

# **Haltech**

## **ELITE 2500**

### **GM GEN IV LS2 & LS3 NON-DBW**

### **Terminated Engine Harness**

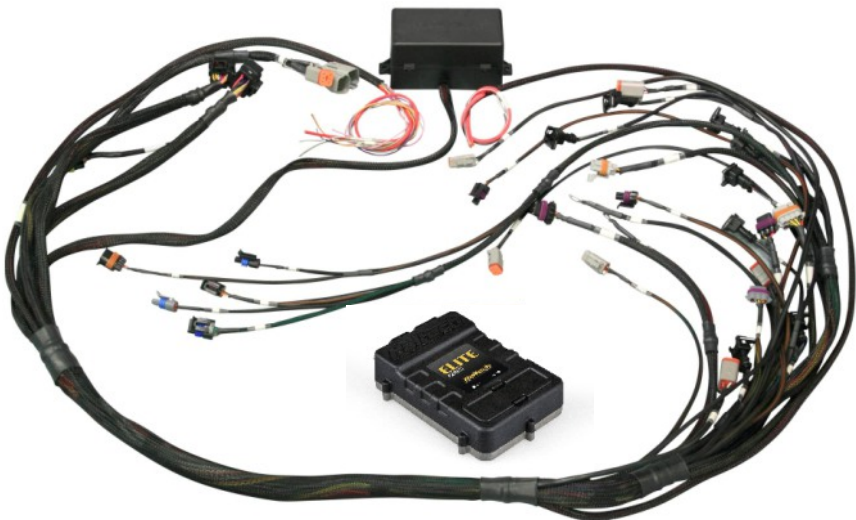
### **QUICK START GUIDE**

### **HT-141364**

### **Suits – OEM EV1 Injector Connectors**



9 356450 007139



## **WARNING - HALTECH OFF-ROAD USAGE POLICY**

In many states it is unlawful to tamper with your vehicle's emissions equipment.

Haltech products are designed and sold for sanctioned off-road/competition, non-registered or non-emissions controlled vehicles only and may never be used on a public road or highway. Using Haltech products for street/road use on public roads or highways is prohibited by law unless a specific regulatory exemption exists (more information can be found on the SEMA Action Network website [www.seman.com/emissions](http://www.seman.com/emissions) for state by state details in the USA).

It is the responsibility of the installer and/or user of this product to ensure compliance with all applicable local and federal laws and regulations. Please check with your local vehicle authority before purchasing, using or installing any Haltech product.

## **INSTALLATION OF HALTECH PRODUCTS**

No responsibility whatsoever is accepted by Haltech for the fitment of Haltech Products. The onus is clearly on the installer to ensure that both their knowledge and the parts selected are correct for that particular application. Any damage to parts or consequential damage or costs resulting from the incorrect installation of Haltech products are totally the responsibility of the installer.

Always disconnect the battery when doing electrical work on your vehicle. Avoid sparks, open flames or use of electrical devices near flammable substances. Do not run the engine with a battery charger connected as this could damage the ECU and other electrical equipment.

Do not overcharge the battery or reverse the polarity of the battery or any charging unit. Disconnect the Haltech ECU from the electrical system whenever doing any welding on the vehicle by unplugging the wiring harness connector from the ECU.

After completing the ECU installation, make sure there is no wiring left un-insulated. Uninsulated wiring can cause sparks, short circuits and in some cases fire. Before attempting to run the engine ensure there are no leaks in the fuel system.

All fuel system components and wiring should be mounted away from heat sources, shielded if necessary and well ventilated. Always ensure that you follow workshop safety procedures. If you're working underneath a jacked-up car, always use safety stands!

## **HALTECH LIMITED WARRANTY**

Unless specified otherwise, Haltech warrants its products to be free from defects in material or workmanship for a period of 12 months from the date of purchase.

If the Haltech product is found to be defective as mentioned above, it will be replaced or repaired if returned prepaid along with proof of purchase. Proof of purchase in the form of a copy of the original purchase invoice, receipt or bill of sale which indicates that the product is within the warranty period, must be presented to obtain warranty service.

