SYVECS LTD

GPSBT Module

Manual Version 1.0

SCal Software Version 2.17.11

Hardware Version x.x

Software Version 1.3.1

13/09/2025

This document is intended for use by a technical audience and describes a number of procedures that are potentially hazardous. Installations should be carried out by competent persons only.

Syvecs and the author accept no liability for any damage caused by the incorrect installation or configuration of the equipment.

Please Note that due to frequent firmware changes certain windows might not be the same as the manual illustrates. If so please contact the Syvecs Tech Team for Assistance.

Support@Syvecs.com

SYVECS
POWERTRAIN CONTROL

Table of Contents

Introduction

The new Syvecs GPSBT is our next generation of our 100 Hz GPS/IMU Module. It now features Bluetooth Low Energy (BLE) connectivity and a host of new features to improve usability and expand compatibility.

Still built around a 100 Hz high-speed GPS receiver and 6-axis IMU for ultra-precise speed, position, and motion data, the GPSBT adds powerful communication and control upgrades. It now includes both CAN and CAN FD interfaces, four analogue inputs, four lowside outputs, OBD2 and BLE support to connect directly to smartphones, tablets, or vehicle infotainment systems.

Paired with the Syvecs Dash app, GPSBT unlocks real-time telemetry, lap timing, track mapping, and custom dashboards. It is ideal for motorsport, performance tuning, and live vehicle monitoring. Naturally backward compatible and built to withstand demanding environments, GPSBT sets a new standard for onboard data capture and connectivity.

The Syvecs GPSBT Module has the following hardware features:

- Two CAN interfaces one with CAN-FD capability.
- True 100Hz GPS update rate.
- Inbuilt IMU/Accelerometer.
- Bluetooth connectivity.
- 4x Lowside PWM capable outputs
- 4x Digital inputs

The Syvecs GPSBT Module has the following software features:

- CAN Bus Configuration: Adjustable data rates (125 kbps–1 Mbps+), software-controlled termination, and programmable speed output.
- Configurable I/O Control: Digital inputs/outputs fully configurable via app. Supports user-defined functions (e.g., lap trigger, shift light, relay control).
- DBC Import: Native support for industry-standard CAN DBC files. Compatible with major ECUs including Syvecs, MoTeC, Pectel, and Link.
- OBD-II Support: Read/clear DTCs and stream live data (up to 200 Hz depending on vehicle CAN setup).
- Car Presets: Pre-configured CAN setups for popular vehicles (e.g., Nissan R35) simplify deployment.
- CAN TX Functions: Transmit custom messages, emulate sensors, or send commands back to ECUs.
- Wireless Connectivity:
  BLE pairing with smartphones, tablets, and in-dash displays. Supports secure pairing with programmable PIN.
- Custom Dash Layouts: Fully customizable interface showing live values (RPM, temperatures, GPS speed, etc.).
- Alerts & Warnings: Define thresholds and receive real-time visual/audio alerts for critical conditions.
- Performance Tracking: 100 Hz GPS for precision timing — supports 0–100 km/h, ¼ mile, and Drag Tree metrics with run history storage.
- Track Mapping: Auto-generated circuits with sector timing and lap comparison — no manual setup needed.
- Video Overlay: Overlay CAN and GPS data onto live video recordings. Export annotated video for review or social sharing.
- Data Logging: Record CAN, GPS, and IMU data to mobile storage in CSV or Syvecs SView formats for later analysis.

Specifications / Maximum Ratings

Outputs

4 x Low Side Outputs (2Amp Peak (100ms) 0.5Amp Continuous)

Inputs

4 x 0-5v Voltage inputs

Communication Interfaces

USB For Updates and Configuration
2 x CAN 2.0B interface for communication with other controllers or logging systems
1 x Kline Interface

Power Supply

6 to 26V input voltage range

Physical

IP67 Sealed Automotive Spec -40c to 125c.
1 x 18 way JAE connector.

GPS Technical Specification

Supports global GPS, Beidou, Galileo, GLONASS	2.0m CEP accuracy
Supports regional QZSS, SBAS	Multipath detection and suppression
16 million time-frequency hypothesis testing	Jamming detection and mitigation
-148dBm cold start sensitivity	AGPS Support
-165dBm tracking sensitivity	Contains LNA, SAW Filter, TCXO, RTC Xtal
29 second cold start TTFF	Works with active and passive antenna
3.5 second TTFF with AGPS	On board active antenna short protection
1 second hot start	On board active antenna detection

IMU Technical Specification

Parameter	Test conditions	Data
Linear acceleration measurement range		0-4
Magnetic measurement range		0-8
Angular rate measurement range		500
Linear acceleration sensitivity	Linear acceleration FS = +4 g	0.122
Magnetic sensitivity	Magnetic FS = +8 gauss	0.29
Angular rate sensitivity	Angular rate FS = ±500 dps	17.5
Linear acceleration typical zero-g level offset accuracy	FS = ±8 g	90
Angular rate typical zero-rate level	FS = ±2000 dps	30
Magnetic disturbance field	Zero-gauss offset starts to degrade	Min 50

