DCCDpro.com Auto Controller Installation Manual

Thank you for your purchase.

Technical Details:

- Microchip's PIC microprocessor running at 4mhz
- 2 axis high resolution g-sensor
- custom firmware with driver adaptive capability
- several internal modes based on driver throttle behavior and g- sensor behavior that switch on the fly automatically
- DCCD calculations are using advanced formula's instead of unintelligent "static mapping" or "lookup tables"

Installation:

Installation is recommended to be performed by a licensed auto mechanic.

"Red" = 12v positive (**switched power**) *Do not connect to "always on" power
"Green" = 0v negative (ground)
"Black" = DCCD "B128 pin 1" (See attached Subaru DCCD Schematic)
"White" = DCCD "B128 pin 4" (See attached Subaru DCCD Schematic)
"Brown" = Ebrake cutout wire (ground this to stop DCCD activity)

"Blue" = TPS: Non-DBW "B135 pin B7" (See attached Subaru ECM Schematic)

DBW <2006MY "B136 pin B18" (See attached Subaru ECM Schematic)

DBW 2006MY+ "B134 pin B18" (See attached Subaru ECM Schematic)

You may add an accessory switch to the 0v wire if desired to be able to turn off the system for "open" operation of your differential. It is also recommended to have at least a 10 amp fused circuit powering the DCCD.

The suggested location for installation of the control module is behind the dashboard in the knee crash pad area, there is a large open area behind the metal bars there. Switched power and ground are also available nearby at the fuse panel to tap into. Due to the differences in swap wiring you will have to source these wires yourself with a multi-meter.

I would also suggest running an extension if needed for the two DCCD wires to the top passenger side of the center diff tailpiece where you can solder in the two wires you need on the B128 DCCD connector. (See Subaru Schematics attached.) Use liquid electrical tape or silicone caulking to keep everything sealed up after soldering the wires at the DCCD plug since they are exposed under the vehicle.

A suggested location for installation of the dual axis g-sensor is on the horizontal metal surface under the center console. ~1 meter of wire between the control module and the sensor is provided for this purpose. Any other horizontal surface will do as long as the sensor case can be attached firmly using epoxy or other strong adhesive. Do not use 2 sided tape, or foam carpet tape, use a 2 part epoxy or contact cement made for plastics. Note the orientation arrow, and install the sensor with its arrow pointed toward the front of the car!

The ebrake cutout installation is simply to attach the brown wire to your ebrake circuit such that the ebrake will ground the wire when pulled. It is advisable to disconnect the wire coming from the car so that there will be no interference from the ebrake indicator system. Alternatively you could place a small signal diode on each wire with the stripe towards ground so that the dccd and ebrake indicators circuits are isolated from each other but the ebrake can still ground both circuits when needed.

Operational Details:

The hardware and firmware were designed to work together to be as "driver transparent" as possible. My philosophy is that the less you need to adjust or monitor while driving the more you can concentrate on the road / race.

During development I considered various options including a knob to select "modes" and / or different formula as well as an LCD to monitor the DCCD output, but when it came down to it they added greater cost to the final product and had little to offer in terms of real functionality.

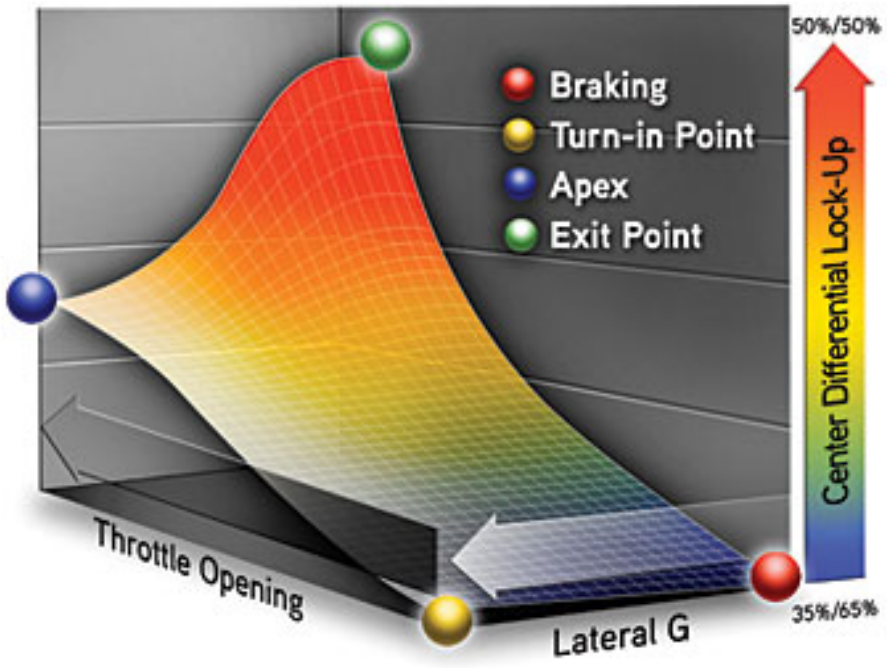
The control knob for the system is used to scale the DCCD “aggressiveness”. Fully CCW turns the unit essentially “off” which will heavily bias the rear wheels, full CW gives it full “aggressiveness” maximizing traction and thusly increasing under-steer. In this setting the system will attempt to give you maximum traction at all times by trying to maximize the amount of DCCD lock at all times. The system is infinitely variable between these two extremes. Start at lower settings (over-steer) and increase the knob setting until you find the car handles the way you would like it to in the corners. You can alter the setting at any time and on the fly as conditions change.

