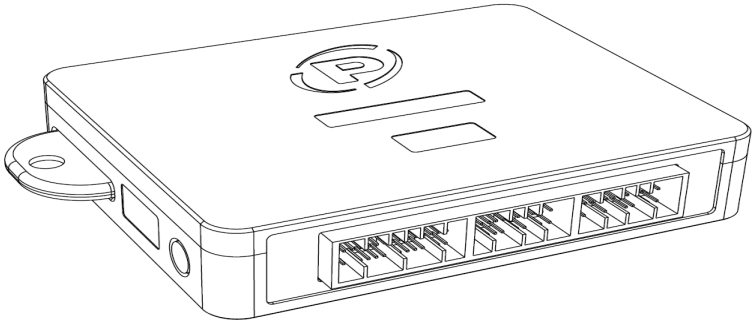
Prodrive GRB ECU



Introduction

The Prodrive GRB ECU is designed as a direct replacement for the standard Denso ECU supplied in a Japanese homologated, 2.0 Litre Subaru WRX Sti (MY2008 onwards).

The Prodrive GRB is supplied loaded with a base map that is suitable for starting the engine prior to tuning, which is required for maximum performance.

The ECU supports the standard features on the car including variable valve timing of up to four camshafts and electronic (fly-by-wire) throttle control. Full support is also provided for wideband lambda sensing and the tumble valves (TGVs) between the plenum and cylinder head in each intake runner that are employed to reduce hydrocarbon emissions during starting. (Support is not provided for cruise control.)

The ECU has been designed to integrate completely with the car electronic systems, which communicate via the vehicle CAN bus. The Prodrive GRB Differential Controller is also available for the car and this communicates via the same CAN bus, enabling differential control strategies to be integrated with the ECU.

The GRB has an additional on board data logger with removable Compact flash card. This logger can store values from ECU parameters and data passed along the vehicle CAN bus from the Prodrive GRB Differential Controller.

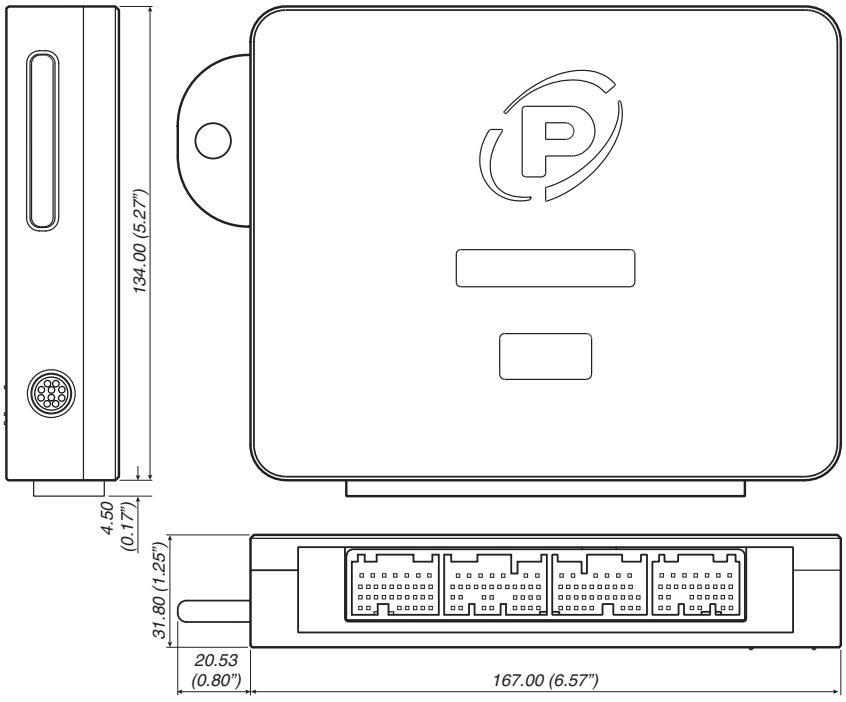
The GRB has reverse-battery, over-voltage and load dump protection built in as standard. Sensor supply and signal ground pins are also protected against shorts to battery positive and negative.

Advanced software features include traction control, launch control, over-run boost, gearshift strategies and scrutineering modes for single make championships.

Installation

The Prodrive GRB ECU is a direct replacement for the standard ECU supplied by Subaru and as such must be installed using the standard loom also supplied by Subaru.