Pinout

NOTE: REVERSED NUMBERS OF THE PINS - RIGHT TO LEFT

	DESCRIPTION		CONNECTOR 18 way JAE
	PART NUMBER		MX23A18SF1
	NOTES:		Pins: M23S05K351, Blanks: M120-55780
Syvecs Description	**Pin**	**Scal Assignment**	**Notes**
LowSide 4	1	LSO4 : C1-01	Low Side output 2A Peak / 0.5A Continuous
LowSide 2	2	LSO2 : C1-02	Low Side output 2A Peak / 0.5A Continuous
PWR GND	3		Main Power Ground
PWR GND	4		Power Ground
CAN1 Low	5		CAN 1 Low – 500KB Default
CAN0 Low	6		CAN 0 Low – CAN FD enabled
AN Ground	7		Analogue Ground
Analogue Input 4	8	AN4 (TH) : C1-08	0-5V Analogue input/Temp Input (Fixed 3K pull up to 5v)
Analogue Input 2	9	AN2 (5V) : C1-09	0-5V Analogue input
LowSide 3	10	LSO3: C1-10	Low Side output 2A Peak / 0.5A Continuous
LowSide 1	11	LSO1 : C1-11	Low Side output 2A Peak / 0.5A Continuous
12V Supply	12		Switched Ignition Fused Supply
KLINE	13		KLINE
CAN1 Hi	14		CAN 1 High - 500KB Default
CAN0 Hi	15		CAN 0 High – CAN FD enabled
5V Out	16		5V reference output (max 500mA)
Analogue Input 3	17	AN4 (TH) : C1-17	0-5V Analogue input/Temp Input (Fixed 3K pull up to 5v)
Analogue Input 1	18	AN1 (5V) : C1-18	0-5V Analogue input

Installation

The GPS unit includes a 6 axis accelerometer, and it is important that unit is fitted in the correct location and orientation to ensure accurate readings.

The unit should be fitted as central as possible within the vehicle between driver and passenger seats. It must be installed level with the connector plug pointing towards the front of the car.

In applications where heavy vibrations are present due to solid engine mounts or similar, it is advised to mount the unit using some rubber mounts to absorb some of the vibrations.

Connections - Power

The Syvecs 100hz GPS Module requires switched ignition power as follows:

Syvecs Description	Pin	Notes
Power Ground	3	Main ECU power Ground
12v Ignition Supply	12	Ignition Switched 2A fuse protected 12V supply

Connections - Outputs

Low Side Outputs

The low side outputs pull to ground when ‘on’. They offer full pulse width modulation control. The outputs can be used to drive up to 2A Peak / 0.5A Continuous. These are suitable for small solenoids/lights etc.

12V – Pull Up Option is also available on the Output if being used for digital signal output.

Pin Number	Function	Scal Assignment
11	LSO1	LOW SIDE 1
2	LSO2	LOW SIDE 2
10	LSO3	LOW SIDE 3
1	LSO4	LOW SIDE 4

Connections - Sensor Supply and Grounds

Sensor/ Analogue Grounds (AN Grounds)

Pin Number	Function
7	ANGND1

5V Regulated Supply

Sensors and miscellaneous analogue inputs have their own power pins which need a stable power supply, the 5v Regulated outputs are provide a stable/clean 5v which can handle 500ma Maximum. The regulated 5V pins are able to support multiple sensor connections as shown in the diagram below.

Pin Number	Function
16	5V OUT

Connections - Inputs

The Syvecs 100hz GPS Module has 4 programmable inputs available of two different types.

Pin Number	Input	Scal Assignment	Notes
18	AN1	AN1 (5V) : C1-18	0-5v
9	AN2	AN2 (5V) : C1-09	0-5v
17	AN3	AN4 (TH) : C1-17	Fixed 3K pull up to 5v
8	AN4	AN4 (TH) : C1-08	Fixed 3K pull up to 5v

Connections - CAN Bus

There are two CAN interfaces, CAN0 and CAN1. CAN0 is CAN FD capable. Both Can buses have software enabled termination available.

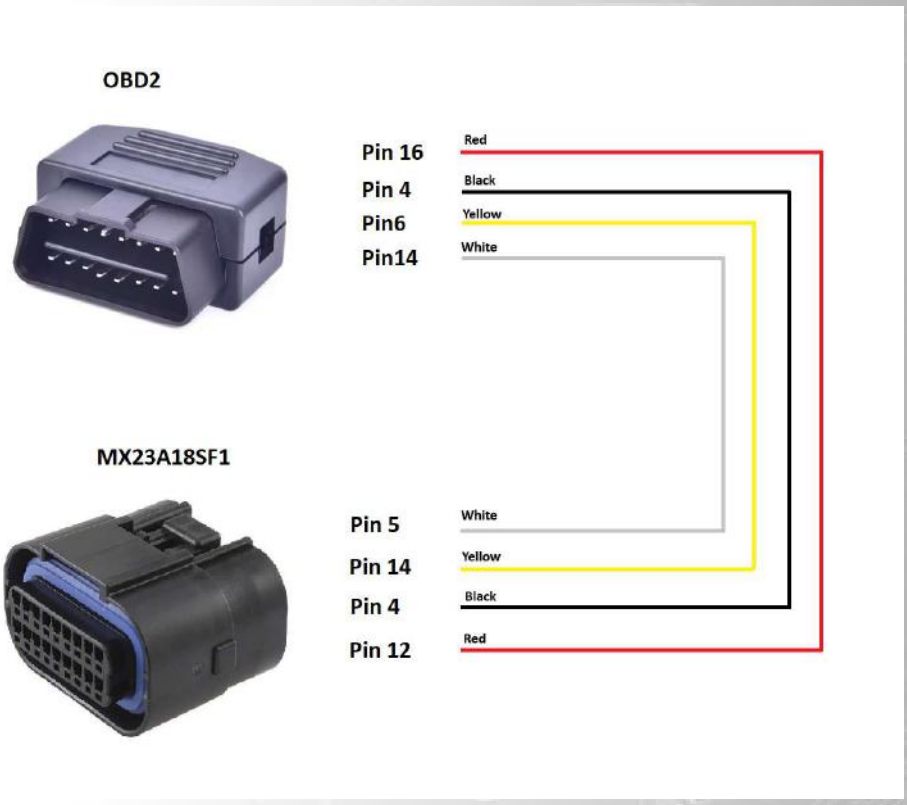
The Syvecs GPSBT module can be connected to Can1 or Can2 on the S8/S12.