This DCCD controller constantly and frequently monitors the attached sensors, updating the DCCD output based on how the car is behaving in reaction to driver inputs. It features several firmware modes that it switches between on the fly. Without going into a detailed explanation of the firmware formulas, the system automatically switches between formula appropriate for "parking lot / highway cruise”, "aggressive cornering", "aggressive straight line", and "stuck in snow/mud" based on what information it receives from the sensors.

It monitors the output level as well as the speed at which the various sensors change. For example it can differentiate between slow gradual throttle application vs. rapid throttle acceleration and respond accordingly.

The internal firmware formula's try to mimic the behavior of the OEM STi DCCD auto mode. (See illustration below.)

DCCD Firmware Response Illustration:



Warnings:

Use at your own risk!

For Off-road use only!

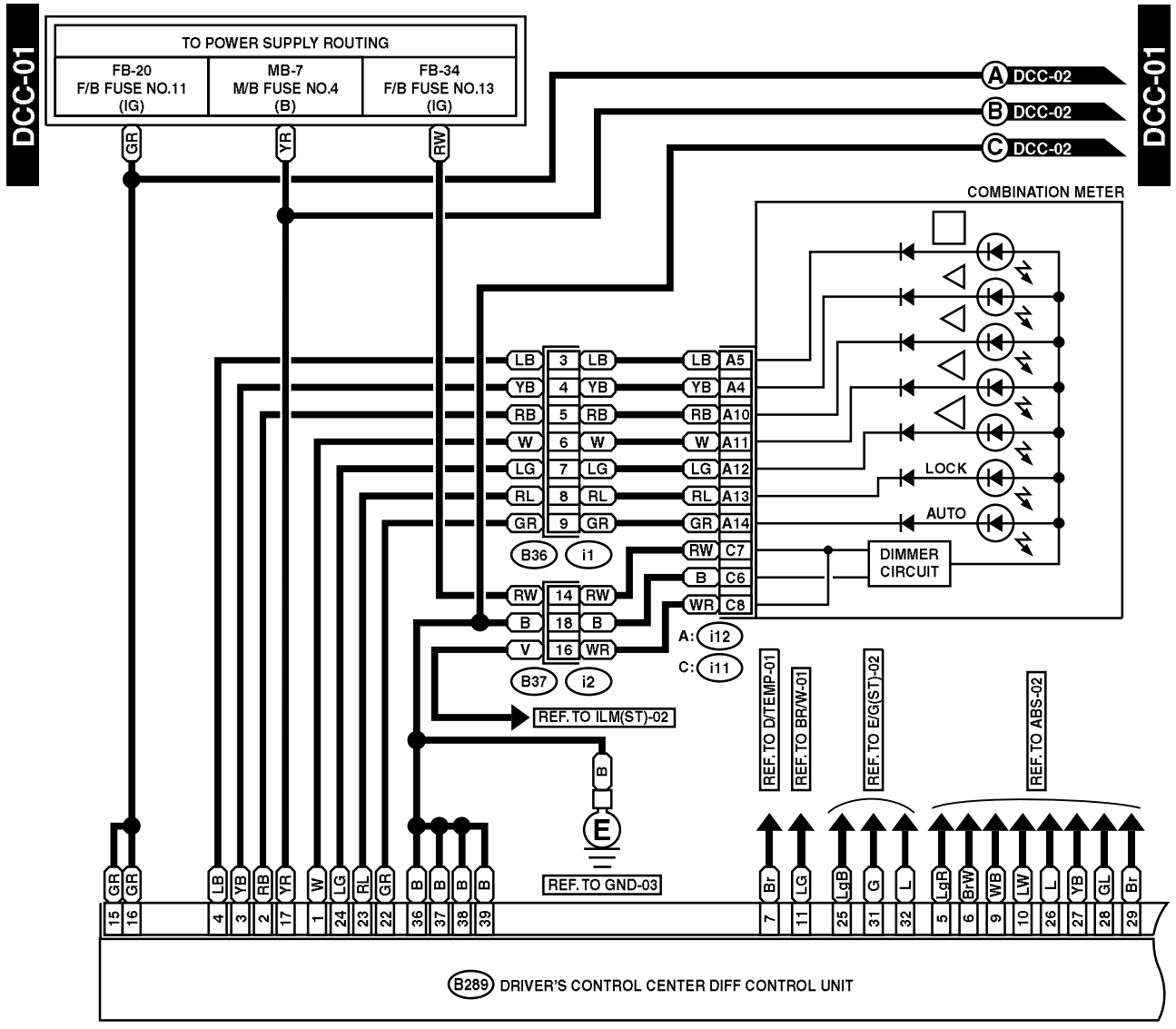
Installation of this controller represents your acceptance of responsibility for all foreseen and unforeseen risks and perils to yourself and / or your vehicle. If you do not agree to these terms simply return the uninstalled controller for a full refund.

