TinyDash V2

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

Table of Contents

Introduction

The TinyDash V2 is a compact and powerful display designed to offer customers vital real time information from their vehicles electronics in off-road, In-car and marine environments.

Designed to be used in the harshest environments the TinyDash V2 Includes a pressure resistive touch panel allowing users the ability to change layouts and calibration settings from the panel directly.

The palm sized unit has been designed with simplicity in mind and to ensure users a hassle free installation process. It requires only one switched 12v supply along with a two wire CAN bus connection.

Being specialists in OEM CAN data decoding, we have added many popular OEM data streams into the TinyDash software as well as after-market ECU company data. This enables instant access to vehicle operating parameters via the 2.4 inch screen. A list of support vehicles / ECU's can be found on the last page.

Two low current PWM outputs are present on the TinyDash and can be setup to do custom tasks via our SCAL software. Please note these outputs will only handle 1 amp of continuous current so mainly used for warning light or to trigger a relay.

Three analog inputs are also present on the TinyDash and have software selectable 3k pull-ups present to allow not only 0-5V ADC reading but 0-5v Thermistor sensors data. These are particularly useful if you are I/O limited in your installation and wish to send voltage or sensor data to your engine controller via CAN in another section of the vehicle. The custom CAN transmit and flexible CAN sections of our SCAL software make this really easy.

Specifications

Outputs

2 x PWM Outputs - 2Amp Peak (100ms) / 1Amp Continuous
1 x 5V Sensor Supply (400ma Max)

Inputs

3 Analogue/Thermistor Inputs (0-5V) with software pull-up

Interfaces

TouchScreen
USB C For Updates and Configuration
1 x CAN 2.0B, user programmable

Power Supply

6 to 26V ignition switched supply

Physical

78mm x 50mm x 20mm

Environmental

High-quality anodised CNC aluminium body with waterproofing
Tyco Spec44 wire ensures a rigorous and long-term use.

Using this manual

This manual highlights important information, warnings or useful tricks with the following colours:

Text in ORANGE describes a step that may be required or information that is important for correct operation.

Text in RED are Warnings and must be followed when installing or operating the unit, failure to do so may damage the unit and will not be covered under warranty.

Letters **highlighted** and underlined in software instructions such as **D**evice > **P**rogram are keyboard shortcuts. For example program the device by pressing keyboard letter **D** followed by letter **P** when using SCal.

As you become more familiar with these shortcuts, the Syvecs SCal becomes very fast to use.

Wiring Connections

Wiring Schedule

Description	Function	Wire Colour
12V	Switched 12V	Red
CANL	CAN Low	Yellow
CANH	CAN High	White
GROUND	Ground	Black
AN1	0-5v Analogue Input	Green
AN2	0-5v Analogue Input	Green
AN3	0-5v Analogue Input	Green
5V OUT	5v Sensor Supply	Grey
LSO1	Low Side Output	Pink
LSO2	Low Side Output	Purple

General Connections

Connecting Power/Ground

The TinyDash unit needs a single ignition 12v supply and single ground connection, as the unit does not consume much current a wire gauge of AWG24 or less can be used.

Warning: The unit must be powered from a fused source, 2A is sensible rating.

Example Schematic

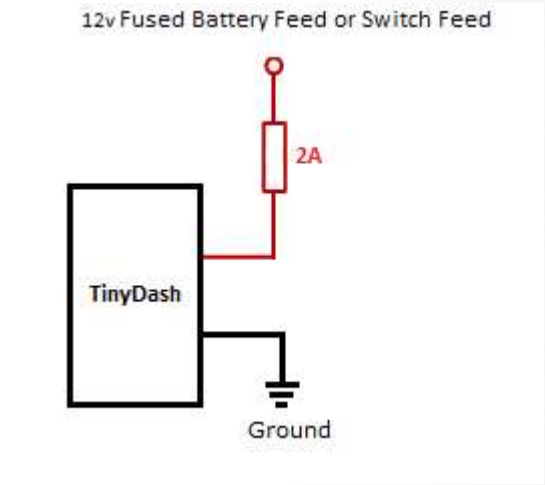


Figure 0-1 – Power and Ground Feeds

Pin Schedule

Wire Colour	Function	Notes
Red	VBAT	Use a fused Switched feed.
Black	Power Ground	Ground for Power and Sensor Signal

Input Connections

Voltage Inputs - AN

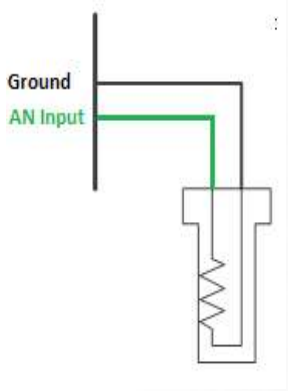
Three Analogue Inputs are available on the TinyDash. These are just 0-5v analogue inputs and cannot support frequency waveforms. They are designed for sensors like pressure transducers, thermistors, switches or position sensors.

All of the inputs have an optional 3k Pull up, which allows them to be used for thermistor sensors as well.

Wiring Guidance

All sensors use the power ground as the sensor ground. The sensor signal output can then be connected to any one of the three AN inputs.

Example Schematic



Temperature Sensor

Pin Schedule

Wire Colour	Function	Notes
Black	Ground	May be shared with multiple sensors
Green	AN1 Input	Any AN Input can be used

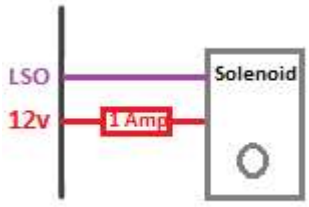
Low Side Outputs

There are two low side outputs available on the TinyDash. They support 2 amp peak/1 amp continuous loads. They are suitable for driving relays and most boost solenoids.

Wiring Guidance

We recommend that each device being switched has its own 1 Amp fuse. This is to protect the low side drivers from damage due to excess current.

Example Schematic



Boost Solenoid

Pin Schedule

Wire Colour	Function	Notes
Pink	LSO1	Low Side Output

Calibration Switch / Cal Up / Down Switch

The TinyDash allows users to have a physical calibration switch wired to the device or virtual switch setup via CAN.

A physical switch can be done in multiple ways, first method is using the Syvecs 12Way rotary switch - https://www.syvecs.com/product/calibration-switch/

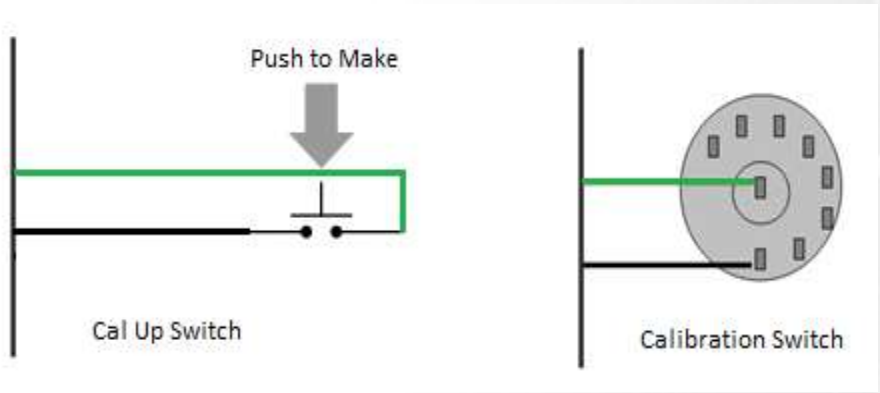
Second method is with a resistor chain up and Down switch setup which allows calibrators to set a low and high voltage threshold for each switch position.

Third method is via a single Cal Up Switch which cycles through all the positions and resets at a set Cal position back to 1.

Physical switches need to be assigned in the I/O configuration – Pin assignments.
Virtual switch setup via the OEM Preset CAN receive or via the Generic CAN receive strategy.

The TinyDash can also transmit the current Cal Selection position via CAN bus to other units like our engine control units. This saves inputs on the ECU and also additional wiring.

