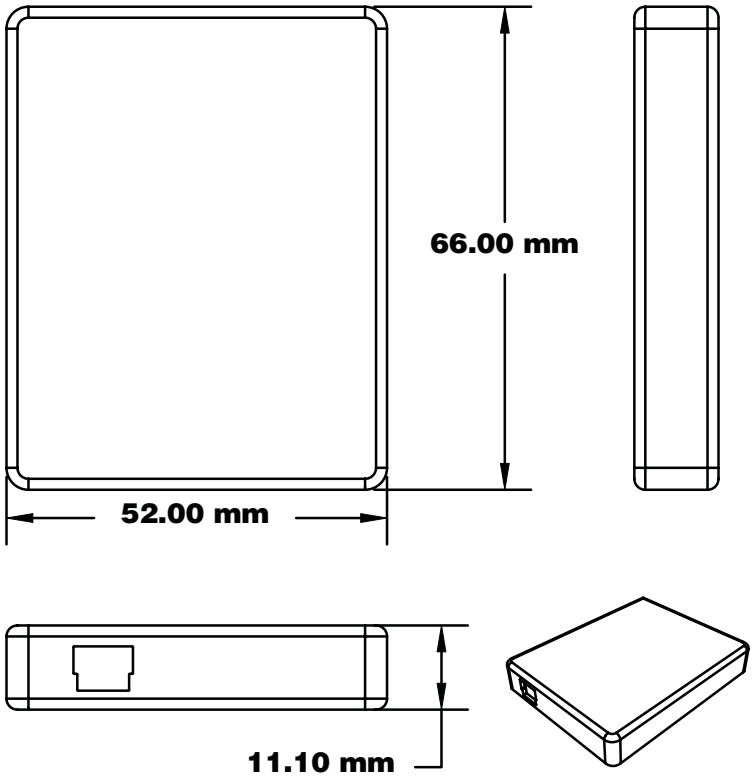

Figure 2 CW19 Dimensions

2 SPECIFICATION continued

2.4 USB Interface

The CW19 has a Mini B 4-pin USB interface port. The CW19 communicates with a PC or Macintosh computer through the USB port using a Virtual COM Port driver. See section 3.1 for driver installation instructions.

2.4 LED Indicators

One Red and one Green LED are positioned on the top surface of the PCB and are used to indicate the operating state of the GPS receiver. An initial long flash indicates the GPS fix mode as follows:

Red – No Fix

Green – GPS Fix

Each long flash may be followed by up to 12 shorter Green or Red flashes. Each Green or Red short flash indicates a satellite being tracked. The Green LED indicates a satellite being tracked and used in the time or position solution and the Red LED a satellite being tracked but not used in the solution. When the GPS receiver is initially powered, both LEDs will flash momentarily.

3 SOFTWARE INSTALLATION

3.1 USB Driver Installation

Initial software setup requires running **CP2101_Drivers.exe** to extract all of the device drivers (Windows and Macintosh). After following the prompts, the utility will copy the driver files to a specified directory or the default directory, “C:\SiLabs\MCU\CP2101”. Each set of drivers will be extracted to an appropriately named directory, for example WIN and MACX.

3.1.1 Windows XP

Follow these steps to install the Windows XP Virtual COM Port driver:

1. Connect the USB cable between the host computer and the CP2101 target device.
2. Windows will open a “Found New Hardware Wizard” window.
3. Select “Install from a list or specific location (Advanced)” and press Next.
4. Select “Include this location in the search”.
5. Press Browse to locate the “C:\SiLabs\MCU\CP2101\WIN” directory. Once this directory is selected press OK.
6. Verify that the correct path and filename are shown and press Next.
7. Press Finish to finish installing the “CP2101 USB Composite Device”.
8. Windows will open a second “Found New Hardware Wizard” window.
9. Select “Install from a list or specific location (Advanced)” and press Next.
10. Select “Include this location in the search”.
11. Press Browse to locate the “C:\SiLabs\MCU\CP2101\WIN” directory. Once this directory is selected press OK.
12. Verify that the correct path and filename are shown and press Next.
13. Press Finish to finish installing the “CP2101 USB to UART Bridge Controller”.

