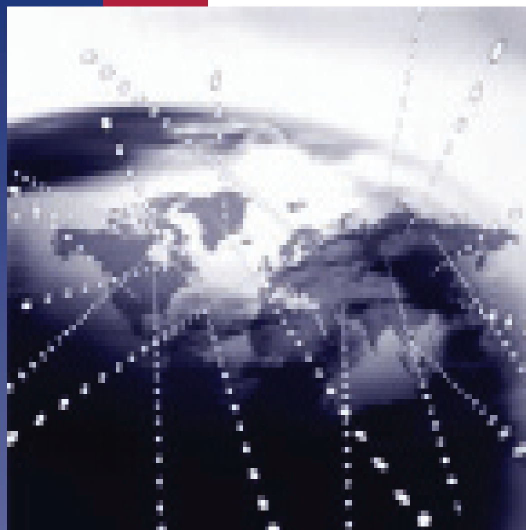
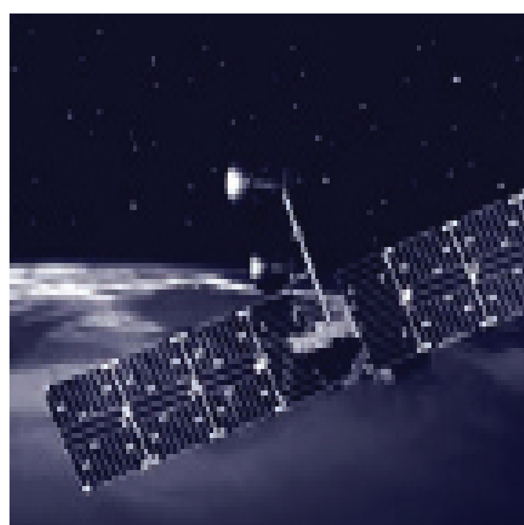
PRELIMINARY



# NavTrac CW85 WiFi Enabled GPS

Ver III

| | |
|---|---|
| Bulletin | NS24-DS |
| Revision | P01 |
| Date | 10 June 2009 |

NAVSYNC

## Contents



## Figure and Table Contents

*List of Figures*



*List of Tables*

# 1 Description

## 1.1 Introduction

The NavTrac combines GPS technology with WiFi transport. Incorporating NavSync's own CW20 module with ultra sensitive GPS receiver, the CW85 provides an 802.11b/g transmission containing NMEA streams giving device location (longitude and latitude) and UTC time. The 802.11b/g supports WPA2 encryption and is fully configurable to a specific network.

## 1.2 GLOBAL POSITIONING SYSTEM (GPS)

The Global Positioning System (GPS) is a military satellite based navigation system developed by the U.S. Department of Defense and made freely available to civil users. Civilian use of GPS is available at the user's own risk, subject to the prevailing DOD policy or limitations, and to individuals understanding of how to use the GPS.

In today's satellite constellation there are a minimum of 24 operational satellites (plus several operational spares) in 6 orbital planes, at an altitude of about 22,000 km. The GPS system can give accurate 3-D position, velocity, time, and frequency, 24 hours a day, anywhere in the world. GPS satellites transmit a code for timing purposes, and also a 'navigation message' that includes their exact orbital location and system integrity data. Receivers use this information, together with data from their internal almanacs, to precisely establish the satellite location. The receiver determines position by measuring the time taken for these signals to arrive. At least three satellites are required to determine latitude and longitude if the altitude is known (e.g. a ship at sea), and at least a fourth to obtain a 3-D fix.

## 1.3 GPS Positioning and Navigation

The NavTrac needs to be able to see at least 4 satellite vehicles (SV's) to obtain an accurate 3-D position fix. When traveling in a valley or built-up area, or under heavy tree cover, you will experience difficulty acquiring and maintaining a coherent satellite lock. Complete satellite lock may be lost, or only enough satellites (3) tracked to be able to compute a 2-D position fix, or even a poor 3D fix due to insufficient satellite geometry (i.e. poor DOP). Note also, that inside a building or beneath a bridge, it probably will not be possible to update a position fix. The Receiver can operate in 2-D mode if it goes down to seeing only 3 satellites by assuming its height remains constant. But this assumption can lead to very large errors, especially when a change in height does occur. A 2-D position fix is not to be considered a good or an accurate fix – it is simply a "better than nothing" fix.

The receiver's antenna must have a clear view of the sky to acquire satellite lock. It is the location of the antenna which will be given as the position fix. The antenna is located under the NavTrac label and should face upwards for best signal reception. If the antenna faces downwards, it may not be possible to successfully track any satellites. Mounting the NavTrac in a vertical position is also acceptable, but the antenna may not be able to receive the satellite signals from those satellites out of line-of-sight from the front of the enclosure, making this a less than ideal position. Please also note that any obstructions (dense foliage, tall buildings) can obstruct the line-of-sight to the satellites and make tracking more difficult.

To measure the range from the satellite to the receiver, two criteria are required: signal transmission time and signal reception time. All GPS satellites have several atomic clocks to keep precise time. These are used to time-tag the message (i.e. code the transmission time onto the signal) and to control the transmission sequence of the coded signal. The receiver has an internal clock to precisely identify the arrival time of the signal. Transit speed of the signal is a known constant (the speed of light), therefore: time x speed of light = distance.

# 1 Description continued

## 1.3 GPS Positioning and Navigation continued

Once the receiver calculates the range to a satellite, it knows that it lies somewhere on an imaginary sphere whose radius is equal to this range. If a second satellite is then found, a second sphere can again be calculated from this range information. The receiver will now know that it lies somewhere on the circle of points produced where these two spheres intersect. When a third satellite is detected and a range determined, a third sphere intersects the area formed by the other two. This intersection occurs at just two points. The correct point is apparent to the user, who has a rough idea of position. A fourth satellite is then used to synchronize the receiver clock to the satellite clocks. In practice, 4 satellite measurements are sufficient for the receiver to determine a position, as one of the two points will be totally unreasonable (possibly many kilometers out into space).

This assumes the satellite and receiver timing to be identical. In reality, when the NavTrac compares the incoming signal with its own internal copy of the code and clock, the two will no longer be synchronized. Timing error in the satellite clocks, the Receiver, and other anomalies, mean that the measurement of the signals transit time is in error. This effectively, is a constant for all satellites, since each measurement is made simultaneously on parallel tracking channels. Because of this, the resultant ranges calculated are known as “pseudo-ranges”.

To overcome these errors, the NavTrac matches or “skews” its own code to become synchronous with the satellite signal. This is repeated for all satellites in turn, thus measuring the relative transit times of individual signals. By accurately knowing all satellite positions, and measuring the signal transit times, the user’s position can be accurately determined. Utilizing its considerable processing power, the NavTrac rapidly updates these calculations from satellite data to provide a real time position fix.

The following DOP terms are computed by the NavTrac:

***HDOP*** Horizontal Dilution of Precision (Latitude, Longitude)

***VDOP*** Vertical Dilution of Precision (Height)

***TDOP*** Time Dilution of Precision (Timing errors)

***PDOP*** Position Dilution of Precision (3-D positioning)

***GDOP*** Geometric Dilution of Precision (3-D position & Time)

***Estimated accuracy*** = DOP x measurement accuracy

While each of these terms can be individually computed, they are formed from covariances and are not independent of each other. For example, a high TDOP will cause receiver clock errors which eventually results in increased position errors. Horizontal accuracy figure of 95% is the equivalent to 2RMS (twice root-mean-square) or twice the standard deviation radial error. Similarly, for vertical and time errors, a figure of 95% is the value of 2 standard-deviations of vertical or time error.

- Root-mean-square (RMS) error is the value of one standard deviation (67%) of error.
- Circular Error Probability (CEP) is the value of the radius of a circle, centered at a position containing 50% of the position estimates.
- Spherical Error Probability (SEP) is the spherical equivalent of CEP, which is centered at a position containing 50% of the position estimates.

CEP and SEP are not affected by large errors, which could make the values an overly optimistic measurement. These probability statistics are not suitable for use in a high accuracy positioning system. The NavTrac reports all accuracies in the form of a standard deviation (RMS) value.