With the S7Plus it is best to use Can2. If CAN2 is used for an expander with Slave CAN then connect CAN1 of the GPS to CAN1 of the S7Plus.

Pin Number	Function	Notes
6	CAN0 Low	1 Mbps
15	CAN0 High	1 Mbps
5	CAN1 Low	500 Kbps
14	CAN1 High	500 Kbps

For OBD2 Connections, we recommend using CAN1. This is setup as default to 500kb which all OBD2 systems support.

Example OBD2 wiring below – *IMPORTANT: OBD2 12v is always 'live'. If fitting for a permanent install its advisable to wire to the 12v supply to the GPSBT from a switched Ignition 12v supply.*



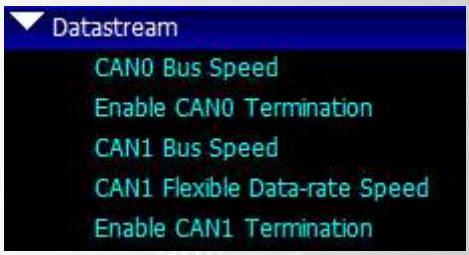
ODB2 Wiring

GPSBT Pin	Function	ODB2 Pin
5	CAN1 High	**14**
14	CAN1 LOW	**6**
4	Ground	**4**
12	12v Supply	**16**

CAN Bus Speed Selection

Whilst the default can speeds are CAN0 1 Mbps and CAN1 500 Kbps, these can be changed via USB connection to the GPSBT using SCal. It is not possible to change CAN speed via the Syvecs Dash app.

Connecting the unit directly to a PC and then connecting via SCal will show the following:



The above will be especially useful for direct can device connections where termination is also required.

Default CAN Data Stream

The default data streams are compatible with our previous GPS units. For custom installations the data streams are as follows:

CAN0 – 1Mbps

ID 679h & 690h – GPS Position (LSB) – Motec M1 (Base ID 0x690h)

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
GPS Latitude in ten-thousands of a minute of arc as a signed 32-bit value. Positive values are North of the Equator, Negatives are South.				GPS Longitude in ten-thousands of a minute of arc as a signed 32-bit value. Positive values are East of the Greenwich Meridian, Negatives are West.			

ID 680h – GPS Position

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
GPS Latitude in ten-thousands of a minute of arc as a signed 32-bit value. Positive Values are north of the Equator. Negatives are South.				GPS Longitude in ten-thousands of a minute of arc as a signed 32-bit value. Positive Values are East of the Greenwich Meridian. Negatives are West.			

ID 681h – GPS Course, Speed and Altitude

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Course in hundredths of a degree as an unsigned 16-bit. A Value of 0 indicates due North.		Speed in centimetres per second as an unsigned 16-bit value.		Altitude in Meters as a signed 16-bit value. Negative values indicate a position below mean sea level.		Unused	

ID 682h – GPS Time And Date

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Day of month as an unsigned 8-bit value	Month of year as an unsigned 8-bit value	Year of Century as an unsigned 8-bit value	Hour of day as an unsigned 8-bit value	Minute of hour as an unsigned 8-bit value	Second of Minute as an unsigned 8-bit value	Thousandths of a second as an unsigned 16-bit value	

ID 683h – Accelerometer

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Latitudinal acceleration in thousands of G as a signed 16-bit value. Positive values represent acceleration to the left (as when turning right). Negative values represent acceleration to the right (as when turning Left)		Longitudinal acceleration in thousandths of a G as a signed 16-bit integer. Positive values represent increasing forward speed, negative values indicate decreasing.		Vertical acceleration in thousandths of a G as a signed 16-bit integer. Positive values represents upwards. Negative downwards.		Unused	

ID 684h – Gyroscope

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Roll in tenths of a degree per second as a signed 16-bit integer. Positive values indicate roll to the right. Negative values indicate roll to the left.		Pitch in tenths of a degree per second as a signed 16-bit integer. Positive values indicate upward pitch. Negative values indicate downward.		Yaw in tenths of a degree per second as a signed 16-bit integer. Positive values indicate yaw to the right. Negatives values to the left.		Unused	

D 654h – GPS Status

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Horizontal dilution of precision in tenths of a meter.		Fixed quality Indicator. 0 = Fix unavailable. 1 = Valid Fix SPS mode. 2 = Valid fix in differential mode (GPS mode)	Number of satellites in view.	GPS Mode Letter. N= Data Not Valid. A= Autonomous Mode. D= Differential Mode. E= Estimated mode.	GPS Status Letter A= Valid Data V= Receiver Warning	Unused	

CAN1 – 500Kbps

ID F0h – GPS Position

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
GPS Latitude in ten-thousands of a minute of arc as a signed 32-bit value. Positive values are North of the Equator. Negatives are South.				GPS Longitude in ten-thousands of a minute of arc as a signed 32-bit value. Positive values are East of the Greenwich Meridian. Negatives are West.			

