CAN Serial GPS (CSG)

User Guide

www.cosworth.com

Contents

Introduction

The CAN Serial GPS (CSG) is a new ultra compact unit that uses both GPS and GLONASS / BeiDou satellite arrays to deliver very high accuracy, low latency positioning information at up to 10Hz.

Built into the unit is a user configurable 9 axis motion pack with adjustable range and filters with CAN update rates of up to 500Hz.

Supporting both RS232 serial and CAN V2.0 simultaneously and combined with an input voltage range of 5-32V allows the CSG to be easily integrated to virtually any system.

Dual band antenna connection is made with an SMA which allows the CSG unit to be mounted in a precise position inside the vehicle to offer unprecedented levels of measurement information.

Ease of operation is achieved by incorporating LEDs to show satellite fix and processor heart beat. In addition a 15 day rechargeable internal battery allows the unit to hot start in less than 1 second.

By default the CSG is ready to use advanced differential correction from WAAS EGNOS and SBAS messages allowing for an even greater level of positional accuracy to be achieved. The unit also supports a differential correction via an RTCM message, this requires the addition of a ground based basestation and a radio link to be implemented.

Specifications

GPS Technical Data	
Receiver type	72 Channel GPS/QZSS L1 C/A GLONASS L10F, BeiDou B1
Update Rate	10Hz
Time to fix [1]	26s Cold start 1s Hot Start
Sensitivity [2]	-167dBm Tracking -160dBm Reacquisition -148dBm Cold start -156dBm Hot Start
Velocity accuracy [3]	0.05m/s
Horizontal position accuracy [4]	2.0m
Antenna Excitation	Selectable 3V3 or off
Differential Correction	SBAS/WAAS/EGNOS RTCM (via NMEA RS232 Rx)

Motion Pack Technical Data	
Axis of measurement	3 axis Accelerometer 3 axis Gyro 3 Axis Magnetometer
Accelerometer range	±2g, ±4g, ±8g, ±16g
Accelerometer low pass filter response	5-260hz
Gyro range	±250°/sec, ±500°/sec, ±1000°/sec, ±2000°/sec
Gyro low pass filter response	5-256hz
Magnetometer range	±1200 µT

Technical Data	
Input voltage	5-32V
Temperature range	Operational -10 to +70°C Storage -20 to +85°C
LED's	1x Processor Status 1x GPS Status
Debug Connection	1x RS232
RS232 communication	1x Debug Tx/Rx 1x NMEA 0183 Tx/Rx
CAN communication	1 x CAN 2.0B
CAN rate	125/250/500/1000 kbps
CAN Termination	Software Selectable

Mechanical Data	
Material	6082 T6 Alloy
Dimensions	50x50x26.5mm
Weight	74g
IP Rating	IP65
Mounting Points	3x M3x0.5 male-female AV

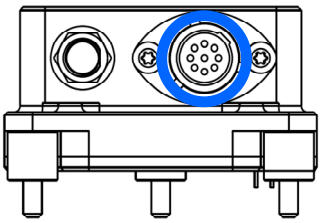
Ordering Information

Part Number	
01S-630090	CSG10 (CAN Serial GPS)
01S-630105-A	GPS Antenna 3v3 SMA 5mtr
01S-630105-B	GPS Antenna 3v3 SMA 1.5mtr
60S-630106	CSG Debug Loom

1. All satellites at -130dBm
2. Demonstraded with a good eternal LNA
3. 50% @ 30m/s
4. CEP, 50%, 24 hours static, -130dBm, 6 SVs