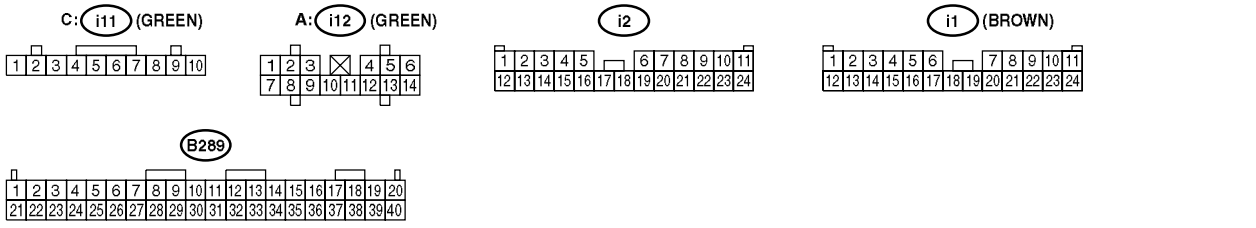
Limited warranty

The 30 day warranty is limited to the repair, replacement or refund of the purchase price to be determined upon receipt and analysis of returned product. Shipping and handling, installation and removal fees and/or damage to the vehicle will not be covered under any circumstances.

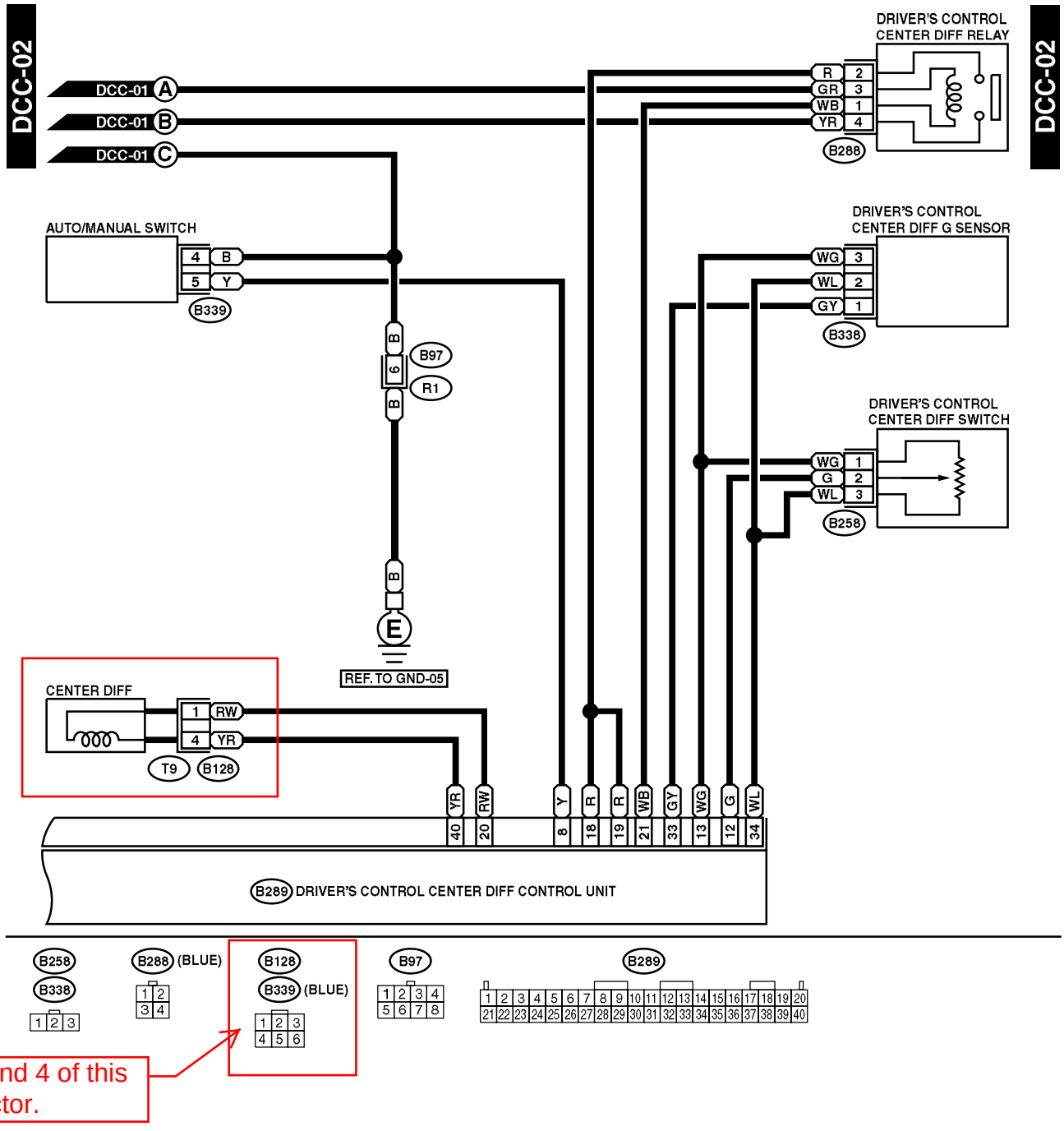
48. Driver's Control Center Differential Control System