ID F1h – GPS Course, Speed and Altitude

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Course in hundredths of a degree as an unsigned 16-bit. A Value of 0 indicates due North.		Speed in centimetres per second as an unsigned 16-bit value.		Altitude in meters as a signed 16-bit value. Negative values indicate a position below mean sea level.		Unused	

ID F2h – Accelerometer

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Latitudinal acceleration in thousands of G as a signed 16-bit value. Positive values represent acceleration to the left (as when turning right). Negative values represent acceleration to the right (as when turning Left).		Longitudinal acceleration in thousandths of a G as a signed 16-bit integer. Positive values represent increasing forward speed, negative values indicate decreasing.		Vertical acceleration in thousandths of a G as a signed 16-bit integer. Positive values represents upwards. Negative downwards.		Unused	

ID F3h – Gyroscope

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Roll in tenths of a degree per second as a signed 16-bit integer. Positive values indicate roll to the right. Negative values indicate roll to the left.		Pitch in tenths of a degree per second as a signed 16-bit integer. Positive values indicate upward pitch. Negative values indicate downward.		Yaw in tenths of a degree per second as a signed 16-bit integer. Positive values indicate yaw to the right. Negatives values to the left.		Unused	

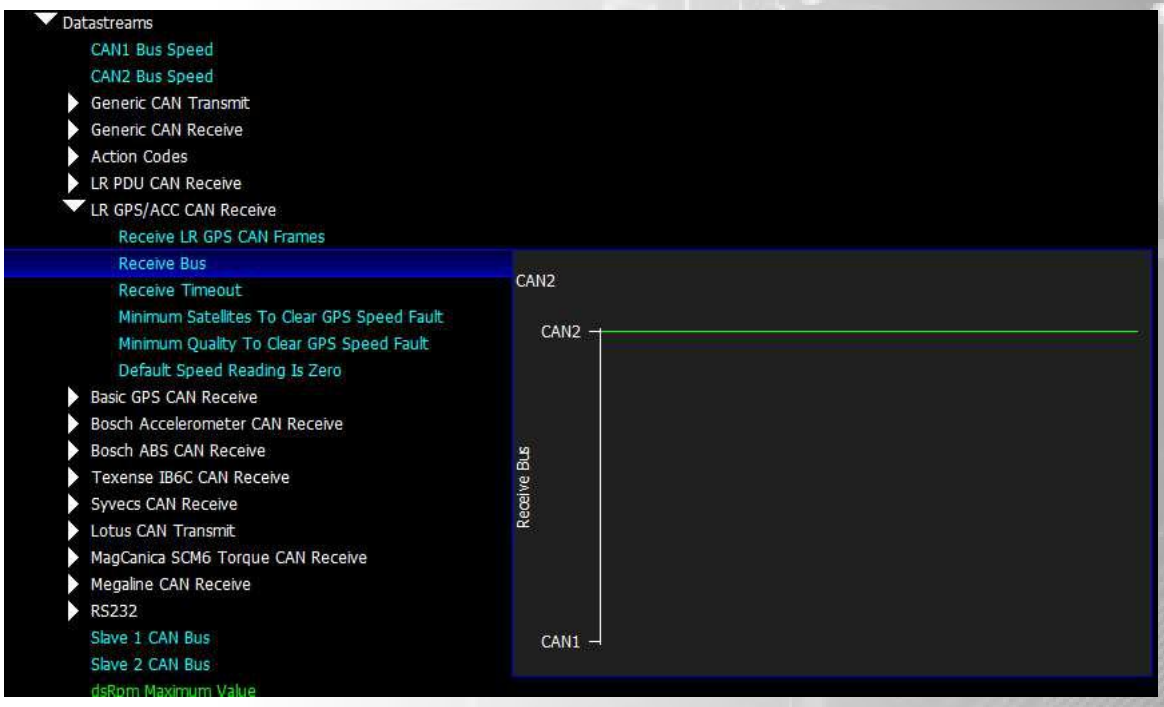
ID F4h – GPS Status

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Horizontal dilution of precision in tenths of a meter.		Fixed quality Indicator. 0 = Fix unavailable. 1 = Valid Fix SPS mode. 2 = Valid fix in differential mode (GPS mode)	Number of satellites in view.	GPS Mode Letter. N= Data Not Valid. A= Autonomous Mode. D= Differential Mode. E= Estimated mode.	GPS Status Letter A= Valid Data V= Receiver Warning	Unused	

Syvecs Configuration

S7+ S8 and S12 ECUs

To enable in Scal users need to select the GPS-AG50 as shown below in Datastreams as well as set the Receive Bus its wired to. A Device - Program is needed after this selection to program the ECU and bring the GPS online.

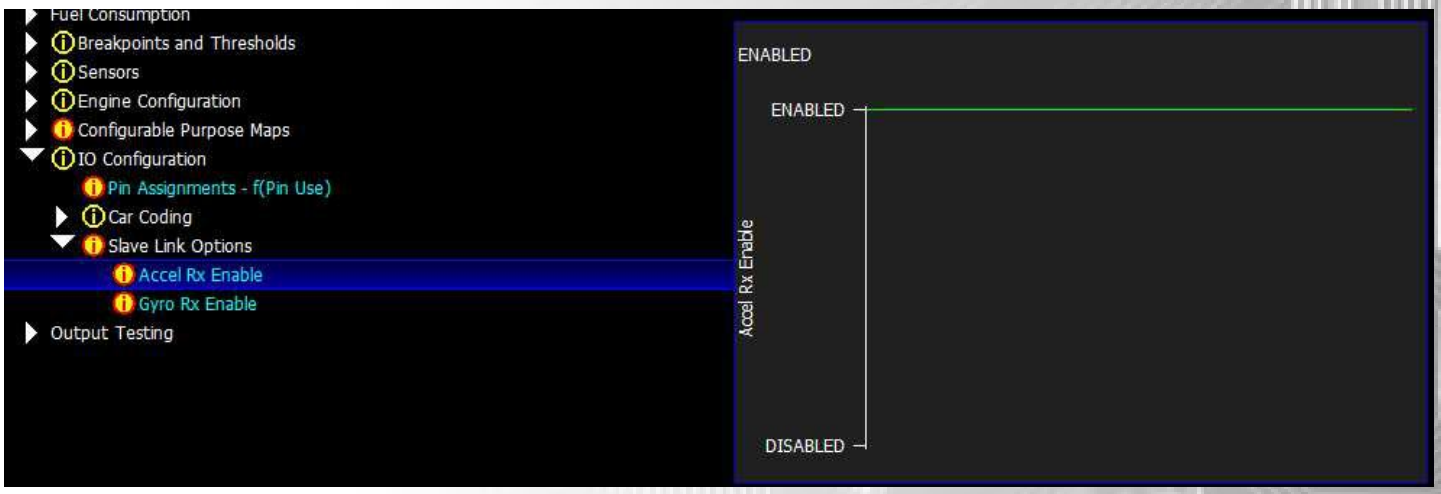


After enabling the logging/gauge items below will become available:

gpsLat	gpsLong	gpsSpeed	gpsCourse	gpsAltitude	gpsHrzDil
gpsFixQual	gpsNumSats	gpsMode	gpsStatus	gpsSatInfo	
longG	latG	vertG	pitch	yaw	roll

S6-I/ S6Plus/ S7-I

The Syvecs GPS 100hz GPSBT Data is picked up automatically on the S6Plus & S6/S7-I with Firmware 1.82+ after wiring onto the Can1 (C8 & C9) (500kb CAN bus). To pickup the Accelerometer data from the module, users will need to enable the Accel Rx Enable and Gyro Rx Enable under I/O Configuration.
Important! Make sure no Acceleration sensors are defined in the Pin Assignments, they will be picked up automatically.



After enabling the logging/gauge items below will become available:

gpsLat	gpsLong	gpsSpeed	gpsCourse	gpsAltitude	
longG	latG	vertG	roll	pitch	yaw

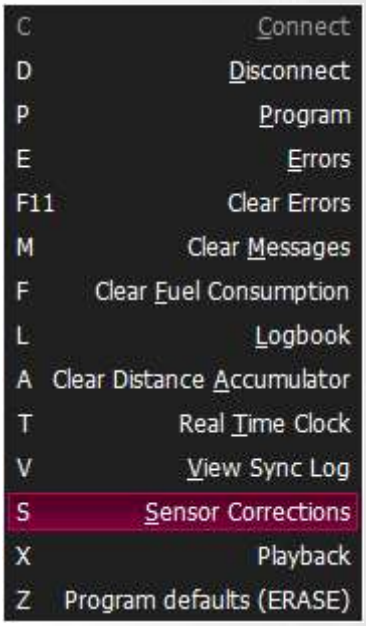
Syvecs ECU Accelerometer Calibration

After mounting correctly you need to reset the sensor corrections in Scal for the ECU accelerometers not on the module itself. To do this click on Device - Sensor Corrections from the top Scal menu.

Then highlight the LatG/Long/VertG/Yaw/Pitch/Roll and select Reset, followed by Set.

The Long G / Lat G will read 0 now when the car is level.

Note: Please ensure the car is flat and level when carrying this out.