Replacement or repair of a defective product shall constitute the sole liability of Haltech. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations, either expressed or implied, including any implied warranty of merchantability or fitness. In no event shall Haltech, be liable for special or consequential damages.

## **PRODUCT RETURNS**

Please include a copy of the original purchase invoice, receipt or bill of sale along with the unused, undamaged product and its original packaging. Any product returned with missing accessory items or packaging will incur extra charges to return the item to a re-saleable condition.

All product returns must be sent via a freight method with adequate tracking, insurance and proof of delivery services. Haltech will not be held responsible for product returns lost during transit.

## **RETURNS OF PRODUCTS SUPPLIED IN SEALED PACKAGING**

The sale of any sensor or accessory supplied in sealed packaging is strictly non-refundable if the sealed packaging has been opened or tampered with. This will be clearly noted on the product packaging. If you do not accept these terms please return the sensor in its original unopened packaging within 30 days for a full refund.

A sensor or accessory product may be returned after 30 days of purchase (with its sealed packaging intact) for credit only (no refunds given) and will be subject to a 10% restocking fee.

# **Elite 2500**

## **GM Gen IV LS2 & LS3 Non-DBW**

### **Terminated Engine Harness**

### **Quick Start Guide**

Congratulations on purchasing a Haltech Engine Management Terminated Engine harness. This *Plug and Play* product allows you to be up and running in a few hours.

The Harness when installed in conjunction with a Haltech Elite 2500 opens the door to virtually limitless performance modification and tuning of your vehicle. Programmable systems allow you to extract all the performance from your engine by delivering precisely the required amount of fuel and ignition timing that your engine requires for maximum output under all operating conditions.

This quick start guide will walk you through installation of the Haltech GM LS2 & LS3 Terminated Engine Harness into a vehicle. This guide is accompanied by the full service manual located on the USB key provided with the ECU that you or your tuner will need to refer to before completing your installation and configuration. The Manual can also be downloaded from the Haltech website [www.haltech.com](http://www.haltech.com).

### **Supported Engine**

The Haltech GM Gen IV LS2 & LS3 Non-DBW Terminated Engine Harness supports the following engine configurations:

- General Motors – Generation IV LS2 & LS3 engines without Drive By Wire Throttle Control

### **Supported ECU**

- Haltech Elite 2500

### **Included in Haltech ECU Kit (HT-151364)**

- Haltech Elite 2500 ECU
- GM LS2 / LS3 Terminated Engine Harness with OEM EV1 Injector connectors
- CAM Sensor Connector Pack
- Deutsch Connector Pack

### **Optional Accessories (Sold Separately)**

- HT-159986 - WB2 Bosch - Dual channel CAN O2 wideband controller kit
- HT-159988 - WB2 NTK - Dual channel CAN O2 wideband controller kit

## Harness Overview

The Haltech GM LS2 / LS3 non-DBW Terminated Engine Harness is a plug and play solution for wiring a General Motors LS2 or LS3, non- Drive By Wire Engine.

Installation is simple and easy as the harness is designed for the engine, all lengths are correct and all wires are clearly labeled.

### Notes on Installation:

- Make sure your Engine is grounded directly to the chassis of the vehicle. A heavy gauge ground strap should be used to ground your engine to the chassis of the vehicle. The Haltech Terminated Engine harness **does not** ground your engine.

### WARNING!

Damage can occur to your harness and / or ECU if you do not ground your engine properly. Please ensure heavy gauge cable is used.

- Keep all wires away from the exhaust manifold and extreme sources of heat.
- The harness is designed to plug directly into the OEM ignition loom and therefore no ignition loom is supplied.
- Base maps are available in the Base maps folder once you have the tuning software installed.

## Termination Descriptions

### Analogue Voltage Inputs (TPS, MAP, Fuel-P, Oil-P)

The Analogue Voltage Inputs can accept variable voltage inputs from 0V to 5V. These inputs can also accept switch inputs that change between two different voltage levels. The on voltage and off voltage define what the thresholds are between the on and off states. The voltage can be viewed as a channel within Haltech NSP Software to determine thresholds for a switched input.