Connector Information

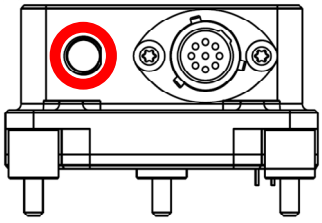
System Connector



Connector	Mating connector
Deutsch ASDD006-09PB	Deutsch ASDD606-09SB

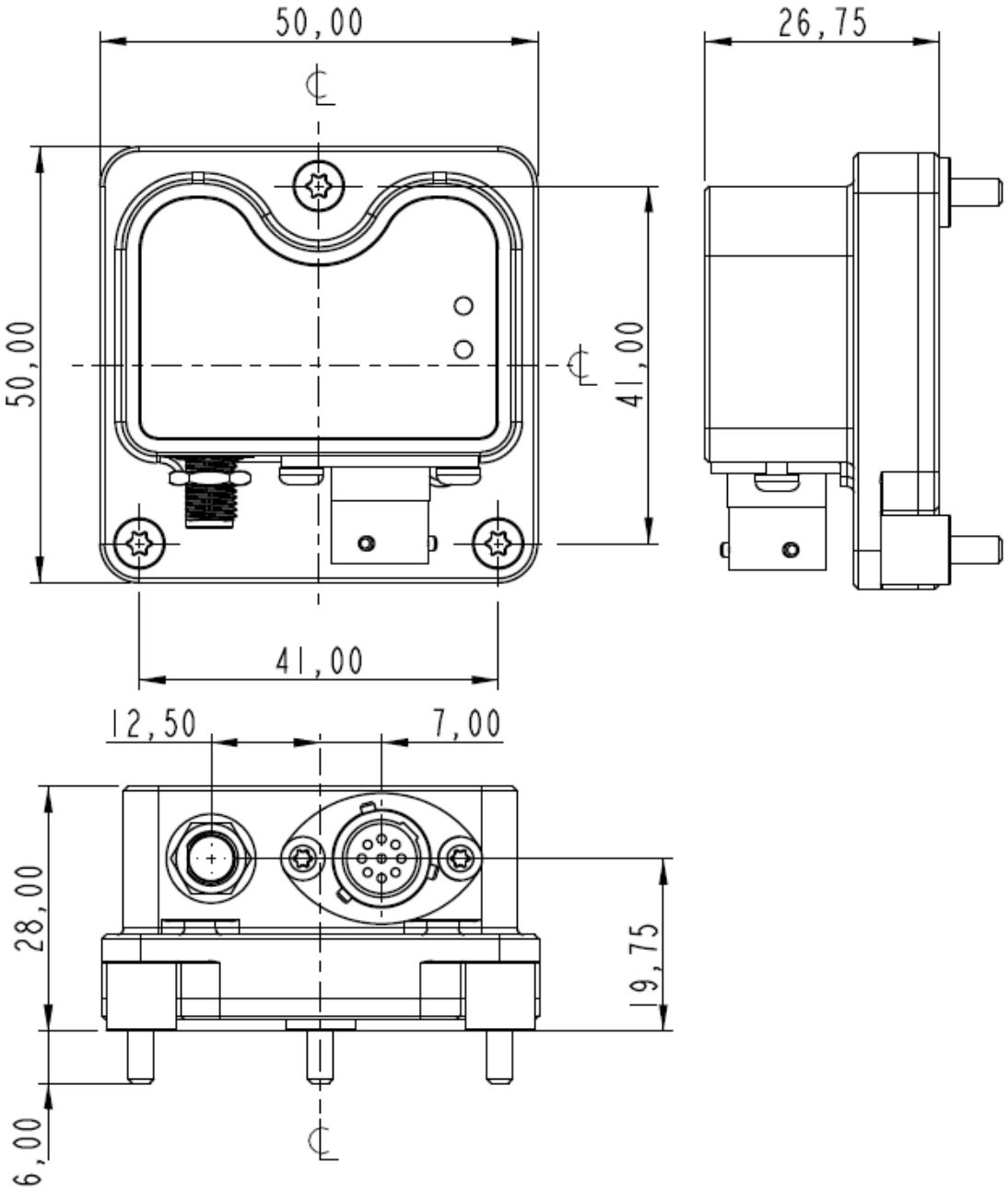
Pin	Signal	Description
1	BATT+	Battery 5-32V Input Voltage
2	DEBRX	Debug Rx (DB9 pin 3)
3	DEBTX	Debug Tx (DB9 pin 2)
4	RS232 Tx	NMEA RS232 Tx
5	RS232 Rx	NMEA RS232 Rx
6	CAN L	CAN Low
7	CAN H	CAN High
8	DEBGND	Debug Gnd (DB9 pin 5)
9	BATT-	Battery 0V

Antenna Connector



Connector	Mating connector
SMA Female, standard polarity, Bulkhead 50 ohm	SMA Male, standard polarity, Cable, 50 ohm **Important Information.** SMA coupling nut mating torque between **minimum 4lbf.in (0.5Nm) and 6lbf.in (0.7Nm) maximum.** If over torqued the bulk head SMA may turn and cause internal damage, voiding warranty.

Dimensions



Interfaces

CAN

There is one CAN port:

Software configurable BAUD rates,

100, 125, 250, 500 and 1000kbit/sec the default is 1MBit.

Software configurable CAN identifiers (IDs).

Software configurable termination, default to terminated.

Serial

There are two serial ports on the CSG.

The first is the Debug, this is configured to operate at a fixed rate of 115k2 Baud, 8 data bits, No parity and one stop bit