Example Schematics

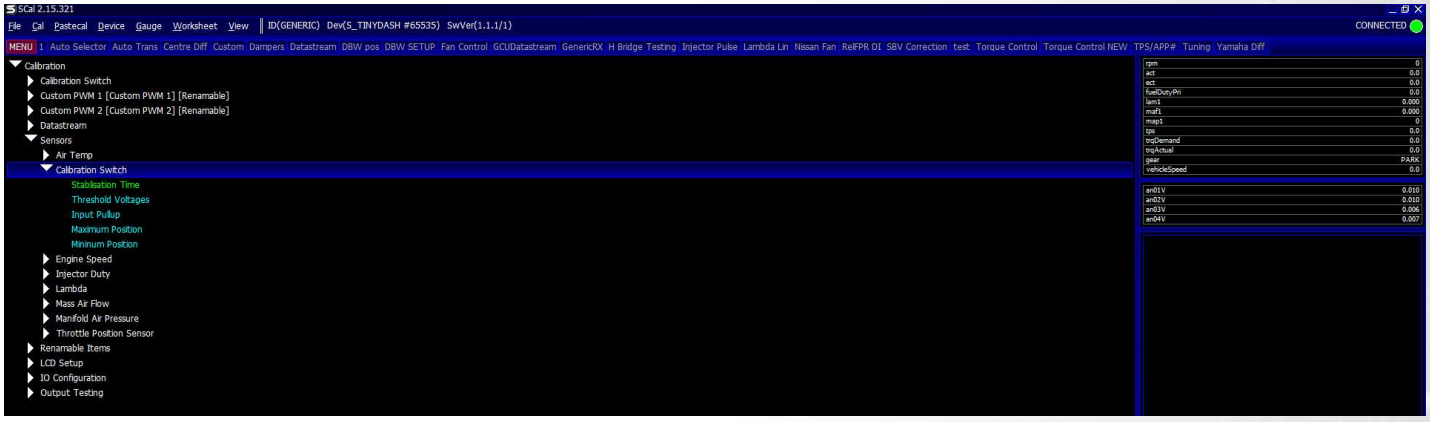


Pin Schedule

Wire Colour	Function	Notes
Black	Ground	May be shared with multiple sensors
Green	AN3	Any AN input is supported

The Syvecs 12 position calibration switch is set in Scal by setting the voltage thresholds for each position in the below map. CalSelect will then update when the voltage is greater then set in the corresponding cell.

Note: If using a syvecs supplied Cal Switch you must have the Input Pull-up enabled.



Gear Position Setup

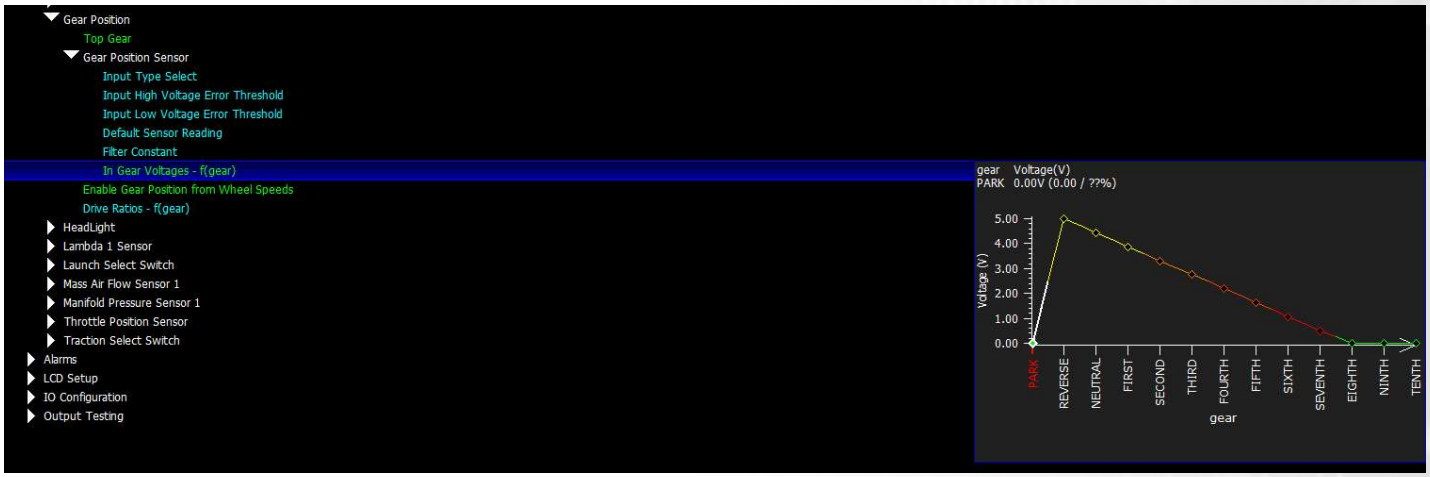
Gear position can be displayed on any Layout but its best to be viewed on Layout 7 which display the gear across the whole screen in a portrait position. Note: t*he orientation of this can be flipped in the LCD Setup area of Scal.*

There is multiple ways the gear can be picked up with the TinyDash, these are listed below:

Preset CAN Receive – If the OEM or Aftermarket ECU has the ability to transmit Gear on the CANbus it will be picked up a displayed.

Generic CAN Receive – Calibrators can setup in Scal to receive the gear via a custom CAN RX setup

Gear Barrel / Position Sensor – Most Sequential gearboxes will come fitted with a gear position sensor that outputs a voltage for each barrel position. In Scal the calibrator can assign the voltage for each gear position.



Gear from wheel speeds – If VehicleSpeed and Rpm are being picked up by the TinyDash then calibrators can enable the map Gear position from wheel speed. This calculates gear from DriveRatio (Rpm/Speed). Setting a drive ratio amount for each gear below then allows the gear to be decoded.

CanBus Communications

Common **A**rea **N**etwork Bus (CAN Bus) is a widely used data interface common used in many cars and aftermarket accessories, such as Data loggers and Dashes. The TinyDash as default has 1 x CAN bus interface and this does not have 120ohm termination resistor present.
The TinyDash supports 250k, 500k, 1mb and 1.3333mb baud rates allowing connections to all types of CAN networks including the 1.333mb Slave CAN which is present when Syvecs ECU's are connected to Expanders.

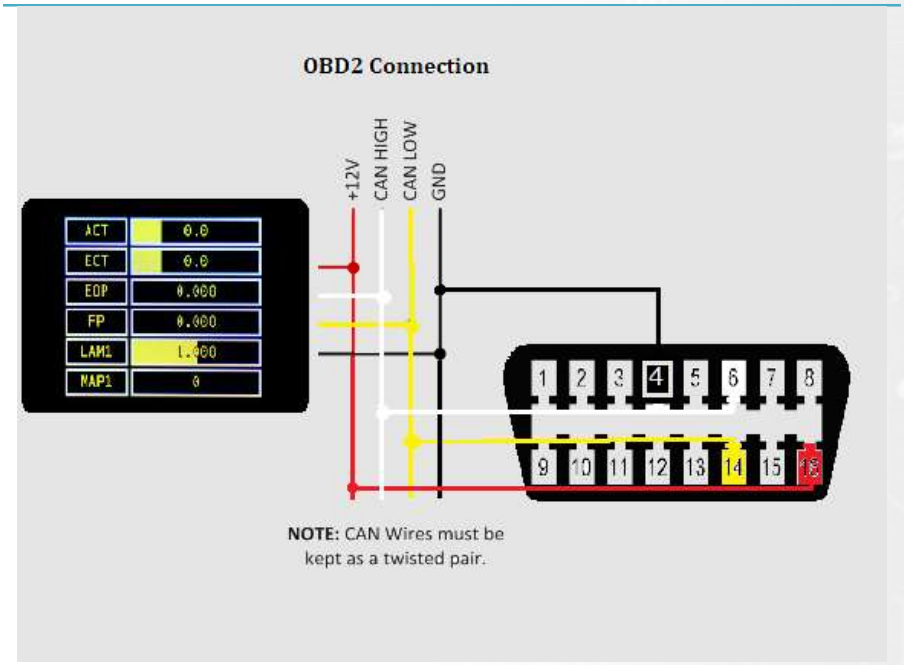
There are two ways of interfacing to the TinyDash.