3.1.2. Windows 2000

Follow these steps to install the Windows 2000 virtual COM port driver:

1. Connect the USB cable between the host computer and the CP2101 target device.
2. Windows will open a “Found New Hardware Wizard” window. Press Next to continue.
3. Select “Search for a suitable driver for my device (recommended)” and press Next.
4. Check “Specify a location” and press Next.
5. Press Browse to locate the “slabbus.inf” driver installation file. The default location is the “C:\SiLabs\MCU\CP2101\WIN” directory. Once this file is selected press OK.
6. Verify that the correct path and filename are shown and press Next.
7. Press Finish to finish installing the “CP2101 USB Composite Device”.
8. Windows will open a second “Found New Hardware Wizard” window. Press Next to continue.
9. Select “Search for a suitable driver for my device (recommended)” and press Next.
10. Check “Specify a location” and press Next.
11. Press Browse to locate the “slabw2k.inf” driver installation file. The default location is the “C:\SiLabs\MCU\CP2101\WIN” directory. Once this file is selected press OK.
12. Verify that the correct path and filename are shown and press Next.
13. Press Finish to finish installing the “CP2101 USB to UART Bridge Controller”.

3.1.3. Windows 98 SE

Follow these steps to install the Windows 98 Virtual COM Port driver:

1. Connect the USB cable between the host computer and the CP2101 target device.
2. Windows will open a “Found New Hardware Wizard” window. Press Next to continue.
3. Select “Search for the best driver for your device (Recommended)” and press Next.
4. Select “Specify a location”.
5. Press Browse to locate the “C:\SiLabs\MCU\CP2101\WIN” directory. Once this directory is selected press Next.
6. Verify that the correct path and filename are shown and press Next.
7. Press Finish to finish installing the “CP2101 USB Composite Device”.
8. Windows will open a second “Found New Hardware Wizard” window. Press Next to continue.
9. Select “Search for the best driver for your device (Recommended)” and press Next.
10. Select “Specify a location”.
11. Press Browse to locate the “C:\SiLabs\MCU\CP2101\WIN” directory. Once this directory is selected press Next.
12. Verify that the correct path and filename are shown and press Next.
13. Press Finish to finish installing the “CP2101 USB to UART Bridge Controller”.

3.1.4. Macintosh OS-X

To install the Macintosh OS-X virtual COM port driver, extract the **cardinal-osx-V1_00c-release.zip** file located in the MACX directory as described at the beginning of Section 3.1. Next, run the extracted file **SLAB_USBtoUART Installer**. To uninstall the driver, run the ex tracked file **SLAB_USBtoUART Uninstaller**.

3.2 Tips on Third Party Software

Once connected to a USB port as described in section 3.1, the CW19 will appear as a COM port in the Device Manager. The CW19 will always use the lowest available COM port for operation. For instance, if COM ports 1 through 3 are in use by other peripherals and applications, the CW19 will use COM 4. The CW19 functions identically to a COM port device from the reference point of both the host application and the serial device, and it can support serial device control requests defined in the Microsoft Win32® Communications API.

The CW19 can be used with most third party software capable of decoding standard NMEA 0183 commands from a serial device. Refer to the documentation included with such software to configure the software to work with the CW19. The CW19s default serial communications parameters are 38,400 baud, 8 data bits, no parity, 1 stop bit. If the software does not support 38,400 baud, then the CW19 must be configured to a different baud rate using the PRTHS,BAUD command described in section 4.3.

4 COMMAND REFERENCE

The CW19 communicates using the standard NMEA 0183 protocol. Commands from the CW19 can be viewed using a terminal program such as Window's Hyper Terminal. Sending commands to the CW19 can be accomplished by transferring a text file containing the commands.