A: SCHEMATIC



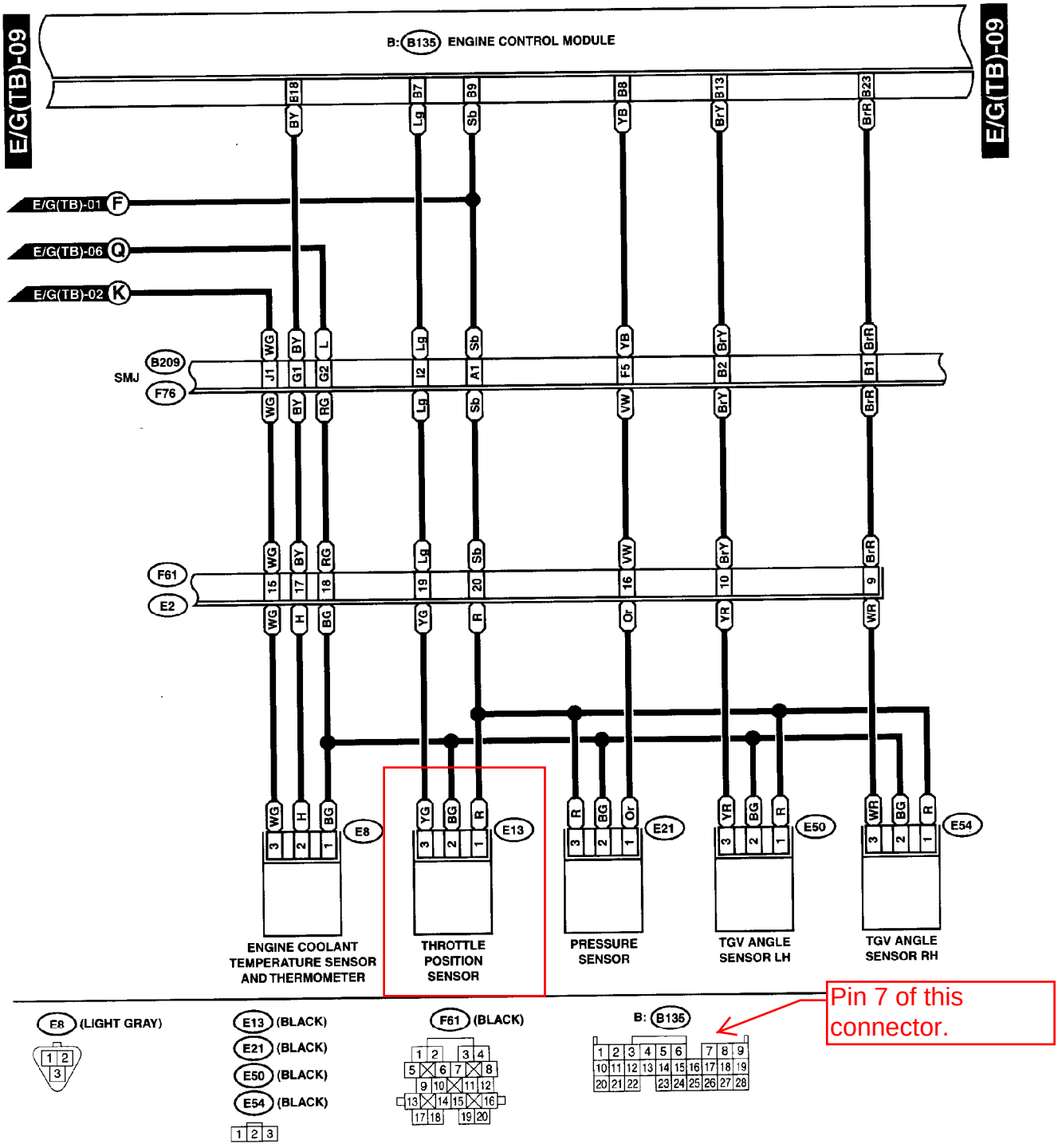


WI-02821


DCC-02
DCC-02
DCC-01 A
DCC-01 B
DCC-01 C
DRIVER'S CONTROL CENTER DIFF RELAY
R 2
GR 3
WB 1
YR 4
B288
AUTO/MANUAL SWITCH
4 B
5 Y
B339
DRIVER'S CONTROL CENTER DIFF G SENSOR
WG 3
WL 2
GY 1
B338
B B
6
B B
B97
R1
DRIVER'S CONTROL CENTER DIFF SWITCH
WG 1
G 2
WL 3
B258
E
REF. TO GND-05
CENTER DIFF
1 RW
4 YR
T9
B128
YR RW Y R R WB GY WG G WL
40 20 8 18 19 21 33 13 12 34
B289 DRIVER'S CONTROL CENTER DIFF CONTROL UNIT
B258
B338
1 2 3
B288 (BLUE)
1 2
3 4
B128
B339 (BLUE)
1 2 3
4 5 6
B97
1 2 3 4
5 6 7 8
B289
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Pin 1 and 4 of this connector.

