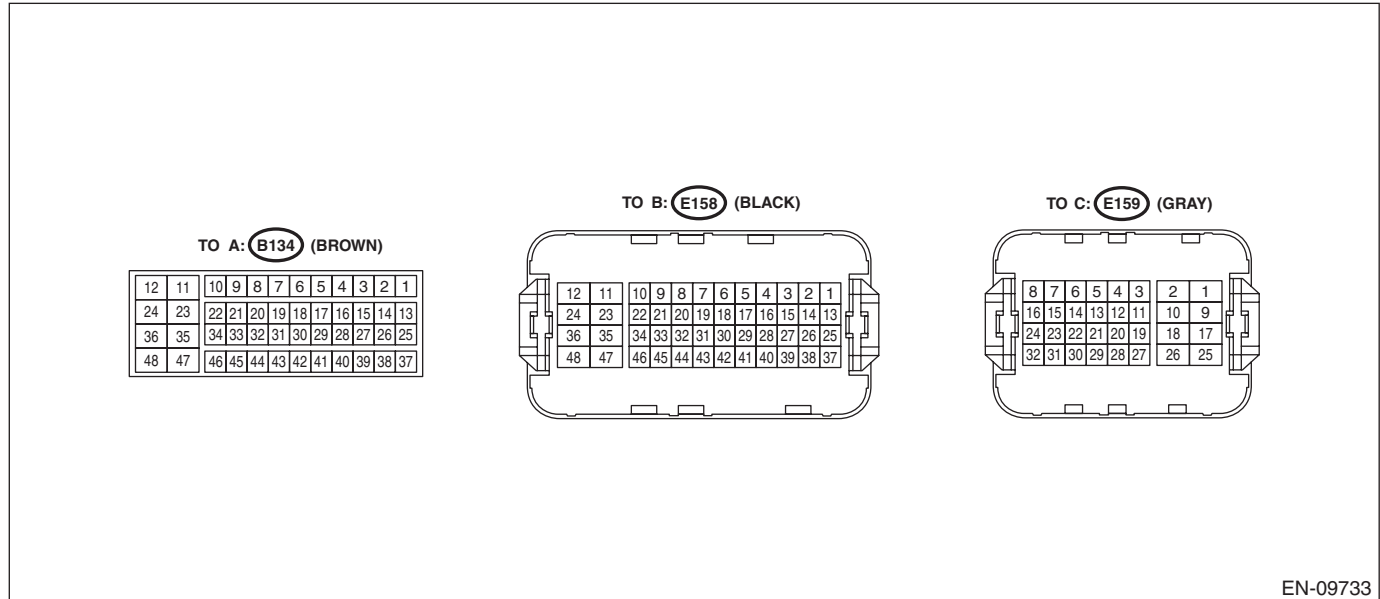


# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

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

### A: ELECTRICAL SPECIFICATION



EN-09733

Description		Connector No.	Terminal No.	Signal (V)		Remarks
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal	E158	19	0 or 5	0 or 5	Waveform
	Ground	E158	31	0	0	—
Intake camshaft position sensor (LH)		E158	21	0 or 5	0 or 5	Waveform
Intake camshaft position sensor (RH)		E158	20	0 or 5	0 or 5	Waveform
Exhaust camshaft position sensor (LH)		E158	33	0 or 5	0 or 5	Waveform
Exhaust camshaft position sensor (RH)		E158	32	0 or 5	0 or 5	Waveform
Camshaft position sensor ground		E158	34	0	0	—
Front oxygen (A/F) sensor	IP+ signal	E158	15	1.7	3.3	Waveform
	VS+ signal	E158	27	2.2	4	Waveform
	COM signal	E158	39	9.8	3.6	Waveform
	Heater signal	E159	9	12 — 15	0 or 12 — 15	Waveform
Rear oxygen sensor	Signal	E158	16	0.3	0.1 — 0.9	Waveform
	Heater signal	E159	3	12 — 15	0 or 12 — 15	Waveform
Air flow sensor	Signal	B134	16	0.3	1.2	—
	Ground	B134	28	0	0	—
Intake air temperature sensor (integrated with air flow sensor)		E158	5	2.7	3	After engine is warmed up.
Engine coolant temperature sensor		E158	38	2.7	1.8	After engine is warmed up.
Engine oil temperature sensor		E158	2	2.9	2.1	After engine is warmed up.
Manifold absolute pressure sensor		E158	4	1.9	0.8	After engine is warmed up.
Intake air temperature sensor (integrated with manifold absolute pressure sensor)		E158	25	3	3	After engine is warmed up.
Fuel pressure sensor		E158	6	2	1	After engine is warmed up.
Knock sensor 1		E158	14	2.5	2.5	Waveform

# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

Description	Connector No.	Terminal No.	Signal (V)		Remarks
			Ignition SW ON (engine OFF)	Engine ON (idling)	
Knock sensor 2	E158	26	2.5	2.5	Waveform
Battery temperature sensor	B134	41	2.2	2.1	After engine is warmed up.
Battery current sensor	B134	42	2.7	2.1	After engine is warmed up.
Accelerator pedal position sensor	Main power supply	B134	30	5	—
	Main signal	B134	17	Fully closed: 0.4 — 1.0 Fully opened: 2.4 — 3.7	Fully closed: 0.4 — 1.0 —
	Main ground	B134	31	0	—
	Sub signal	B134	29	Fully closed: 0.4 — 1.0 Fully opened: 2.4 — 3.7	Fully closed: 0.4 — 1.0 —
Tumble generator valve actuator (LH)	Position signal	E158	41	2.38 — 3.93	In closing direction: 0.43 — 1.19 In opening direction: 2.38 — 3.93 —
	Motor open	E159	6	10 — 13	0 or 12 — 15 Waveform
	Motor closed	E159	22	10 — 13	0 or 12 — 15 Waveform
Tumble generator valve actuator (RH)	Position signal	E158	40	0.43 — 1.19	In closing direction: 2.38 — 3.93 In opening direction: 0.43 — 1.19 —
	Motor open	E159	14	10 — 13	0 or 12 — 15 Waveform
	Motor closed	E159	30	10 — 13	0 or 12 — 15 Waveform
Intake oil control solenoid (LH)	E159	15	10 — 13	0 or 12 — 15	Waveform
Intake oil control solenoid (RH)	E159	7	10 — 13	0 or 12 — 15	Waveform
Exhaust oil control solenoid (LH)	E159	31	10 — 13	0 or 12 — 15	Waveform
Exhaust oil control solenoid (RH)	E159	23	10 — 13	0 or 12 — 15	Waveform
Wastegate control solenoid valve	E159	11	10 — 13	12 — 15	—
Canister purge control solenoid valve 1	E159	4	10 — 13	0 or 12 — 15	Waveform
Canister purge control solenoid valve 2	E159	12	10 — 13	0 or 12 — 15	Waveform
Ignition control	#1	E159	8	0	0 or 5 Waveform
	#2	E159	16	0	0 or 5 Waveform
	#3	E159	24	0	0 or 5 Waveform
	#4	E159	32	0	0 or 5 Waveform
EGR control valve	A+	E159	5	10 — 13	0 or 12 — 15 —
	A-	E159	21	10 — 13	0 or 12 — 15 —
	B+	E159	13	10 — 13	0 or 12 — 15 —
	B-	E159	29	10 — 13	0 or 12 — 15 —
Fuel pump control unit	Control signal	B134	40	10 — 13	0 or 12 — 15 Waveform
	Diagnostic signal	B134	44	0	12 — 15 —
High-pressure fuel pump (Hi)	E158	10	2.4	0 or 12 — 15	Waveform
High-pressure fuel pump (Lo)	E158	22	2.4	0 or 12 — 15	Waveform