#### ***Fuel Pressure Sensor (Fuel-P, AVI 3)***

The Fuel-P labeled connector connects directly to the fuel pressure sensor on the engine. This will enable the user to know the current fuel pressure of the vehicle.

#### ***Oil Pressure Sensor (Oil-P, AVI 4)***

The Oil-P labeled connector connects directly to the oil pressure sensor on the engine. This will enable the user to know the current oil pressure of the vehicle.

#### ***Throttle Position Sensor (TPS, AVI 10)***

The TPS labeled connector connects directly to the throttle sensor on the engine. This will enable the user to know the current throttle position of the engine.

#### ***Spare Analog Voltage Input (AVI 5, In Engine Bay)***

The AVI 5 labeled connector is a spare Analogue Voltage Input (AVI 5). The 3 pin connector has the following terminations, Please isolate all unused terminations.

Pin # 1 – Blk/Wht : Sensor Ground  
Pin # 2 – Org : +5V Sensor Power  
Pin # 3 – Org/Grn : Sensor Signal (AVI 5)

This input can be programmed within the NSP Software to read inputs such as:

- O2 Sensors
- Pressure Sensors
- Temperature Sensors
- Various Switches
- Trim Module

For a full list of input options and explanations please go to the help within the NSP Software.

#### ***Spare Analog Voltage Input (AVI 2, In Cabin Harness)***

AVI 2 input is a spare Analogue Voltage Input (AVI 2) that can be programmed within the NSP Software to do the following options:

- Trim Module Input
- Various Switches
- 0-5V Analog Voltage Input
- Pressure Sensor
- Temperature Sensors

#### **Pinout:**

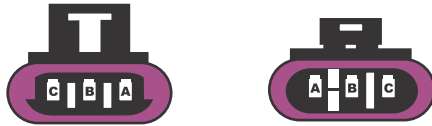
Pin A – Blk/Wht : Sensor Ground  
Pin B – Org : +5V Sensor Power  
Pin C – Org/Blk: Sensor Signal (AVI 2)

## Camshaft Position Sensor Input (CAM)

The camshaft position sensor is used in conjunction with the crank angle sensor to determine crankshaft position and stroke of the engine.

Connector style and wiring of the CAM sensor varies between models therefore two connectors have been supplied for the end user to terminate for their application. Some applications connect to the CAM sensor directly whilst others use a small pigtail harness.

Refer to the table below for correct wiring of your CAM Sensor. Insert pre-terminated pins into the rear of the connector until they lock.

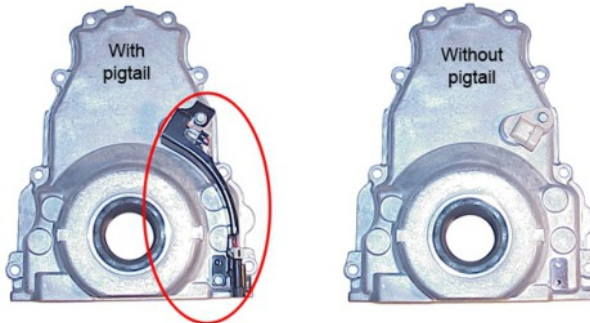


Looking into front of connector

Wiring to Pigtail Harness	
Location	Wire Color
A	YELLOW
B	BLUE
C	RED

Wiring to Pigtail Harness	
Location	Wire Color
A	YELLOW
B	BLUE
C	RED

Red = 12V	Blue = Ground	Yellow = Signal
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**Figure 2 - Alternate Cam Sensor Wiring**

### **Crank Angle Sensor (CRANK)**

The Crank signal connects directly to the engine Crank Angle Sensor located in the right rear of the engine block behind the starter motor.

The Haltech ECU uses this signal to accurately measure crankshaft position and engine speed.

### **Ignition 1-8 (IGN1, IGN2, IGN3, IGN4, IGN5, IGN6, IGN7, IGN8)**

The ignition outputs connect directly to the factory ignition harness. Ensure the correct ignition output is connected to the corresponding coil bank on the engine.

Please refer to the label on the harness for correct cylinder bank allocation.