WI-02822

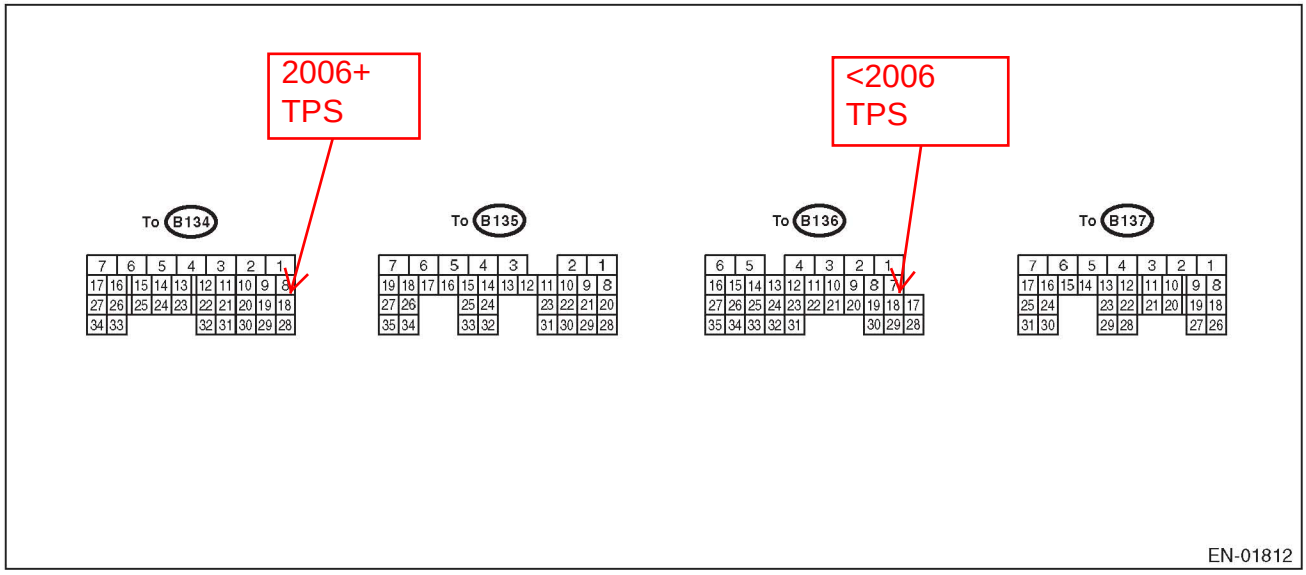
Wiring for cable throttle



GU10-22I

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	10	0	–7 — +7	Sensor output waveform
	Signal (–)	B135	22	0	0	—
	Shield	B135	31	0	0	—
Rear oxygen sensor	Signal	B137	25	0	0 — 0.9	—
	Shield	B137	31	0	0	—
	GND (sensor)	B136	35	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B134	3	0 — 1.0	—	Sensor output waveform
	Signal 2	B134	2	0 — 1.0	—	Sensor output waveform
Rear oxygen sensor heater signal		B135	2	0 — 1.0	—	Sensor output waveform
Engine coolant temperature sensor	Signal	B136	14	1.0 — 1.4	1.0 — 1.4	After warm-up the engine.
	GND (sensor)	B136	35	0	0	After warm-up the engine.
Vehicle speed signal		B135	26	0 or 5	0 or 5	"5" and "0" are repeatedly displayed when vehicle is driven.
Mass air flow sensor	Signal	B136	23	—	0.3 — 4.5	—
	Shield	B136	32	0	0	—
	GND	B136	31	0	0	—
Intake air temperature sensor signal		B136	13	0.3 — 4.6	0.3 — 4.6	—
Tumble generator valve position sensor RH	Signal	B136	27	Fully closed: 3.8 — 4.9 Fully opened: 0.2 — 0.9		—
	Power supply	B136	16	5	5	—
	GND (sensor)	B136	35	0	0	—

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Tumble generator valve position sensor LH	Signal	B136	26	Fully closed: 3.8 — 4.9 Fully opened: 0.2 — 0.9		—
	Power supply	B136	16	5	5	—
	GND (sensor)	B136	35	0	0	—
Tumble generator valve RH (open)		B134	9	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve RH (close)		B134	8	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve LH (open)		B134	11	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve LH (close)		B134	10	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Wastegate control solenoid valve		B134	32	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Starter switch		B137	8	0	0	Cranking: 8 — 14