# Engine Control Module (ECM) I/O Signal

## ENGINE (DIAGNOSTICS)

Description		Connector No.	Terminal No.	Signal (V)		Remarks
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Fuel injector	Power supply 1	B134	36	10 — 13	12 — 15	—
	Power supply 2	B134	48	10 — 13	12 — 15	—
	#1 (+)	E158	11	2.4	—	Measurement is prohibited while the engine is running.
	#1 (-)	E158	12	2.4	—	
	#2 (+)	E158	23	2.4	—	
	#2 (-)	E158	24	2.4	—	
	#3 (+)	E158	35	2.4	—	
	#3 (-)	E158	36	2.4	—	
	#4 (+)	E158	47	2.4	—	
#4 (-)	E158	48	2.4	—		
Electronic throttle control	Sensor power supply	E158	18	5	5	—
	Main signal	E158	17	Fully closed: Approx. 0.7 Fully open: Approx. 3.9	Fully closed: Approx. 0.7	After engine is warmed up.
	Sub signal	E158	29	Fully closed: Approx. 4.4 Fully open: Approx. 1.1	Fully closed: Approx. 4.4	After engine is warmed up.
	Ground	E158	30	0	0	—
	Motor power supply	B134	11	10 — 13	12 — 15	—
Electronic throttle control motor (+)		E159	2	0	0 or 12 — 15	—
Electronic throttle control motor (-)		E159	1	0	0 or 12 — 15	—
Electronic throttle relay control		B134	39	0	0	—
Starter relay control		B134	14	2.9	2.9	—
Self-shutoff relay control		B134	38	0	0	—
Starter cut relay control		B134	13	0	0	Model with push button start
Main fan relay control		B134	37	10 — 13	0 or 12 — 15	—
Sub fan relay control		B134	25	10 — 13	0 or 12 — 15	—
A/C relay control		B134	1	10 — 13	0 or 12 — 15	—
A/C switch		E158	7	ON: 10 — 13 OFF: 0	ON: 12 — 14 OFF: 0	Manual A/C model
Blower fan switch		E158	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	Manual A/C model
Starter switch		B134	45	0	0	Model with push button start Cranking: waveform
Starter switch 2		B134	8	0	0	Cranking: 8 — 14
Ignition switch		B134	32	10 — 13	12 — 15	—
Pressure switch		B134	7	10 — 13	12 — 15	—
Neutral position switch		B134	33	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 15	Switch is ON when select lever is in "P" range or "N" range.

# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

Description		Connector No.	Terminal No.	Signal (V)		Remarks
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Cruise control	Main switch	B134	20	ON: 0 OFF: 5	ON: 0 OFF: 5	—
	Command switch	B134	6	When operating nothing: 3.5 — 4.5 When operating RES/+: 2.5 — 3.5 When operating DISTANCE: 1.5 — 2.5 When operating SET/-: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/+: 2.5 — 3.5 When operating DISTANCE: 1.5 — 2.5 When operating SET/-: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
Brake switch 1 (brake switch)		B134	43	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	—
Brake switch 2 (stop light switch)		E158	8	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	—
Oil level switch		E158	44	0	0	Oil level LOW: 10 — 14
Accessory cut request		B134	2	10 — 13	12 — 15	Model with push button start Cranking: 0
Engine speed output		B134	4	10 — 13	0 or 12 — 15	Model with push button start Waveform
Generator control		B134	26	1.8	1.8	After engine is warmed up.
CAN communication	(Hi)	B134	10	—	—	—
	(Lo)	B134	9	—	—	—
Immobilizer communication		E158	43	—	—	—
Delivery mode switch		E158	45	10 — 13	12 — 15	—
Control module power supply		B134	12	10 — 13	12 — 15	—
		B134	24	10 — 13	12 — 15	—
Back-up power supply		B134	23	10 — 13	12 — 15	—
Sensor power supply		B134	18	5	5	—
		E159	19	5	5	—
Shield (sensor system)		E158	28	0	0	—
Shield (high-pressure fuel system)		E158	46	0	0	—
ELCM	Switching valve	B134	27	10 — 13	12 — 14	Operating: 0
	Pressure sensor	B134	15	1 — 4	1 — 4	When ignition switch is turned to ON: atmospheric pressure
	Vacuum pump	B134	3	10 — 13	12 — 14	Operating: 0
Brake booster pressure sensor		E158	13	0.8 — 1.2	1.0 — 1.6	After engine is warmed up. When brake pedal is released.

