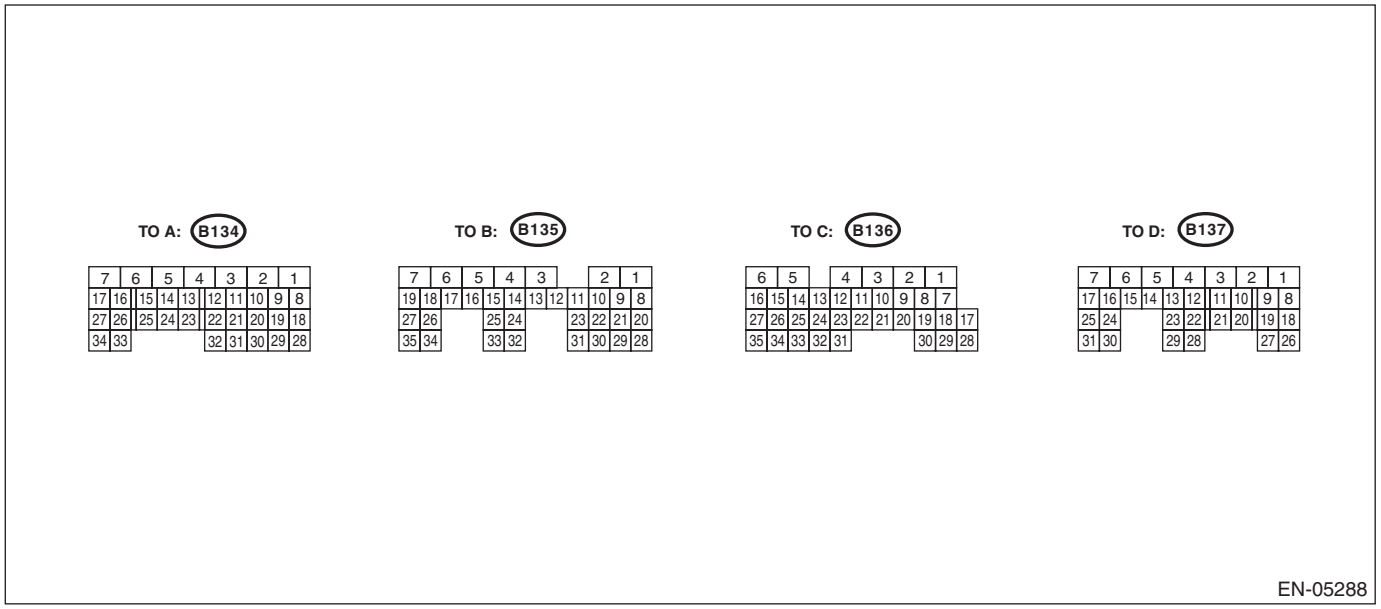
5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B137	17	0	–7 — +7	Waveform
	Signal (–)	B137	25	0	0	—
	Shield	B137	31	0	0	—
Camshaft position sensor	Signal (+)	B137	24	0	–7 — +7	Waveform
	Signal (–)	B137	30	0	0	—
	Shield	B137	31	0	0	—
Electronic throttle control	Main	B134	18	Approx. 0.9 (After engine is warmed up.)	Approx. 0.6 — 0.7 (After engine is warmed up.)	Fully closed: Approx. 0.6 Fully open: Approx. 4.0
	Sub	B134	28	Approx. 1.7 (After engine is warmed up.)	Approx. 1.5 — 1.6 (After engine is warmed up.)	Fully closed: Approx. 1.5 Fully open: Approx. 4.2
	Power supply	B134	19	5	5	—
	Ground (sensor)	B134	29	0	0	—
Electronic throttle control motor (+)		B134	2	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (–)		B134	1	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B135	7	10 — 13	12 — 14	—
Electronic throttle control motor relay		B135	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	When ignition switch is turned to ON: ON