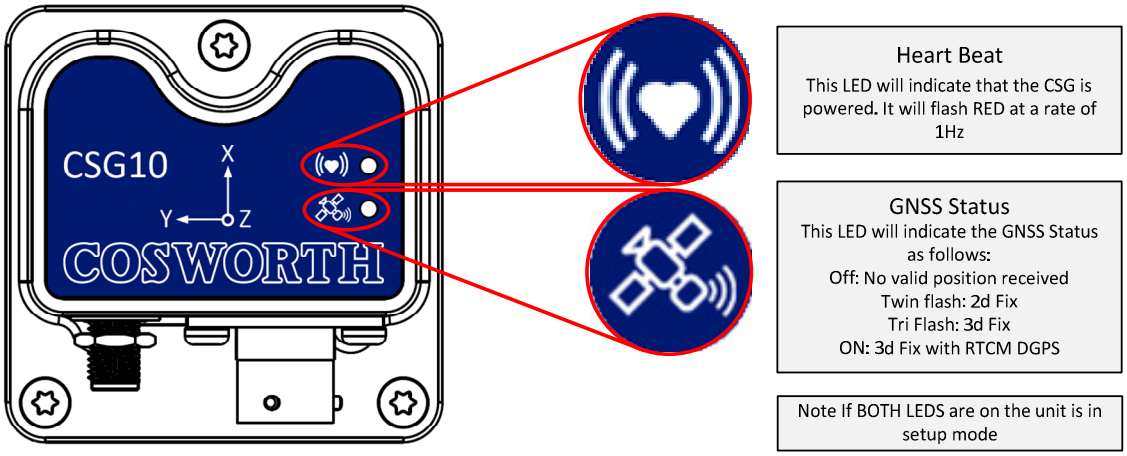
The Debug serial port is used to access a CSG configuration menu.. The serial port is also used for firmware updates.

The Second is the NMEA which can be configured using the Debug port. The NMEA port can be configured to transmit at a rate of 4800 to 115200, 8 data bits, No parity and one stop bit.

LED's

Identification

There are 2 LED's on the CSG these indicate the following information to the user.

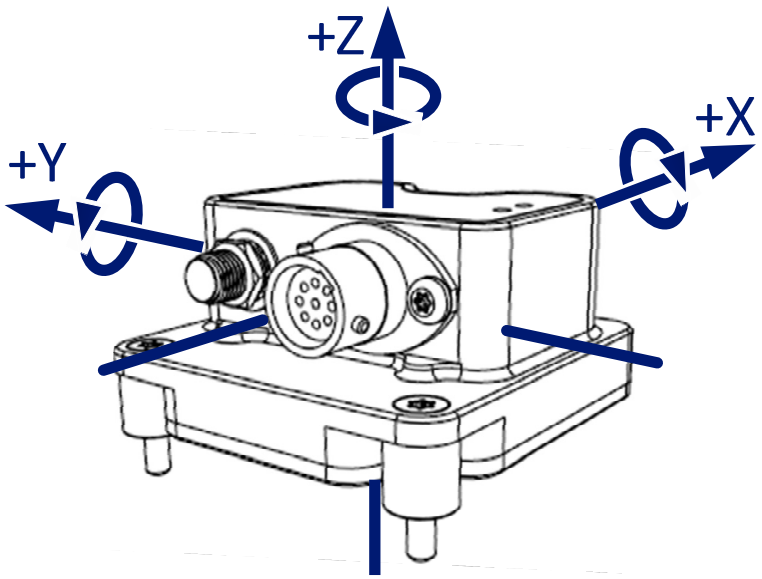


Motion Pack

The CSG10 is fitted with a 9 Axis motion pack allowing for a single detailed chassis analysis from a single unit. The values from the motion pack are only available via the CAN link.

Motion pack orientation

The Motion pack contains a 3 Axis Accelerometer, a 3 Axis Gyro and a 3 Axis Magnetometer, which are installed in the following orientation.



Where possible the CSG should be mounted as close to the centre of gravity.

Accelerometers Range

The Accelerometers fitted within the CSG have software selectable Ranges allowing the user to configure the unit to their exact requirement. The options available via debug for this are as follows.

```
Accel Range +/-(2, 4, 8, 16)G [ 8 ]
```

By default the CSG will be configured to have a Range of 8G, the current setting for the Accel Range is also transmitted via CAN to allow the user to see how it was configured.

Gyros Range

The Gyros fitted within the CSG also have software selectable Ranges again allowing the user to configure the unit to their exact requirements. The options available via debug for this are as follows:

```
Gyro Range +/-(250, 500, 1000, 2000)deg/sec [ 250 ]
```

By default the CSG will be configured to have a Range of 250deg/sec, the current setting for the Gyro Range is also transmitted via CAN to allow the user to see how it was configured.

Accelerometer and Gyro Low Pass Filter

The CSG gives the user the option to configure a software selectable Low pass filter within the unit again allowing the user to have a greater levers of control over the data. The options available via debug are as follows.

```
Motion Low Pass Filter (5, 10, 20, 40, 100, 200)Hz [ 100 ] :
```

By default the CSG will be configured to have a Range of 100Hz, the current setting for the Low pass filter are also available via CAN to allow the user to see how it was set.

There is only one low pass filter option whatever setting you make will be applied to both Accel's and Gyros.

Magnetometers

The Magnetometers within the CSG have been fitted to allow the user to accurately produce a compass heading for the box.