The NMEA 0183 Standard defines sentence formats for communication between navigational equipment. The CW19 outputs a series of NMEA sentences every second reporting the most recent measurements of time, position, velocity, satellite status, accuracy, etc. All sentences start with the $ character followed by five characters defining the sentence name. The remainder of the line is comma delimited fields terminated with *<CS><CR><LF> where <CS> is the two digit exclusive OR checksum in hexadecimal of the data bytes between the $ and * characters.

The CW19 uses two main types of NMEA sentences, Approved and Proprietary. The following Approved NMEA sentences are supported:

GPGLL	Latitude and longitude, with time of position fix and status
GPRMC	The "recommended minimum" sentence defined by NMEA for GPS/Transit system data.
GPVTG	Velocity given as Course Over Ground (COG) and ground speed
GPGGA	Time and position, with GPS fixing related data
GPGSA	GPS receiver operating mode, number of satellites used, and DOP values
GPGSV	Details of satellites in view.

Also, the following Proprietary NMEA output sentences are supported:

POLYT	Time of day
POLYP	Position data
POLYS	Satellite status
POLYI	Additional information

Finally, the CW19 has a set of Proprietary NMEA commands for input and output of the form
$PRTH<Q|S|R>,*ID*,<data fields>{*<CS>}<CR><LF>
where <S|Q|R> is the single ASCII character as follows:

S	Command, requires the CW19 receiver to Set system settings
Q	Command, a Query command to the CW19 receiver
R	Response, a CW19 Response to a $PRTHQ or acknowledgment of a $PRTHS command

and *ID* is one of the following:

DYNA	Receiver dynamics setting
ITIM	Initialize time and date
ILLH	Initialize longitude and latitude
RSET	Reset the receiver
U1CM	Port baud rate
U1OP	NMEA output configuration

4.1 Approved NMEA Output Commands

GPGLL: Geographic position

This message gives the latitude and longitude, with time of position fix and status.

Format:

$GPGLL,*latitude*,*latH*,*longitude*,*lonH*,*UTC*,*status**<CS><CR><LF>

Explanation of Parameters

latitude	User datum latitude in degrees, minutes, decimal minutes with format *ddmm.mmmmm*.
latH	Latitude hemisphere (N = North or S = South)
longitude	User datum longitude in degrees, minutes, decimal minutes with format *dddmm.mmmmm*.
lonH	Longitude hemisphere (E = East or W = West)
UTC	UTC time in hours, minutes, seconds an decimal seconds with format *hhmmss.ss*
status	Fix status (V = Navigation receiver warning or A = Data valid)

GPRMC: Recommended Minimum Data

This message is the recommended minimum sentence defined by NMEA for GPS/Transit system data.

Format:

$GPRMC,*UTC*,*status*,*latitude*,*latH*,*longitude*,*lonH*,*speed*,*course*,*date*,*MV**<CS><CR><LF>

Explanation of Parameters

UTC	UTC time in hours, minutes, seconds with format *hhmmss*
status	Status (V = Navigation receiver warning or A = Data valid)
latitude	User datum latitude in degrees, minutes, decimal minutes with format *ddmm.mmmmm*
latH	Latitude hemisphere (N = North or S = South)
longitude	User datum latitude in degrees, minutes, decimal minutes with format *dddmm.mmmmm*
lonH	Longitude hemisphere (E = East or W = West)
speed	Ground speed in knots
course	Course made good
date	Date in day, month, year with format *ddmmyy*
MV	Magnetic Variation

GPVTG: Course Over Ground and Ground Speed

Velocity is given as Course Over Ground (COG) and ground speed.

Format:

$GPVTG,*COGT*,T,*COGM*,M,*knots*,N,*kph*,K*<CS><CR><LF>

Explanation of Parameters

COGT	Course Over Ground (True)
COGM	Course Over Ground (Magnetic)
knots	Ground speed in knots
kph	Ground speed in kilometers per hour

GPGGA: GPS Fix Data

This message gives time and position, together with GPS fixing related data (number of satellites in use and the resulting HDOP, age of differential data if in use, etc.).