Engine Control Module (ECM) I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Accelerator pedal position sensor	Main sensor signal	B135	23	Fully closed: 1.0 Fully opened: 3.5	Fully closed: 1.0 Fully opened: 3.5	—
	Main power supply	B135	21	5	5	—
	Ground (Main sensor)	B135	29	0	0	—
	Sub sensor signal	B135	31	Fully closed: 1.0 Fully opened: 3.5	Fully closed: 1.0 Fully opened: 3.5	—
	Sub power supply	B135	22	5	5	—
	Ground (Sub sensor)	B135	30	0	0	—
Front oxygen (A/F) sensor	Signal (+)	B136	19	—	2.7 — 2.9	—
	Signal (–)	B136	18	—	2.35 — 2.25	—
	Shield	B136	9	0	0	—
Rear oxygen sensor	Signal	B136	20	0	0 — 0.9	—
	Shield	B136	9	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B136	6	10 — 13	1 — 14	Duty waveform
	Signal 2	B136	5	10 — 13	1 — 14	Duty waveform
Rear oxygen sensor heater signal		B135	6	10 — 13	1 — 14	Duty waveform
Engine coolant temperature sensor		B137	22	1.0 — 1.4	1.0 — 1.4	After engine is warmed up.
Starter switch		B136	16	0	0	CVT model Cranking: 8 — 14 MT model Cranking with the clutch pedal pressed: 8 — 14
Starter relay control		B135	26	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—
Ignition switch		B136	30	10 — 13	12 — 14	—
Neutral position switch		B136	35	ON: 0 OFF: 12±0.5		CVT model: Switch is ON when select lever is in “P” range or “N” range. MT model: Switch is ON when the shift lever is in neutral.
Delivery (test) mode switch		B136	34	10 — 13	13 — 14	When fuse is installed: 0
Knock sensor	Signal	B137	2	2.5	2.5	—
	Shield	B137	8	0	0	—
Back-up power supply		B136	2	10 — 13	12 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B137	7	10 — 13	12 — 14	—
		B136	1	10 — 13	12 — 14	—
Ignition control	#1	B134	21	0	0 or 5	Waveform
	#2	B134	22	0	0 or 5	Waveform
	#3	B134	31	0	0 or 5	Waveform
	#4	B134	32	0	0 or 5	Waveform

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Fuel injector	#1	B134	10	10 — 13	1 — 14	Waveform
	#2	B134	11	10 — 13	1 — 14	Waveform
	#3	B134	12	10 — 13	1 — 14	Waveform
	#4	B134	13	10 — 13	1 — 14	Waveform
Fuel pump relay control		B136	33	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—
Radiator fan relay 1 control		B135	11	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—
Radiator fan relay 2 control		B135	12	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—
Self-shutoff control		B135	13	0.5 or less	0.5 or less	—
Malfunction indicator light		B135	33	—	—	Light “ON”: 1 or less Light “OFF”: 10 — 14
Engine speed output		B135	15	—	0 — 13 or more	Waveform
Oil temperature sensor signal		B137	21	1.0 — 1.4	1.0 — 1.4	After engine is warmed up.
Purge control solenoid valve		B137	6	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	Duty waveform
EGR valve	Signal 1	B134	8	0 or 10 — 13	0 or 12 — 14	Waveform
	Signal 2	B134	9	0 or 10 — 13	0 or 12 — 14	Waveform
	Signal 3	B134	20	0 or 10 — 13	0 or 12 — 14	Waveform
	Signal 4	B134	30	0 or 10 — 13	0 or 12 — 14	Waveform
Power steering oil pressure switch		B137	28	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	—
Oil level switch		B136	26	0	0	Oil level LOW: 10 — 14
Oil switching solenoid valve RH	Signal (+)	B134	7	0	Duty waveform	Drive frequency: 300 Hz
	Signal (–)	B134	15	0	0	—
Oil switching solenoid valve LH	Signal (+)	B134	5	0	Duty waveform	Drive frequency: 300 Hz
	Signal (–)	B134	14	0	0	—
Variable valve lift diagnosis oil pressure switch RH		B137	14	0	0	—
Variable valve lift diagnosis oil pressure switch LH		B137	13	0	0	—
Manifold absolute pressure sensor		B137	20	3.4 — 3.8	1.4 — 1.8	—
Air flow sensor	Signal	B136	22	—	0.3 — 4.5	—
	Shield	B136	10	0	0	—
	Ground	B136	11	0	0	—
Intake air temperature sensor signal		B136	31	0.3 — 4.6	0.3 — 4.6	—
Immobilizer communication		B135	25	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—
SSM communication		B135	14	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—
Sensor power supply		B134	19	5	5	—
		B135	22	5	5	—