1. Hard wired directly to the vehicle/ECU CANbus (best option)
2. Connect to the ODBII diagnostic port.

ODBII Connections

The TinyDash controller supports the OBD2 Data receive protocol allowing users to retrieve data via the OEM ECU OBD2 protocol making installation very straightforward. (please note: Not ever manufacture supports the SAE J1979 protocol we use)

Example Schematic



The OBD2 CAN wires need to be connected or as shown above and connected to CAN1 on the TinyDash module. Configuration is explained in the software section of this manual.

Direct CAN connection

TinyDash supports direct CAN connection to the vehicle or ECU data bus. This is a very powerful way of getting very fast real time vehicle running data.
At the end of this manual is the list of supported OEM vehicles / Aftermarket Ecu's which Syvecs support and it's expanding all the time. **Please Note**: OEM Vehicle don't all have the power-train CAN available at the OBD2 connect, users may need to connect on the CAN at the ECU location.

If the vehicle/Ecu you wish to connect to is not present in the predefined CAN list inside the TinyDash then Syvecs also have a generic receive section for allowing calibrators to set a custom CAN receive setup.

Connecting the CAN network on your car needs to be done at the ECU location to ensure the powertrain CAN messages are present. T into the CAN wires and run them to the TinyDash.

No Termination Resistor is present on the TinyDash

Generic Can Receive

The generic CAN receive section allows for calibrators to setup the items they wish to display on the TinyDash by setting the Identifier, Start Bit, Length, and scaling.

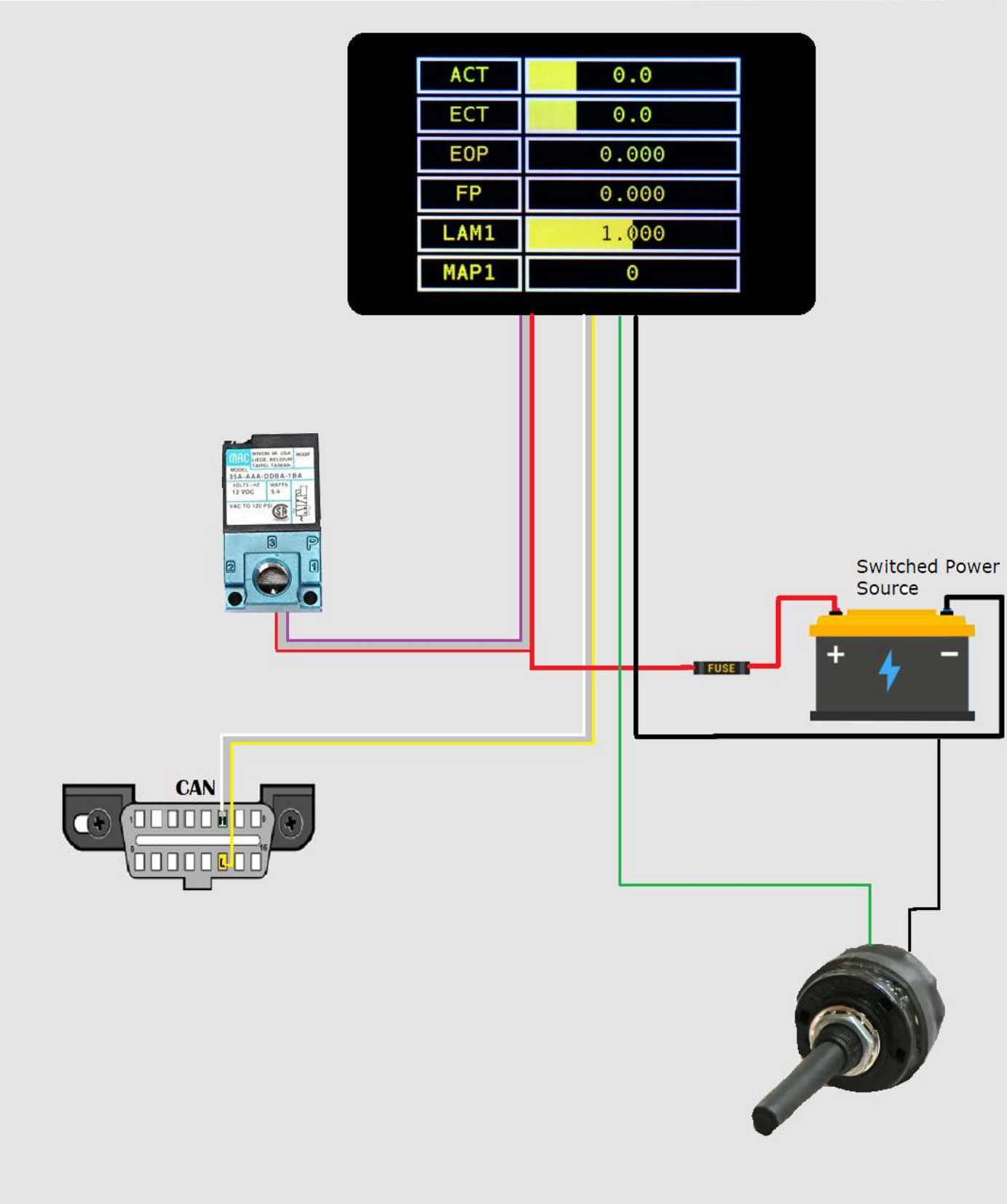
The easier way to setup the Generic CAN is to create a worksheet and add in all the maps like below to make each CANRX* maps line up.

Above you can see the RPM is setup to be received from CAN ID 0x600, data is not Little Endian, value is signed, scaling is 1.00 and is being picked up from start bit 0 with a length of 16 bits.

More info can be found on www.youtube.com/SyvecsHelp. Search for Generic Can Receive.

Please note: Any Item which is assigned in Pin Assignments will take its data from the Pin assignment and ignore the Generic CAN Rx data.

Example Wiring



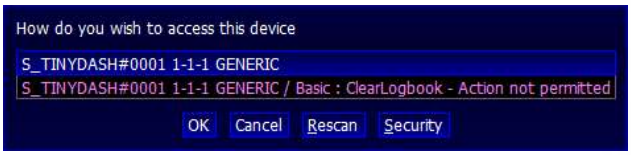
PC Connection - SCAL

In order for the TinyDash to work it must have a valid calibration present in the device and when shipping from the factory no calibration is loaded to ensure calibrator's setup the configuration to suit the installation.

A USB C port is found on the back of the TinyDash which is used for calibration changes on the device.

The S-Suite software can be downloaded from below.
https://www.syvecs.com/software/

After running the SSuite installer, open SCal and click **D**evice > **C**onnect. You will be asked "How do you wish to access this device". Click OK.



Next you can load a calibration if you have one saved from a previous installation or program defaults if new installation.

The TinyDash will now connect. This status will be displayed in on the top right hand corner of SCal. A green indicator and Connected will be displayed.

TIP When navigating within SCal you will note that some configuration settings are in blue and others green. All green settings take effect immediately, and do not require programming. Settings highlighted in blue need to be programmed before the changes take effect.

Calibrators now have the ability to setup the TinyDash live.

Press F1 for help on any map and remember that Calibration names highlights in Green are adjustable Live and changes are immediate. Blue Maps require programming (Device > Program) to take effect.