### **Injection 1-8 (INJ1, INJ2, INJ3, INJ4, INJ5, INJ6, INJ7, INJ8)**

The injector outputs connect directly to the injectors. Please ensure the correct injector output is connected to the corresponding injector in the engine.

Please refer to the label on the harness for correct injector allocation.

### **Knock Sensors (Knock 1 , Knock 2)**

The knock sensor inputs connect directly to the OEM knock sensors. This signal is used by the ECU Knock Control function to detect knock events within the engine.

### **Manifold Absolute Pressure Sensor (MAP)**

The Manifold Absolute Pressure Sensor is located on the intake manifold. Connect the MAP labeled connector directly to the sensor.

The MAP sensor measures changes in the intake manifold pressure which result from engine load and RPM changes and converts these into a voltage output so the ECU knows the manifold pressure.

### **Vehicle Speed Sensor Input (VSS-Input) (optional)**

The Vehicle speed sensor provides information on vehicle speed to the Haltech ECU which can be used to display vehicle speed, detect gears or controlling of switches etc.

Connections on the plug are as follows

Pin# 1: Blk/Wht – Sensor Ground

Pin# 2: Org – Sensor Signal (SPI 1)

### **Synchronised Pulsed Inputs (SPI)**

SPI 2 and SPI 3 are located in the cabin harness as flying leads, and SPI 4 is located in the engine bay terminated with a DTM3 connector. These inputs can be programmed within the software to control auxiliaries such as:

- Air Con Input Switch
- Aux RPM Limit
- Switched Inputs
- Flex Fuel Sensor
- Vehicle/Driveshaft Speed Sensors
- Trans Brake Input Switch
- Launch Control Switch
- Flat Shift Switch

#### **SPI 4 plug (engine bay)**

Pin 1 - Blk/Wht - Sensor ground  
Pin 2 - Gry/Red - +12v switched  
Pin 3 - Org - SPI4 input

## **Starter Signal (STS)**

The Starter Signal connects directly to the starter motor solenoid. This will supply 12V to the solenoid on receiving a start signal from the ignition switch when in the start position.

**Please ensure you supply a main power connection to the starter motor and a main earth strap to the engine to ensure correct operation of the starter motor, and to avoid damage to your terminated harness and ECU.**

## **Spare Digital Pulsed Outputs**

The Spare DPO's connector contains one Digital Pulsed Output and one +12V DC Switched Power.

When the output is activated by the ECU the output will switch to ground. Solenoid valves and shift lights etc can be run directly from the output, however high current devices such as thermo fans and additional fuel pumps must be activated through a relay. A Relay can be wired between the DPO and the supplied +12V DC on this connector. This way the output is only switching the relay and not a high current draw device.

**The Digital Pulsed Outputs are limited to 800mA Max current draw.**

These outputs can be programmed within the NSP Software to control auxiliaries such as:

- Air Con Output
- Aux Fuel Pump
- Boost Control
- ECU Diagnostic Light
- Intercooler Fan
- Shift Light
- Thermo fans
- Reverse Lockout Solenoid Valve

For a full list of output options and explanations please go to the help within the NSP Software.

### **Digital Pulsed Output 1 & 2**

Located in the Cabin Harness (flying lead)

### **Digital Pulsed Output 3 & 4**

Located in the Engine Bay, on DTM2 connector with +12V.

### **Idle Control Outputs (Stepper 1-4)**

Located in the Engine Bay



## Engine Coolant Temperature Sensor (ECT)

The Engine Coolant Temperature Sensor input connects directly to the OEM engine coolant temperature sensor located towards front of the head of the left bank.

The Engine Coolant Temperature Sensor provides the ECU with a signal that allows the ECU to know the current engine temperature.

## Intake Air Temperature Sensor (IAT)

The Intake Air Temperature Sensor input connects to a temperature sensor located in the intake air stream.

The Intake Air Temperature Sensor provides the ECU with a signal that allows the ECU to know the current intake air temperature.

## Ground (GND)

The Ground cable connects directly to the engine block.

**Warning** this in **NOT** the earth cable for the engine, please ensure that you earth the engine with an earth strap from the block of the engine to the chassis of the car.