Format:

$GPGGA,*UTC*,*latitude*,*latH*,*longitude*,*lonH*,*FS*,*noSV*,*HDOP*,*altRef*,*m*,*diffAge*,*diffStation**<CS><CR><LF>

Explanation of Parameters

UTC	UTC Time in hours, minutes, seconds with format *hhmmss*
latitude	User datum latitude in degrees, minutes, decimal minutes with format *ddmm.mmmmm*
latH	Latitude hemisphere (N = North or S = South)
longitude	User datum longitude in degrees, minutes, decimal minutes with format *dddmm.mmmmm*
lonH	Longitude hemisphere (E = East or W = West)
FS	Fix Status (0 = no Fix, 1 = standard GPS, or 2 = differential GPS)
noSV	Number of satellites used in the position solution
HDOP	2-D Horizontal Dilution of Precision (00.0 to 99.9)
atlRef	Altitude above the user datum ellipsoid
m	Units for *altRef* (m = meters)
diffAge	Age of differential correction
diffStation	Differential base station ID

GPGSA: GPS DOP and Active Satellites

This message give the GPS receiver operating mode, satellites used for navigation and the DOP values.

Format:

$GPGSA,*Smode*,*FS*,*SV1*,*SV2*,...,*SV12*,*PDOP*,*HDOP*,*VDOP**<CS><CR><LF>

Explanation of Parameters

Smode	2D/3D Switching mode (A = Automatic Switching or M = Manual/fixed)
FS	Fix Status (0 = no Fix, 1 = standard GPS, or 2 = differential GPS)
SV1...12	PRNs of Satellites in use, null for unused fields
HDOP	2D Horizontal Dilution of Precision (00.0 to 99.9)
VDOP	Vertical Dilution of Precision (00.0 to 99.9)
PDOP	3D Position Dilution of Precision (00.0 to 99.9)

GPGSV: GPS Satellites in View

This message displays the number of satellites in view, together with each PRN, elevation and azimuth angle, and C/No value. Only four satellite details are transmitted in one message, there being up to three messages used as indicated in the first field.

Format:

$GPGSV,*noMsg*,*msgNo*,*noSV*,{*SV1*,*elv1*,*az1*,*CNO1*{,*SV2*,*elv2*,*az2*,*CNO2*...}}*<CS><CR><LF>

Explanation of Parameters

noMsg	Total number of GPGSV messages being output (1 to 3)
msgNo	Number of this message (1 to *noMsg*)
noSV	Total number of satellites tracked (1 to 4 x *noMsg*)

4.2 Proprietary NMEA Output Commands

POLYT: Time of Day

This message displays time and date information, together with clock bias and drift.

Format:

$POLYT,*UTC*,*date*,*UTC_TOW*,*GPS_week*,*GPS_TOW*,*clkB*,*clkD*,*PG**<CS><CR><LF>

Explanation of Parameters

UTC	UTC time in hours, minutes, seconds with format *hhmmss.ss*
date	Date in day, month, year with format *ddmmyy*
UTC_TOW	UTC Time Of Week in seconds (0.0-604800.0)
GPS_week	GPS week number, not mod 1024
GPS_TOW	GPS Time Of Week in seconds (0.0-604800.0)
clkB	Receiver clock Bias in nanoseconds
clkD	Receiver clock Drift in nanoseconds/second
PG	1 PPS Granularity nanoseconds

POLYP: Position Data

This message gives time and position information, together with position accuracy.