TinyDash Calibration

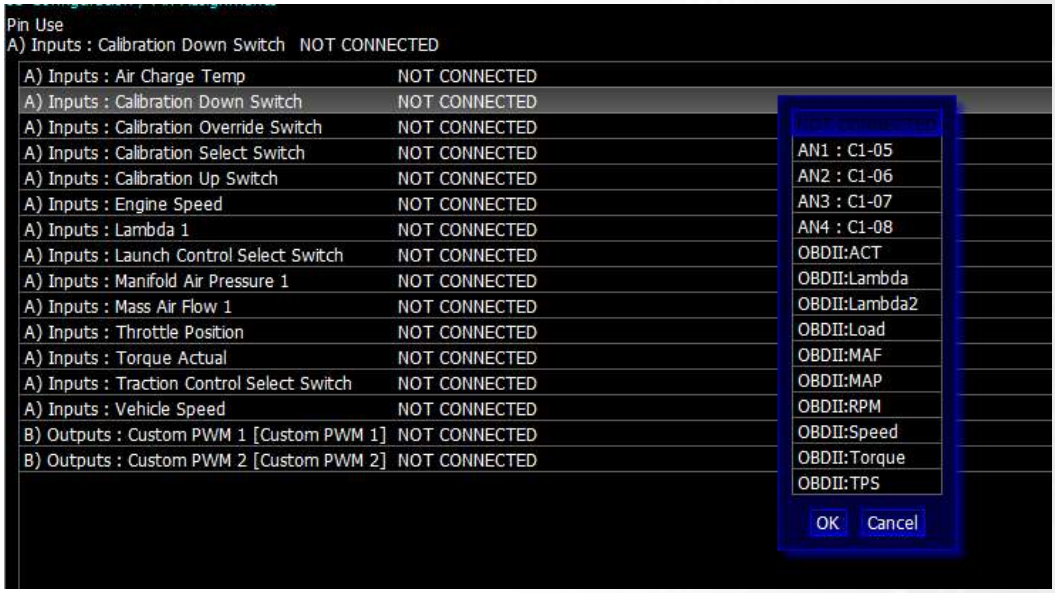
OBD2 Setup

The TinyDash controller supports the OBD2 Data receive protocol, allowing users to grab item data if it's present on the OEM ECU OBD2 protocol making the installation even simpler.

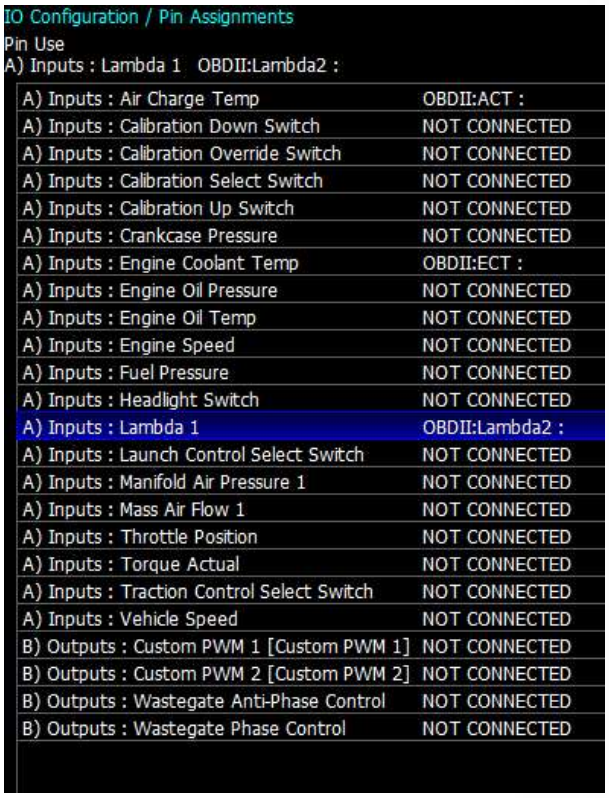
OBD2 Supports: Rpm, Tps, Torque Actual, Torque Demand, Maf1, Map1, ACT , ECT, Lam1, Speed

Select the input they wish to assign OBD2 data on and then select the OBDII: Item best suited.
Example: Air Charge Temp – OBDII ACT

Users need to Device – Program the controller after for the setting to be applied



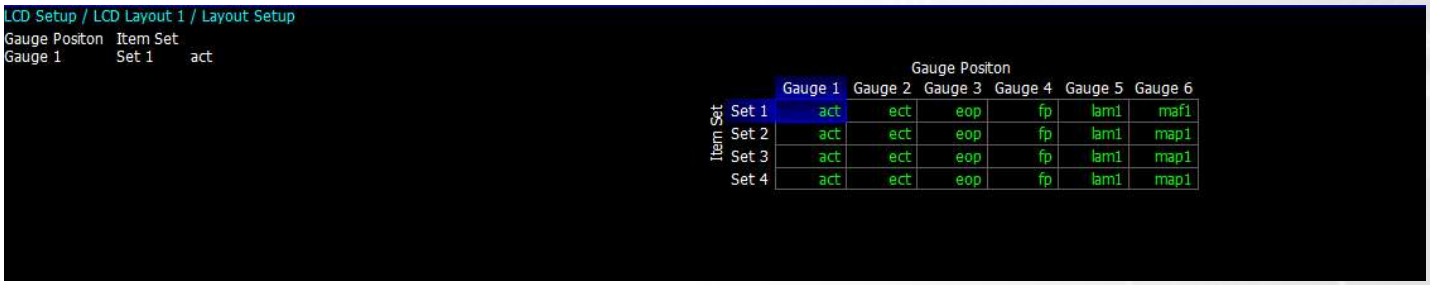
Multiple items can be assigned at the same time



Layout Setup

Multiple layouts are available on the TinyDash and each layout can also have different data sets based on the calibration switch position.

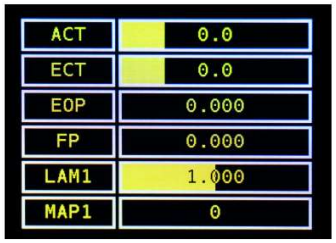
Under each Layout area is a setup map which allows users to input the items they wish to display. 4 layout sets are available meaning a layout style can display 6 different sets of items which are selectable under Calibration Switch – Layout Control

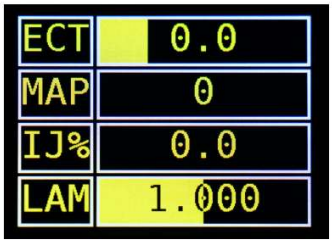


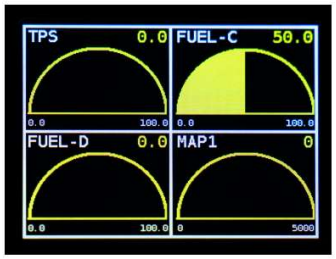
Users can also adjust the following in the LCD Setup area:

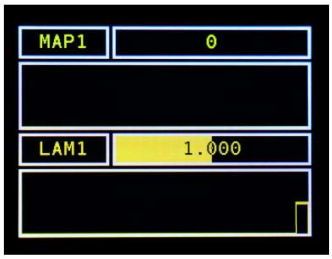
- Background Colour
- Text Colour
- Box Colour
- Orientation
- Brightness