Ensure that the chassis of the car is connected to the battery negative (-) terminal with heavy gauge cable or earthing strap.

Damage to the ECU and or terminated harness may result if this is not done.

## Haltech CAN wideband kits (sold separately)

For precise fuel tuning and control of the engine, wideband O2 sensors are used to accurately measure the air-fuel ratio of the engine.

This harness is fitted with a DTM-4 CAN plug to connect to Haltech CAN devices such as the dual channel wideband kits:

HT-159986 - WB2 Bosch - Dual channel CAN O2 wideband controller kit

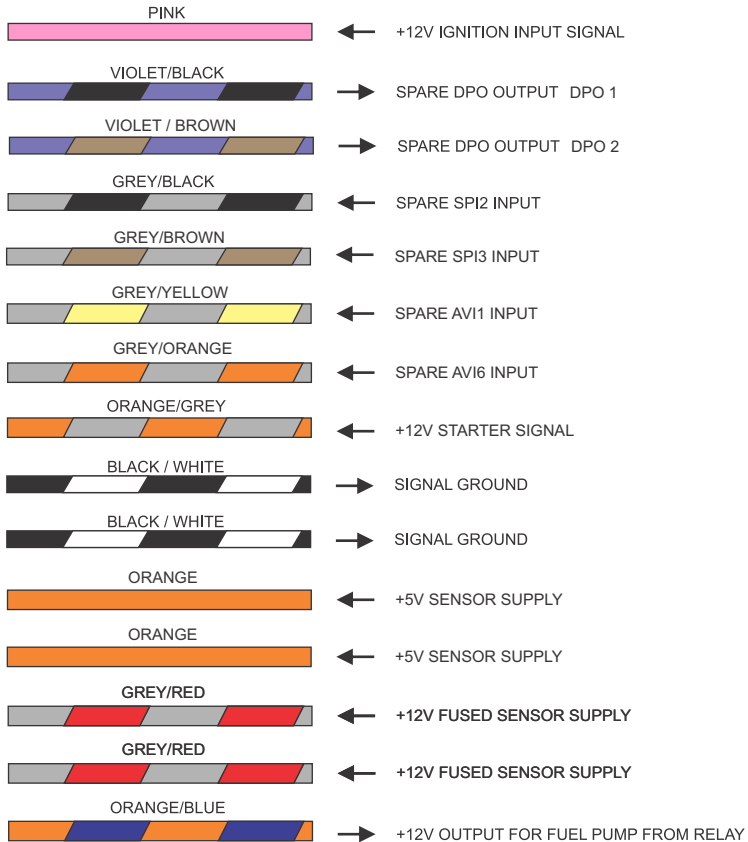
HT-159988 - WB2 NTK - Dual channel CAN O2 wideband controller kit



## Cabin Wiring

The Cabin Wiring is made up multiple inputs and outputs. Correct connection of these cables is essential for proper operation of the harness.

All wires have been labeled and required cables should be connected as outlined below.



**Figure 5 - Cabin Harness Wiring**

## Fuse Box

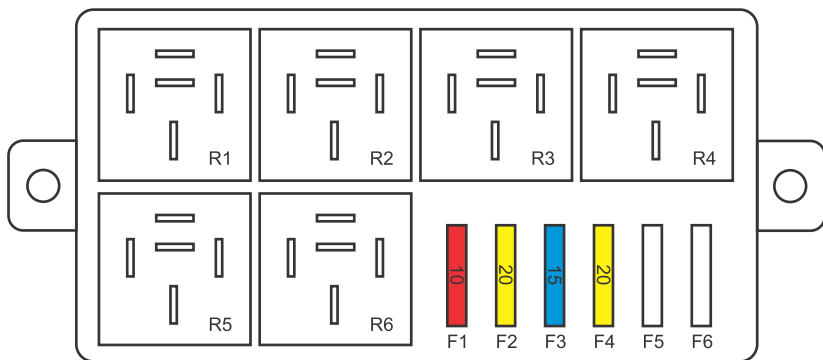
The Haltech fuse box is connected to the harness. Contained within the Haltech Fuse box is 4 fuses and 4 relays, each fuse protects the corresponding relay output (ie. fuse #1 protects relay output #1, fuse #2 protects relay output #2, etc.).