Format:

$POLYP,*UTC*,*latitude*,*latH*,*longitude*,*lonH*,*altRef*,*FS*,*Hacc*,*Vacc*,*SOG*,*COG*,*Vvel*,*ageC*,*VDOP*,*PDOP*,*TDOP*,*GSV*,*RSV*,*DR**<CS><CR><LF>

Explanation of Parameters

UTC	UTC time in hours, minutes, seconds with format *hhmmss.ss*
latitude	User datum latitude in degrees, minutes, decimal minutes with format *ddmm.mmmmm*
latH	Latitude hemisphere (N = North or S = South)
longitude	User datum longitude in degrees, minutes, decimal minutes with format *dddmm.mmmmm*
lonH	Longitude hemisphere (E = East or W = West)
atlRef	Altitude above the user datum ellipsoid in meters
FS	Fix Status:

NF	No Fix
DR	Predictive Dead Reckoning solution
DA	Predictive Dead Reckoning solution with DR aiding
G1	Partial GPS solution with DR aiding
G2	Stand alone 2D solution
G3	Stand alone 3D solution
D1	Partial Differential GPS solution with DR aiding

D2 Differential 2D solution
D3 Differential 3D solution

Hacc Horizontal (2-sigma) accuracy estimate in meters (0 to 9999)
Vacc Vertical (2-sigma) accuracy estimate in meters (0 to 9999)
SOG Speed Over Ground in knots (000.00 to 999.99)
COG Course Over Ground (True) in degrees (000.00 to 359.99)
Vvel Vertical (positive up) velocity in meters/second (-999.99 to 999.99)
ageC Age of most recent DGPS Corrections applied in seconds (00.0 to 99.9 = none available)
HDOP 2D Horizontal Dilution of Precision (00.0 to 99.9)
VDOP Vertical Dilution of Precision (00.0 to 99.9)
PDOP 3D Position Dillution of Precision (00.0 to 99.9)
GDOP 4D Geometric Dilution of Precision (00.0 to 99.9)
TDOP Time Dilution of Precision (00.0 to 99.9)
GSV Number of GPS satellites used in the navigation solution
RSV Number of GLONASS satellites used in the navigation solution
DR Dead Reckoning aiding status bids (in ASCII Hex):

bit 0 Altitude position aiding applied
bit 1 Vertical velocity aiding applied
bit 2 (GPS-GLONASS) time difference aiding applied
bit 3 External distance travelled aiding applied
bit 4 External speed input used
bit 5 External track input used
bit 6 External delta-track input used
bit 7-8 Reserved for future use

POLYS: Satellite Status

Format:
$POLYS,*noSV*{,*SV1*,*status1*,*az1*,*elv1*,*CNO1*,*LK1*{, *SV2*,*status2*,*az2*,*elv2*,*CNO2*,*LK2*...}}*<CS><CR><LF>

Explanation of Parameters

noSV Total number of satellites tracked (1 to 12)
SV1...12 Satellite PRN number (1-32)
status1...12 Satellite status:

- Not used
U Used on solution
e Available for use, but no ephemeris

az1...12 Satellite azimuth angle in degrees (000 to 359)
elv1...12 Satellite elevation angle in degrees (00 to 90)
CNO1...12 Carrier to Noise ratio in dBHz (0 to 55)
LC1...12 Satellite carrier Lock Count:

0 Code lock only
1 to 254 Number of seconds carrier locked
255 Locked for 255 or more seconds

POLYI: Additional Information

Format:

$POLYI,JN,*jammer*,EXT{,*efield1*{,*efield2*...}},INT{,*ifield1*{,*ifield2*...}}*<CS><CR><LF>

Explanation of Parameters

jammer Detected jammer to noise ratio in dBHz

*efield*n Externally provided ancillary measurements used e.g. received from Network Assistance:

DIFF	Differential inputs
TSYNC	Time synchronization
CLKB	Clock bias
FREQ	Frequency of the reference oscillator
HPOS	Horizontal position
VPOS	Vertical position (altitude)
VVEL	Vertical velocity
DIST	Distance moved
SPEED	Current speed
TRACK	Current track
DTRACK	Delta track (change in direction)

*ifield*n Internally provided ancillary measurements used e.g. retrieved from non-volatile memory:

TSYNC	Time synchronization
CLKB	Clock bias
FREQ	Frequency of the reference oscillator
HPOS	Horizontal position
VPOS	Vertical position (altitude)
VVEL	Vertical velocity
DIST	Distance moved
SPEED	Current speed
TRACK	Current track
DTRACK	Delta track (change in direction)

4.3 Proprietary NMEA Input/Output Commands

PRTH<S|Q|R>,DYNA

This message Sets, Queries and Responds to the receiver dynamics setting. The receiver dynamics setting controls how the navigation Kalman filter operates.