Compass

The CSG also has a compass this is derived from the Magnetometers. The Compass heading can be used along with the GPS Heading of motion channel to view the difference between them.

Care must be taken when installing the CSG to make sure that it is not placed near large ferrous materials (steel) as this will affect the compass. For information about calibrating the compass refer to the Compass Configuration section on Page 20.

CAN Communications

- All CAN identifications are fixed using the following structure.

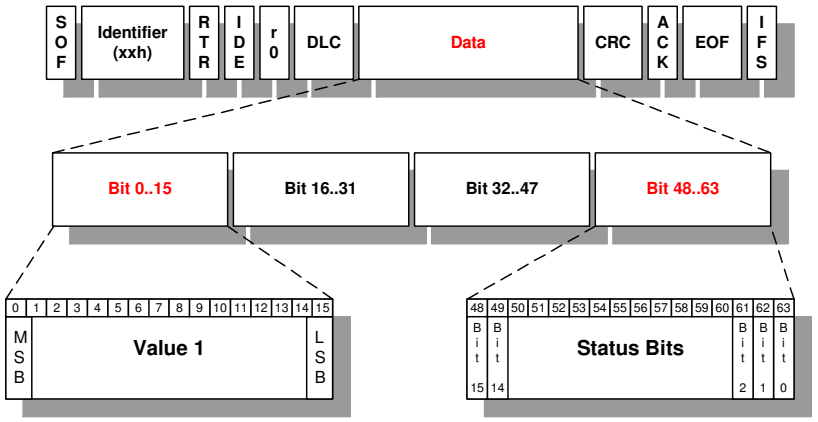
CAN Bus Properties

- Software selectable Baud rate
- Software selectable 11 bit Standard or 29 bit extended identifiers
- The data shall be in Motorola format (Big endian)

Each message is defined in a table as per the example below:-

ID	Xxh			
Dir	Sigma Logger TX / Engine Controller RX			
Rate	1ms*			
Bits	Name	Scaling	Notes	
0-15	Value 1			
16-31	Value 2			
32-47	Value 3			
48-63	Status Bits	Bitfield	Bit 48	Status bit 15
			Bit 49	Status bit 14
			…	…
			Bit 62	Status bit 1
			Bit 63	Status bit 0

The CAN interface is defined using a bit index from the start of the data field in the message. All multi-bit values are in big-endian format.



Some messages may have ‘sub messages’ multiplexed in them. In these cases the sub messages are all defined in similar tables and the Rate specified applies to the sub message and not the containing CAN message ID.

CAN Transmission

Message 0xD0 - CAN System Parameters

ID	System Parameters Tx		
Dir	CSG to X		
Rate	5Hz (as default, but can be configured or switched off)		
Bits	Name	Scaling	Notes
0-15	Cosworth Validation Word	U16	
16-23	Software Version Major	U8	
24-31	Software Version Minor	U8	
32-39	Box Temp	U8	1˚C/bit
40-47	Antenna Voltage	U8	100mV/bit
48-63	Battery Voltage	U16	100mV/bit

Message 0xD1 - Navigation Tx 0

ID	GNSS Tx 0		
Dir	CSG to X		
Rate	10Hz (as default, but can be configured or switched off)		
Bits	Name	Scaling	Notes
0-31	Latitude	S32	1e-7 Deg
32-63	Longitude	S32	1e-7 Deg

Message 0xD2 - Navigation Tx 1

ID	GNSS Tx 1		
Dir	CSG to X		
Rate	10Hz (as default, but can be configured or switched off)		
Bits	Name	Scaling	Notes
0-31	Heading of Motion	S32	1e-5 Deg
32-63	Ground Speed	S32	mm/s (2D)

Message 0xD3 - Navigation Tx 2

ID	GNSS Tx 0		
Dir	CSG to X		
Rate	10Hz (as default, but can be configured or switched off)		
Bits	Name	Scaling	Notes
0-7	Multiplex Counter	U8	0-5
8-63	Data Payload	56 bits	

Message 0xD3 - Multiplex Data Payload 0

ID	Multiplex Counter 0 Data Payload		
Bits	Name	Scaling	Notes
8-15	ToD Validity	U8	[a]
16-23	FixType	U8	[b]
24-31	Flags	U8	[c]
32-63	Height (above MSL)	S32	mm

Note [a] ToD Validity

Bit	0	1 = Valid UTC Date
	1	1 = Valid UTC Time of Day
	2	1 = UTC ToD fully resolved

Note [b] Fix Type

enum	0	= No Fix
	1	= Dead Reckoning Only
	2	= 2D – Fix
	3	= 3D – Fix
	4	= GNSS + dead reckoning combined
	5	= Time Only fix

Note [c] Flags

Bit	0	1 = Valid Fix (within DOP & Accuracy Masks)
	1	1 = Differential corrections applied
	2-4	Power Save Mode State
`	enum	0 = no PSM active
		1 = ENABLED
		2 = ACQUISITION
		3 = TRACKING
		4 = POWER OPTIMISED TRACKING
		5 = INACTIVE