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Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Ground	Sensor	B134	29	0	0	—
		B135	30	0	0	—
	Engine 1	B134	6	0	0	—
	Engine 2	B134	4	0	0	—
	Engine 3	B134	3	0	0	—
	Engine 4	B137	1	0	0	—
	Engine 5	B137	3	0	0	—
	Body	B136	4	0	0	—
Clutch switch		B135	9	When clutch pedal is depressed: 0 When clutch pedal is released: 10 — 13	When clutch pedal is depressed: 0 When clutch pedal is released: 12 — 14	—
Brake switch 1 (brake switch)		B136	15	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 12 — 14	—
Brake switch 2 (stop light switch)		B136	3	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 12 — 14 When brake pedal is released: 0	—
Cruise control main switch		B136	13	ON: 0 OFF: 5	ON: 0 OFF: 5	—
Cruise control command switch		B136	12	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
Fuel temperature sensor		B136	23	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (77°F)
Fuel tank pressure sensor		B136	21	2.3 — 2.7	2.3 — 2.7	Value after removing fuel filler cap and installing again
Drain valve		B135	4	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	—
CAN communication	(Hi)	B136	17	2.5 — 3.5	2.5 — 3.5	Waveform
	(Lo)	B136	28	1.5 — 2.5	1.5 — 2.5	Waveform

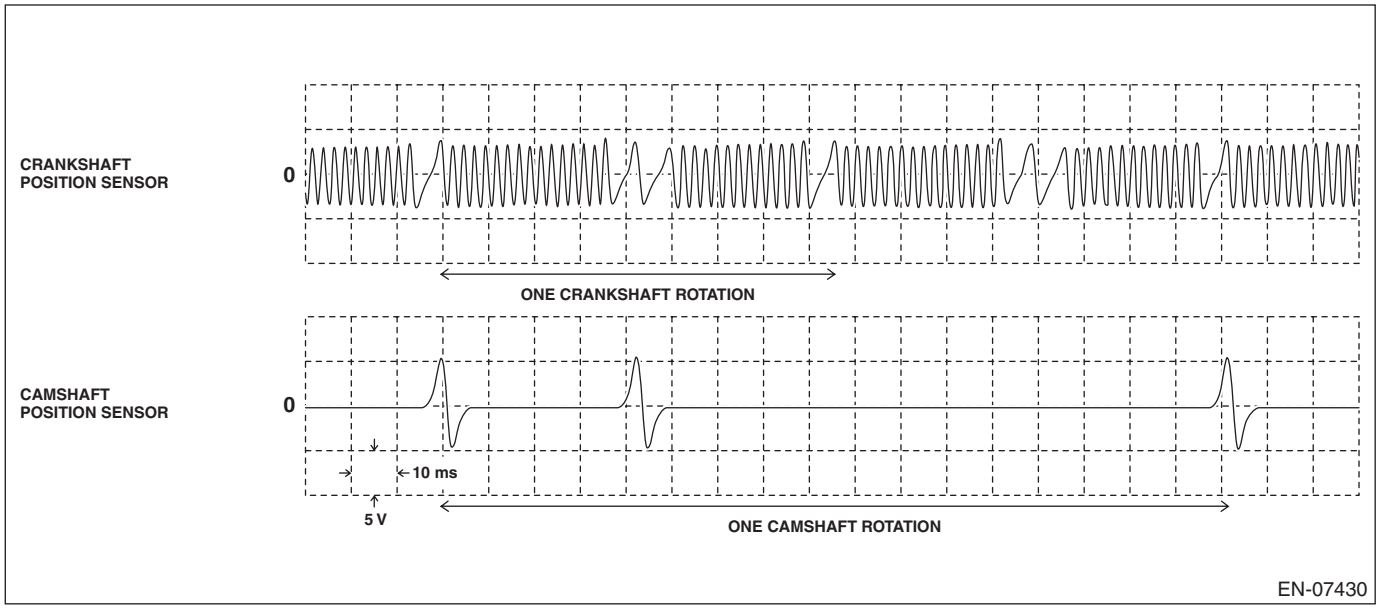
Input/output name:

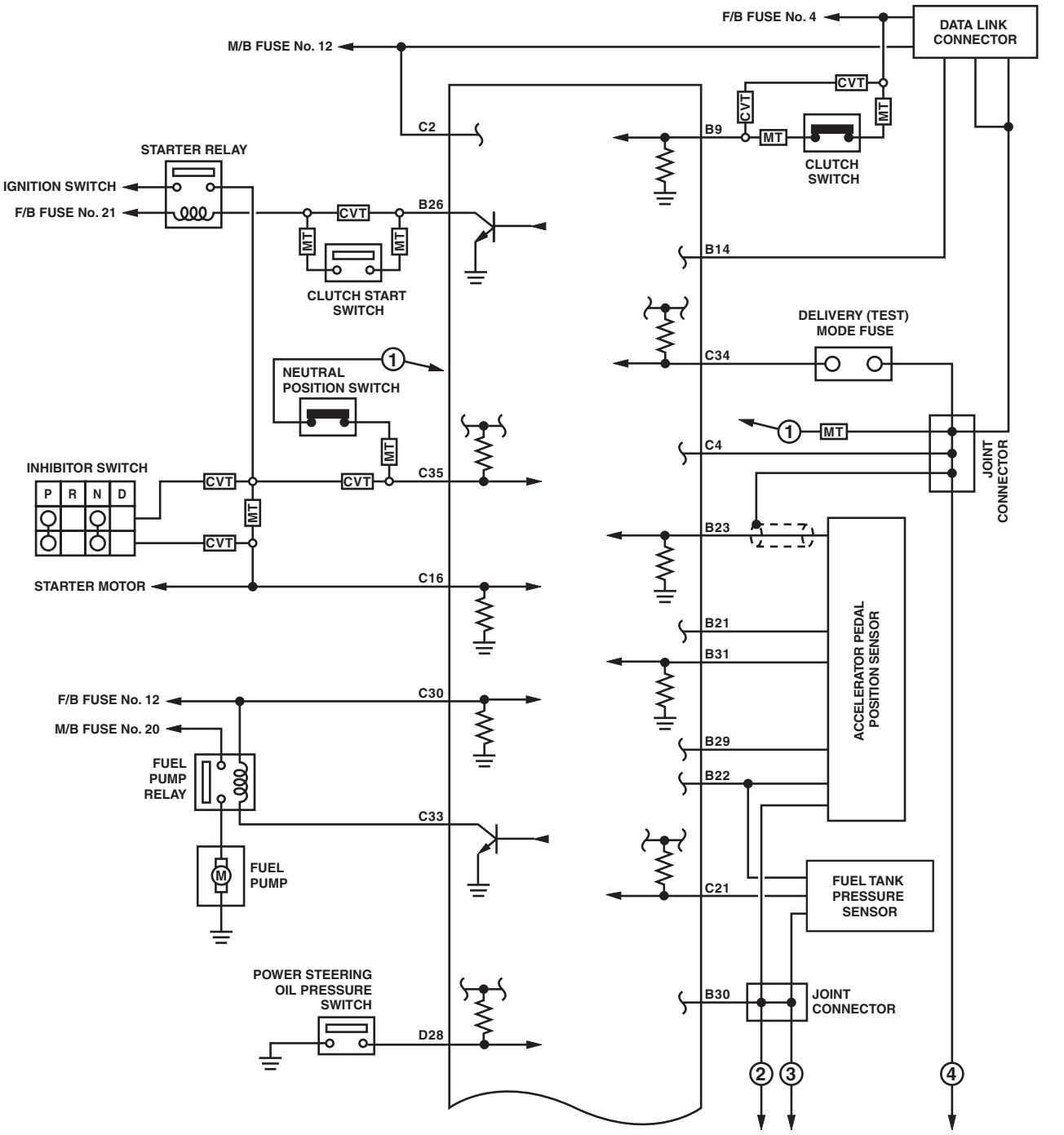
- Crankshaft position sensor
- Camshaft position sensor