A/C switch		B137	17	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B137	14	10 — 13	13 — 14	—
Neutral position switch		B137	9	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Test mode connector		B137	15	5	5	When connected: 0
Knock sensor	Signal	B136	25	2.8	2.8	—
	Shield	B136	33	0	0	—
Back-up power supply		B135	19	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B135	5	10 — 13	13 — 14	—
		B135	6	10 — 13	13 — 14	—
Sensor power supply		B136	16	5	5	—
Ignition control	#1	B135	18	0	13 — 14	Waveform
	#2	B135	17	0	13 — 14	Waveform
	#3	B135	16	0	13 — 14	Waveform
	#4	B135	16	0	13 — 14	Waveform
Fuel injector	#1	B136	6	10 — 13	1 — 14	Waveform
	#2	B136	5	10 — 13	1 — 14	Waveform
	#3	B136	4	10 — 13	1 — 14	Waveform
	#4	B136	3	10 — 13	1 — 14	Waveform
Fuel pump control unit	Signal 1	B135	27	0 or 5	0 or 5	Sensor output waveform
	Signal 2	B137	28	10 — 13	13 — 14	—
A/C relay control		B135	33	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 1 control		B135	25	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 2 control		B135	24	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	Model with A/C only
Malfunction indicator lamp		B134	17	—	—	Light “ON”: 1 or less Light “OFF”: 10 — 14
Engine speed output		B134	23	—	0 — 13, or more	Waveform
Purge control solenoid valve		B134	14	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	Sensor output waveform