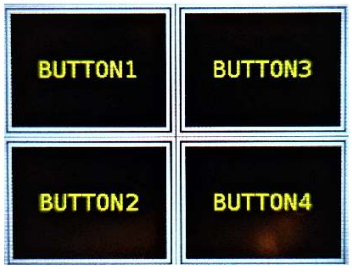
Layouts Available

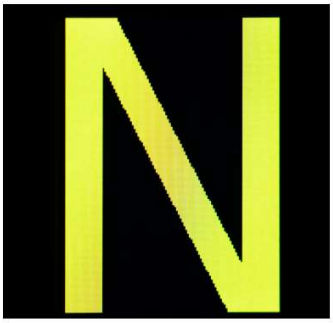








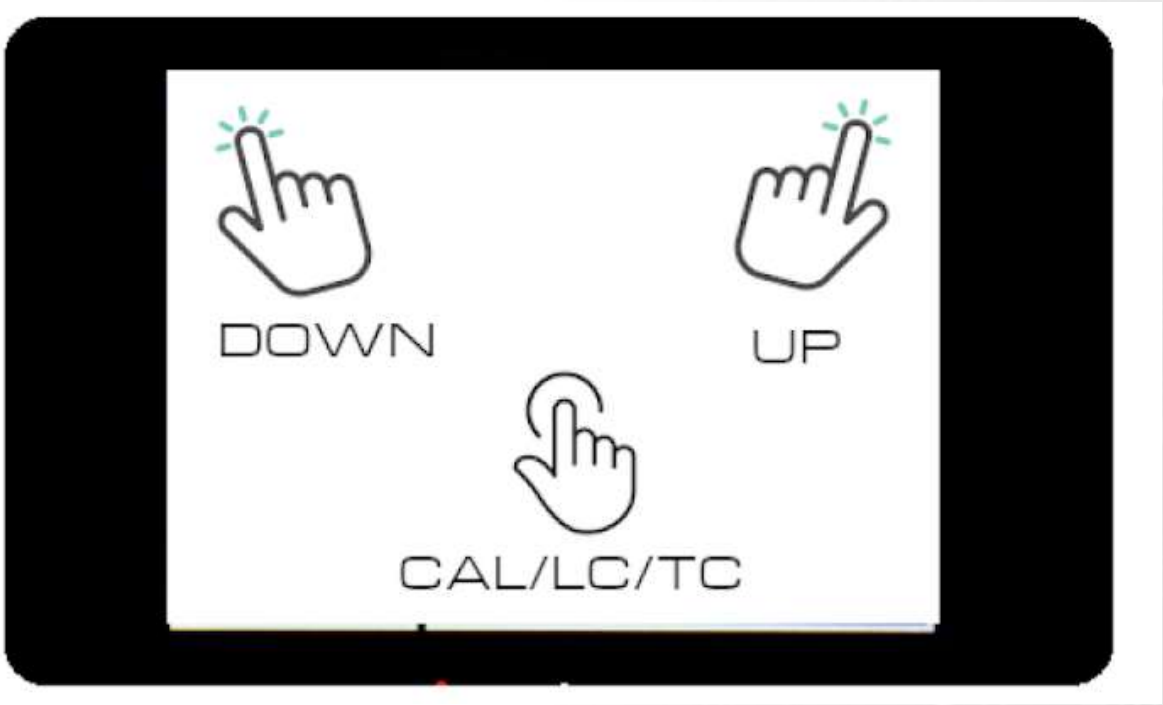




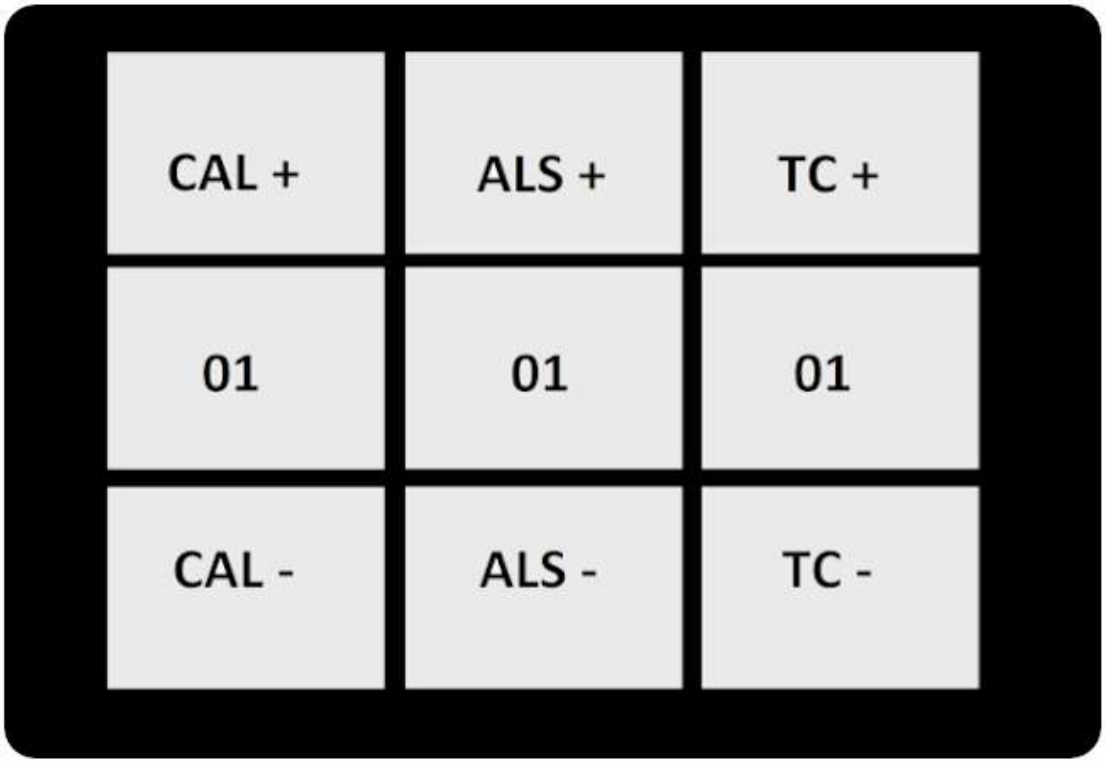
Touch-Screen Control

The V2 TinyDash has a resistive touch screen panel allowing users to be able to change the internal CalSelect on the TinyDash, the internal Cal Select as default changes the display layout but also allows for different calibration changes inside the Tinydash for on-board strategies like boost control.

Pressing in each top corner of the screen changes the CalSelect up and down.



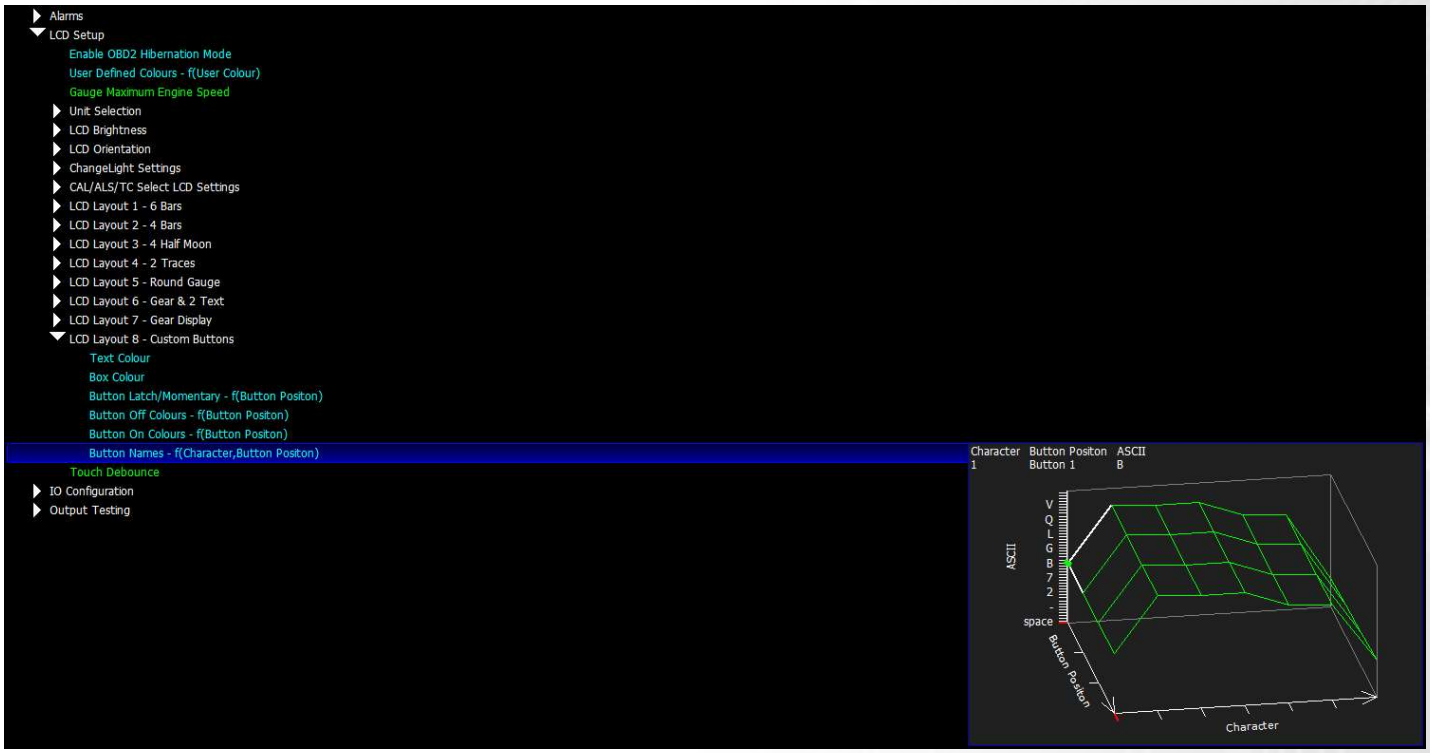
Pressing the middle of the screen activates the Map Switching function of the TinyDash and will make the items EcuCalSelect, AlsSelect and TCSelect update. These can these be transmitted by CANBus to your Engine Control Module.