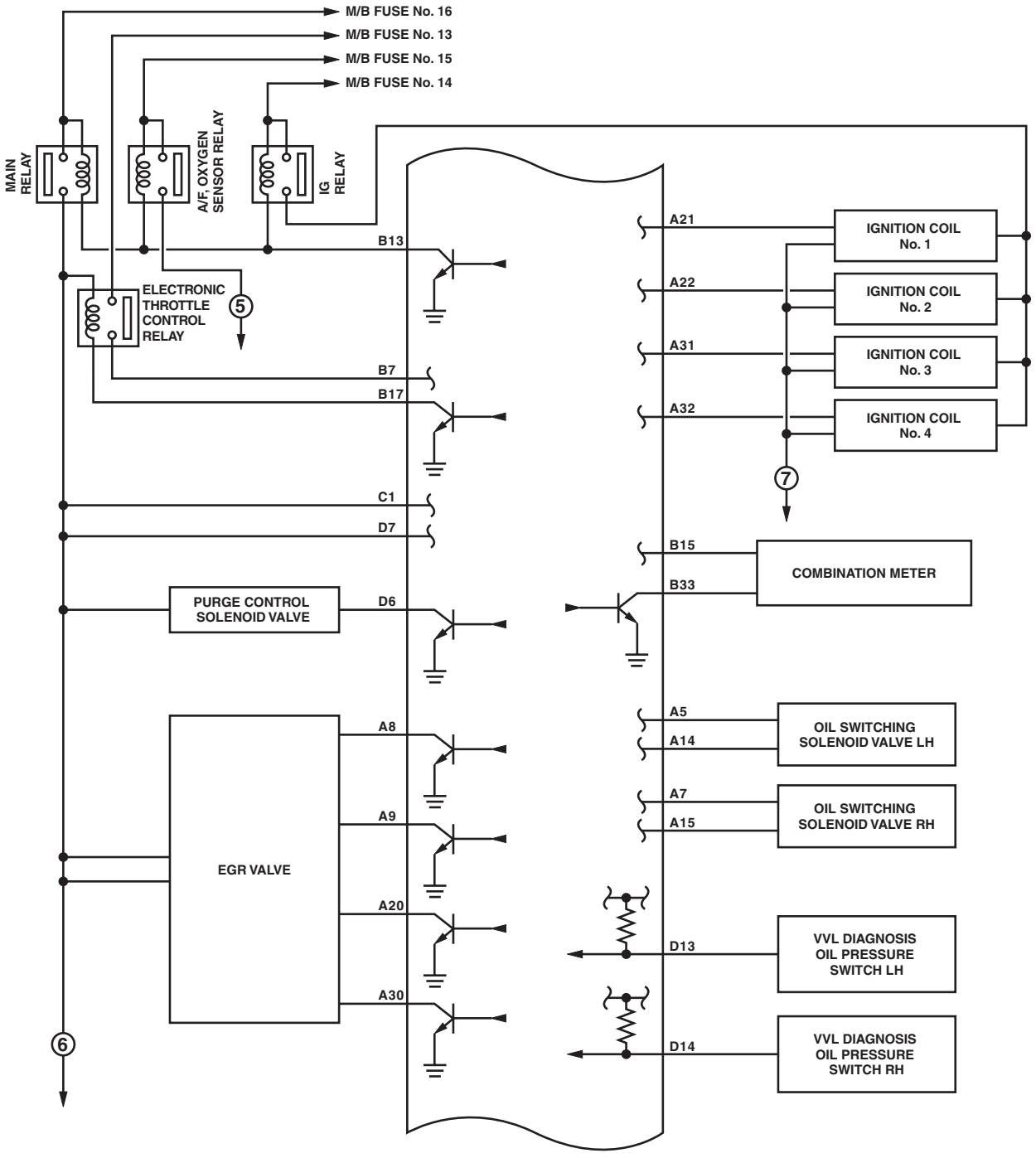
Measuring condition:

- After warming-up

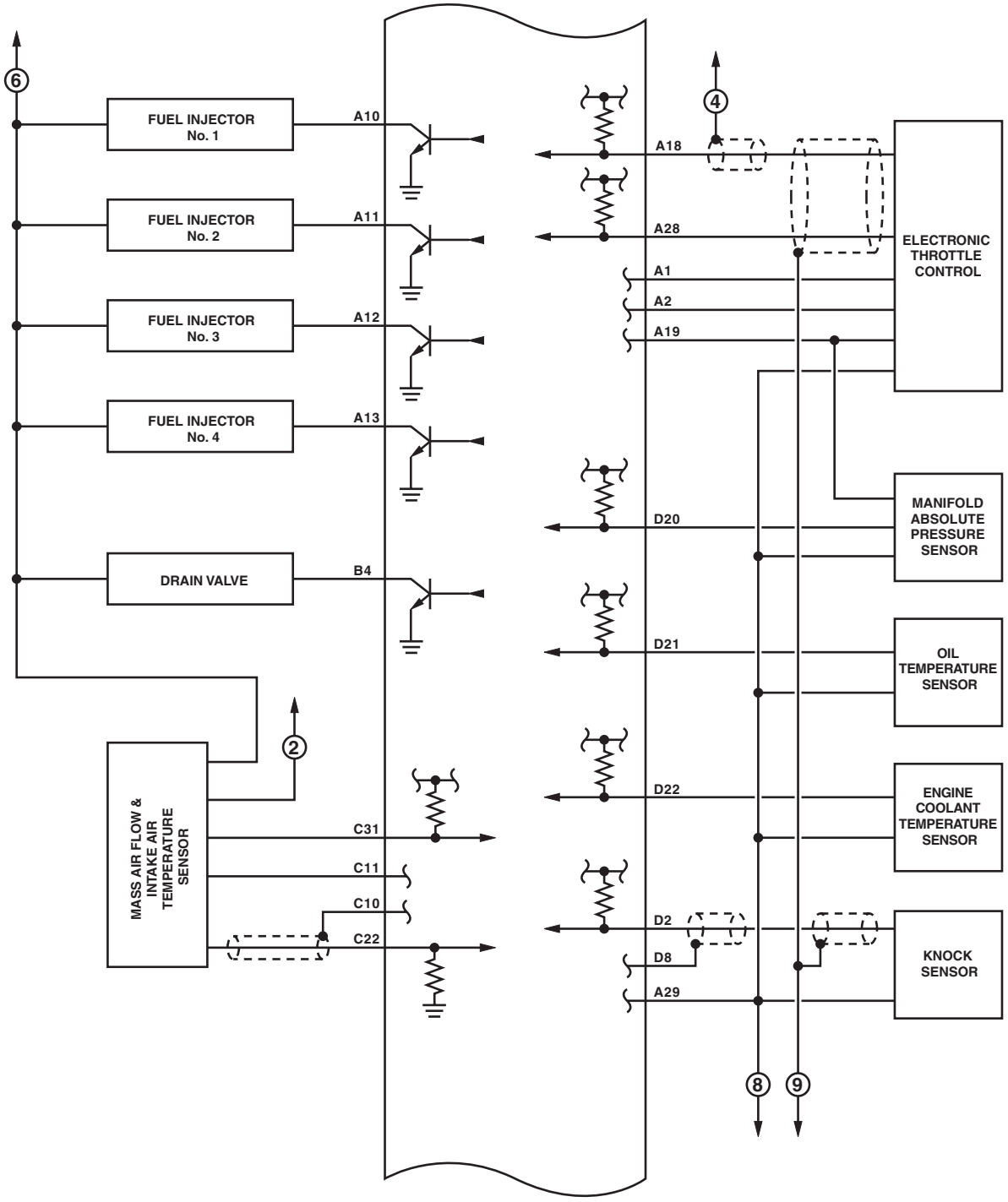
- At idling


CRANKSHAFT POSITION SENSOR
0
ONE CRANKSHAFT ROTATION
CAMSHAFT POSITION SENSOR
0
10 ms
5 V
ONE CAMSHAFT ROTATION
EN-07430

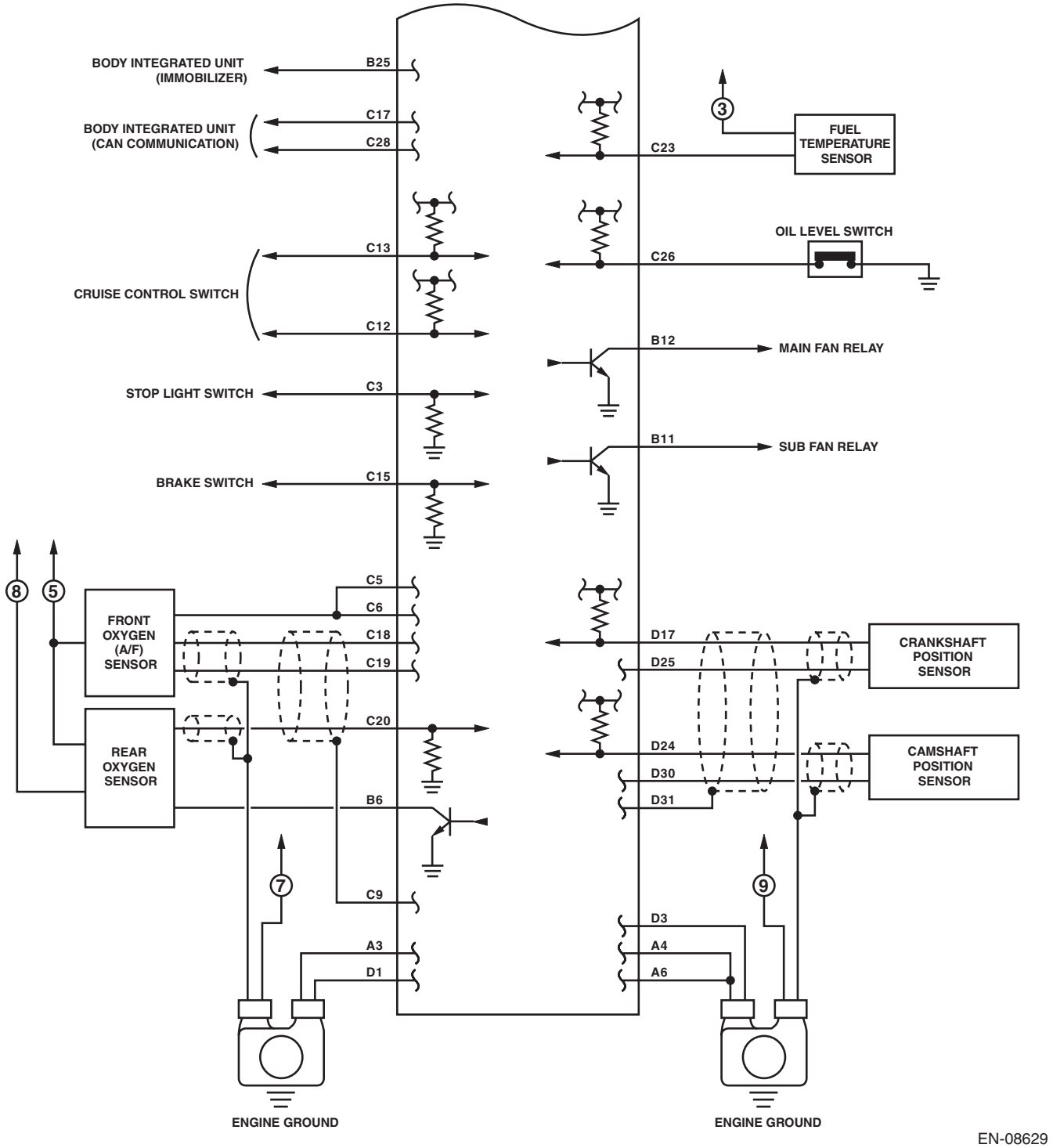

F/B FUSE No. 4
DATA LINK CONNECTOR
M/B FUSE No. 12
CVT
MT
C2
B9
CLUTCH SWITCH
STARTER RELAY
IGNITION SWITCH
F/B FUSE No. 21
B26
CLUTCH START SWITCH
B14
DELIVERY (TEST) MODE FUSE
C34
NEUTRAL POSITION SWITCH
C4
JOINT CONNECTOR
INHIBITOR SWITCH
P R N D
C35
STARTER MOTOR
C16
B23
B21
B31
ACCELERATOR PEDAL POSITION SENSOR
F/B FUSE No. 12
M/B FUSE No. 20
C30
FUEL PUMP RELAY
B29
B22
C33
FUEL PUMP
C21
FUEL TANK PRESSURE SENSOR
POWER STEERING OIL PRESSURE SWITCH
D28
B30
JOINT CONNECTOR
EN-08626


M/B FUSE No. 16
M/B FUSE No. 13
M/B FUSE No. 15
M/B FUSE No. 14
MAIN RELAY
A/F, OXYGEN SENSOR RELAY
IG RELAY
ELECTRONIC THROTTLE CONTROL RELAY
5
B13
B7
B17
C1
D7
PURGE CONTROL SOLENOID VALVE
D6
EGR VALVE
A8
A9
A20
A30
6
A21
A22
A31
A32
IGNITION COIL No. 1
IGNITION COIL No. 2
IGNITION COIL No. 3
IGNITION COIL No. 4
7
B15
B33
COMBINATION METER
A5
A14
OIL SWITCHING SOLENOID VALVE LH
A7
A15
OIL SWITCHING SOLENOID VALVE RH
D13
VVL DIAGNOSIS OIL PRESSURE SWITCH LH
D14
VVL DIAGNOSIS OIL PRESSURE SWITCH RH

EN-08627


6
FUEL INJECTOR No. 1
FUEL INJECTOR No. 2
FUEL INJECTOR No. 3
FUEL INJECTOR No. 4
DRAIN VALVE
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR
2
A10
A11
A12
A13
B4
C31
C11
C10
C22
4
A18
A28
A1
A2
A19
D20
D21
D22
D2
D8
A29
8
9
ELECTRONIC THROTTLE CONTROL
MANIFOLD ABSOLUTE PRESSURE SENSOR
OIL TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
KNOCK SENSOR

EN-08628


BODY INTEGRATED UNIT (IMMOBILIZER)
B25
BODY INTEGRATED UNIT (CAN COMMUNICATION)
C17
C28
C13
CRUISE CONTROL SWITCH
C12
STOP LIGHT SWITCH
C3
BRAKE SWITCH
C15
8
5
FRONT OXYGEN (A/F) SENSOR
REAR OXYGEN SENSOR
C5
C6
C18
C19
C20
B6
7
C9
A3
D1
ENGINE GROUND
3
FUEL TEMPERATURE SENSOR
C23
OIL LEVEL SWITCH
C26
B12
MAIN FAN RELAY
B11
SUB FAN RELAY
D17
D25
CRANKSHAFT POSITION SENSOR
D24
D30
D31
CAMSHAFT POSITION SENSOR
9
D3
A4
A6
ENGINE GROUND

EN-08629