## Engine Control Module (ECM) I/O Signal

### ENGINE (DIAGNOSTICS)

Description		Connector No.	Terminal No.	Signal (V)		Remarks
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Brake vacuum pump		E158	1	0	0	After engine is warmed up.
Brake vacuum pump relay		E158	37	10 — 13	12 — 15	After engine is warmed up.
Sensor ground		B134	19	0	0	—
		E159	27	0	0	—
Ground	Engine 1	B134	35	0	0	—
	Engine 2	B134	47	0	0	—
	Engine 3	E159	10	0	0	—
	Engine 4	E159	18	0	0	—
	Engine 5	E159	26	0	0	—
	Engine 6	E159	17	0	0	—
	Engine 7	E159	25	0	0	—

# Engine Control Module (ECM) I/O Signal

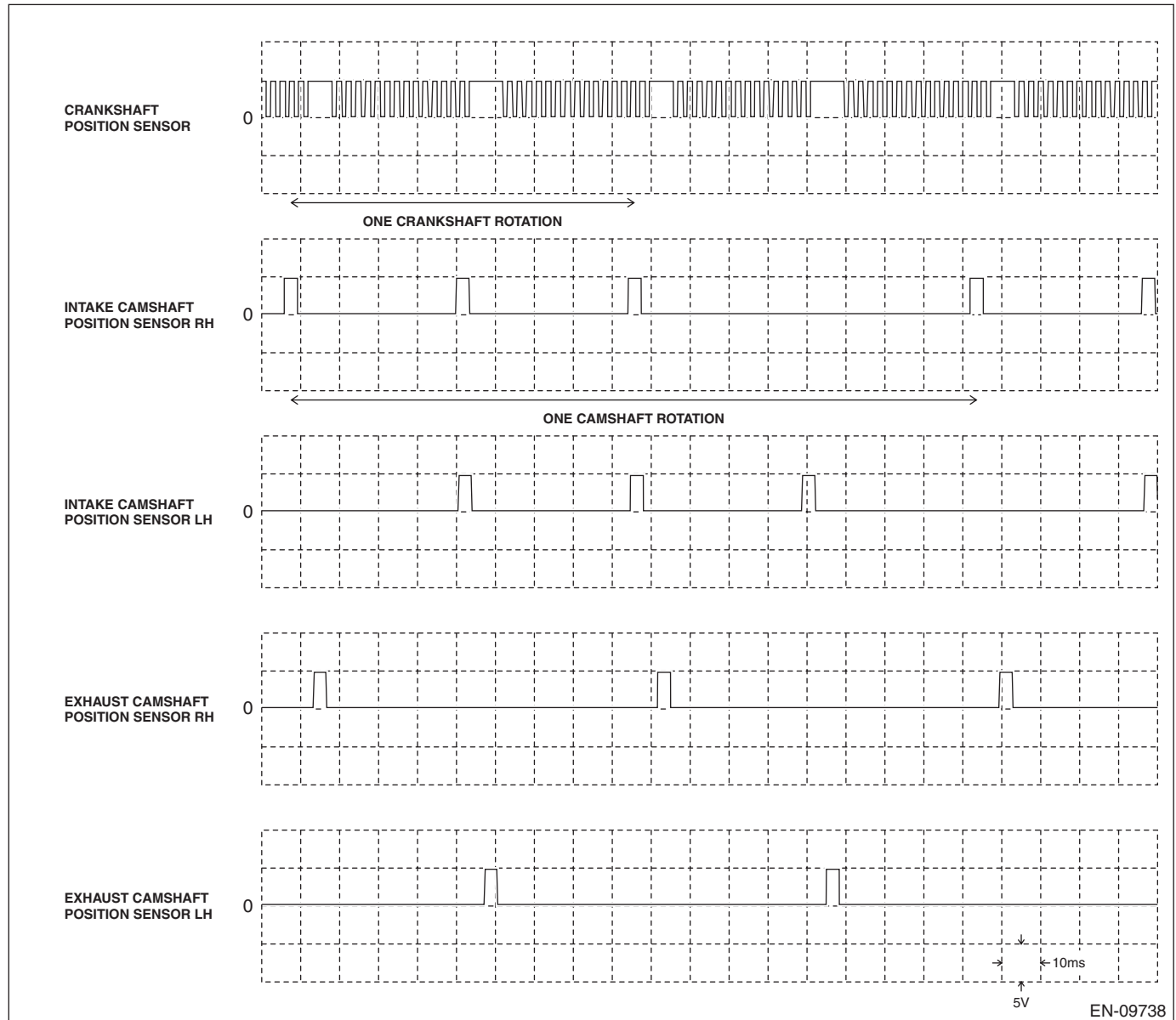
ENGINE (DIAGNOSTICS)

## Input/output name:

- Crankshaft position sensor
- Intake camshaft position sensor RH
- Intake camshaft position sensor LH
- Exhaust camshaft position sensor RH
- Exhaust camshaft position sensor LH

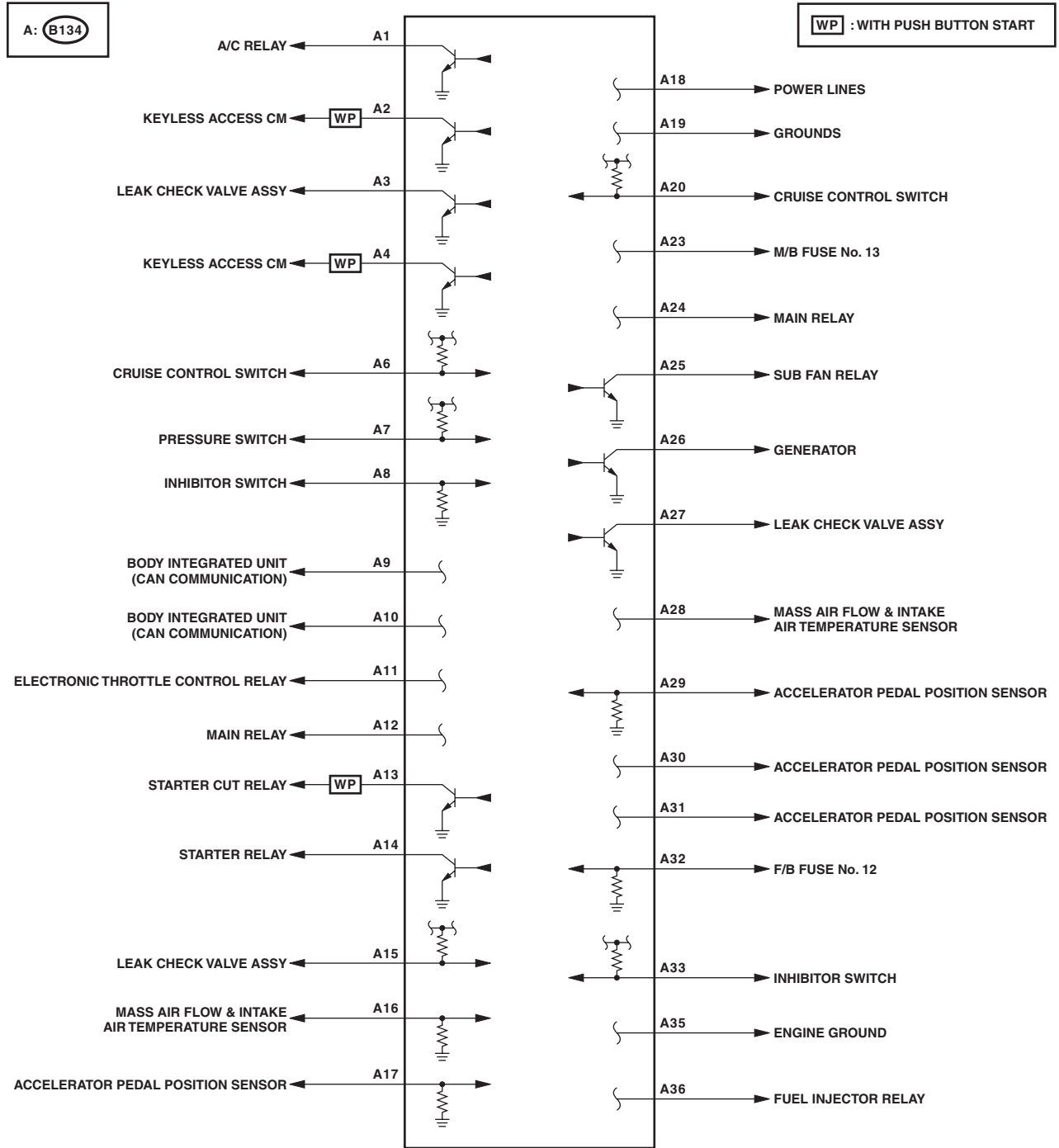
## Measuring condition:

- After warming-up
- At idling



# Engine Control Module (ECM) I/O Signal

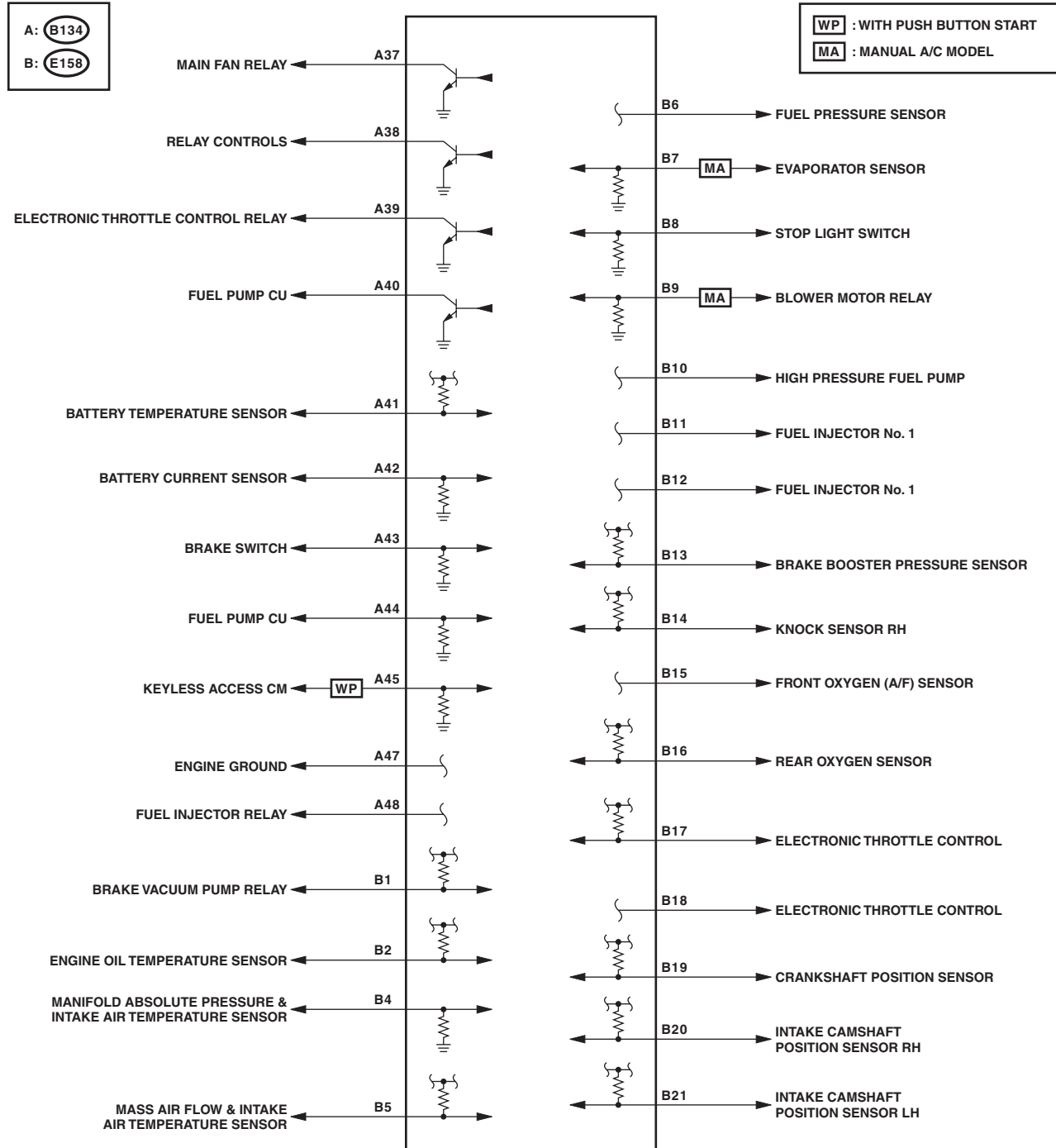
ENGINE (DIAGNOSTICS)



EN-10491

# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)



EN-10492

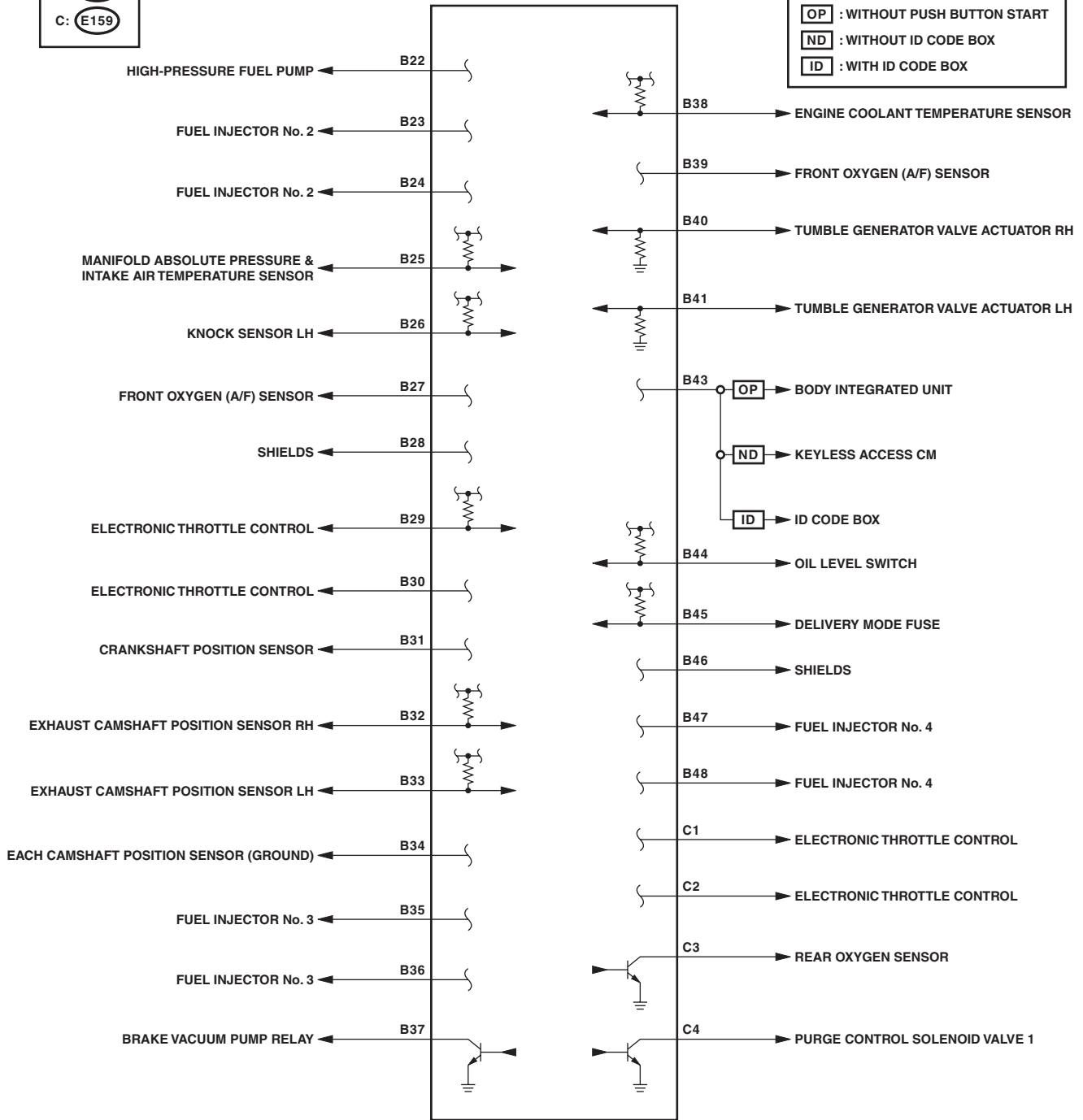


# Engine Control Module (ECM) I/O Signal

## ENGINE (DIAGNOSTICS)

B: (E158)  
C: (E159)

OP : WITHOUT PUSH BUTTON START  
ND : WITHOUT ID CODE BOX  
ID : WITH ID CODE BOX

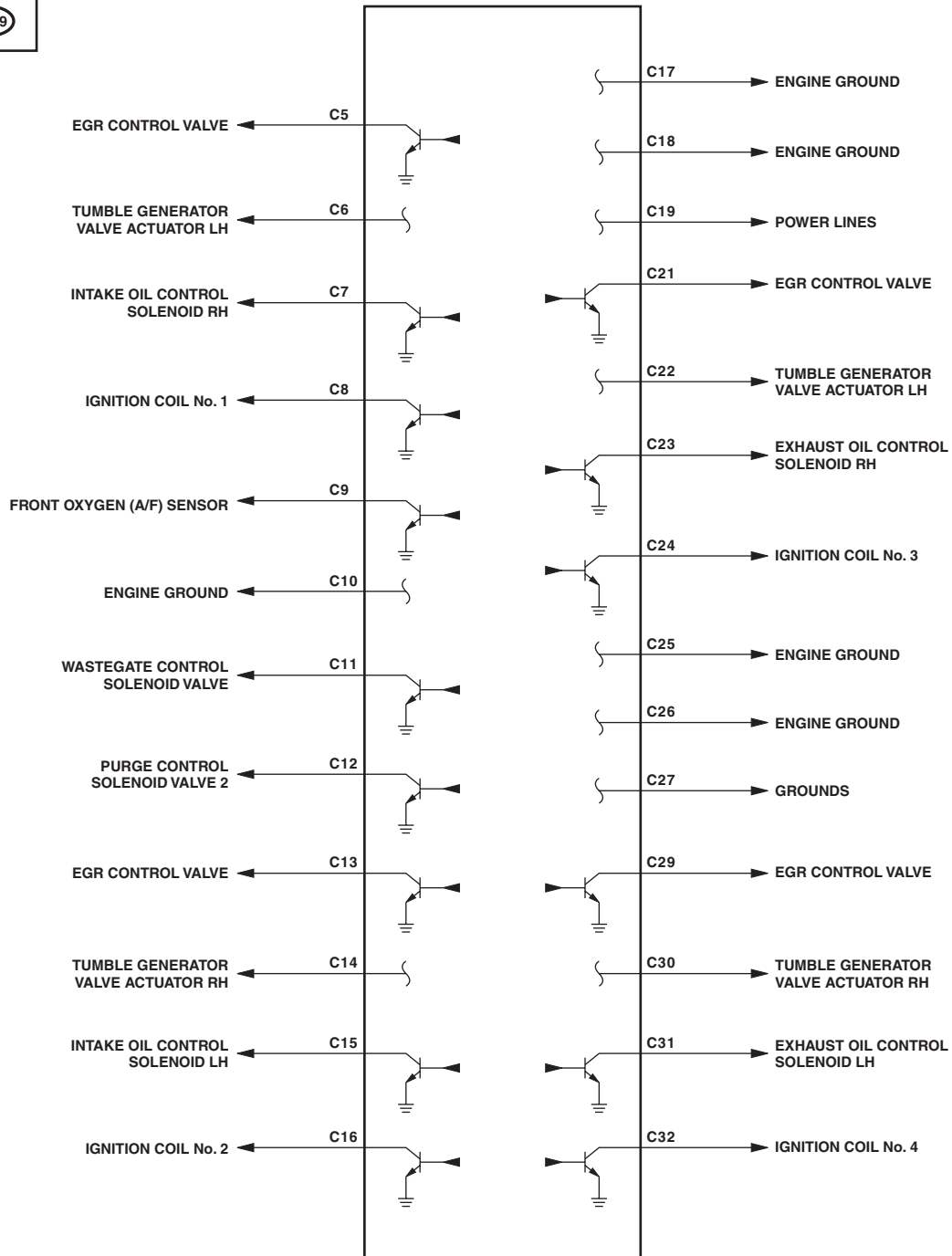


EN-11029

# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

C: E159



EN-10230