## 1 Description continued

### 1.4 Operation

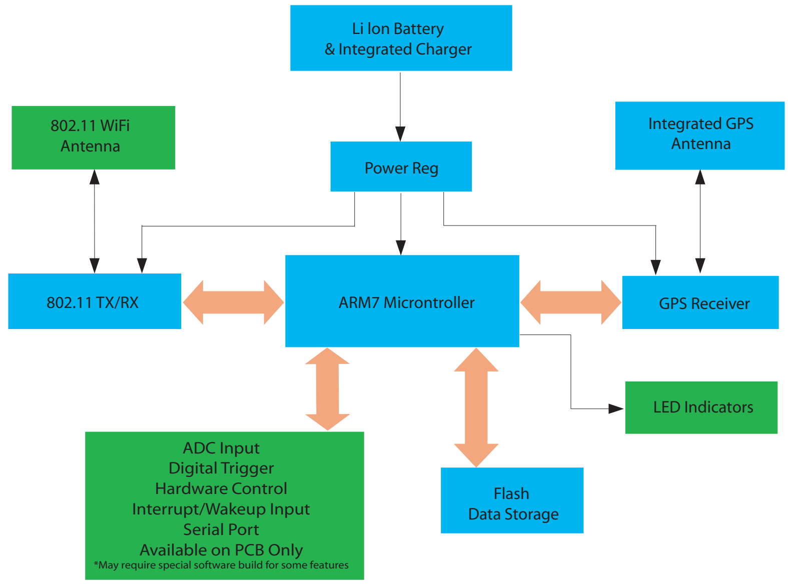



**Figure 1 CW85 Block Diagram**

The default 802.11 network settings of the CW85 are as follows:

Topology: Infrastructure Mode

Source IP: DHCP client

Source Port: Varies

Channel: 6

Network SSID: CW85_Setup (higher priority) or LTRX_IBSS (lower priority)

Data Rate: 1 Mbps

WPA2 Security Passphrase: GSDemo123

*Note: The unit will also transmit on a network with security disabled even though the phrase is configured.*

Packet type: UDP

Destination IP: 192.168.1.2

Destination Port: 9999

Upon power up, the NavTrac will scan for 802.11b/g networks to associate with and attempt to obtain an IP address through DHCP. During this time, the GPS receiver is turned on and the NavTrac will attempt to obtain a valid GPS fix. Once the GPS receiver is turned on, a 'heartbeat' LED (POWER) will blink once per second indicating that the NavTrac unit is fully operational. The STATUS LED will give an indication of network status and GPS status as indicated in Table 1.

## 1.4 Operation continued

### Status LED

| Condition | Status LED |
|---|---|
| No network detected and no GPS Fix | OFF |
| Network detected but no GPS Fix | Blinks once every 2.5 seconds |
| No network detected but GPS Fix | Blinks once every 5 seconds |
| Network detected and GPS Fix | Blinks once every 500 mS |

**Table 1: Status LED**

The default configuration of the unit is set to send out NMEA messages immediately to the user configured server address. This can only occur if the unit has acquired an IP address and the network it has connected to is compatible with the configured destination IP (192.168.1.2 by default). This default behavior may be changed by the user via SNMP – see Section 3 'Device Configuration via SNMP'.

When the unit first powers on, the GPS "cold" starts, which means that the GPS has no ephemeris or almanac information. This mode requires higher satellite signal strength to acquire a GPS fix than is required for tracking. Once the unit begins tracking satellites, it begins to download the almanac and ephemeris information. Depending on the number of satellites in view with sufficient strength, this could take 12-15 minutes, although in an open-sky situation it will occur much more quickly. After the GPS has successfully downloaded the ephemeris and almanac information, lower level signal testing may be done.

*Note: The accuracy numbers quoted in the specifications section assume that the unit has valid ephemeris and almanac information.*

**The following configuration options are not available on V3.0 and V3.01.**

The operation of the NavTrac unit is highly user configurable. Not only can the network settings be configured via the SNMP interface, but the operational parameters can be changed. Appendix 1 lists the parameters that are configurable, as well as their default values. By default, the device will send out all of the NMEA sentences via UDP. However, individual sentences can be turned off, and the rate at which these sentences can be sent out can vary (see Section 1.6). Additionally, the user can choose to send out packets via TCP/IP instead of UDP/IP for both the current GPS data, and for the logged data in flash memory.

Changes to the connection type (TCP/UDP) will not take effect until the device is restarted. Changes to the TCP port or destination IP will also take effect only after the device is restarted. Alternatively, because UDP is a 'connectionless' protocol, any changes to the port or destination IP will take effect on the next transmission. Additionally, changes to most of the other network settings require a restart to take effect. This allows the user to fully configure the device before those changes take effect.

The NavTrac will check for association prior to sending out the NMEA sentences at the configured transmission rate. If the unit is not associated with a network, it will rescan every 10 seconds until it finds one of the configured networks. There are three different SSIDs that the unit can be configured to scan, each one with its own channel. These networks can be used for either Infrastructure mode or AdHoc mode (Note: to utilize ADHOC mode for normal situations, do not use the GSNADHOCSSID and corresponding channel settings, but use the GSNAPSSID1-3 settings). In AdHoc mode, the unit will not create an AdHoc network, but will scan for an existing network.

Security options can be set per SSID. Available security options are no encryptions, WEP64, WEP128, WPA, or WPA2-PSK. Each SSID can support all of these security options, or a subset. This is selectable through the SNMP interface. By default, all security options are supported. It is recommended to enable only those security options that are necessary to enable the most secure operation. Note: this operation is not available on V4.0 and lower.

## 1 Description continued

### 1.4 Operation continued

The NavTrac utilizes flash memory for saving the NMEA streams in case the unit is unable to transfer the data. This could occur if a network is not present, if the unit is unable to associate with the network, or if there is a TCP socket problem (if TCP has been set as the default for transmission). The user can also control how often the messages are saved to flash memory. For example, the unit can be configured to transmit every 3 seconds, while, at the same time, the unit may only save to flash memory every other period (every 6 seconds) to maintain the longest history possible in memory. Once the NavTrac unit is re-associated with the network (or, with TCP, has re-established the socket connection), it will send out the contents of its flash memory, starting with the oldest data and ending with the newest, then erase its memory after the entire contents have been successfully transmitted. As long as the NavTrac is able to detect that it is on the network, it will continue its normal operation of sending out the selected NMEA streams at the selected rate.

If the NavTrac is configured for TCP rather than UDP communications, any socket error on the TCP connection causes the data to be saved to flash memory. If the socket connection is closed, it will attempt to restart it.

Additional functionality has been built into the NavTrac to enhance the data logging feature. There are commands to save all data, even if there is no network issue. The rate at which the data is saved is controlled in the same way as when it is saving only unsuccessful transmissions. A command to force a log dump over the configured IP/Port is available in this mode, as well as a command to erase the entire log. Because the data is saving continuously to the flash memory, a dump of the flash memory will not occur automatically. The user must tell the unit to dump its memory. As the log becomes full, the oldest data is erased and overwritten with the newest data. If the device is powered down with data in its memory, it will recover the beginning and end of the lost data when it is powered on again. New data will saved in a continuous fashion right after the newest data in memory. If no data is in memory, an internal flag in volatile RAM will remain set until the first data bytes are stored in memory. The unit will then attempt to send out this data. Since this is a volatile flag, it will not remain set following a power cycle.

After a data log is sent out, the ASCII characters “log complete” will be sent out at the end of the transmission, signaling that all of the data has been retrieved from memory. At that point, the flash memory is given the command to erase the data log. Erases are done in the spare time of the system, and a full log erase can take up to 2 minutes, although the typical time is about 1 minute. New data will still be saved to memory during the log erase. If a unit is powered off during the erase cycle, it will not continue to erase on the next power up. Instead, the new data being stored into the flash will be appended to whatever data remained in memory.

Key Features of the NavTrac include:

- Sensitive GPS Receiver with Tracking as Low as -150dBm
- 802.11b/g Compliant
- WPA2 Encryption
- Integrated Rechargeable Battery
- User Programmable Update Rates
- Internal Flash Memory for Saving GPS Data

The specifications in the following sections refer to the standard software builds of the NavTrac. The performance and specification of the NavTrac can be modified through the User Configuration and additional I/O capabilities may be available with special software builds. Please contact the factory for more details.

Please refer to section 4 NMEA Messages for detailed information on the available NMEA messages.

## 1 Description continued

### 1.5 Safe Mode

The NavTrac has been configured with a Safe Mode. If the unit cannot associate with any of the three configured SSIDs, or it loses its association and cannot re-associate, it will enter a mode that will search for the AdHoc network NAVTRAC_ ADHOC on channel 11, with no security. In this mode, the IP address of the device changes to 192.168.1.50 and it searches for an SNMP manager at 192.168.1.51. It will search for approximately 25-30 seconds, after which time it will go back to its normal search for the three configured SSIDs. This behavior will only be displayed once per power on.

The recommended method for entering this mode is to power the device off, and turn off any of the networks it is configured to associate with. Then start the NAVTRAC_ADHOC network, using the IP 192.168.1.51 and turn the NavTrac on. Once the NavTrac sees the AdHoc network, configuration via SNMP is available. The NavTrac will remain in this mode until the connection has been lost for a short period of time. Please note, this mode occurs during the normal operational mode, so the device is still obtaining GPS data during this time. If the NavTrac is able to resolve the destination IP, it will attempt to send packets.

The NavTrac also supports a setting for returning to its original factory configuration. This command will reset the device to the defaults in Appendix 1. However, the MAC address will be reset to the value 00 50 4A 9B A0 00. The MAC address MUST be reset to its initial value (written on the label on the backside of the unit) after using this command. Failure to do so may result in an unusable unit. After receiving the command to reset the MAC address, the NavTrac should have the power cycled.

### 1.6 Special considerations when modifying GPS update rate/messages

(OID .1.3.6.1.4.1.28295.99.1.2.1.16.5)

This takes effect when the internal counters controlling each GPS message reach 0. For example, if you've set the message to 100 seconds, and then change it to 10, you have to wait until the 100 second period is up before the 10 second period takes effect. Also note, all messages that are to be enabled should be occurring at a common interval prior to changing this rate or changing them may result in different GPS messages reporting at different epochs.

(OID .1.3.6.1.4.1.28295.99.1.2.1.19.5)

This takes effect when the internal counters controlling the GPS save rate reach 0. If the data transmission rate is set to 3, and this rate is set to 1, then data will save every 3 seconds if the network is not detected. If the data transmission rate is set to 3, and this is set to 2, then this would save every 6 seconds if the network is not detected.

(OID .1.3.6.1.4.1.28295.99.1.2.1.21.5)

This OID controls which GPS messages are enabled. The bit map of the binary representation of the number configured is as follows:

Bit 0 - GPGGA,
Bit 1 - GPGLL,
Bit 2 - GPGSA,
Bit 3 - GPGSV,
Bit 4 - GPRMC,
Bit 5 - GPZDA,
Bit 6 - GPVTG

For example: 127 is 0111 1111b, which enables all messages (the default)
3 is 0000 0011b, which enables GPGGA and GPGLL

Note that if the current transmission rate is not 1 second intervals, then messages that are newly enabled could be on a different epoch than previously enabled messages. The recommended method of changing the messages is to set the transmission rate to 1 second, enable the required messages, wait until all messages are appearing on 1 second intervals together, and then change the data rate to the desired number.

Failure to follow the above can result in messages being sent that are not from the same EPOCH, as each messages runs on its own counter and updating the interval does not update the counter for a message until that counter = 0.

## 1.7 Diagnostic Messages

(OID .1.3.6.1.4.1.28295.99.1.2.1.11.5)

A diagnostic message containing the RSSI and VBAT voltage as measured on board is available on command to be sent out the data port. Each time a 0 or a 1 is written to the appropriate OID, a message of the form:

<MAC ADDY>,$PNVTC, RSSI, VBAT*<checksum>

where RSSI is the received signal strength and VBAT indicates battery level.

This VBAT voltage is not the actual battery voltage at the battery, but the voltage as measured on board the ARM processor. Currently, this number corresponds to the levels where the unit goes into ‘forever standby’ mode. This will occur at 630 currently, and 650 for turn on. SNMP warning messages begin at 730.

# 2 Specifications

## 2.1 Performance

## CW85 WIFI ENABLED GPS SPECIFICATIONS

### GPS RECEIVER SPECIFICATIONS

| **Physical** | | Note |
|---|---|---|
| Module Dimensions | 3.773” (W) x 3.149” (H) x 1.253” (D)<br>95.83mm (W) x 79.98mm (H) x 31.83mm (D) | |
| **GPS Performance** | | |
| GPS Channels | 16 | |
| Frequency | 1575.42 MHz – L1 C/A Code | |
| TTFF Cold Start @ -135 dBm | 46 seconds | 1, 6 |
| TTFF Warm Start @ -141 dBm | 34 seconds | 1, 6 |
| TTFF Hot Start @ -141 dBm | 5 seconds | 1, 6 |
| Re-acquisition Time @ -147 dBm | <3 seconds | 2 |
| Acquisition Sensitivity<br>(fix not available)<br>TTFF (Hot) with all signals at -138 dBm: 30 s<br>TTFF (Hot) with all signals at -141 dBm: 41 s<br>(fix available) | <br><br><br><br>-147 dBm | <br><br>3<br><br>4 |
| Tracking Sensitivity | -150 dBm | 5 |
| Static Accuracy 50% Confidence (CEP) | 1.2 m | 6 |
| 95% Confidence (CEP) | 3.1 m | 6 |
| Maximum Horizontal Speed | 515 m/s | 7 |
| Maximum Vertical Speed | 15 m/s | 8 |
| Maximum Altitude | 18 Km | 9 |
| Maximum Acceleration (g) | 2 g | |

### WIFI SPECIFICATIONS

| **WiFi Performance** | |
|---|---|
| Maximum Transmit Power | 15 dBm |
| Frequency Band | 2.4GHz ISM |
| Transmission Speed | 1Mbps default, contact factory for 2Mbps |
| Modulation | Direct-Sequence Spread Spectrum (DSSS) |
| Protocol | 802.11b/g compatible |
| Security | 802.11i (WPA2-PSK) |
| AES Encryption/Decryption | Hardware implemented |

## 2 Specifications continued

### 2.1 Performance continued

| GENERAL SPECIFICATIONS | | |
|---|---|---|
| Power (Avg.) Transmitting | ~1.1W | Note |
| Operation When Not Transmitting | <0.5W | |
| Standby Mode | <50 uA | 10 |
| Internal Li Ion Rechargeable Battery | 900 mAH | |
| Battery Life | 8+ hours | 11 |
| Battery Charge Current | 500mA max | 12 |
| Battery Charge Temperature Range | 0C to 45C | |
| Operating Temperature Range | -15°C to 60°C | 13 |
| Storage Temperature Range | -20C to 45C | 14 |
| Shock / Vibration | TBD | |
| GPS Fix Rate Maximum | Once per second | |
| Wireless Transmission Period | Default is once per second, user configurable via SNMP | |
| **ANTENNA REQUIREMENTS** | | |
| 802.11 Antenna | Stubby 802.11 included, reverse SMA connection provided | |
| GPS Antenna | Internal Passive Antenna Provided | |

*The specifications refer to the standard software builds of the CW85. The performance and specification of the CW85 can be modified with the use of customized software builds.*

**Table 2 CW85 Specification**

*Notes:*

1. *These are RMS values*
2. *Maximum Sensitivity -147 dBm*
3. *Simulator Test, all signals at specified power level*
4. *Estimated*
5. *Simulator Test, continuous fix with all signals at specified power level*
6. *Open-sky, 24 hrs statistic,* ***active*** *antenna (signal range is between 30 to 49 dB/Hz)*
   **Note: These values are antenna dependent and may vary*
7. *Limited by International Traffic in Arms Regulation (ITAR)*
8. *Defined by navigation integrity check*
9. *Limited by International Traffic in Arms Regulation (ITAR)*
10. *Not available on some models*
11. *Continuous transmission, 1 fix per second, 27°C*
    *8 hours of operation are not guaranteed for the entire operational temperature range*
12. *Total current drawn by the device via USB port. If the device is operating during charge, the current required for operation reduces the available charge current, maintaining a maximum draw of 500mA*
13. *Although the battery will continue to function from -15° to 60°C, the battery lifetime is reduced*
14. *Exceeding the specifications for storage range will decrease the life and capacity of the Lithium Ion battery*
    *The unit will continue to operate above the storage temperature, but the battery life will be significantly shorter*

## 2 Specifications continued

### 2.2 Transmission Distance

Estimation of maximum transmission distance on 802.11b/g signal versus transmission rate:

| | Open Plan Building | Semi Open Office | Closed Office |
|---|---|---|---|
| 11 Mbps | 160 m (525 ft) | 50 m (165 ft) | 25 m (80 ft) |
| 5.5 Mbps | 270 m (855 ft) | 70 m (230 ft) | 35 m (115 ft) |
| 2.0 Mbps | 400 m (1300 ft) | 90 m (300 ft) | 40 m (130 ft) |
| 1.0 Mbps | 550 m (1750 ft) | 115 m (375 ft) | 50 m (165 ft) |

*To give the longest possible transmission range, the NavTrac is configured to transmit at 1.0 Mbps.*

**Table 3 WiFi Transmission Distance**

### 2.3 Mechanical Dimensions

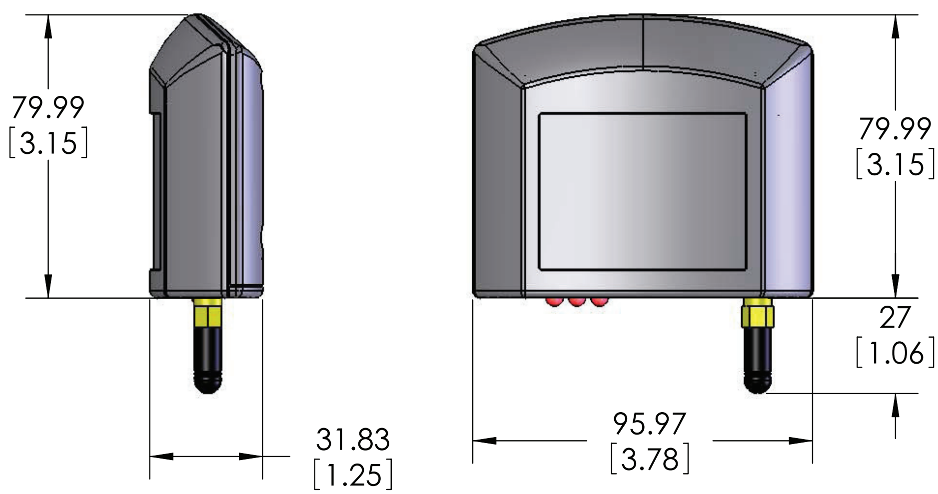



**Figure 2 NavTrac Dimensions**

## 2 Specifications continued

### 2.4 External Connections

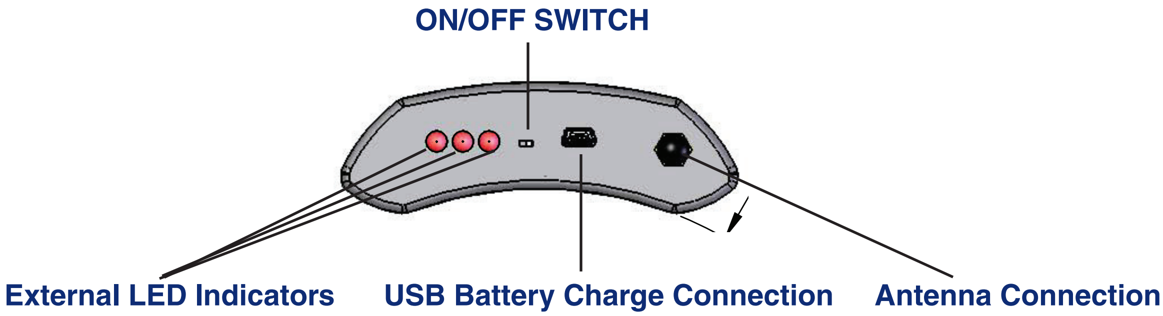



**Figure 3 External Connections**

### 2.5 Optimal Orientation

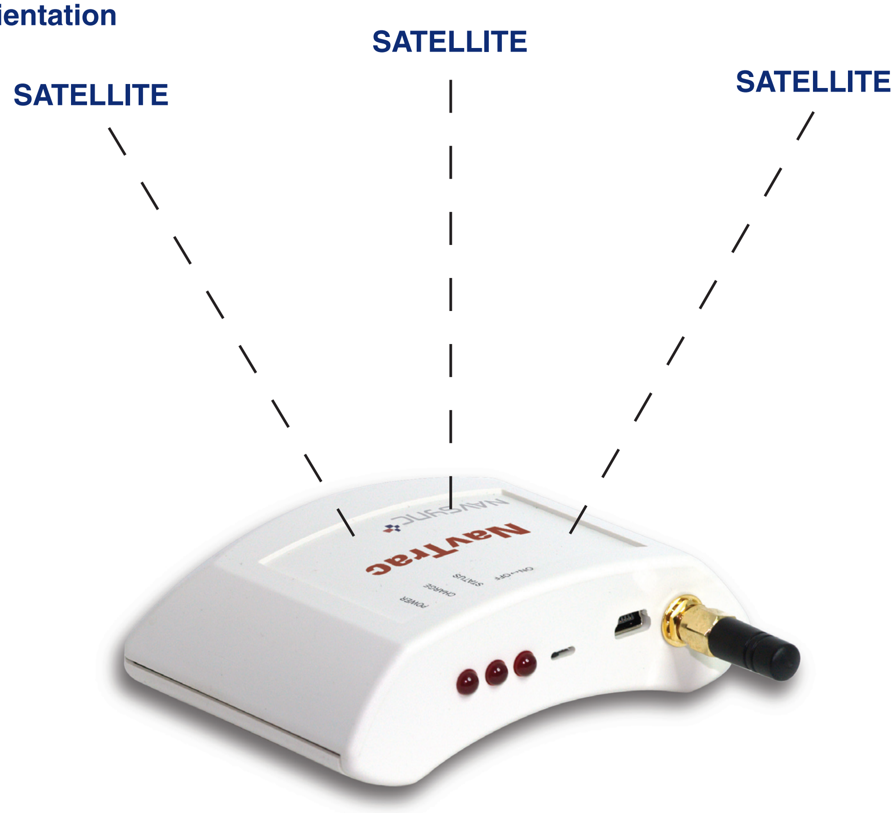



**Figure 4 NavTrac Optimal Position**

# 3 Device Configuration via SNMP

## 3.1 General Information

The NavTrac parameters are configured via a Simple Network Management Protocol (SNMP) manager. SNMP is an industry standard protocol for networked devices. It defines the messaging protocol and the structure (but not the content) of an information database, called the Management Information Base (MIB), which is contained in managed network devices. There are several versions of SNMP, the NavTrac supports version 1 (SNMPv1).

The structure of the MIB is hierarchical in nature with several well defined levels of parameters and the ability to define more parameters at the device level. An SNMP agent and the MIB reside in the device, giving access to read-only and configurable parameters. Each parameter has a unique object identifier (OID), a dotted decimal notation which describes its location in the SNMP hierarchy.

Managed devices in an SNMP network also have specified ‘community names’. These are used to group managers and devices and help identify where information is sent. A managed device can have different community names for reading and writing operations.

We recommend using Net-SNMP software as an easy method to understand and begin managing the NavTrac parameters using SNMP. The Net-SNMP homepage is www.net-snmp.org, the latest version can be downloaded free of charge from SourceForge.net at http://sourceforge.net .

Once installed, the net-SNMP software can be used to read (get) and write (set) to the NavTrac parameter database using the “snmpget” and “snmpset” commands.

The format of a snmpget command is:

*snmpget [OPTIONS] AGENT OID*

Desired options include:

The SNMP version specifier, ‘-v 1’. The NavTrac uses SNMPv1.

An output format specifier, ‘-O a’, which requests string values to be printed as ASCII text.

The community name, ‘-c GSN_GET’. The community name for reading a NavTrac device is “GSN_GET”.

The agent for the NavTrac is the IP address of the unit, which is configured via DHCP. Please see Section 1.4 and Section 6 for the default network settings and details on how to bring the device up on a network.

The OID’s for the NavTrac parameters are given in the NavTrac OID Table. Each OID is prefixed with .1.3.6.1.4.1.28295.1 -or- .1.3.6.1.4.1.28295.99.1. Using the 1st table entry “GSNSENSORSERVERIP” as an example, the snmp data read request would be:

*snmpget –v 1 -O a -c GSN_GET 192.168.1.102 .1.3.6.1.4.1.28295.99.1.2.1.6.5*

A typical response would look like:

*SNMPv2-SMI::enterprises.28295.99.1.2.1.6.5 = IpAddress: 192.168.1.2*

Writing to parameter database is accomplished using the snmpset command.

The format of a snmpset command is:

*snmpset [OPTIONS] AGENT OID TYPE VALUE*

Necessary options are the same as snmpget, although the ‘-O’ output specifier is not used. The type and value of the parameter must be specified in a single character, as shown in the following Data Type Table 4. The data type for the NavTrac parameters appears in the in the NavTrac OID Table.

## 3.2 Data Type Table

| Type | TypeSpecifier | Description |
|---|---|---|
| INTEGER | i | A whole number |
| STRING | s | Character string |
| IpAddress | a | Four-octet string of hexadecimal data |

**Table 4: Data Type**

The parameter value itself is enclosed in quotations.

Using the same example as above, writing to the 1st table entry “GSNSENSORSERVERIP” would look like:

*snmpset –v 1 -c GSN_SET 192.168.1.102 .1.3.6.1.4.1.28295.99.1.2.1.6.5 a “192.168.1.4”*

In this example, the NavTrac sensor server IP address is being set to “192.168.1.4”.

*There is additional information on the format and use of these and many other operations available in the documentation that accompanies the Net-SNMP software package.*

# 4 NMEA Messages

## 4.1 General NMEA Information

Each NMEA message is preceeded by the ASCII value of the MAC address. This is separated from the NMEA message by a comma, and intended to be used as a unique identifier for each message. All messages start with $, have fields delimited by commas and end with <CR><LF>. Approved NMEA messages are recognized by the first 5 characters after the $ which define both the kind of talker providing the information (2 characters, GP in the case of a GPS) and the type of information (3 characters).

EXAMPLE OUTPUT – no FIX

```
0050C29BA003,$GPGGA,195713.000,0000.0000,S,00000.0000,W,0,00,00.0,0.0,M,0.0,M,,*5A
0050C29BA003,$GPGLL,0000.0000,S,00000.0000,W,195713.000,V,A*49
0050C29BA003,$GPGSA,A,1,,,,,,,,,,,,,0.0,0.0,0.0*30
0050C29BA003,$GPRMC,195713.000,V,0000.0000,S,00000.0000,W,0.00,0.00,281008,,,A*7D
0050C29BA003,$GPZDA,000000.000,22,08,1999,01,00*57
0050C29BA003,$GPVTG,0.00,T,,,0.00,N,0.00,K,A*70
```

*Note: The GPGSV sentence is not sent out on start up until it contains non-zero data.*

EXAMPLE OUTPUT – with a FIX

```
0050C29BA003,$GPGGA,193927.070,4154.8388,N,08845.3577,W,1,08,00.9,279.1,M,-34.9,M,,*59
0050C29BA003,$GPGLL,4154.8388,N,08845.3577,W,193927.070,A,A*43
0050C29BA003,$GPGSA,A,3,04,08,09,11,17,20,28,32,,,,,1.7,0.9,1.4*32
0050C29BA003,$GPGSV,2,1,08,4,38,201,40,8,13,177,33,9,21,314,31,11,22,051,34*4C
0050C29BA003,$GPGSV,2,2,08,17,73,333,47,20,23,088,37,28,66,115,47,32,16,062,24*7C
0050C29BA003,$GPRMC,193927.070,A,4154.8388,N,08845.3577,W,0.00,134.12,281008,,,A*72
0050C29BA003,$GPZDA,193927.070,28,10,2008,01,00*56
0050C29BA003,$GPVTG,134.12,T,,,0.00,N,0.00,K,A*75
```

The following Approved NMEA messages are available from the CW85:

| Message | Section |
|---|---|
| GPGGA | 4.2 |
| GPGLL | 4.3 |
| GPGSA | 4.4 |
| GPGSV | 4.5 |
| GPRMC | 4.6 |
| GPZDA | 4.7 |
| GPVTG | 4.8 |

### 4.2 GPGGA, GPS fix data.

Time and position, together with GPS fixing related data.

$GPGGA,hhmmss.sss,Latitude,N,Longitude,E,FS,NoSV,HDOP,Altref,M,msl,M,DiffAge,DiffStation*cs

| Field | Description |
|---|---|
| $GPGGA | NMEA sentence header (Position Data) |
| hhmmss.sss | UTC Time in hours, minutes, seconds. and decimal second format. |
| Latitude | User datum latitude degrees, minutes, decimal minutes format (ddmm.mmmmmm) |
| N | Hemisphere: 'N'= North, 'S' = South |
| Longitude | User datum longitude degrees, minutes, decimal minutes format (dddmm.mmmmmm) |
| E | Longitude Direction: 'E'= East, 'W' = West |
| FS | Fix Status:<br>0 No fix<br>1 Standard GPS<br>2 Differential GPS |
| NoSv | Number of satellites used in the position solution |
| HDOP | 2-D Horizontal Dilution of Precision (0.00 to 99.99) |
| AltRef | Altitude (meters) above user datum ellipsoid. |
| M | Units of height (meters) |
| msl | Mean Sea Level |
| M | Units of Mean Sea Level (meters) |
| DiffAge | Age of differential correction |
| DiffStation | Differential base station ID |
| cs | Message checksum in hexadecimal |

### 4.3 GPGLL, Geographic position, Lat/Lon.

Latitude and longitude, with time of position fix and status.

$*GPGLL, Latitude,N,Longitude,E,hhmmss.sss,Status,Mode*cs*

| Field | Description |
|---|---|
| $GPGLL | NMEA sentence header (Position Data) |
| Latitude | User datum latitude degrees, minutes, decimal minutes format (ddmm.mmmmmm) |
| N | Hemisphere: 'N'= North, 'S' = South |
| Longitude | User datum longitude degrees, minutes, decimal minutes format (dddmm.mmmmmm) |
| E | Longitude Direction: 'E'= East, 'W'= West |
| hhmmss.sss | UTC Time in hours, minutes, seconds. and decimal second format. |
| Status | Status: V=navigation receiver warning, A=data valid |
| Mode | Mode Indicator:<br>D = Valid, Differential<br>A = Valid, Autonomous<br>E = Invalid, Estimated<br>N = Invalid, Not Valid |
| cs | Message checksum in hexadecimal |

## 4 NMEA Messages continued

### 4.4 GPGSA, GPS DOP and Active satellites.

GPS receiver operating mode, satellites used for navigation, and DOP values.

$*GPGSA*,Smode,FS,sv,sv,sv,sv,,,,,,,,PDOP,HDOP,VDOP*cs

| Field | Description |
|---|---|
| $GPGSA | NMEA sentence header (Satellite Data) |
| Smode | A= Automatic switching 2D/3D; M=Manually fixed 2D/3D |
| FS | Fix Status:<br>1 No fix<br>2 2D GPS Fix<br>3 3D GPS Fix |
| sv | Satellites in use, null for unused fields (12 available fields) |
| PDOP | 3-D Position Dilution of Precision (0.00 to 99.99) |
| HDOP | 2-D Horizontal Dilution of Precision (0.00 to 99.99) |
| VDOP | Vertical Dilution of Precision (00.0 to 99.9). |
| cs | Message checksum in hexadecimal |

### 4.5 GPGSV, GPS Satellites in View.

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

$GPGSV, NoMsg, MsgNo, NoSv{,sv,elv,az,cno}{,sv,elv,az,cno}{,sv,elv,az,cno}{,sv,elv,az,cno}*cs

*Note: {} designate optional sections that appear only if there is satellite data.*

| Field | Description |
|---|---|
| $GPGSV | NMEA sentence header (Satellite Data) |
| NoMsg | Total number of GPGSV messages being output |
| MsgNo | Number of this message |
| NoSv | Number of satellites in view |
| sv | Satellites ID |
| elv | Satellite elevation angle (degrees) |
| az | Satellite azimuth angle (degrees) |
| cno | Satellite signal/Noise ration (dB/Hz) |
| cs | Message checksum in hexadecimal |

## 4.6 GPRMC, Recommended Minimum data.

The 'Recommended Minimum' sentence defined by NMEA for GPS/Transit system data.

$GPRMC,hhmmss.sss,status,latitude,Hemisphere,longitude,E,spd,cmg,ddmmyy,mv,mvd,Mode*cs

| Field | Description |
|---|---|
| $GPRMC | NMEA sentence header (Recommended Minimum Sentence) |
| hhmmss.sss | UTC Time in hours, minutes, seconds |
| status | Status: V=navigation receiver warning, A=data valid |
| Latitude | User datum latitude degrees, minutes, decimal minutes format (ddmm.mmmmmm) |
| N | Hemisphere: 'N'= North, 'S' = South |
| Longitude | User datum longitude degrees, minutes, decimal minutes format (dddmm.mmmmmm) |
| E | Longitude Direction: 'E'= East, 'W'= West |
| spd | Speed over ground (knots) |
| cmg | Course made good |
| ddmmyy | Date in Day, Month, Year format |
| mv | Magnetic variation |
| mvd | Magnetic variation direction |
| Mode | Mode Indicator:<br>D = Valid, Differential<br>A = Valid, Autonomous<br>E = Invalid, Estimated<br>N = Invalid, Not Valid |
| cs | Message checksum in hexadecimal |

## 4.7 GPZDA UTC Time and Date

This message transfers UTC Time and Date. Since the latency of preparing and transferring the message is variable, and the time does not refer to a particular position fix, the seconds' precision is reduced to 2 decimal places.

$GPZDA,hhmmss.sss,dd,mm,yyyy,Int,Unsigned*cs

| Field | Description |
|---|---|
| $GPZDA | NMEA sentence header (Time and Date) |
| hhmmss.sss | UTC Time in hours, minutes, seconds |
| dd | UTC day |
| mm | UTC month |
| yyyy | UTC year |
| Int | Local zone hours |
| Unsigned | Local zone minutes |
| cs | Message checksum in hexadecimal |

## 4 NMEA Messages continued

### 4.8 GPVTG, Course over ground and Ground speed.

Velocity is given as Course over Ground (COG) and Ground Speed

$GPVTG,cogt,T,cogm ,M ,knots,N,kph,K,Mode*cs

| Field | Description |
|---|---|
| $GPVTG | NMEA sentence header (Speed and heading) |
| cogt | Course over ground (true) |
| T | True - fixed field |
| cogm | Course over ground (magnetic) |
| M | Magnetic - fixed field |
| knots | Speed over ground (knots) |
| N | Knots - fixed field |
| kph | Speed over ground (kph) |
| K | Kilometers per hour – fixed field |
| Mode | Mode Indicator:<br>D = Valid, Differential<br>A = Valid, Autonomous<br>E = Invalid, Estimated<br>N = Invalid, Not Valid |
| cs | Message checksum in hexadecimal |

## 5 Lithium Ion Battery and Integrated Charger

The NavTrac unit contains a 900mAH Lithium Ion rechargeable battery and integrated battery charger. To charge the battery, a user needs to connect a 5V, 500mA capable power supply. The interface provided for charging the battery is a mini-USB connector. There is no serial data connection to the connector, just power and ground. No data is available to or from this port.

The operation range of this battery is -15° to 60°C, while the charging and storage temps are restricted to 0° to 45°C and -20° to 45°C, respectively. This is because, although the battery will operate from 45° to 60°C, long term storage at that temperature can cause a considerable reduction in battery capacity. Long term operation above 45°C is not recommended for the best battery life.

The unit does contain circuitry for over/under temperature protection of the charging circuitry. The internal temperature protection will restrict a user from charging a battery below 0°C or above 45°C. This temperature is not measured ambient temperature, but is the temperature inside the enclosure. It is accurate to within about 3°C. There is about 3 degrees of hysteresis built into the charging circuitry to help prevent the battery charger from toggling on/off at a rapid rate. If the battery charger detects the out-of-temperature band, it will flash the battery charging LED at a very rapid rate.

If an error is detected when charging the battery (ie – the battery voltage is too low and possible internal damage is suspected), the battery charging LED will also flash at a rapid rate. If 2-3 successive attempts to charge the battery fail, the battery should be replaced. Please contact the factory for details on replacement batteries.

The battery is charged using a constant-current, constant-voltage method. There is a safety timeout period of 2 hours once the charging is in the constant-voltage mode. This will prevent damage to the battery from leaving power connected for too long.

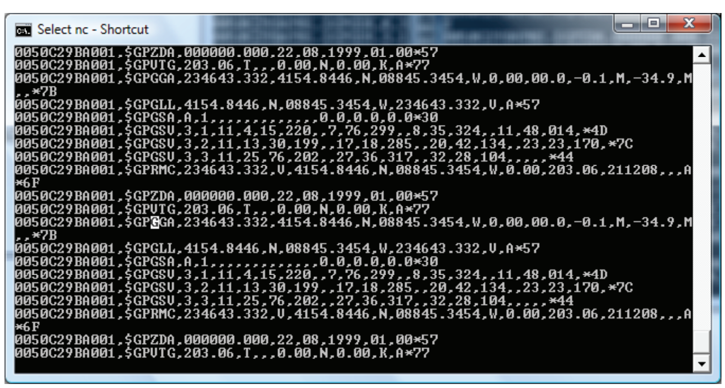
The LED provided on the front panel for charging status will be lit when battery charging begins and will be constantly on until the battery is 90% charged. The LED will go off when the battery reaches 90% of its capacity, so it is advised to leave the battery charging for approximately 30 minutes after the LED goes off. Total battery charging time depends on how depleted the battery is at the time of charge. If the battery voltage is not so low as to require trickle charging prior to entering constant-current mode, the charge cycle is approximately 3 hours. Please note that if the NavTrac unit turns off due to a low battery condition, the charge indicator is turned off, even if the device is on the charger. This is because the microcontroller is in a special mode until it is restarted to ensure a proper shutdown in low battery conditions. To re-enable the LED indicator that shows the battery is charging properly, please do the following: charge the battery for a fewminutes. Remove the charger and cycle the power. Then re-insert the charger. The LED should function properly after this procedure. It is NOT necessary to follow this procedure to charge the battery, this is just to re-enable the indicator if the unit goes into its low battery shutdown mode.

## 6 Installation Instructions for Initial Setup

1. Power the NavTrac by turning the switch to the "ON" position (you may need to use a paper clip). Make sure the WiFi antenna is properly connected and the internal GPS antenna is properly oriented (the NavTrac label should be facing upwards towards an open view of the sky).
2. Provide a wireless router or a network access point that is configured for DHCP. The SSID should be set to 'CW85_Setup' and configured for Channel 6 with Wireless Encryption disabled.
   The recommended settings are to have the router at 192.168.1.X (Please do not use 192.168.1.2 - that address is pre-configured for the Data Server) and to have it serve addresses on the 255.255.255.0 Subnet. If this is not the first time that you have installed the NavTrac unit and you have altered the SSID and Channel settings in the device, please use your altered settings.
3. Provide the host computer(s) IP settings to match those of the NavTrac GSNPRIMARYSNMPMGRIP address (for SNMP parameter management) and the GSNSENSORSERVERIP address (for GPS data). The default values for these are 192.168.1.2. Please note that if this computer is connected wirelessly to the network, then it must have the same SSID/Channel/Encryption settings as above.
4. Obtain and install a copy of Net-SNMP on the host computer configured with the GSNPRIMARYSNMPMGRIP as the IP address (default: 192.168.1.2); see www.net-snmp.org. Use the Net-SNMP commands to read (snmpget) and write (snmpset) the NavTrac configurable parameters. See Section 3 – Configuration via SNMP.
5. If you don't already have server software that is listening for the incoming data stream, or if you would like an easy-to-setup program for viewing the NMEA streams/debugging, we suggest using NetCat; see http://netcat.sourceforge.net/. Netcat can be used to display the ASCII GPS data being sent from the NavTrac. Once the unit has received an IP address via DHCP, it will begin transmitting UDP packets to 192.168.1.2, port 9999.
6. Monitoring the GPS data using Netcat:
   Netcat is a utility that can be used to read the UDP packets containing the GPS data from the NavTrac. The netcat utility is freely available at http://netcat.sourceforge.net/.
   The NavTrac GPS receiver communicates on port 9999. A simple netcat command line to display the GPS data would look like:

   nc –l –p 9999 –u

An example of the output that would be seen in a NetCat window:



OID relative to .1.3.6.1.4.1.28295.99.1.2.1

| NAME | OID[1] | Access | Type | Default | Range | Comments |
|---|---|---|---|---|---|---|
| GSNSENSORSERVERIP | 6.5 | R/W | IP ADDRESS | 192.168.1.2 | All possible values | IP address of the sensor data server for the CW85 |
| GSNSENSORDATAPORTNUM | 9.5 | R/W | INTEGER | 9999 | All possible values | Port number of the sensor data server for the CW85 |
| NAVTRACLOGSERVERIPADDR | 6.3 | RW | IP ADDRESS | 192.168.1.2 | All possible | IP for the data log. Changes for UDP are automatic, changes for TCP take effect following a reboot |
| NAVTRACLOGSERVERPORTNUM | 9.3 | RW | INTEGER | 9998 | All possible | Port for the data log. Changes for UDP are automatic, changes for TCP take effect following a reboot |
| NAVTRACLOGSERVERPORTTYPE | 7.3 | RW | INTEGER | (UDP) | 1-2(TCP is 2) | Packet type for the log. Change to this take effect following a reboot. |
| NAVTRACDATASERVERPORTTYPE | 7.5 | RW | INTEGER | 7(UDP) | 1-2(TCP is 2) | Packet type for the data. Changes to this take effect following a reboot |
| NAVTRACTESTVAR | 11.5 | RW | INTEGER | 0 | 0-1 | Writing a 0 or 1 to this will cause a diagnostic sentence to be sent containing RSSI and battery status. |
| NAVTRACGPSUPDATERATE | 16.5 | RW | INTEGER | 1 | 0-86399 | Data transmission rate in seconds. |
| NAVTRACFLASHUPDATERATE | 19.5 | RW | INTEGER | 1 | 0-86399 | Data save rate as a multiple of the transmission rate. |
| NAVTRACMSGENABLE | 21.5 | RW | INTEGER | 127 | Meaningful range currently 0 - 127 | The binary representation of this integer number controls which GPS messages are enabled. |
| NAVTRACFLASHALWAYSSAVE | 27.5 | RW | INTEGER | 0 | 0-1 | Setting this bit enables the Always Save feature. This will cause data to be saved to flash memory at the configured rate EVEN IF the network is detected and the data trans mits. Note that if this is set to 1, data WILL NOT be sent out the data log UNTIL given command 28.5. |
| NAVTRACFLASHDUMP | 28.5 | RW | INTEGER | 0 | 0-1 | Datalog Dump command. Writing a 0 or 1 to this bit provides a one time successful dump of the data log.. Reading this bit returns the last value set. This bit does not have to be cleared or set specifically, writing either will cause the dump operation. |
| NAVTRACFLASHERASE | 29.5 | RW | INTEGER | 0 | 0-1 | Datalog Erase command. Writing a 0 or a 1 to this bit forces the datalog to erase. Reading this bit returns the last value set. This bit does not have to be cleared or set specifically, writing either will cause the erase operation. |

Notes
1. The OID column includes the ending 'instance identifier' which must be included in the MIB variable. ('0' indicates a scalar object; a non-zero value is an object in a table.
2. These values are assigned via DHCP, which is by default enabled on the device.
3. On V3.0, the 2nd GSNAPSSID was LTRX_IBSS and the 3rd was CW85_Setup. For V3.01, the table shows the correct values.

**Table 5: NavTrac OID Table**

OID Relative to .1.3.6.1.4.1.28295.1.

| NAME | OID[1] | Access | Type | Default | Range | Comments |
|---|---|---|---|---|---|---|
| GSNFWVERSION | 1.1.2.0 | R | INTEGER | | All possible values<br>Example: 67108867 = ID: | Integer returned, convert to hex for firmware version.<br>0x00040003 (Version 4.0 sample) |
| GSNPLATFORMVERSION | 1.1.3.0 | R | INTEGER | | All possible values | Platform version |
| GSNRESTOREFACTORYCFG | 1.1.4.0 | RW | INTEGER | | - | PLEASE CONSULT FACTORY PRIOR TO USE. THIS WILL RESET THE MAC ADDRESS, USE .1.3.5.0 to re-set the MAC to original state. |
| GSNLASTERROR | 1.1.5.0 | RW | STRING | | - | Last error occurred |
| GSNREBOOTNODE | 1.1.6.0 | RW | INTEGER | | - | Restart Network |
| GSNBATTERYWARNINGLEVEL | 1.1.8.0 | RW | INTEGER | 730 | - | Battery Warning Level - Do Not Chnage |
| GSNBATTERYSTANDBYLEVEL | 1.1.9.0 | RW | INTEGER | 630 | - | Battery Standby Level - Do Not Change |
| GSNSCANTYPE | 1.2.1.0 | RW | INTEGER | | 0(Passive)-1(Active), 1(Active) | DO NOT CHANGE FOR NORMAL OPERATION |
| GSNADHOCSSID | 1.2.2.0 | RW | STRING | “<null>” | - | SSID in ad hoc mode. This is used for a special mode when you need to create an AdHoc network. Use GSNAPSSID1-3 for normal operation when wanting to join an existing AdHoc network. If this is configured, the unit will continue to try and create this AdHoc network rather than continuing to search for the other SSIDs. |
| GSNADHOCCHANNEL | 1.2.3.0 | RW | INTEGER | 6 | All supported channels | Channel in ad hoc mode |
| GSNAUTHALGO | 1.2.4.0 | R | INTEGER | | | Auth algo used - Do Not Change |
| GSNPSKPASSPHRASE | 1.2.5.0 | W<br>Read Disabled | STRING | GSDemo123 | | |
| GSNOUTERAUTHTYPE | 1.2.6.0 | R | INTEGER | - | | DOES NOT EXIST FOR WPA2_PSK VERSION |
| GSNINNERAUTHTYPE | 1.2.7.0 | R | INTEGER | - | | DOES NOT EXIST FOR WPA2-PSK VERSION |
| GSNUSERNAME | 1.2.8.0 | RW | STRING | - | | DOES NOT EXIST FOR WPA2-PSK VERSION |
| GSNPASSWD | 1.2.9.0 | RW | STRING | - | | DOES NOT EXIST FOR WPA2-PSK VERSION |
| GSNPSKKEY1 | 1.2.10.0 | W | STRING<br>Read Disabled | “<null>” | 256-bit pseudo-random sequence. | Pre computed PSK key. This key is derived from SSID1 and the pass phrase. |
| GSNPSKKEY2 | 1.2.11.0 | W | STRING<br>Read Disabled | “<null>” | 256-bit pseudo-random sequence. | Pre computed PSK key. This key is derived from SSID2 and the pass phrase. |
| GSNPSKKEY3 | 1.2.12.0 | W | STRING<br>Read Disabled | “<null>” | 256-bit pseudo-random sequence. | Pre computed PSK key. This key is derived from SSID3 and the pass phrase. |

Notes
1. The OID column includes the ending ‘instance identifier’ which must be included in the MIB variable. (‘0’ indicates a scalar object; a non-zero value is an object in a table.
2. These values are assigned via DHCP, which is by default enabled on the device.
3. On V3.0, the 2nd GSNAPSSID was LTRX_IBSS and the 3rd was CW85_Setup. For V3.01, the table shows the correct values.

**Table 5: NavTrac OID Table**

OID Relative to .1.3.6.1.4.1.28295.1.

| NAME | OID[1] | Access | Type | Default | Range | Comments |
|---|---|---|---|---|---|---|
| GSNIPADDRESS | 1.3.1.0 | RW | IP ADDRESS | "<null>" | All possible values | IP address of the NavTrac |
| GSNSUBNETADDRESS | 1.3.2.0 | RW | IP ADDRESS | 255.255.255.0 | All possible values | Subnet of NavTrac |
| GSNGATEWAYIPADDRESS | 1.3.3.0 | RW | IP ADDRESS | "<null>" | All possible values | Gateway IP in Infrastructure mode. |
| STATICIPENABLED | 1.3.4.0 | RW | INTEGER | 0 | 0-1, 0l Set to 1 to enable | Static IP. Set to 0 to enable DHCP. |
| GSNMACADDRESS | 1.3.5.0 | RW | HEX | 0x00504A9BAYYY | All possible values | Mac address. Read with -O t option<br>To be used only i8n conjucntion with GSN Restore<br>Factory CFG |
| GSNPRIMARYSNMPMGRIP | 1.4.3.0 | RW | IP ADDRESS | 192.168.1.2 | All possible values, | IP of SNMP manager |
| GSNSECONDARYSNMPMGRIP | 1.4.4.0 | RW | IP ADDRESS | 192.168.1.2 | All possible values, | IP of backup SNMP manager |
| GSNAPSSID1 | 1.4.5.1.2.1 | R/W | STRING | "CW85_Setup" | All possible values | SSID's of the access point to be used in infrastructure mode. They will be searched in order. |
| GSNAPSSID2 | 1.4.5.1.2.2 | R/W | STRING | "CW85_Setup"[3] | All possible values | |
| GSNAPSSID3 | 1.4.5.1.2.3 | R/W | STRING | "LTRX_IBSS"[3] | All possible values | |
| GSNAPCHANNEL1 | 1.4.5.1.3.1. | R/W | INTEGER | 6 | All possible values | Access point channel number for the corresponding SSID. |
| GSNAPCHANNEL2 | 1.4.5.1.3.2 | R/W | INTEGER | 6 | All possible values | |
| GSNAPCHANNEL3 | 1.4.5.1.3.3 | R/W | INTEGER | 6 | All possible values | |
| GSNAPWEPKEYIDSSID1 | 1.4.5.1.4.1 | RW | INTEGER | 0 | 0-3 | WEP Key ID |
| GSNAPWEPKEYIDSSID2 | 1.4.5.1.4.2 | RW | INTEGER | 0 | 0-3 | WEP Key ID |
| GSNAPWEPKEYIDSSID3 | 1.4.5.1.4.3 | RW | INTEGER | 0 | 0-3 | WEP Key ID |
| GSNAPWEPKEYLENSSID1 | 1.4.5.1.5.1 | RW | INTEGER | 5 (WEP64) | 5 or 13 | WEP Key Length |
| GSNAPWEPKEYLENSSID2 | 1.4.5.1.5.2 | RW | INTEGER | 5 (WEP64) | 5 or 13 | WEP Key Length |
| GSNAPWEPKEYLENSSID3 | 1.4.5.1.5.3 | RW | INTEGER | 5 (WEP64) | 5 or 13 | WEP Key Length |
| GSNAPWEPKEYVALSSID1 | 1.4.5.1.6.1 | RW | STRING | 0x00, 0x00, 0x00, 0x00, 0x00 | 10 Bytes or 26 Bytes using O-F and 0-9 | WEP Key Value |
| GSNAPWEPKEYVALSSID2 | 1.4.5.1.6.2 | RW | STRING | 0x00, 0x00, 0x00, 0x00, 0x00 | 10 Bytes or 26 Bytes using O-F and 0-9 | WEP Key Value |
| GSNAPWEPKEYVALSSID3 | 1.4.5.1.6.3 | RW | STRING | 0x00, 0x00, 0x00, 0x00, 0x00 | 10 Bytes or 26 Bytes using O-F and 0-9 | WEP Key Value |
| GSNAPPSKPASSPHRASESSID1 | 1.4.5.1.7.1 | RW | STRING | "<null>" | - | AP Pass Phrase |
| GSNAPPSKPASSPHRASESSID2 | 1.4.5.1.7.2 | RW | STRING | "<null>" | - | AP Pass Phrase |
| GSNAPPSKPASSPHRASESSID3 | 1.4.5.1.7.3 | RW | STRING | "<null>" | - | AP Pass Phrase |