The Haltech fuse box can handle a maximum continuous current draw of 70AMP, exceeding this value may cause damage to the fuse box therefore please ensure all auxiliary devices, fans and fuel pumps connected do not exceed the supplied fuse current limits.

The functions of each of the relays are outlined below:

Fuse #	Relay #	Function	Fuse Required
F1	R1	+12V Output to ECU	10A
F2	R2	+12V Output to Injectors	20A
F3	R3	+12V Output to Ignition	15A
F4	R4	+12V Output to Fuel Pump	20A
F5	R5	Unpopulated	—
F6	R6	Unpopulated	—

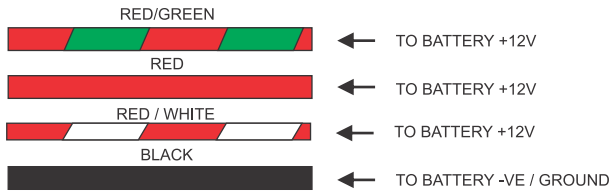
**Figure 3 - Haltech Fuse Box Relay Allocation Table**



**Figure 4 - Haltech Fuse Box Layout**

## Battery Connections

The following cables will connect directly to the battery on the vehicle:



**Figure 6 - Battery Wiring**

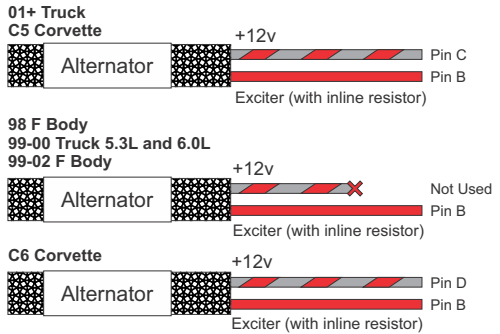
## Alternator Connection

The alternator connection is comprised of two wires that must be inserted into the supplied connector by the installer based upon the model of alternator being used. Typical known alternator pinouts are listed below with their corresponding vehicle model.



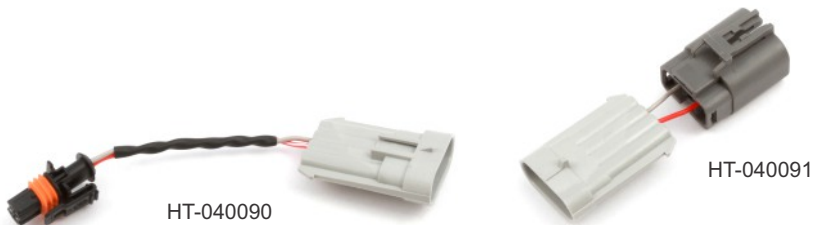
(Looking into connector, pin side)

### Supplied Alternator Connector



### Alternator Connections

For cases where the alternator uses a different connector, there are optional adapters that can be purchased separately to suit.



### NOTE:

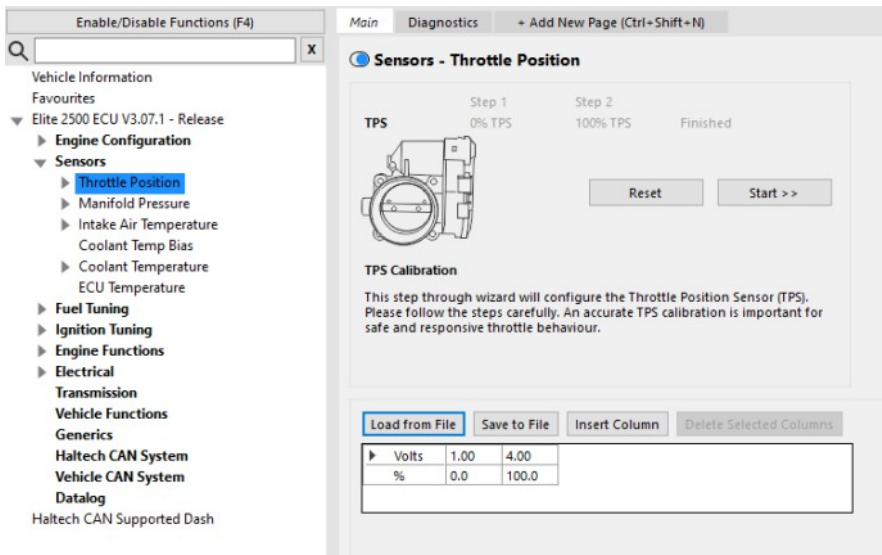
If you do not see your alternator listed or if you experience charging issues you may have a non-standard alternator and will need to reference OEM wiring documentation for the correct pinout.

## Initial Setup

When installation is complete it is now time to upload the basemap to your ECU. Connect to the ECU using the Haltech Nexus Software Programmer (NSP). When connected navigate through the software to File > Import/Upload > Documents > Haltech > Nexus Maps and Data Logs > Base Maps > GM > LS and select the file that suits your application. NSP will now upload the selected basemap to your ECU. When upload is complete it is now time to check and setup any non OEM performance parts and accessories (e.g. injector size, boost control, etc.) that your engine may require.

**At this time it is important to calibrate your throttle position sensor.** To do this please go to the Throttle Position Sensor function in the setup page and follow the prompts to calibrate the throttle. Once complete you are now able to start your engine and proceed to check timing and tune.

Please refer to the help file located within the NSP software for more information on setup and tuning.



Enable/Disable Functions (F4)

Vehicle Information

Favourites

▼ Elite 2500 ECU V3.07.1 - Release

- ▶ Engine Configuration
- ▼ Sensors
  - ▶ **Throttle Position**
  - ▶ Manifold Pressure
  - ▶ Intake Air Temperature
  - ▶ Coolant Temp Bias
  - ▶ Coolant Temperature
  - ▶ ECU Temperature
- ▶ Fuel Tuning
- ▶ Ignition Tuning
- ▶ Engine Functions
- ▶ Electrical
- ▶ Transmission
- ▶ Vehicle Functions
- ▶ Generics
- ▶ Haltech CAN System
- ▶ Vehicle CAN System
- ▶ Datalog

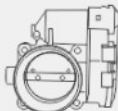
Haltech CAN Supported Dash

Main Diagnostics + Add New Page (Ctrl+Shift+N)

### Sensors - Throttle Position

Step 1 0% TPS Step 2 100% TPS Finished

TPS



Reset Start >>

**TPS Calibration**

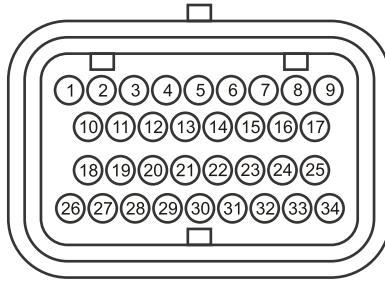
This step through wizard will configure the Throttle Position Sensor (TPS). Please follow the steps carefully. An accurate TPS calibration is important for safe and responsive throttle behaviour.