Message 0xD3 - Multiplex Data Payload 1

ID	Multiplex Counter 1 Data Payload		
Bits	Name	Scaling	Notes
8-15	UTC Hours	U8	0..23
16-23	UTC Minutes	U8	0..59
24-31	UTC Seconds	U8	0..60
32-63	UTC Fractional Seconds	S32	ns

Message 0xD3 - Multiplex Data Payload 2

ID	Multiplex Counter 2 Data Payload		
Bits	Name	Scaling	Notes
8-15	UTC Day	U8	1..31
16-23	UTC Month	U8	1..12
24-31	U/A	U8	
32-63	hAcc	S32	mm estimate height acc

Message 0xD3 - Multiplex Data Payload 3

ID	Multiplex Counter 3 Data Payload		
Bits	Name	Scaling	Notes
8-15	Sats	U8	Sats used for position
16-31	UTC Year	U16	1999 – 2099 supported
32-63	headAcc	S32	deg 1e-5 estimate head acc

Message 0xD3 - Multiplex Data Payload 4

ID	Multiplex Counter 4 Data Payload		
Bits	Name	Scaling	Notes
8-15	U/A	U8	
16-31	PDOP	U16	0.01
32-63	sAcc	S32	mm/s estimate speed acc

Message 0xD3 - Multiplex Data Payload 5

ID	Multiplex Counter Data Payload 5		
Bits	Name	Scaling	Notes
8-15	Flags	U8	[d]
16-31	I^2C PVT Message Count	U16	
32-47	CAN Message Count	U16	
48-63	CAN Buffer Allocation Fails	U16	

Note [d] Flags

Bit	0	0 = Using PVT data	1 = Using NMEA data
	1	0 = PVT Lat/Lon	1 = NMEA Lat/Lon
	2	1 = GPS Active	
	3	1 = SBAS Active	
	4	1 = BeiDou Active	
	5	1 = QZSS Active	
	6	1 = GLONASS Active	
	7	N/A	

Message 0xD4 - Accel Tx

ID	Accel Tx		
Dir	CSG to X		
Rate	100Hz (as default, but can be configured or switched off)		
Bits	Name	Scaling	Notes
0-7	Motion Filter	U8	[e]
8-15	Accel Range	U8	[f]
16-31	Accel X	S16	0.001g / bit
32-47	Accel Y	S16	0.001g / bit
48-63	Accel Z	S16	0.001g / bit

Note [e] Motion Filter

enum	0	5Hz
	1	10Hz
	2	20Hz
	3	40Hz
	4	100Hz
	5	200Hz

Note [f] Accel Range

enum	0	±2g
	1	±4g
	2	±8g
	3	±16g

Message 0xD5 - Gyro Tx

ID	Gyro Tx		
Dir	CSG to X		
Rate	100Hz (as default, but can be configured or switched off)		
Bits	Name	Scaling	Notes
0-7	Magnetometer Status	U8	[g]
8-15	Gyro Range	U8	[h]
16-31	Gyro X	S16	0.1°/s / bit
32-47	Gyro Y	S16	0.1°/s / bit
48-63	Gyro Z	S16	0.1°/s / bit

Note [g] Magnetometer Status

Bit	0	U/A
	1	U/A
	2	1 = Data Error
	3	1 = Magnetic Sensor Overload
	4-7	U/A

Note [h] Gyro Range

enum	0	±250°/s
	1	±500°/s
	2	±1000°/s
	3	±2000°/s

Message 0xD6 - Mag Tx

ID	Mag Tx 0		
Dir	CSG to X		
Rate	10Hz (as default, but can be configured or switched off)		
Bits	Name	Scaling	Notes
0-15	Compass Heading	U16	0.01° / bit
16-31	Mag X	S16	0.3µT / bit (13 bits res)
32-47	Mag Y	S16	0.3µT / bit (13 bits res)
48-63	Mag Z	S16	0.3µT / bit (13 bits res)

Setup and Debug

The setup and debug menu is available using the debug pins on the CSG.

There is one serial port which is configured to operate at a fixed rate of 115k2 Baud, 8 data bits, no parity and one stop bit

The serial port is used to access a menu, from here you can configure the CSG. The serial port is also used to update the code level.

Config Menu

This menu is available at any time by pressing the <Esc> key. All CAN functionality is suspended whilst in this menu. The present values of the parameters are shown in square brackets. The test menu display is shown below:

```
**********************
  Configuration Menu
**********************
    CSG  Ver 1.0
**********************

C - CAN Configuration
G - GNSS Module Configuration
H - Hardware Information
M - Motion Pack Configuration
N - NMEA Configuration
O - Compass Configuration
R - Restore Factory Defaults
U - Update System EEPROM
W - Watch
X - Exit Config Menu and return to Run Mode
Z - Go to sleep and wait for watchdog
? - Display this menu
        Enter selection:
```

When an option is selected which requires user input, each option will be displayed one line at a time with the present value being displayed inside square brackets. If <cr> is pressed then the value is not modified and the next parameter is displayed. The EE will not be updated unless specifically requested from the menu. The following example shows 2 entries in a sub-menu, user input is shown in red:

```
Sub menu configuration
  Parameter 1 [0xf0] : <cr>
  Parameter 2 [0x12] : 0x13<cr>
```

CAN Configuration

When 'C' is selected from the main menu the user can display/modify CAN parameters one at a time, as shown below. The configuration can be exited at any time by pressing <Esc>, rather than having to step through the complete list:

```
CAN Configuration
  CAN Bit rate (1000, 500, 250, 125, 100 kbps) [ 1000 ] :
  CAN Extended Addressing (On or Off) [ Off ] :
  CAN Termination (On or Off) [ On ] :
  Sys   Tx ID [ 0x00d0 ] :
  Nav 0 Tx ID [ 0x00d1 ] :
  Nav 1 Tx ID [ 0x00d2 ] :
  Nav 2 Tx ID [ 0x00d3 ] :
  Accel Tx ID [ 0x00d4 ] :
  Gyro  Tx ID [ 0x00d5 ] :
  Mag   Tx ID [ 0x00d6 ] :
  Sys   Tx Rate (T, 0, 1, 2, 5, 10, 20, 50, 100 Hz) [ 5 ] :
  Nav 0 Tx Rate (T, 0, 1, 2, 5, 10, 20, 50, 100 Hz) [ 10 ] :
  Nav 1 Tx Rate (T, 0, 1, 2, 5, 10, 20, 50, 100 Hz) [ 10 ] :
  Nav 2 Tx Rate (T, 0, 1, 2, 5, 10, 20, 50, 100 Hz) [ 10 ] :
  Accel Tx Rate (T, 0, 1, 2, 5, 10, 20, 50, 100, 200, 500 Hz) [ 100 ] :
  Gyro  Tx Rate (T, 0, 1, 2, 5, 10, 20, 50, 100, 200, 500 Hz) [ 100 ] :
  Mag   Tx Rate (T, 0, 1, 2, 5, 10, 20, 50, 100 Hz) [ 10 ] :
```

The T (Triggered) option allows the production of CAN messages immediately appropriate new data is available.

GNSS Module Configuration

When 'G' is selected from the main menu the user can display/modify the GNSS module configuration.

A number of operational parameters pertaining to the GNSS module can be configured here.

```
GNSS Module Configuration
   Antenna Power (On or Off) [ On ] :
   Platform (Fixed, Automotive, Maritime, Aviation) [ Automotive ] :
   GPS     (On or Off) [ On ] :
   SBAS    (On or Off) [ Off ] :
   BeiDou  (On or Off) [ Off ] :
   QZSS    (On or Off) [ Off ] :
   GLONASS (On or Off) [ Off ] :
```

Antenna Power

The CSG as standard is designed to be compatible with a 3v3 active antenna, should the user wish to use a different antenna the internal antenna power can be turned off. The CSG is protected for reverse voltage into the antenna signal pin.

Platform

The CSG has a series of standard kalman filters which can be selected from this menu.

Fixed

Used in timing applications (Antenna must be stationary) or other stationary applications. Velocity fixed to 0m/s, Zero dynamics assumed

Automotive

Used for applications with equivalent dynamics to those of a passenger car. Low vertical acceleration assumed.

Maritime

User for applications at sea with zero vertical velocity. Assumed at sea level.

Aviation

Recommended for applications with extreme dynamic environments. No 2D fixes supported.

GPS

The CSG positioning modules is designed to receive and track the L1C/A signals provided at 1575.42 MHz by the Global Positioning System (GPS). The CSG can receive and process GPS concurrently with GLONASS or BeiDou.

SBAS

The CSG support SBAS. This system supplements GPS data with additional regional or wide area GPS augmentation data. The system broadcasts augmentation data via satellite and this information can be used by GNSS receivers to improve the resulting precision. SBAS satellites can be used as additional satellites for ranging (navigation), further enhancing precision and availability. The following SBAS types are supported by the CSG: WAAS, EGNOS and MSAS.

BeiDou

The CSG can receive and process BeiDou concurrently with GPS or GLONASS. The CSG is designed to receive and track the B1 signals provided at 1561.098 MHz by the BeiDou Navigation Satellite System. The ability to receive and track BeiDou B1 satellite signals in conjunction with GPS results in higher coverage, improved reliability and better accuracy. By the end of 2013 BeiDou is not fully operational and provides regional coverage only. Global coverage is scheduled for 2020.