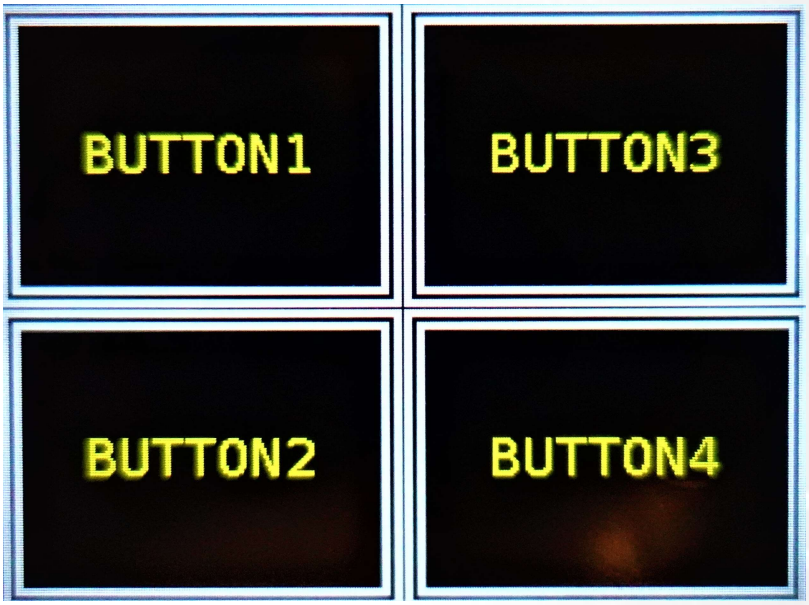
KeyPad Option

The TinyDash V2 also has the ability to be a Keypad, allow custom buttons to be created which have the option to be toggled as a momentary button or latched.

These buttons can then be renamed in Scal and assigned to custom maps in Scal or Transmitted over CANBus to other modules.

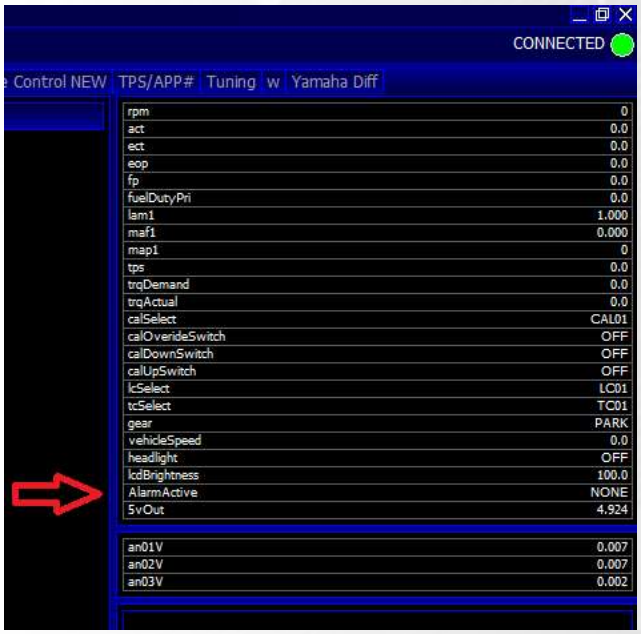


Many options are also available on the keypad page (Layout8) to change the button colours when not active and active



Alarms

Many Alarms can be set on the TinyDash unit, When an alarm is active it will bring up a red warning on the LCD Panel and also set a warning in Scal - **AlarmActive**



Custom alarms are easily configurable from the Alarm menu, for an alarm to trigger it must either be above a configurable maximum threshold, or under a minimum threshold.

Alarms active RPM threshold allows you to turn off all alarms beneath a configured RPM limit. For example set that to 100RPM and the alarms will stop if the engine comes to a stop.

Where a minimum and maximum threshold exists such as the battery, the alarm will sound if it goes outside of either of those thresholds

The duration of the alarm is configured in “Alarm Hold Duration”, and this sets the time the Alarm warning page is active for. After this time has passed another timer starts to set when the alarm page will display again. This can be adjusted in “Alarm Hold Off Duration”

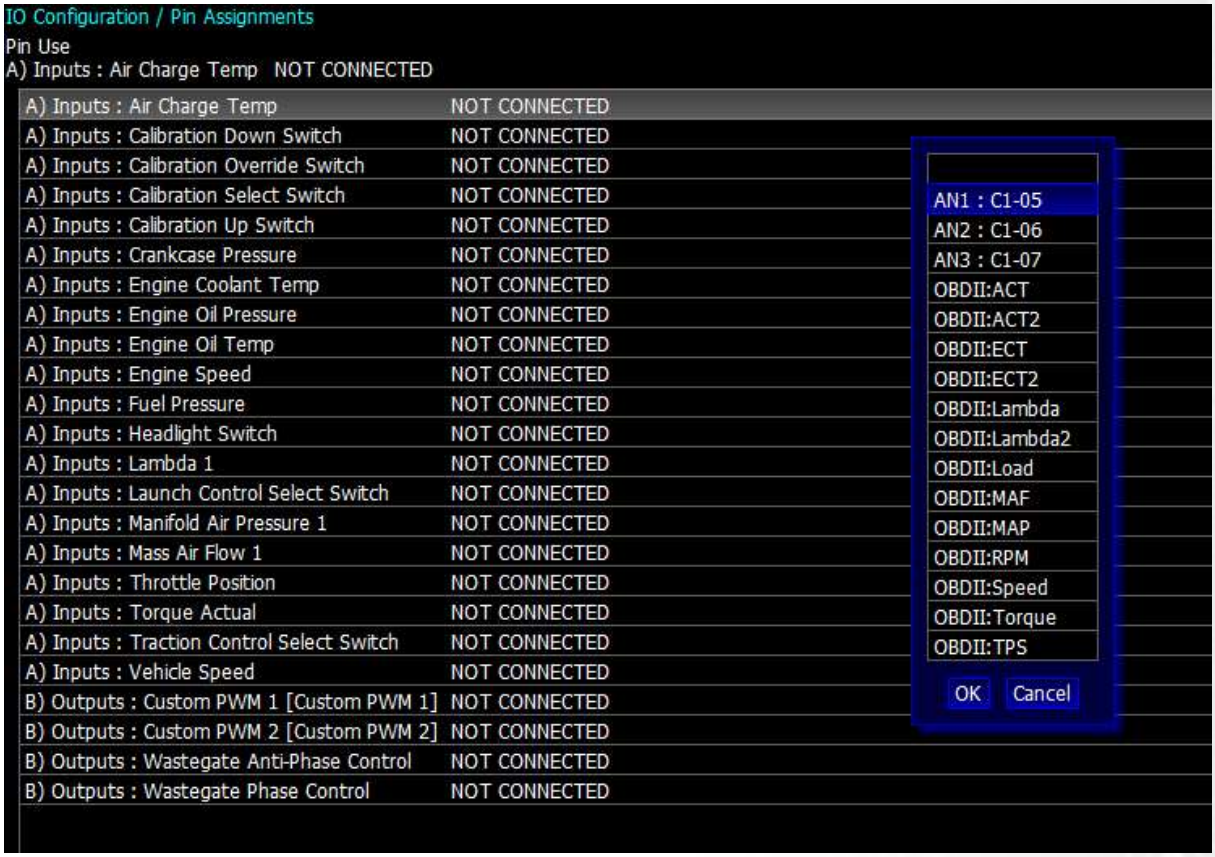
Note:

The Alarm page will only be displayed once if the item which is in alarm is present on the layout, are which point the item will change to Red on the screen to warn the user

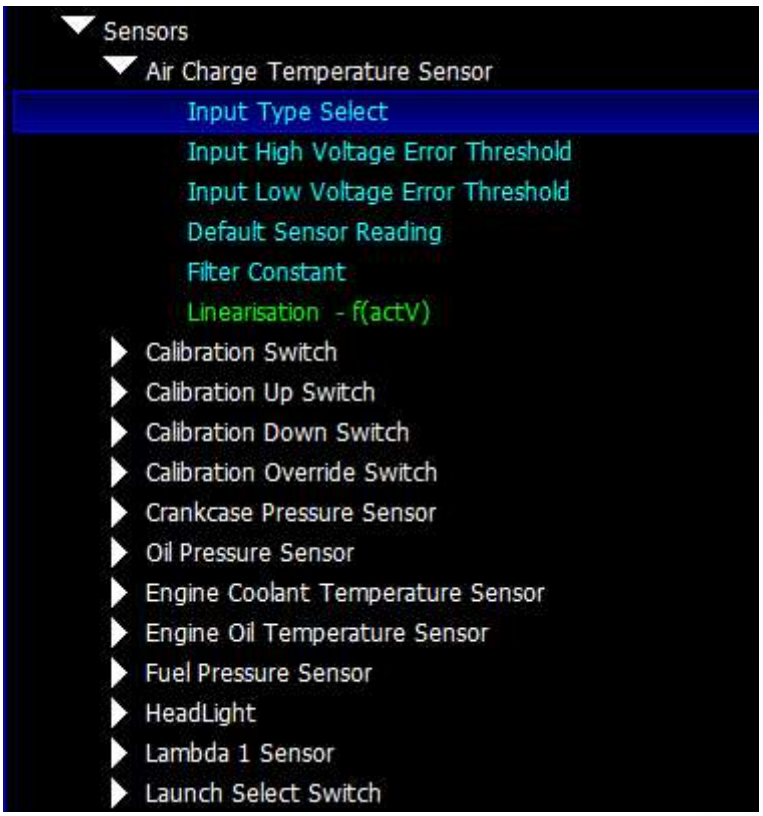
Layout5 will not display an Alarm

Input - Sensor Setup

The Tinydash has three 0-5v inputs available and these can be selected in the I/O Configuration – Pin Assignments



Once assigned the calibrator can head to the sensors area to setup the input assigned.



Input Type Select – Allows either a 5V or Thermistor to be selected. When thermistor is selected a 3K pull up resistor is enabled on the Input.

Input High Voltage Error Threshold – Sets the high voltage level for which the TinyDash will class the input in Error

Input Low Voltage Error Threshold – Sets the low voltage level for which the TinyDash will class the input in Error

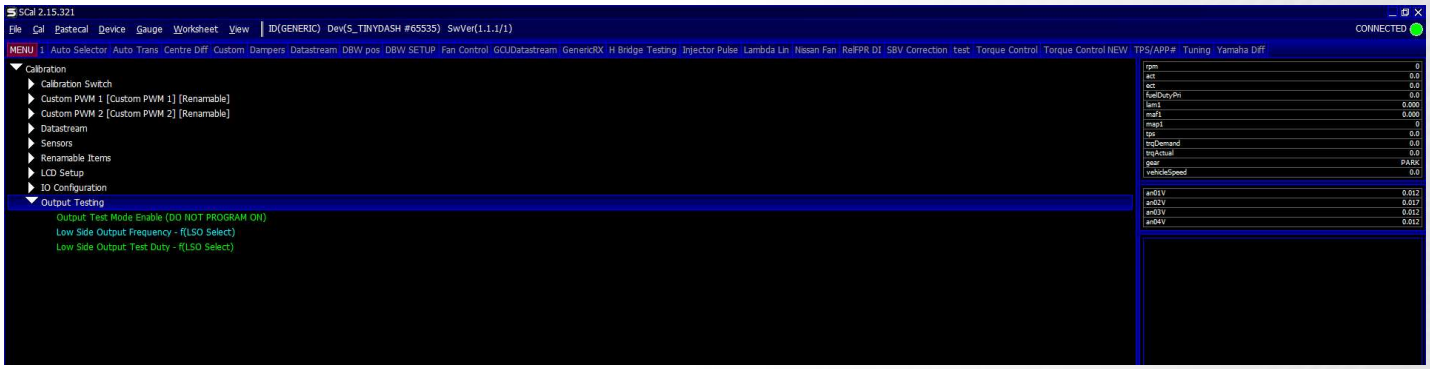
Default Sensor Reading – When the input is in Error the value in this map will applied on the Item

Filter Constant – Amount of recursive filtering to be applied to the Signal, higher the value = more filtering

Linearisation – Sets the input voltage to sensor units applied on the item

Output Testing

The TinyDash outputs can be tested live with our Syvecs - Scal program and information on connecting to the unit can be found in the PC Connection section of the manual. After connecting to the unit via USB, users will see an area at the bottom of the calibration tree called output testing.



Here users are able to test the functions of each output by itself without the need for any master/slave CAN communication.

NOTE:* / Low Side Output Frequency** *maps must be set and programmed onto the device for the output testing logic of these outputs to apply. You cannot change these maps when* ***Output Test Mode Enable *is enabled.*

Remember that Calibration names highlights in Green are adjustable Live and changes are immediate. Blue Maps require programming (Device > Program) to take effect.

Set a frequency you wish the outputs to be driven at in **LowSide Output Frequency.** Device – Program for it to be saved. Then enable **Output Test Mode Enable** map.

Now you can then set a duty for each output to be driven in **Low Side Output Test Duty**, these maps can be adjusted live.

Strategy Help

All the strategies/maps on the TinyDash controller have help text available for them. This is shown by pressing F1 on the keyboard when in Scal when a calibration is open.

Supported CAN Streams

The following OEM CAN streams are supported, but check the Syvecs Forum for TinyDash firmware updates as more cars will be added.

	RPM	MAP	TPS	PPS	(Driven/Sport Mode)	Torque Actual	Torque Demand	ACT	ECT	EOT	Gear	Brake P	Speed	LatG	LongG
Audi Mk2 TTRS / RS3	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
Audi Mk3 TTRS / RS3 / S3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audi R8 Gen1	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
Audi R8 Gen2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BMW E46	✓		✓	✓		✓	✓		✓	✓		✓	✓		
BMW E92	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓		
Corvette Z06	✓		✓	✓		✓	✓		✓			✓	✓		
Evo X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
ECUMASTER	✓	✓	✓	✓				✓							
Honda FD2/FN2	✓	✓	✓	✓		✓	✓		✓			✓	✓		
Honda FK2/FK8	✓		✓	✓		✓	✓		✓	✓		✓	✓	✓	✓
Infiniti Q60	✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
Jeep 2022	✓		✓	✓	✓	✓	✓				✓	✓	✓		
Lamborghini LP520	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
Lamborghini LP560	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
Lamborghini Huracan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lamborghini Aventador	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LandRover Defender 90 110	✓		✓	✓		✓	✓		✓				✓		
LINKECU	✓	✓	✓	✓				✓	✓	✓			✓		
Mclaren 12c,650,675,570,600, 720,765,P1	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓		
Mercedes Gen1 E55 C63	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓		
Mercedes Gen2 C63 SLS	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
MoTeC M1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		
Nissan 370Z	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Nissan Patrol Y61	✓		✓	✓		✓	✓		✓		✓	✓	✓	✓	✓
Nissan Patrol Y62	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
Nissan R35GTR	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Porsche 991 / 981 / GTS / GT2RS / GT3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Porsche 996	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		
Porsche 997/987	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Simos 18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Subura Impreza My15+	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓		
Suzuki 2013+	✓	✓	✓	✓		✓	✓		✓			✓	✓		
Syvecs Ecu's	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Toyota Yaris Gr	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓
Toyota LandCruiser/Lexus LX570	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓		
Toyota GT86 /BRZ	✓			✓		✓	✓		✓	✓		✓	✓		
VAG Me7	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
VAG Me9	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
VAG MED17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VW Golf Mk5/6 Seat TFSI/TSI, Audi TSI/TFSI	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
VW Golf Mk7 MQB Seat MQB Audi MQB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Yamaha YXZ	✓		✓	✓		✓	✓		✓		✓		✓		

The following After-market ECU CAN streams are supported, but check the Syvecs Forum for TinyDash firmware updates as more Ecus will be added.