Query Format: $PRTHQ,DYNA<CR><LF>

Set Format: $PRTHS,DYNA,*dynamics*<CR><LF>

Response Format: $PRTHR,DYNA,*dynamics*<CR><LF>

Explanation of Parameters

dynamics	Integer receiver dynamics setting:
0	Fixed base station
1	Stationary but unknown position
2	Walking
3	At sea
4	Automotive / land vehicle
5	Airborne low dynamics (< 1g)

PRTH<S|Q|R>,ITIM: Initialise Time and Date

This message Sets, Queries and Responds to the user initialized time and date. Two input options are available, one allowing a calendar date and GMT time to be input and the other a GPS week number and seconds of the week.

The input date is acted upon regardless and is primarily used to set the GPS week inside the receiver. The time input will not be used if it is set to zero, or if the receiver is currently tracking satellites and therefore already has a good sub-millisecond knowledge of time.

If the time input is not used then the Response message returns the values used or assumed instead of those input. The time RMS accuracy is used to decide how much importance to put on the input values and should be set with care.

Query Format: $PRTHQ,ITIM<CR><LF>

Set Format: Using a GMT time format
$PRTHS,ITIM,*timeRMS*,GMT,d*ay*,*month*,*year*{,*hours*}{,*minutes*}{,*seconds*}<CR><LF>
Using a GPS time format
$PRTHS,ITIM,*timeRMS*,GPS,*GPS*_*week*,{*GPS_TOW*}<CR><LF>

Response Format:
$PRTHR,ITIM,*timeRMS*,GMT,*day*,*month*,*year*,*hours*,*minutes*,*seconds*,GPS,*GPS_week*,*GPS_TOW** <CS><CR><LF>

Explanation of Parameters

timeRMS	RMS accuracy of the input time-tag in seconds (floating point, ±0-999999.0)
day	day of the month (integer, 1-31)
month	month of the year (integer, range 1-12)
year	4-digit year (integer, 1980-2047)
hours	hour of the day (integer, 0-23)

minutes	minute of the hour (integer, 0-59)
seconds	seconds of the minute (floating point, 0-59.999)
GPS_week	GPS week number, not mod 1024 (integer, 0-32768)
GPS_TOW	GPS Time Of Week in seconds (floating point, 0.0-604800.0)

PRTH<Q|S|R>,ILLH: Initialize Latitude, Longitude and Height Position

This message Sets, Queries and Responds to the initialized geodetic position (latitude, longitude, ellipsoidal height and antenna height above the reference marker) in the receiver's current user datum.

The position RMS accuracy is used to decide how much importance to put on the input values and should be set with care.

Query Format: $PRTHQ,ILLH<CR><LF>

Set Format:
$PRTHS,ILLH,*LatDeg*,*LatMin*,*LatSec*,*LatH*,*LonDeg*,*LonMin*,*LonSec*,*LonH*,*EllHt*,*AntHt*,*posRMS** <CR><LF>

Response Format:
$PRTHR,ILLH,*LatDeg*,*LatMin*,*LatSec*,*LatH*,*LonDeg*,*LonMin*,*LonSec*,*LonH*,*EllHt*,*AntHt*,*posRMS**<CS> <CR><LF>

Explanation of Parameters

LatDeg	Latitude degrees (±90.0)
LatMin	Latitude minutes (±59.999999)
LatSec	Latitude seconds (±59.999999)
LatH	Latitude hemisphere (N = North or S = South)
LonDeg	Longitude degrees (±90.0)
LonMin	Longitude minutes (±59.999999)
LonSec	Longitude seconds (±59.999999)
LonH	Longitude hemisphere (E = East or W = West)
EllHt	Height of the reference marker above the current user datum reference ellipsoid in meters (±18,000.0)
AntHt	Height of the antenna phase center above the reference marker defined by *EllHt* above in meters (±18,000.0)
posRMS	RMS accuracy of the input position in meters (0-999999.0)

Note that since the Degrees, Minutes and Seconds fields will accept floating point values then a decimal degree value, or an integer degree, decimal minute value can be input directly by setting the minutes and seconds fields to zero as appropriate (e.g. 52.12345678,0,0,N or 52,14.123456,0,N).

PRTH<S|R>,RSET: Reset the receiver

This message Sets, Queries and Responds to a receiver reset command with optional actions such as clearing specific data groups stored in the CW19's BASIC battery-backed memory area.

The data areas that can be cleared include satellite almanacs, ephemerides, and receiver configuration

parameters.
This command invokes a 2-second time-out prior to the reset being invoked so that there are two chances (on a 1Hz build) of seeing the acknowledgment message first. A response of NO indicates that no reset command is currently activated.

Query Format
$PRTHQ,RSET<CR><LF>

Set Format
$PRTHS,RSET{,option1{,option2...}}<CR><LF>

Response Format
$PRTHR,RSET{,option1{,option2...}}*<CS><CR><LF>

Explanation of Parameters
option An optional character descriptor to indicate which, actions are to be undertaken prior to the software reset defined as follows:

CONFIG	Clear the receiver configuration data in battery backed RAM
EPH	Clear the satellite ephemeris data in battery backed RAM
ALM	Clear the satellite almanac data in battery backed RAM
ALL	Clear all data in battery backed RAM

PRTH<Q|S|R>,U1CM: Port baud rate
This message Queries, Sets, and Responds with the port baud rate. The default baud rate is 38,400 bps.

Query Format
$PRTHQ,U1CM<CR><LF>

Set Format
$PRTHS,U1CM,BaudRate<CR><LF>

Response Format
$PRTHR,U1CM,BaudRate*<CS><CR><LF>

Explanation of Parameters
BaudRate The baud rate in bps. Supported values are 1200, 2400, 4800, 9600, 19200, 38400,

57600, 115200, and 230400.

PRTH<Q|S|R>,U1OP: NMEA Output configuration

This message Queries, Sets, and Responds with the NMEA sentence output rates.

Query Format

$PRTHQ,U1OP{,type1=rate1{,type2=rate2 ...}}<CR><LF>

Set Format

$PRTHS,U1OP{,type1=rate1{,type2=rate2 ...}}<<CR><LF>

Response Format

$PRTHR,U1CM{,type1=rate1{,type2=rate2 ...}}*<CS><CR><LF>

Explanation of Parameters

typen A character descriptor corresponding to a NMEA sentence type as follows:

GLL	GPGLL - Geographic Position - Latitude longitude
RMC	GPRMC - Recommended Minimum Specific GNSS Sentence
VTG	GPVTG - Course Over Ground and Ground Speed
GGA	GPGGA - GPS Fix Data
GSA	GPGSA - GNSS DOPS and Active Satellites
GSV	GPGSV - GNSS Satellites in View
GRS	GPGRS - GNSS Range Residuals
GST	GPGST - GNSS Pseudorange Errors Statistics
PLT	POLYT - Time
PLP	POLYP - Position (Lat, Long)
PLU	POLYU - UTM position
PLG	POLYG - Local Grid position
PLS	POLYS - Satellite data
PLH	POLYH - HDS Time Information
PLI	POLYI - Additional Information

raten The output period in seconds for the NMEA sentence given by typen. An output period of 0 indicates that the sentence is disabled.

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