Load from File Save to File Insert Column Delete Selected Columns

▶ Volts	1.00	4.00
▶ %	0.0	100.0

**Figure 7 - Throttle Position Sensor Calibration**

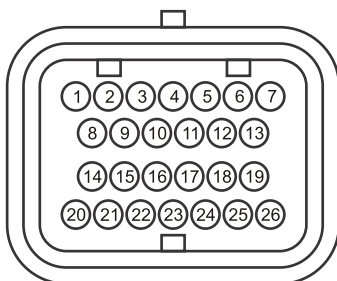
## Harness Pinout



**ECU CONNECTOR (34 PIN)  
(Looking into ECU)**

Position	Connection	Function	Notes
A1	DPO 2	Spare Output	In Cabin Harness
A2	AVI 4	Oil Pressure Sensor	In Engine Bay
A3	IGN 1	Ignition Output 1	To Ignition Bank 1 Connector
A4	IGN 2	Ignition Output 2	To Ignition Bank 2 Connector
A5	IGN 3	Ignition Output 3	To Ignition Bank 1 Connector
A6	IGN 4	Ignition Output 4	To Ignition Bank 2 Connector
A7	IGN 5	Ignition Output 5	To Ignition Bank 1 Connector
A8	IGN 6	Ignition Output 6	To Ignition Bank 2 Connector
A9	5VDC	5V Sensor Power	5V Supply to Sensors
A10	Chassis Ground	Chassis Ground	Chassis Ground Terminal
A11	Chassis Ground	Chassis Ground	Chassis Ground Terminal
A12	8VDC	-	-
A13	Ignition Input	Ignition Input	In Cabin Harness
A14	AVI 10	TPS Signal	In Engine Bay (TPS)
A15	AVI 9	MAP Signal	In Engine Bay (MAP)
A16	AVI 2	Spare AVI	In Cabin Harness
A17	AVI 3	Fuel Pressure Sensor	In Engine Bay (Fuel Press)
A18	DPO 1	Tacho Output	In Cabin Harness
A19	INJ 1	Injection Output 1	To Injector # 1
A20	INJ 2	Injection Output 2	To Injector # 2
A21	INJ 3	Injection Output 3	To Injector # 3
A22	INJ 4	Injection Output 4	To Injector # 4
A23	DPO 3	Spare Output	In Engine Bay
A24	DPO 5	Fuel Pump Relay	To Fuel Pump Relay Control
A25	DPO 6	Engine Control Relay	To Fuse Box Engine Control Relays
A26	Injector Power Input	Injector Power Input	12V From Fuse Box Injection Relay
A27	INJ 5	Injection Output 5	To Injector # 5
A28	INJ 6	Injection Output 6	To Injector # 6
A29	INJ 7	Injection Output 7	To Injector # 7
A30	INJ 8	Injection Output 8	To Injector # 8
A31	Stepper 1	Idle Control Output	In Engine Bay (Idle D)
A32	Stepper 2	Idle Control Output	In Engine Bay (Idle C)
A33	Stepper 3	Idle Control Output	In Engine Bay (Idle B)
A34	Stepper 4	Idle Control Output	In Engine Bay (Idle A)

**Figure 8 - 34 Pin Harness Connector Pin Allocation**



**ECU CONNECTOR (26 PIN)  
(Looking into ECU)**

Position	Connection	Function	Notes
B1	Trigger +	Crank / Ref Signal	In Engine Bay
B2	Home +	Cam / Sync Signal	In Engine Bay
B3	AVI 7	IAT Signal	In Engine Bay
B4	Avi 8	ECT Signal	In Engine Bay
B5	Trigger -	-	-
B6	Home -	-	-
B7	SPI 4	Spare Digital Input	In Engine Bay
B8	SPI 1	Vehicle Speed Sensor	In Engine Bay
B9	SPI 2	Spare Digital Input	In Cabin Harness
B10	SPI 3	Spare Digital Input	In Cabin Harness
B11	ECU Power	12V Input ECU Power	12V Supply From Fuse Box ECU Relay
B12	AVI 6	Spare AVI	In Cabin Harness
B13	AVI 1	Spare AVI	In Cabin Harness
B14	Signal Ground	Signal Ground	To Sensor Grounds
B15	Signal Ground	Signal Ground	To Sensor Grounds
B16	Signal Ground	Signal Ground	To Sensor Grounds
B17	IGN 7	Ignition Output 7	To Ignition Bank 1 Connector
B18	IGN 8	Ignition Output 8	To Ignition Bank 2 Connector
B19	DPO 4	Spare Digital Output	In Engine Bay
B20	AVI 5	Spare AVI	In Engine Bay
B21	Knock 1	Knock Sensor 1	In Engine Bay
B22	Knock 2	Knock Sensor 2	In Engine Bay
B23	CAN Hi	CAN Communications	To CAN Connector
B24	Can Lo	CAN Communications	To CAN Connector
B25	DBW1	-	-
B26	DBW2	-	-

**Figure 9 - 26 Pin Harness Connector Pin Allocation**

# *Haltech*

V4.0 Rev.D

## Need more help?



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**Europe:** +43 720 883968 **UK:** +44 121 285 6650 **NZ:** +64 988 706 16



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