QZSS

The Quasi-Zenith Satellite System (QZSS) is a regional navigation satellite system that transmits additional GPS L1C/A signals for the Pacific region covering Japan and Australia. The CSG is able to receive and track these signals concurrently with GPS signals, resulting in better availability especially under bad signal conditions, e.g. in urban canyons. The L1-SAIF signal provided by QZSS is not supported.

GLONASS

The CSG can receive and process GLONASS concurrently with GPS or BeiDou. The Russian GLONASS satellite system is an alternative system to the US-based Global Positioning System (GPS). The CSG is designed to receive and track the L1OF signals GLONASS provides at 1602 MHz + k*562.5 kHz, where k is the satellite's frequency channel number (k = –7,..., 5, 6). The ability to receive and track GLONASS L1OF satellite signals allows design of GLONASS receivers where required by regulations.

Motion Pack Configuration

When “M” is selected from the main menu the user can display/modify the Motion Pack configuration.

A number of operation parameters pertaining to the motion pack can be configured here

```
Motion Pack Configuration
         Gyro Range +/-(250, 500, 1000, 2000)deg/sec [ 250 ]
         Accel Range +/-(2, 4, 8, 16)G [ 4 ]
         Motion Low Pass Filter (5, 10, 20, 40, 100, 200)Hz [ 100 ] :
```

Gyro Range

The Gyro has a selectable range to allow the user to select the best resolution for their application

Accel Range

The Accel has a selectable range to allow the user to select the best resolution for their application

Motion Low Pass Filter

The Motion Low Pass filter is applied to both the Gyro and Accel at the same time. All data transmitted via CAN will have the appropriate filter applied.

NMEA Configuration

When ‘N’ is selected from the main menu the user can display/modify the NMEA Sentence configuration.

```
NMEA Configuration
   Baud Rate (4800, 9600, 19200, 38400, 57600, 115200) [ 38400 ] :
   GGA Rate (0, 1, 2, 5, 10 Hz) [ 10 ] :
   VTG Rate (0, 1, 2, 5, 10 Hz) [ 10 ] :
   GSA Rate (0, 1, 2, 5, 10 Hz) [ 10 ] :
   RMC Rate (0, 1, 2, 5, 10 Hz) [ 0 ] :
   ZDA Rate (0, 1, 2, 5, 10 Hz) [ 0 ] :
```

Compass Configuration

When “O” is selected from the main menu the user can display/modify the compass configuration.

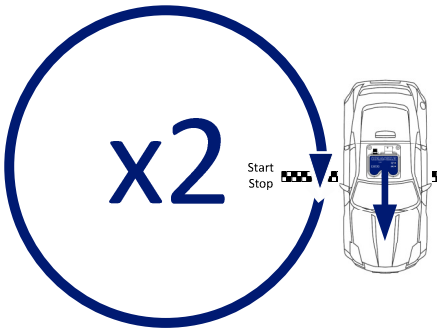
```
Compass Configuration
   *** Changing any of the following settings will ***
   *** remove the calibration from the compass     ***
   Moving Average Filter Samples @ 83Hz Sampling (0 - 200) [ 100 ] :
   Compass Calibration (Auto or Manual) :  [ Manual ] :
```

Auto Compass Calibration

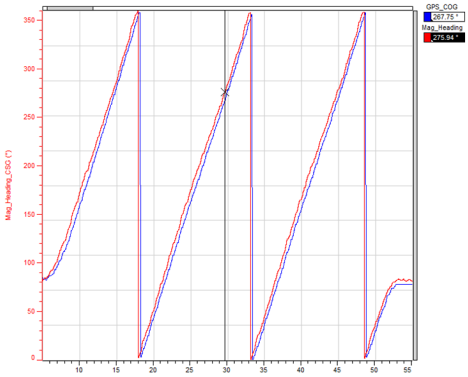
When the compass calibration is set to “Auto” the compass auto learns its local magnetic variations. The CSG will continue to improve its compass until it has all 4 quadrants saved. When in “Auto” the compass will not be saved over a power cycle so it will have to auto learn after each power cycle.

Manual Compass Calibration

When the compass calibration is set to “Manual” the compass must be manually shown the location of each of the magnetic quadrants. For this to work the CSG must be mounted in its actual position in the vehicle once enabled the user should drive the vehicle slowly in a circle, this should be done as smoothly and slowly as possible so as to give it the best chance to learn its true position. Once two complete rotations have been varied out the manual configuration can be ended. The values from a “Manual” calibration will be held in EEPROM meaning you will not have to calibrate it again unless you move the CSG.

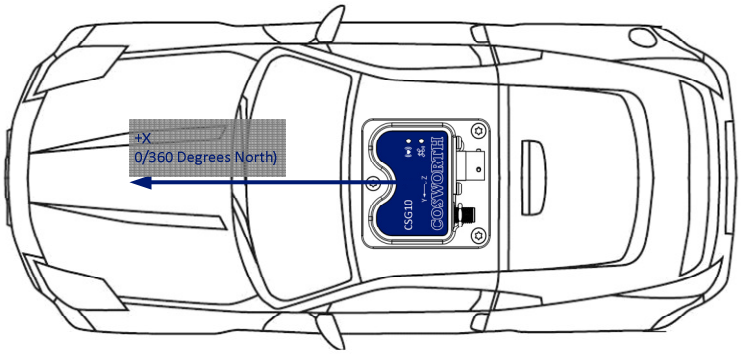


During a calibration the CAN data is enabled this means that the actual compass values can be logged/watched. The below trace shows a calibration in progress, it can be seen that the Mag_Heading alignes itself with GPS COG during the calibration process



Compass North

For the CSG to correctly report north the CSG should be mounted so that the direction of travel of the vehicle is in the X Axis.



Restore Defaults

When 'R' is selected from the main menu, the following factory defaults are restored into the EEPROM:

Description	Default	Options
CAN Baud Rate	1000kbit/sec	1000, 500, 250, 125, 100kbit/sec
CAN Addressing	Standard	Standard 11bit or Extended 29 bit
CAN Termination	On	Off, On
Sys Tx Rate	5Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz
Sys Tx ID	0x0D0	0 to 0x7ff (or 0 to 0x1fffffff)
Nav Tx 0 Rate	10Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz
Nav Tx 0 ID	0x0D1	0 to 0x7ff (or 0 to 0x1fffffff)
Nav Tx 1 Rate	10Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz
Nav Tx 1 ID	0x0c2	0 to 0x7ff (or 0 to 0x1fffffff)
Nav Tx 2 Rate	10Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz
Nav Tx 2 ID	0x0D3	0 to 0x7ff (or 0 to 0x1fffffff)
Accel Tx Rate	100Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz, 200Hz, 500Hz, 1000Hz
Accel Tx ID	0x0D4	0 to 0x7ff (or 0 to 0x1fffffff)
Gyro Tx Rate	100Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz, 200Hz, 500Hz, 1000Hz
Gyro Tx ID	0x0D5	0 to 0x7ff (or 0 to 0x1fffffff)
Mag Tx Rate	10Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz, 200Hz, 500Hz, 1000Hz
Mag Tx ID	0x0D6	0 to 0x7ff (or 0 to 0x1fffffff)
Config UBLOX	Sys	Sys or User
Platform	Automotive	Fixed, Automotive, Maritime, Aviation
GGA rate	10Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz(, 20Hz)
VTG rate	10Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz(, 20Hz)
GSA rate	10Hz	Off, 1Hz, 2Hz, 5Hz, 10Hz(, 20Hz)
RMC rate	Off	Off, 1Hz, 2Hz, 5Hz, 10Hz(, 20Hz)
ZDA rate	Off	Off, 1Hz, 2Hz, 5Hz, 10Hz(, 20Hz)
Gyro Range	250°/sec	±250, ±500, ±1000, ±2000°/sec
Motion Low Pass Filter	100Hz	5, 10, 20, 40, 100, 200Hz
Accel Range	±8g	±2, ±4, ±8, ±16g
PIC Baud Rate	19200	4800, 9600, 19200, 38400, 57600, 115200

Description	Default	Options
GNSS Baud Rate	38400	4800, 9600, 19200, 38400, 57600, 115200
Tx Routing	Nav	Nav or PIC
Rx Routing	PIC	Nav or PIC
Antenna Power	On	Off, On
GPS	On	Off, On
SBAS	Off	Off, On
BeiDou	Off	Off, On
QZSS	Off	Off, On
GLONASS	Off	Off, On

Update System EEPROM

After changes have been made to the system the parameters must be written to the EEPROM so they can be stored over a power cycle. When “U” is selected from the main menu (and when changes to any EEPROM parameter have been made) the following message will be displayed.

```
Some settings have been changed.
  Update System EEPROM? (Y or N) :
```

Watch

When “W” is selected from the main menu the user can display the live parameters from the CSG.

Motion pack values are shown as RAW were all other values have the unit as indicated.

```
Date:- 06/08/2014  Time:- 08:02:02 UTC

Lon:-   0.1375206 deg  PVT     Sat:- 0
Lat:-  52.3001446 deg  PVT     Fix:- 0
Alt:-  -103.771 m
COG:-     0.00000 deg
Spd:-     0.00 m/s

PVT Messages:-    749      Temp:- 26.5 degC
CAN Mess Sent:- 47931      Vbat:- 11.5 V
CAN Mess Fail:- 47923      Vant:-  3.4 V

Compass:- 310.978 deg

Motion        x          y          z
Accel:-     166        101       8470
Gyro:-      -84        132        -29
Mag:-      -195         -3        115


*** Press ESC to exit ***
```

Exit Config Menu

When “X” is selected from the main menu the user will take the CSG out of debug mode and return it to Run mode.