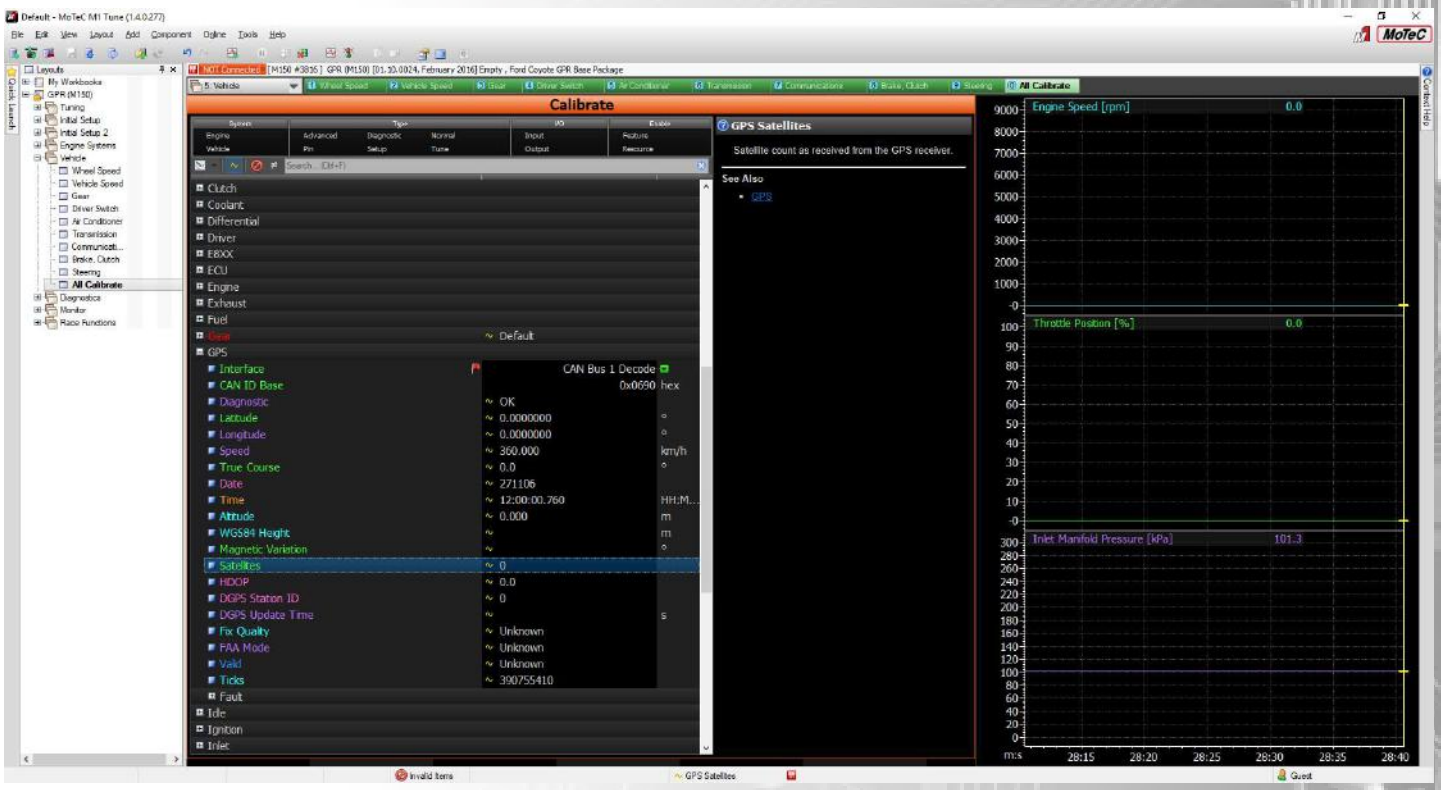


Motec Calibration and Setup

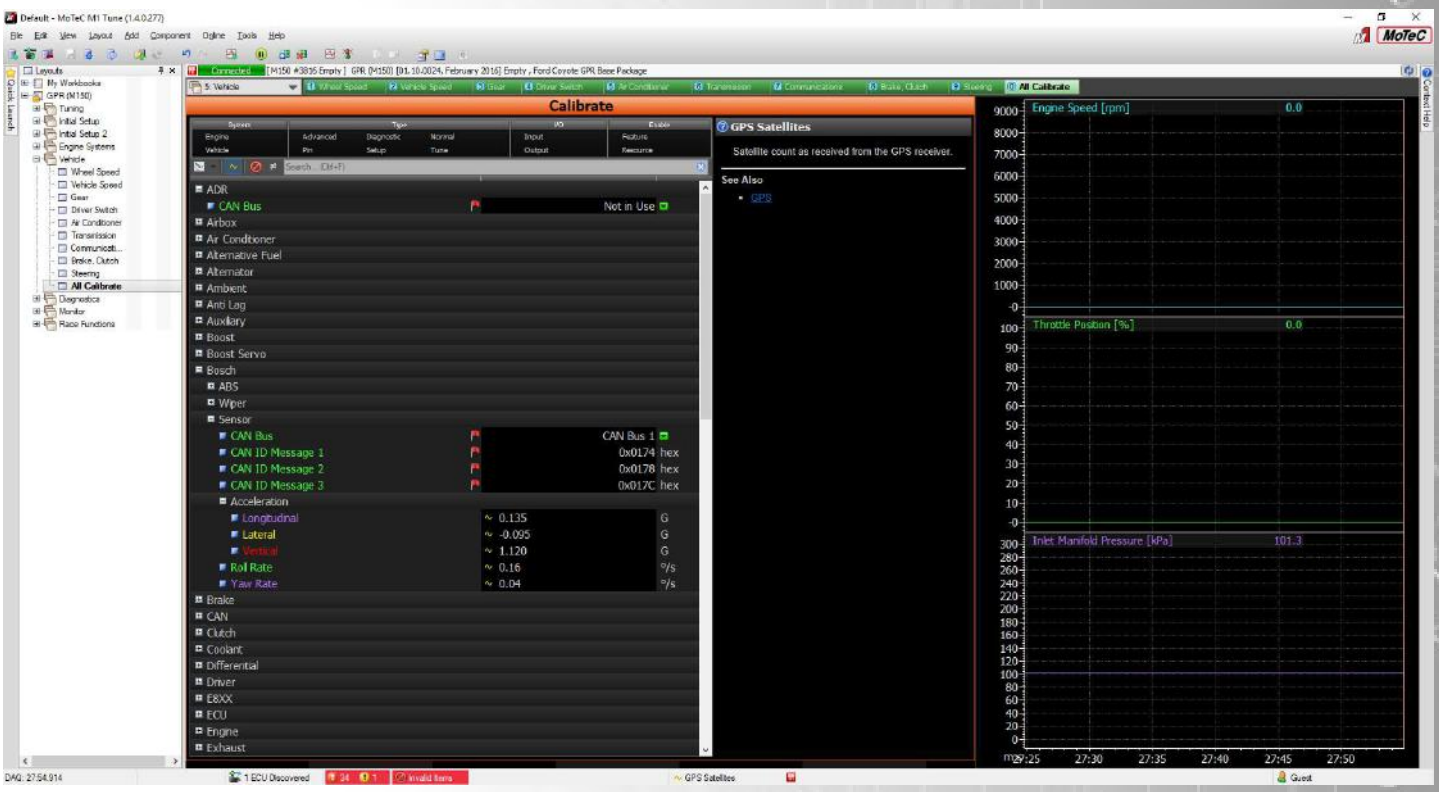
M1 Series

The Syvecs GPSBT CAN0 can be connected to Can1, Can2 or Can3 on the M1 Series of Ecu's.

M1Tune users need to head to the All Calibrate Section, select GPS. Set the Can Interface Used and Base ID at 0x690



The Gyro/IMU Information needs to come via the Bosch MM5 protocol. Select Bosch in All Calibrate and set the CAD ID Messages as below.



Bluetooth Features and Functions

The Syvecs GPSBT Syvecs Dash App provides a very comprehensive and powerful performance and data analysis tool.