Engine Control Module (ECM) I/O Signal

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Manifold absolute pressure sensor	Signal	B136	22	1.7 — 2.4	1.1 — 1.6	—
	Power supply	B136	16	5	5	
	GND (sensor)	B136	35	0	0	
Fuel tank pressure sensor	Signal	B136	21	2.3 — 2.7	2.3 — 2.7	The valve operates when fuel filler cap is removed and reinstalled.
	GND (sensor)	B136	35	0	0	—
Fuel tank pressure control solenoid valve		B134	12	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Drain valve		B134	13	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Fuel tank sensor control valve		B134	24	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Fuel level sensor		B136	20	0.12 — 4.75	0.12 — 4.75	—
Fuel temperature sensor signal		B136	12	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (75°F)
Blow-by leak diagnosis signal		B137	24	0	0	When disconnection (malfunction): 5
Small light switch		B137	12	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Blower fan switch		B137	13	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Rear defogger switch		B137	11	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Power steering oil pressure switch		B137	10	10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal (+)		B134	33	2.8 — 3.2	2.8 — 3.2	—
Front oxygen (A/F) sensor signal (–)		B134	26	2.4 — 2.7	2.4 — 2.7	—
Front oxygen (A/F) sensor shield		B134	25	0	0	—
SSM/GST communication line		B137	20	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
GND (injectors)		B137	7	0	0	—
GND (ignition system)		B135	12	0	0	—
GND (power supply)		B135	4	0	0	—
		B135	1	0	0	—
GND (control systems)		B137	1	0	0	—
		B137	2	0	0	—
GND (front oxygen (A/F) sensor heater 1)		B134	7	0	0	—
GND (front oxygen (A/F) sensor heater 2)		B134	6	0	0	—
Camshaft position sensor (LH)		B135	8	0 — 0.9	ON: 0 OFF: 4.7 — 5.3	Sensor output waveform
Camshaft position sensor (RH)		B135	9	0 — 0.9	ON: 0 OFF: 4.7 — 5.3	Sensor output waveform

Engine Control Module (ECM) I/O Signal

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Electronic throttle control	Main	B136	18	0.64 — 0.72 Fully opened: 3.96	0.64 — 0.72 (After engine warm-up)	Fully closed: 0.6 Fully opened: 3.96
	Sub	B136	29	1.51 — 1.58 Fully opened: 4.17	1.51 — 1.58 (After engine warm-up)	Fully closed: 1.48 Fully opened: 4.17
	Power supply	B136	16	5	5	—
	GND (sensor)	B137	3	0	0	—
Electronic throttle control motor (+)		B137	5	Duty waveform	Duty waveform	Driving frequeney: 500 Hz
Electronic throttle control motor (–)		B137	4	Duty waveform	Duty waveform	Driving frequeney: 500 Hz
Electronic throttle control motor power supply		B137	6	10 — 13	13 — 14	—
Electronic throttle control motor relay		B135	35	ON: 010 OFF: — 13	ON: 0 OFF: 13 — 14	When ignition switch is ON: ON
Oil flow control solenoid valve (LH)	Signal (+)	B134	19	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B134	29	0	0	—
Oil flow control solenoid valve (RH)	Signal (+)	B134	18	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B134	28	0	0	—
Accelerator pedal position sensor	Main	B136	17	Fully closed: 1 Fully opened: 3.5	Fully closed: 1 Fully opened: 3.5	—
	Power supply	B136	15	5	5	—
	GND (sensor)	B136	34	0	0	—
	Sub	B136	28	Fully closed: 1 Fully opened: 3.5	Fully closed: 1 Fully opened: 3.5	—
Cruise control set light		B134	16	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Main light		B134	15	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Clutch switch		B134	1	When clutch pedal is depressed: 0 When clutch pedal is released: 10 — 13	When clutch pedal is depressed: 0 When clutch pedal is released: 13 — 14	—
SET/COAST switch		B136	11	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Brake switch 1		B136	9	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2		B136	8	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—
RESUME/ACCEL switch		B136	10	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Main switch		B136	7	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—