Dimensions



Dimensions in millimetres and (inches)

Specifications

Description	Value
Processor	Freescale MPC565 @ 56MHz, 5MB flash memory & 4MB non-volatile RAM
Supply Voltage	+8V to +18V reverse battery, over-voltage and load dump protection
Data Logging	ECU: 1MB, 2000 samples/second Internal card: 256MB, 8000 samples/second
Communication	1x RS232 2x CAN 2.0B 1x Ethernet (10MBit)
Case Operating Temp.	-40°C to +70°C
Environmental	IP40
Weight	500g

Ordering information

Product	Part number
Prodrive GRB ECU	01E-500450
with optional gearbox upgrade	01E-500450-E011

Connector information

Comms connector

Connector	Mating connector
Lemo EPG-1B310-HLNS	Lemo FGG-1B310

Comms connector pinout details

Pin	Function
1	CANLA
2	CANHA
3	RS232RX-1
4	RS232TX-1
5	ETHERTX+

Pin	Function
6	ETHERTX-
7	ETHERRX+
8	ETHERRX-
9	BATPOS
10	GND

Loom main connector pinout

The loom connector is divided into four sections, Blocks A to D. Following the convention used in Subaru documentation the following pinout tables list the pins on the loom connectors.

The location of pins on the loom connector blocks are shown in the connector diagram before each pinout table.

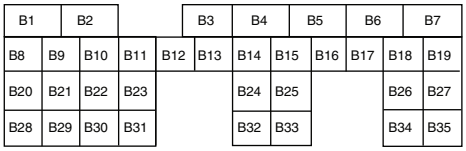
Loom connector Block A

A1	A2	A3	A4	A5	A6	A7				
A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	
A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	
A28	A29	A30	A31	A32				A33	A34	

Face view of loom connector Block A, 34 way

Pin	GRB Name	Description
1	PWM22	Shift Light 1
2	PWM23	Shift Light 2
3	PWM24	Spare PWM
4	AIN 10	ACT
5	Star GND	Engine Ground
6	AIN 1	MAP
7	BAT POS	Main Power Relay In
8	AIN 12	ALS Switch
9	EXT GND 1	Analogue Ground
10	EXT PSU 1	Spare Reg +12V
11	CAM	Intake Cam RH
12	DIN 1	Exhaust Cam RH
13	CRANK 1	Crank +ve
14	EXT GND 2	Crank –ve
15	AIN KNOCK 1	Knock
16	AIN 2	TGV LH Position Signal
17	No connection	No connection
18	AIN 6	TPSA 1
19	EXT PSU 2	PPS1, PPS2 +5V
20	No connection	No connection
21	DIN 2	Intake Cam LH
22	EXT GND 2	Digital Ground Cams
23	No connection	No connection
24	Star GND	Crank Screen
25	Star GND	Knock Screen
26	AIN 3	TGV RH Position Signal
27	PWM25	SACV Signal
28	AIN 7	TPSA 2
29	EXT GND 3	Analogue Ground
30	EXT PSU 2	Spare Analogue +5V
31	DIN 3	Exhaust Cam LH
32	DIN 4	Spare Analogue/Digital
33	DIN 5	PAS Switch
34	AIN 4	ECT

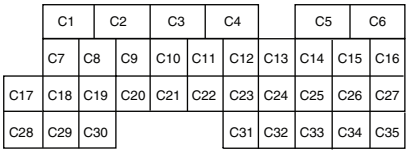
Loom connector Block B



Face view of loom connector Block B, 35 way

Pin	GRB Name	Description
1	Star GND	AF Sensor screen
2	BAT POS	Main Power Relay In
3	No connection	No connection
4	Lambda VS 2	Rear AF Sensor V Signal
5	Perm +ve	Permanent Power +ve
6	No connection	No connection
7	No connection	No connection
8	EXT GND 1	Front AF Sensor Ground
9	Lambda VS 1	Front AF Sensor V Signal
10	TCNEG	Thermocouple –ve
11	PWM21	Baro
12	TC1POS	Thermocouple +ve
13	No connection	No connection
14	EXT GND 4	Comms Ground
15	DB1RS232 RX	SACV Relay
16	DB1RS232 TX	DB1RS232 TX
17	DB1Comms Ground	DB1 Comms Ground
18	AIN 11	AAT
19	VIGIN	Ignition Power +ve
20	No connection	No connection
21	EXT PSU 2	PPS1 +5V
22	EXT PSU 2	PPS2 +5V
23	AIN 9	PPS2 Signal
24	No connection	No connection
25	No connection	No connection
26	AIN 5	AFM Signal
27	No connection	No connection
28	DIN 10	Stop Light
29	EXT GND 1	PPS1/PPS2 Ground
30	EXT GND 1	AFM/Rear Oxy Ground
31	AIN 8	PPS1 Signal
32	No connection	No connection
33	PWM 3	Fuel Pump Control 1
34	EXT GND 1	AFM Ground
35	Star GND	AFM Signal Screen

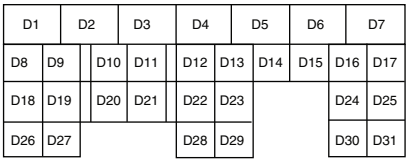
Loom connector Block C



Face view of loom connector Block C, 35 way

Pin	GRB Name	Description
1	Cam Valve Pwr Link	Main Relay/Cam Valve +12 ve
2	PWM 1	Front AF Heater
3	PWM 1	Front AF Heater
4	PWM 2	Rear AF Heater
5	PWM28	Spare PWM
6	Star GND	Data link/Engine Ground
7	PWM34	Canister Purge 2
8	PWM 5	Secondary Air Pump Relay
9	PWM36	A/C System Relay
10	No connection	No connection
11	PWM 6	Engine Error Lamp
12	PWM7	Fuel Pump Control 2
13	No connection	No connection
14	Star GND	Engine Ground
15	Star GND	Engine Ground
16	No connection	No connection
17	CAN HC	Dash CAN H
18	PWM27	Radiator Fan System 2 (Sub Fan Relay)
19	CAN LC	Dash CAN L
20	No connection	No connection
21	PWM 4	Main/Cam Valve Relay Control
22	PWM14	Tacho Output
23	MAIN	Main Power Control Signal
24	DIN 9	A/C System Switch
25	DIN 6	Clutch Switch
26	No connection	No connection
27	CAN HB	BIU/ECU CAN H
28	DIN 7	Engine Kill Switch
29	PWM13	Radiator Fan System 1 (Main Fan Relay)
30	PWM26	SACV Relay Control
31	DIN 8	Neutral Switch
32	No connection	No connection
33	No connection	No connection
34	No connection	No connection
35	CAN LB	BIU/ECU CAN L

Loom connector Block D



Face view of loom connector Block D, 31 way

Pin	GRB Name	Description
1	Star GND	Engine Ground
2	Star GND	Engine Ground
3	Star GND	Engine Ground
4	HB1B	FBW –ve
5	HB1A	FBW +ve
6	Star GND	Coil Ground Engine
7	Star GND	Engine Ground
8	INJ 1	Fuel Injector 1
9	INJ 2	Fuel Injector 2
10	INJ 3	Fuel Injector 3
11	INJ 4	Fuel Injector 4
12	HB2B	TGV LH +ve
13	HB2A	TGV LH –ve
14	INJ 11	LH Intake Vcam Solenoid
15	Cam Valve Pwr Link	LH Intake Vcam Solenoid +12V
16	INJ 10	RH Intake Vcam Solenoid
17	Cam Valve Pwr Link	RH Intake Vcam Solenoid +12V
18	CDI 1	Ignition 1
19	CDI 2	Ignition 2
20	CDI 3	Ignition 3
21	CDI 4	Ignition 4
22	HB3B	TGV RH +ve
23	HB3A	TGV RH –ve
24	PWM10	RH Exhaust Vcam Solenoid
25	Cam Valve Pwr Link	RH Exhaust Vcam Solenoid +12V
26	Star GND	Coil Ground Engine
27	INJ 6	Wastegate Valve
28	No connection	No connection
29	PWM33	Canister Purge 1
30	PWM11	LH Exhaust Vcam Solenoid
31	Cam Valve Pwr Link	LH Exhaust Vcam Solenoid +12V

Recycling and Environmental Protection

Cosworth Electronics is committed to conducting its business in an environmentally responsible manner and to strive for high environmental standards.

Manufacture

Cosworth products comply with the appropriate requirements of the Restriction of Hazardous Substances (RoHS) directive (where applicable).

Disposal

Electronic equipment should be disposed of in accordance with regulations in force and in particular in accordance with the Waste in Electrical and Electronic Equipment directive. (WEEE)

Battery

This equipment contains a battery. (Lithium Thionylchloride)

The equipment may be returned to Cosworth Electronics for a replacement battery. (A charge may be made for this service)

Removal of the battery by the user may void any warranty on the equipment.

To remove the battery for recycling:

- Remove the case cover(s).
- Remove the printed circuit boards from the case.
- Remove the battery from the printed circuit board.

Dispose of the battery in accordance with regulations in force.

Declaration of Conformity

We, the undersigned,

Pi Research
Brookfield Motorsports Centre,
Cottenham,
Cambridgeshire, CB4 8PS
United Kingdom

Certify and declare under our sole responsibility that the following equipment:

GH8 ECU – part number 01E-500450 (development name)

GRB ECU – part number 01E-500450 (external name)

An ECU GRB for use only in motorsport applications

Conforms to the following EC directives including applicable amendments:

EMC Directive 89/336/EEC, 72/245/EEC (last amended 2004/104/EC)

The following standards have been applied:

2004/104/EC

Cottenham, 28th July 2008

George Lendrum - Divisional Managing Director