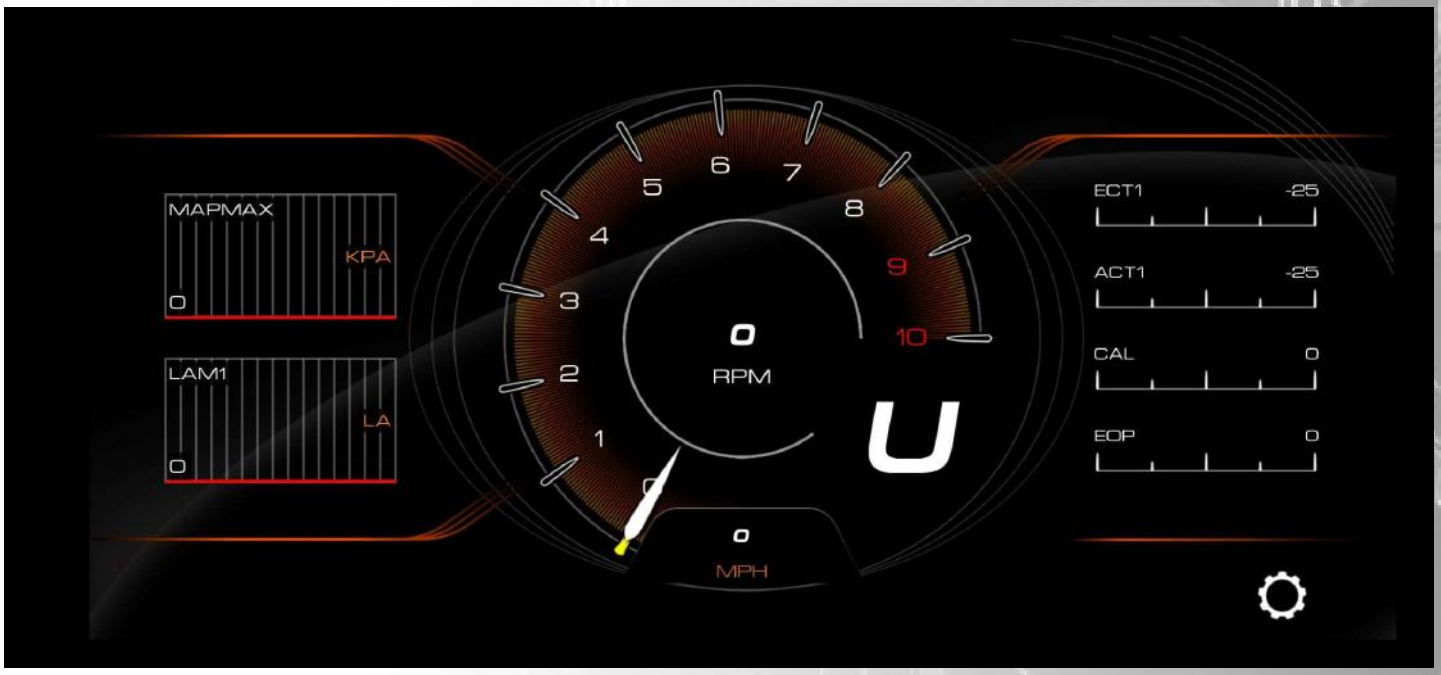
To download the App, Search either Apple App Store or Google Play Store for Syvecs Dash.

Important – Permissions. For correct functionality, follow the prompts when installation is in progress to allow access to when asked. Its also important to disable battery saving whilst the app is in use, or unexpected behaviour is likely. It uses Bluetooth Low Energy and will need access to location services for correct GPS function.

Connecting to the App

Connection between the device and the GPSBT is automatically carried out. Pairing is not necessary.

Once connected the home screen/dash will be shown as below:



Clicking on the bottom right gear will bring up the main menu. See next page for more information.

Main Menu

Useful tip! The main menu is **context sensitive** and available options will depend on the selected Dash currently in use. However by way of an example the default dash display is as follows:

Edit. Allows users to change any data object shown on the main dash screen. For example you may have MAP shown, but instead you want to replace it with TPS.

Sub Menu. It allows access to settings and further advanced options.

This is the calibration menu. It allows user switching between Calibrations/Launch Control/Anti-Lag/and user defined Switches.

Dash View select. Choose from a range of pre-defined, user customisable dash layouts.

Head up display mode. This inverts the screen for reflecting from the windscreen as a Head up display.

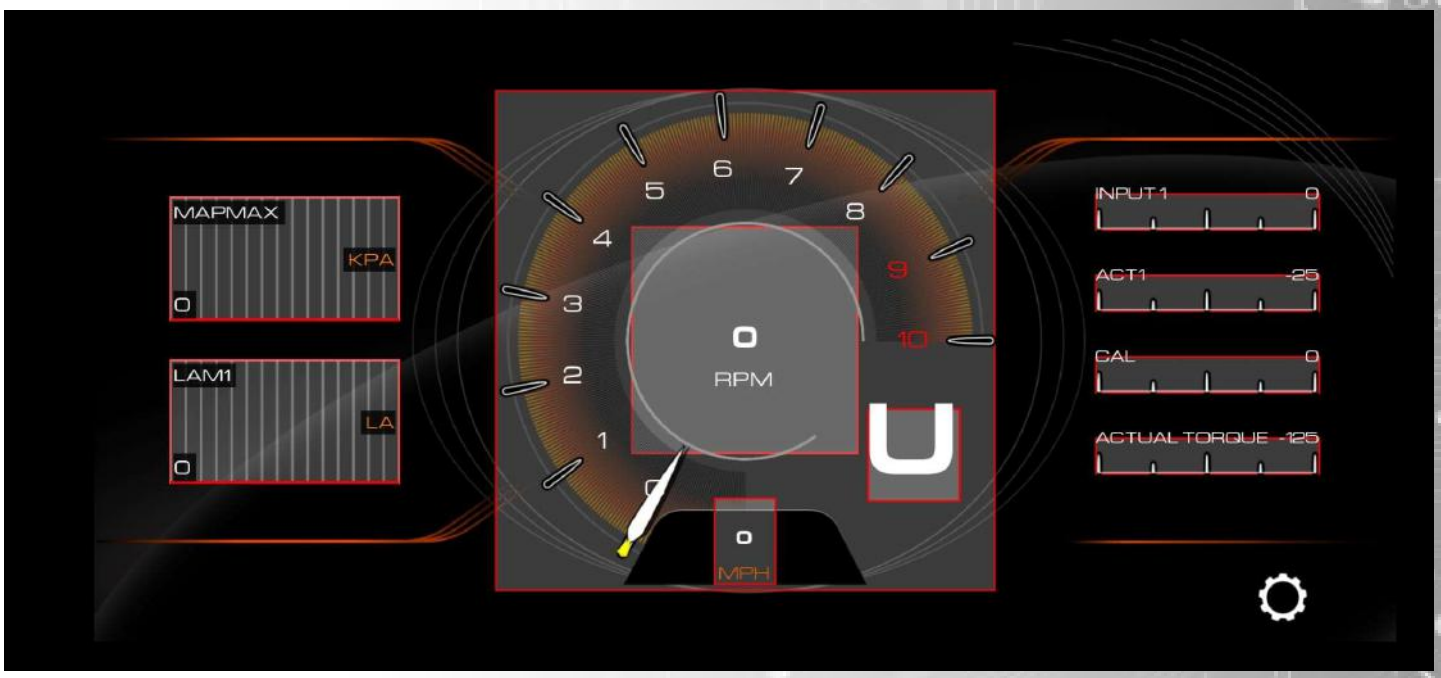
Data Log start button.