	RPM	MAP	TPS	PPS	(Driven/Sport Mode)	Torque Actual	Torque Demand	ACT	ECT	EOT	Gear	Brake P	Speed	LatG	LongG
ECUMASTER	✓	✓	✓	✓				✓							
LINKECU	✓	✓	✓	✓				✓	✓	✓			✓		
MoTeC M1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		
Syvecs Ecu's	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Syvecs CAN Content Layouts

S6 Default

(Can be used for S8, S12 also)

Frame	Slot 1	2	3	4
1	rpm	ppsFinal	tps1	longG
2	map1	SPARE	ignFinalPri1	SPARE
3	SPARE	SPARE	fuelFinalPri1	SPARE
4	relFp1	lam1	SPARE	SPARE
5	SPARE	lam2	fuelMltCll1	limpMode
6	act1	ect1	egt1	SPARE
7	SPARE	fuelDutyPri1	SPARE	SPARE
8	SPARE	SPARE	SPARE	SPARE
9	eop1	SPARE	SPARE	SPARE
10	eot	fp1	SPARE	SPARE
11	calSelect	tcSelect	SPARE	SPARE
12	SPARE	SPARE	SPARE	fuelComp
13	SPARE	SPARE	SPARE	SPARE
14	SPARE	SPARE	SPARE	SPARE
15	SPARE	gear	SPARE	SPARE
16	flSpeed	frSpeed	rlSpeed	rrSpeed
17	longG	latG	vehicleSpeed	SPARE
18	SPARE	SPARE	SPARE	SPARE
19	SPARE	SPARE	SPARE	SPARE
20	SPARE	engTrqEstOutputTrans	engTrqDmdPps	SPARE

S7 Fixed Stream

(Can be used for S8, S12 also)

Frame	1	2	3	4
1	rpm	ppsFinal	tpsMax	dip1
2	engTrqEstOutputTrans	engTrqEstOutputPot	engTrqDmdPps	engTrqEstFriction
3	bp01Duty_Spare	bp02Duty_Spare	clPwm01DutyFinal	dpcDuty
4	brakeLight	launchSwitch	changeLightState	vinTx
5	fan3Duty_NONE	fan6Duty_PWM	fan7Duty_Evap1	fan8Duty_Evap2
6	CUST_U01_U01	CUST_U02_U02	CUST_U03_U03	CUST_U04_U04
7	rpmDTR	map1DT	tps1DT	dip1
8	runMode	runTimeLR	highLoadTimer	loggingActive
9	vehicleSpeed	drivenSpeed	gpsSpeed	driveRatio
10	flSpeed	frSpeed	rlSpeed	rrSpeed
11	mapMax	wgMapTarg1	wgMapLimit1	clutchSwitch
12	lam1	lam2	fuelMltCll1	fuelMltCll2
13	fuelFinalPri1	fuelFinalSec1	fuelDutyPri1	fuelDutySec1
14	fuelConsVolHR	fuelConsVolRate	n2oFinal	fuelEndAngle
15	longG	latG	yaw	pitch
16	ect1	act1	eot	ft1
17	eop1	relFp1	ecp	ccp1
18	trqFuelSev	trqIgnSev	trqIgnRtd	ignFinalPri1
19	launchRpm	revLimitRpm	revCutRpm	flvlA
20	gear	fuelComp	idleTarget	trqFuelSevSrc
21	knockWarnLight	tpsClosed	idleControlActive	n2oSwitch
22	cm201	cm202	cm203	cm204
23	cm301	cm302	cm303	cm304
24	CUST_U05_U05	CUST_U06_U06	CUST_U07_U07	CUST_U08_U08
25	fuelPump1Duty	fuelPump1	fuelPump2	fuelPump3
26	dbw1Duty	dbw1Targ	egt1	egt2
27	vvt1In	vvt1Ex	vvtInTarg	vvtExTarg
28	fan1	fan2	fan4_NONE	fan5
29	limpMode	sensorWarningLevel	errorFlagsH	errorFlagsL
30	cruiseActive	bap	airConCtl	airConSwitch
31	carCode01	carCode02	carCode03	carCode04
32	calSelect	tcSelect	launchSelect	alsSelect
33	carCode05	carCode06	SPARE	SPARE
34	wgFinalDuty1	launchInStage	turboSpeed1DeSpiked	n2op
35	cruiseVehSpdTarg	vbat	pitSwitch	pitLimitActive
36	atShiftCtl1Duty	atShiftCtl2Duty	atShiftCtl3Duty	atShiftCtl4Duty
37	atShiftCtl5Duty	atShiftCtl6Duty	atLinePDuty	atLockPDuty
38	SPARE	SPARE	SPARE	SPARE
39	SPARE	SPARE	SPARE	SPARE
40	SPARE	SPARE	SPARE	SPARE

S12

Frame	Slot 1	2	3	4
1	rpm	ppsA	tps1	longG
2	map1	SPARE	ignFinalPri1	SPARE
3	SPARE	SPARE	SPARE	SPARE
4	relFp1	lam1	SPARE	fuelComp
5	SPARE	lam2	fuelMltCll2	SPARE
6	act1	ect1	egt1	limpMode
7	SPARE	fuelDutyPri1	egt2	vbat
8	SPARE	SPARE	SPARE	SPARE
9	eop1	SPARE	SPARE	SPARE
10	ect1	SPARE	SPARE	SPARE
11	SPARE	calSelect	tcSelect	SPARE
12	SPARE	SPARE	bap	SPARE
13	SPARE	SPARE	SPARE	SPARE
14	SPARE	SPARE	SPARE	SPARE
15	SPARE	gear	SPARE	SPARE
16	flSpeed	frSpeed	rlSpeed	rrSpeed
17	SPARE	latG	vehicleSpeed	SPARE
18	wheelSpin	tcSpinTarg	tcSpinErr	tcTrq
19	SPARE	SPARE	SPARE	SPARE
20	SPARE	engTrqEstOutputExt	engTrqDmdPps	SPARE
21	SPARE	SPARE	SPARE	SPARE
22	SPARE	SPARE	SPARE	SPARE
23	SPARE	SPARE	SPARE	SPARE
24	SPARE	SPARE	SPARE	SPARE
25	SPARE	SPARE	SPARE	SPARE
26	SPARE	SPARE	SPARE	SPARE
27	SPARE	SPARE	SPARE	SPARE
28	SPARE	SPARE	SPARE	SPARE
29	SPARE	SPARE	SPARE	SPARE
30	SPARE	SPARE	SPARE	SPARE
31	SPARE	SPARE	SPARE	SPARE
32	SPARE	SPARE	SPARE	SPARE
33	SPARE	SPARE	SPARE	SPARE
34	SPARE	SPARE	SPARE	SPARE
35	SPARE	SPARE	SPARE	SPARE
36	SPARE	SPARE	SPARE	SPARE
37	SPARE	SPARE	SPARE	SPARE
38	SPARE	SPARE	SPARE	SPARE
39	SPARE	SPARE	SPARE	SPARE
40	SPARE	SPARE	SPARE	SPARE