Notes

1. The OID column includes the ending 'instance identifier' which must be included in the MIB variable. ('0' indicates a scalar object; a non-zero value is an object in a table.
2. These values are assigned via DHCP, which is by default enabled on the device.
3. On V3.0, the 2nd GSNAPSSID was LTRX_IBSS and the 3rd was CW85_Setup. For V3.01, the table shows the correct values.

**Table 5: NavTrac OID Table**

OID Relative to .1.3.6.1.4.1.28295.1.

| NAME | OID[1] | Access | Type | Default | Range | Comments |
|---|---|---|---|---|---|---|
| GSNWEPKEYAUTHMODESSID1 | 1.4.5.1.8.1 | RW | INTEGER | | Open Authentication | DO NOT CHANGE |
| GSNWEPKEYAUTHMODESSID2 | 1.4.5.1.8.2 | RW | INTEGER | | Open Authentication | DO NOT CHANGE |
| GSNWEPKEYAUTHMODESSID3 | 1.4.5.1.8.3 | RW | INTEGER | | Open Authentication | DO NOT CHANGE |
| GSNENCRYPTIONMODESSID1 | 1.4.5.1.9.1 | RW | INTEGER | 219(DBh) | All possible Values | Encryption control for SSID1. Bitmap of the binary equivalent controls which encryption methods are allowed.<br>Note: Bit 3 and 6 are Not Available on WPA2-PSK version.<br>Not available on version 4.0 and prior. |
| GSNENCRYPTIONMODESSID2 | 1.4.5.1.9.2 | RW | INTEGER | 219(DBh) | All possible Values | Encryption control for SSID2. Bit 0 WEP, Bit 4 WPA2-Personal<br>Bit 1 WPA-Personal, Bit 5 RESERVED - Set to 0 |
| GSNENCRYPTIONMODESSID3 | 1.4.5.1.9.3 | RW | INTEGER | 219(DBh) | All possible Values | Encryption control for SSID3. Bit 2 RESERVED - Set to 0<br>Bit 6 WPA2-Enterprise (N/A), Bit 3 WPA-Enterprise<br>Bit 7 Open Encryption (none) |
| GSNCONFIGCOMPLETE | 1.4.6.0 | RW | INTEGER | | | DO NOT CHANGE |
| GSNGETCOMMSTRING | 1.4.10.0 | R | STRING | GSN_GET | | DO NOT CHANGE |
| GSNSETCOMMSTRING | 1.4.11.0 | R | STRING | GSN_SET | | DO NOT CHANGE |
| GSNTRAPCOMMSTRING | 1.4.12.0 | R | STRING | GSN_TRAP | | DO NOT CHANGE |
| GSNTRAPCONFIGINTNEWTMR | 1.4.13.0 | RW | HEX | 0x0000001400000000 (10 seconds) | HEX String | Wakeup interval for config traps,<br>Note: 1 sec is 0x0000000200000000<br>Read the HEX value with the -Ot option rather than -Oa. |
| GSNTRAPLINKUPINTNEWTMR | 1.4.14.0 | RW | HEX | 0x0000002800000000 (20 seconds) | HEX String | Wakeup interval for linkup traps.<br>Note: 1 sec is 0x0000000200000000<br>Read the HEX value with the -Ot option rather than -Oa. |
| GSNFWUPDATEIP | 1.6.1.0 | RW | IPAD-DRESS | 192.168.1.2 | All possible values | |
| GSNFWUPDATEPORT | 1.6.2.0 | RW | INTEGER | 8355 | All possible values | |
| GSFWUPGRADENEEDED | 1.6.3.0 | RW | INTEGER | | 0 | DO NOT USE |

Notes
1. The OID column includes the ending 'instance identifier' which must be included in the MIB variable. ('0' indicates a scalar object; a non-zero value is an object in a table.
2. These values are assigned via DHCP, which is by default enabled on the device.
3. On V3.0, the 2nd GSNAPSSID was LTRX_IBSS and the 3rd was CW85_Setup. For V3.01, the table shows the correct values.

Table 5: NavTrac OID Table

OID Relative to .1.3.6.1.4.1.28295.1.

| NAME | OID[1] | Access | Type | Default | Range | Comments |
|---|---|---|---|---|---|---|
| GSNHRDWAREVERSION | 2.10.1.0 | R | INTEGER | | All possible values, not defined | The hardware version is loaded at boot time by the software from a hardware register. |
| GSNBOOTROMVERSION | 2.10.2.0 | R | INTEGER | | All possible values, not defined | The boot ROM version is loaded at boot time by the software from a specific memory location |
| GSNWLANFWVERSION | 2.10.3.0 | R | INTEGER | | - | Firmware version |
| GSNBUPVERSION | 2.10.4.0 | R | INTEGER | | - | BUP version |
| GSNMODEMBVERSION | 2.10.5.0 | R | INTEGER | | - | Modem B version |
| GSNSTREAMVERSION | 2.10.6.0 | R | INTEGER | | - | Stream processor version |
| GSNLASTERRCODE | 2.10.7.0 | R | INTEGER | | - | Last error code |
| GSNLASTERRPARAM | 2.10.8.0 | R | STRING | | - | Last error parameter |
| GSNRANDOMVECTOR | 2.10.9.0 | R | STRING | | - | Rx timestamp LSBs for random calculation |
| GSNRANDOMELEMENTS | 2.10.10.0 | R | INTEGER | | - | |
| GSNLOWPOWERXTAL | 2.10.11.0 | R | INTEGER | | - | |

Notes
1. The OID column includes the ending 'instance identifier' which must be included in the MIB variable. ('0' indicates a scalar object; a non-zero value is an object in a table.
2. These values are assigned via DHCP, which is by default enabled on the device.
3. On V3.0, the 2nd GSNAPSSID was LTRX_IBSS and the 3rd was CW85_Setup. For V3.01, the table shows the correct values.

**Table 5: NavTrac OID Table**

## Revision History of Version 3.0

| Revision | Date | Released By | Note |
|---|---|---|---|
| P00 | 01/29/09 | Engineering | Preliminary Release |
| Po1 | 06/10/09 | OID Table Revisions | |

Table 6 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 7 Additional Documentation List

NAVSYNC

# NavTrac
# CW85 WiFi
# Enabled GPS



**NavSync, Ltd. Europe**

*Bay 143*
*Shannon Industrial Estate*
*Shannon, Co. Clare, Ireland*
*Phone: +353 61 475 666*
*E-mail: sales@navsync.com*

**North America**

*2111 Comprehensive Drive*
*Aurora, IL 60505, USA*
*Phone: 630.236.3026*
*E-mail: northamerica@navsync.com*

**www.navsync.com**