Instant screen record. Allows users to record the dash in real time to video on the device.

Help video and advice at your finger tips.

Changing Dash Data Items.

Edit example: In edit mode the screen will be highlighted as follows:



Clicking on the cog again will show connection information:

In the example above BT CAN and I/O indicating blue is showing a good connection. GPS shows white in this example as not locked onto GPS satellites. Yellow would indicate a weak signal.

Clicking on Close will take you back to the main screen.

Data Logging

The Syvecs Dash app features built in data logging with the ability for it to be read in our SView data analysis software.

Configuration is carried out by the Data logging settings from within the main submenu.

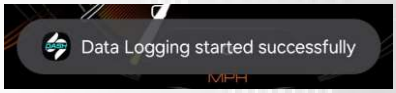
Menu > Sub menu > Data-Logging

From here you can:

- See what items are being logged
- Specify what data items you wish to log.
- Set how many samples a second are logged.
- Check for log files on the device.

Starting a Data Log Session

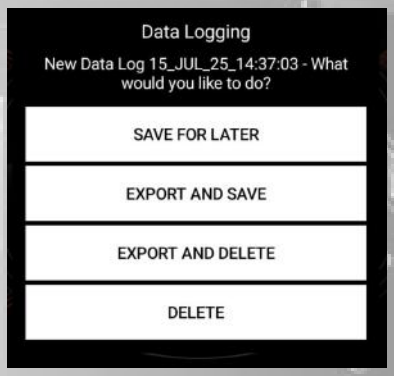
From the main menu, select Start Data Log. 

You should now see the following 

In addition you'll notice there is a green flashing circle on the top right of the display 

Stopping a Data Log Session

Pressing on the green dot will end the session and prompt you with a few options.



In all cases to view the files, its necessary to export data logs in order to view them.

Managing Data Log Files

Until exported the data logs remain within the Syvecs Dash App. Once exported to either a local folder on the device, or a removable storage device, the files can then be transferred to a windows machine running SView.

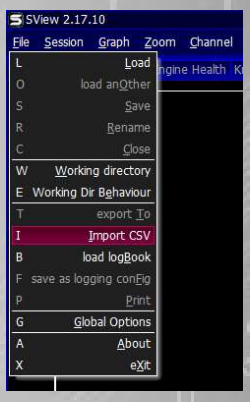
Viewing what log files are available is possible via Menu > Sub menu > Data-Logging > Stored Data Logs.

Selecting a file within Stored Data Logs will give you the same options as above for data logged files.

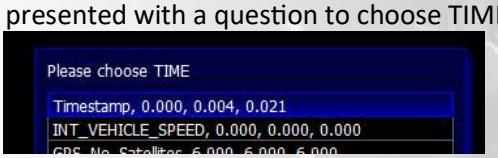
Viewing Data Log Files

After data logs have been exported they can be imported and viewed within SView.

From within SView, click File > Import CSV, and navigate to the location of where you put the data log file.



After the file has been opened you'll be presented with a question to choose TIME. Select Timestamp from the list and click OK.



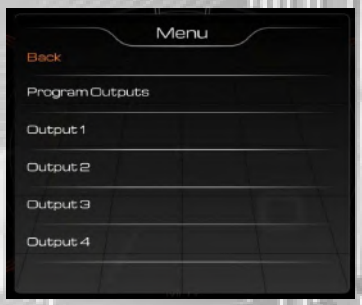
The next window will present you with all logged items to be imported. Pressing F10 will select all items. Finally click OK to continue, and the datafile will open.

TIP: You can save the opened log file from the File menu: File > Save and it will be saved as a standard SView .SD log file, allowing it to be opened as normal.

SDash I/O usage and configuration

A major feature of the GPSBT is inputs and outputs controllable via the SDash app. The GPSBT has 4 low side outputs and 4 analogue inputs. It also has CAN switching control, for example CAL switch selection for ECU control.

Outputs



Configuring outputs is done by the SDash app. From the Dash > Main Menu > I/O Settings > Outputs will show the screen on the right.

Tip! After the outputs have been programmed, the Program Outputs option must be used to send the configuration to the GPSBT unit.

From here Outputs 1-4 can be renamed and configured and programmed as necessary.

Example configuration: