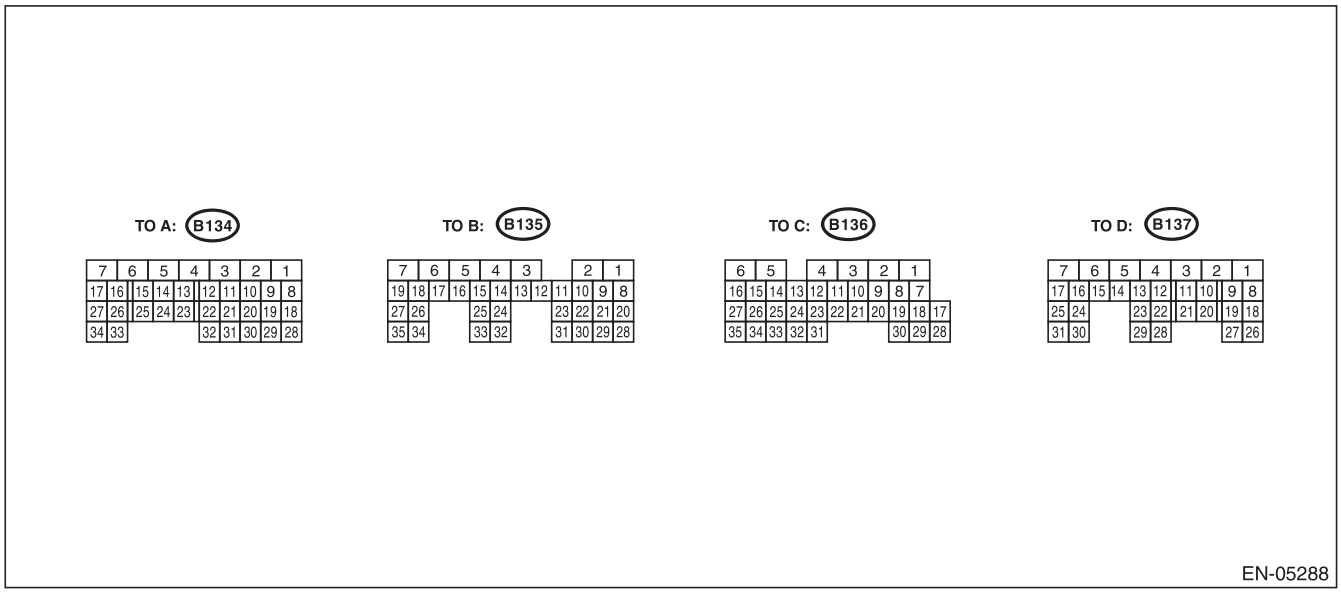
5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Contents		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B134	13	0	–7 — +7	Waveform
	Signal (–)	B134	14	0	0	—
	Shield	B134	24	0	0	—
Rear oxygen sensor	Signal	B135	4	0	0 — 0.9	—
	Shield	B135	1	0	0	—
	GND (sensor)	B135	30	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B136	3	—	—	Waveform
	Signal 2	B136	2	—	—	Waveform
Rear oxygen sensor heater signal		B136	4	0 — 13	12 — 14	Waveform
Engine coolant temperature sensor	Signal	B134	34	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.
	GND (sensor)	B134	29	0	0	After engine is warmed-up.
Air flow sensor	Signal	B135	26	—	0.3 — 4.5	—
	Shield	B135	35	0	0	—
	GND	B135	34	0	0	—
Intake air temperature sensor signal		B135	18	0.3 — 4.6	0.3 — 4.6	—
Wastegate control solenoid valve		B137	27	0 or 10 — 13	0 or 12 — 14	Waveform
Starter switch		B136	32	0	0	Cranking: 8 — 14
A/C switch		B136	24	ON: 10 — 13 OFF: 0	ON: 12 — 14 OFF: 0	—
Ignition switch		B135	19	10 — 13	12 — 14	—
Neutral position switch (AT / MT)		B136	31	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Delivery (test) mode connector		B135	27	10 — 13	13 — 14	When connected: 0

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Contents		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Knock sensor	Signal	B134	15	2.8	2.8	—
	Shield	B134	25	0	0	—
Back-up power supply		B135	5	10 — 13	12 — 14	Ignition switch “OFF” : 10 — 13
Control module power supply		B134	7	10 — 13	12 — 14	—
		B135	2	10 — 13	12 — 14	—
Sensor power supply		B134	19	5	5	—
Ignition control	#1	B137	18	0	12 — 14	Waveform
	#2	B137	19	0	12 — 14	Waveform
	#3	B137	20	0	12 — 14	Waveform
	#4	B137	21	0	12 — 14	Waveform
Fuel injector	#1	B137	8	10 — 13	1 — 14	Waveform
	#2	B137	9	10 — 13	1 — 14	Waveform
	#3	B137	10	10 — 13	1 — 14	Waveform
	#4	B137	11	10 — 13	1 — 14	Waveform
Fuel pump control unit	Signal 1	B135	33	10 — 13	12 — 14	—
	Signal 2	B136	12	0 or 5	0 or 5	Waveform
A/C relay control		B136	9	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—
Radiator fan relay 1 control		B136	18	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—
Radiator fan relay 2 control		B136	29	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	Model with A/C only
Malfunction indicator light		B136	11	—	—	Light “ON”: 1 or less Light “OFF”: 10 — 14
Engine speed output		B136	22	—	0 — 13 or more	Waveform
Purge control solenoid valve 1		B137	29	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	Waveform
Purge control solenoid valve 2		B136	7	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	Waveform
Manifold absolute pressure sensor	Signal	B134	6	1.7 — 2.4	1.1 — 1.6	—
	Power supply	B134	19	5	5	
	GND (sensor)	B134	29	0	0	
Power steering oil pressure switch		B134	33	10 — 13	ON: 0 OFF: 12 — 14	—
Front oxygen (A/F) sensor signal (+)		B135	9	2.8 — 3.2	2.8 — 3.2	—
Front oxygen (A/F) sensor signal (–)		B135	8	2.4 — 2.7	2.4 — 2.7	—
Front oxygen (A/F) sensor shield		B135	1	0	0	—
SSM communication line		B136	16	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—
Intake camshaft position sensor (LH)		B134	21	0 or 5	0 or 5	Waveform
Intake camshaft position sensor (RH)		B134	11	0 or 5	0 or 5	Waveform
Intake camshaft position sensor ground		B134	22	0	0	—

Contents		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Electric throttle control	Main	B134	18	0.64 — 0.72 Fully opened: 3.96	0.64 — 0.72 (After engine is warmed-up.)	Fully closed: 0.6 Fully opened: 3.96
	Sub	B134	28	1.51 — 1.58 Fully opened: 4.17	1.51 — 1.58 (After engine is warmed-up.)	Fully closed: 1.48 Fully opened: 4.17
	Power supply	B134	19	5	5	—
	GND (sensor)	B134	29	0	0	—
Electronic throttle control motor (+)		B137	5	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (–)		B137	4	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B136	1	10 — 13	12 — 14	—
Electronic throttle control motor relay		B136	21	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	When ignition switch is turned to ON: ON
Intake AVCS solenoid (LH)	Signal (+)	B137	15	ON: 10 — 13 OFF: 0	ON: 12 — 14 OFF: 0	—
	Signal (–)	B137	14	0	0	—
Intake AVCS solenoid (RH)	Signal (+)	B137	17	ON: 10 — 13 OFF: 0	ON: 12 — 14 OFF: 0	—
	Signal (–)	B137	16	0	0	—
Accelerator pedal position sensor	Main sensor signal	B135	23	Fully closed: 1 Fully opened: 3.3	Fully closed: 1 Fully opened: 3.3	—
	Main power supply	B135	21	5	5	—
	GND (main sensor)	B135	29	0	0	—
	Shield	B136	6	0	0	—
	Sub sensor signal	B135	31	Fully closed: 1 Fully opened: 3.3	Fully closed: 1 Fully opened: 3.3	—
	Sub power supply	B135	22	5	5	—
	GND (sub sensor)	B135	30	0	0	—
Starter relay		B136	20	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	ON: cranking
A/C middle pressure switch		B136	33	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Clutch switch		B136	25	When clutch pedal is depressed: 0 When brake pedal is released: 10 — 13	When clutch pedal is depressed: 0 When brake pedal is released : 12 — 14	—
Brake switch 1		B135	20	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	—

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Contents		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Brake switch 2		B135	28	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 command switch		B135	24	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	—
Cruise control main switch		B135	12	ON: 0 OFF: 5	ON: 0 OFF: 5	—
Fuel tank pressure sensor		B135	32	2.3 — 2.7	2.3 — 2.7	—
Pressure control solenoid valve		B136	28	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	—
Drain valve		B136	17	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	—
Fuel temperature sensor		B135	17	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (77°F)
Immobilizer	Signal 1	B136	26	—	—	—
	Signal 2	B136	34	—	—	—
CAN communication (+)		B136	27	—	—	—
CAN communication (–)		B136	35	—	—	—
AT/MT identification		B136	15	0	0	—
Blow-by leak diagnosis signal		B134	30	0	0	At the time of open circuit (fault): 5
Tumble generator valve position sensor signal (RH)		B134	26	Fully closed: 0.4 — 1.2 Fully opened : 2.8 — 4.6	Fully closed : 0.4 — 1.2 Fully opened : 2.8 — 4.6	—
Tumble generator valve position sensor signal (LH)		B134	16	Fully closed: 0.4 — 1.2 Fully opened : 2.8 — 4.6	Fully closed : 0.4 — 1.2 Fully opened : 2.8 — 4.6	—
Tumble generator valve RH (closed)		B137	23	0 or 10 — 13	0 or 12 — 14	—
Tumble generator valve LH (closed)		B137	13	0 or 10 — 13	0 or 12 — 14	—
Tumble generator valve RH (open)		B137	22	0 or 10 — 13	0 or 12 — 14	—
Tumble generator valve LH (open)		B137	12	0 or 10 — 13	0 or 12 — 14	—
Secondary air pipe pressure sensor	Signal	B134	27	2.2 — 2.8	2.2 — 2.8	When secondary air is inducted: 3.2 — 4.9
	Power supply	B134	19	5.12	5.12	—
	GND (sensor)	B134	29	0	0	—

Engine Control Module (ECM) I/O Signal

Contents	Connector No.	Terminal No.	Signal (V)		Note
			Ignition SW ON (engine OFF)	Engine ON (idling)	
Secondary air combination valve relay 1	B136	30	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Secondary air combination valve relay 2	B136	19	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Secondary air pump relay	B136	8	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Self-shutoff control	B136	23	10 — 13	12 — 14	—
GND (ignition system)	B137	26	0	0	—
	B137	6	0	0	—
Ground (engine 1)	B134	5	0	0	—
Ground (engine 2)	B137	7	0	0	—
Ground (engine 3)	B137	2	0	0	—
Ground (engine 4)	B137	1	0	0	—
Ground (engine 5)	B137	3	0	0	—
Ground (body)	B136	6	0	0	—

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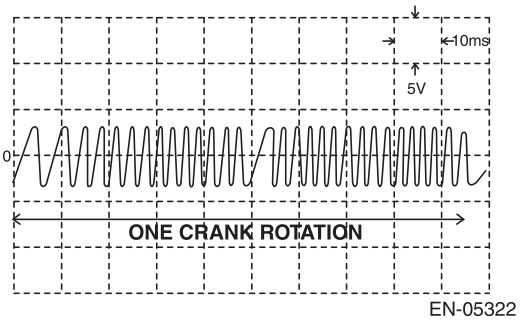
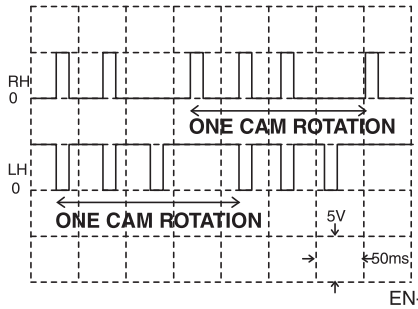
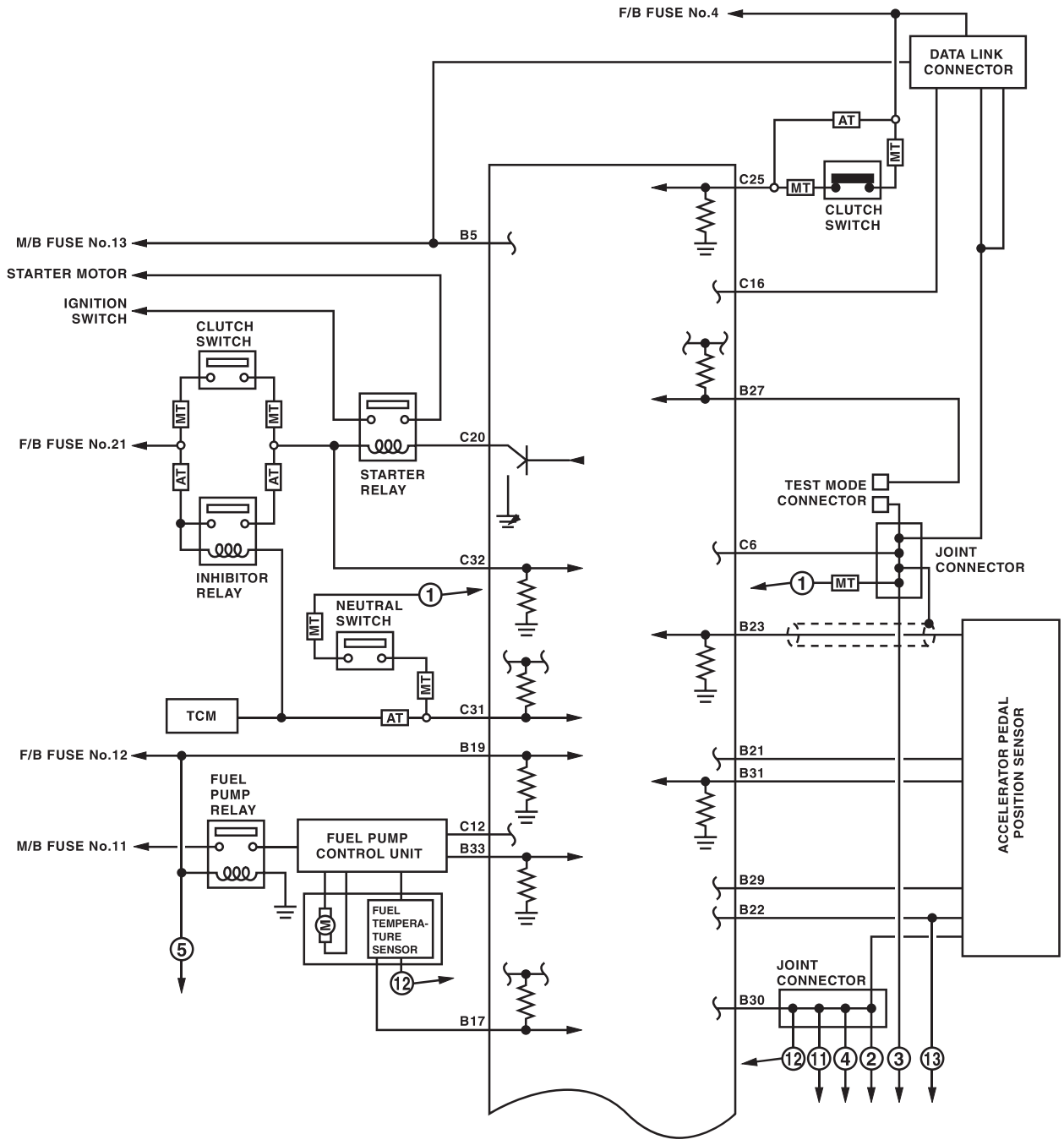
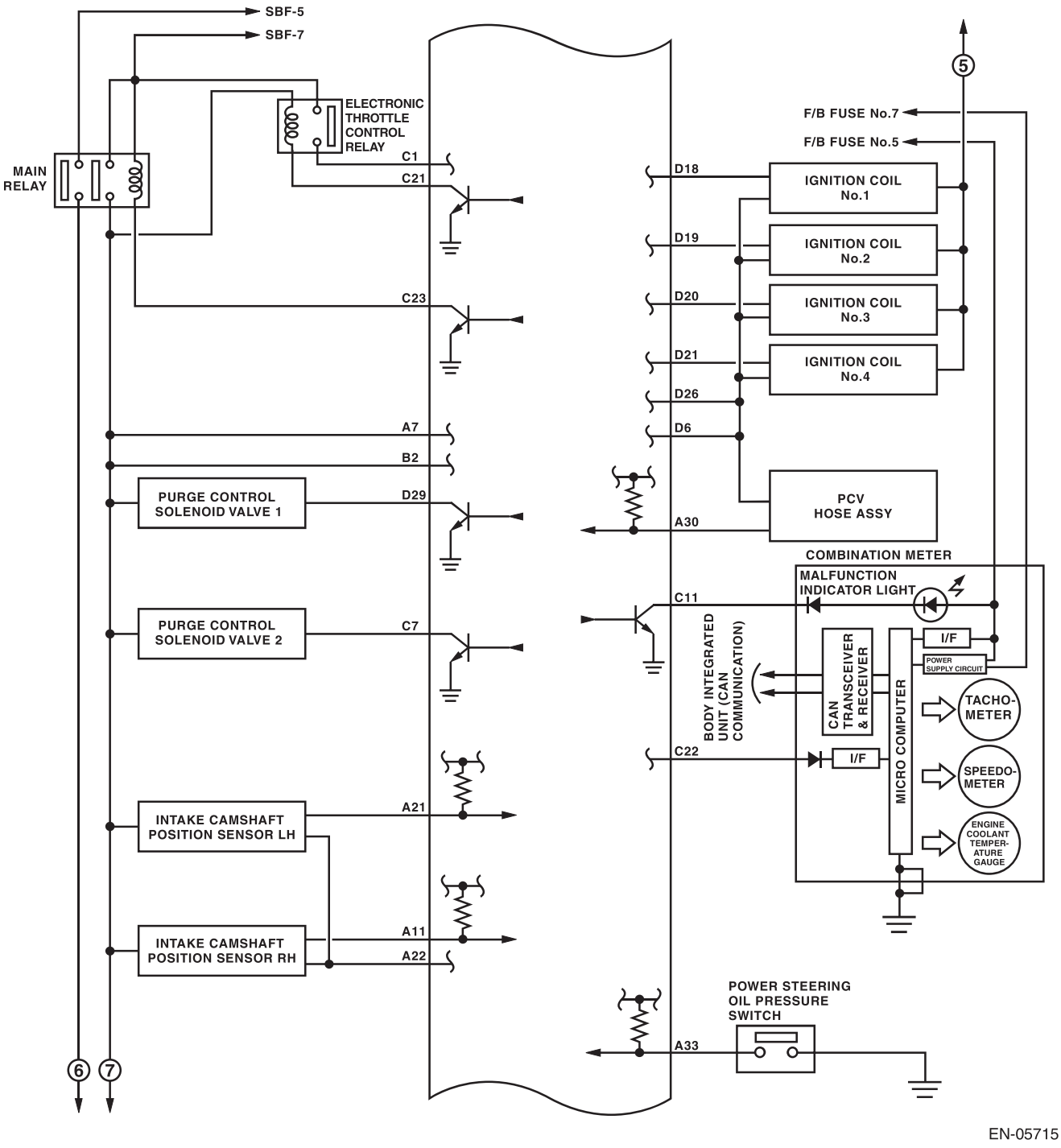
Input/output name	Measuring condition	Waveform
1. Crankshaft position sensor	During idling	 EN-05322
2. Camshaft position sensor	During idling	 EN-05359

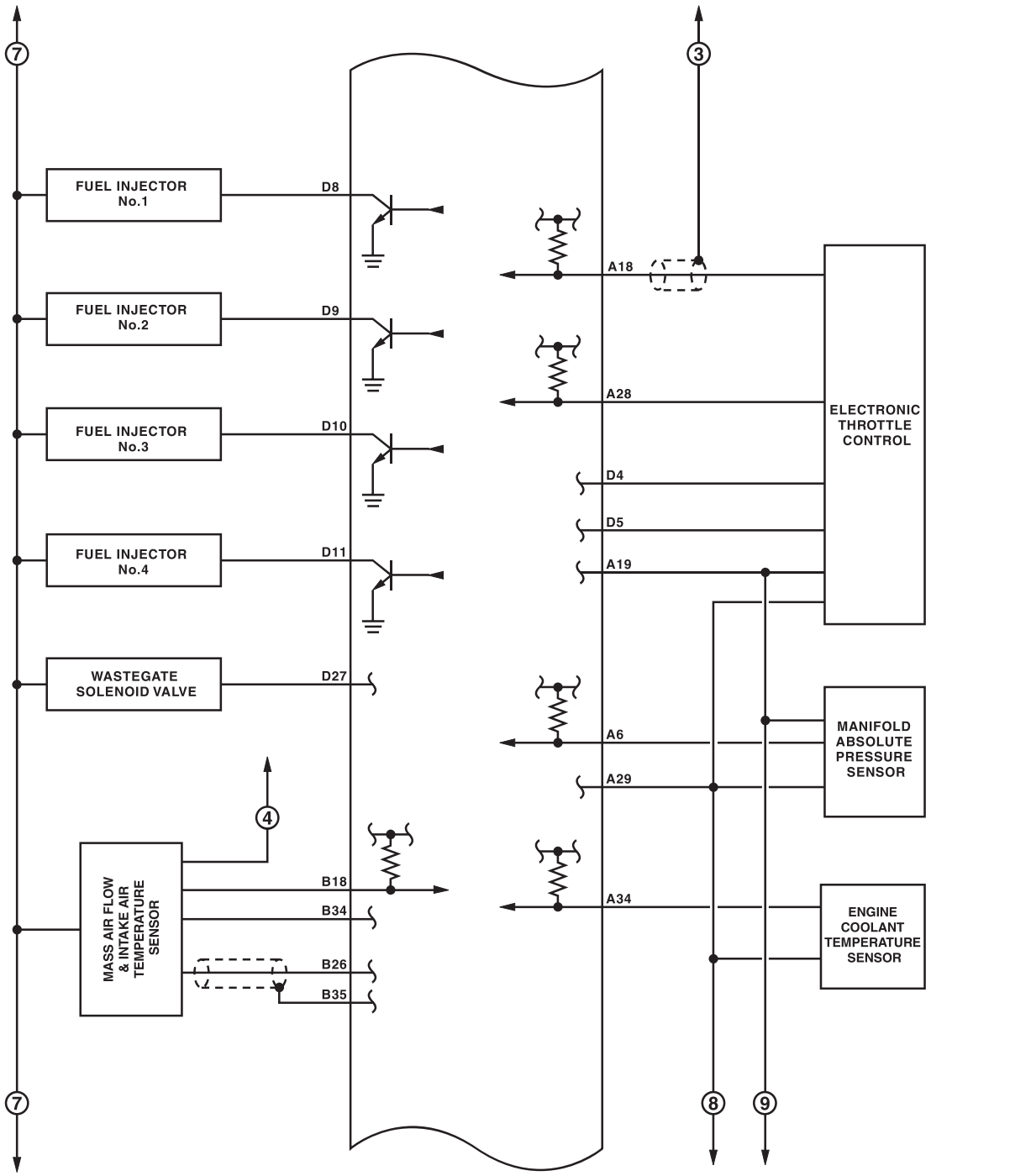

F/B FUSE No.4
DATA LINK CONNECTOR
AT
MT
C25
CLUTCH SWITCH
M/B FUSE No.13
B5
STARTER MOTOR
IGNITION SWITCH
C16
CLUTCH SWITCH
B27
F/B FUSE No.21
C20
STARTER RELAY
TEST MODE CONNECTOR
C6
JOINT CONNECTOR
INHIBITOR RELAY
C32
NEUTRAL SWITCH
B23
TCM
C31
ACCELERATOR PEDAL POSITION SENSOR
F/B FUSE No.12
B19
B21
B31
FUEL PUMP RELAY
M/B FUSE No.11
FUEL PUMP CONTROL UNIT
C12
B33
FUEL TEMPERA-TURE SENSOR
B29
B22
JOINT CONNECTOR
B30
B17

EN-05714

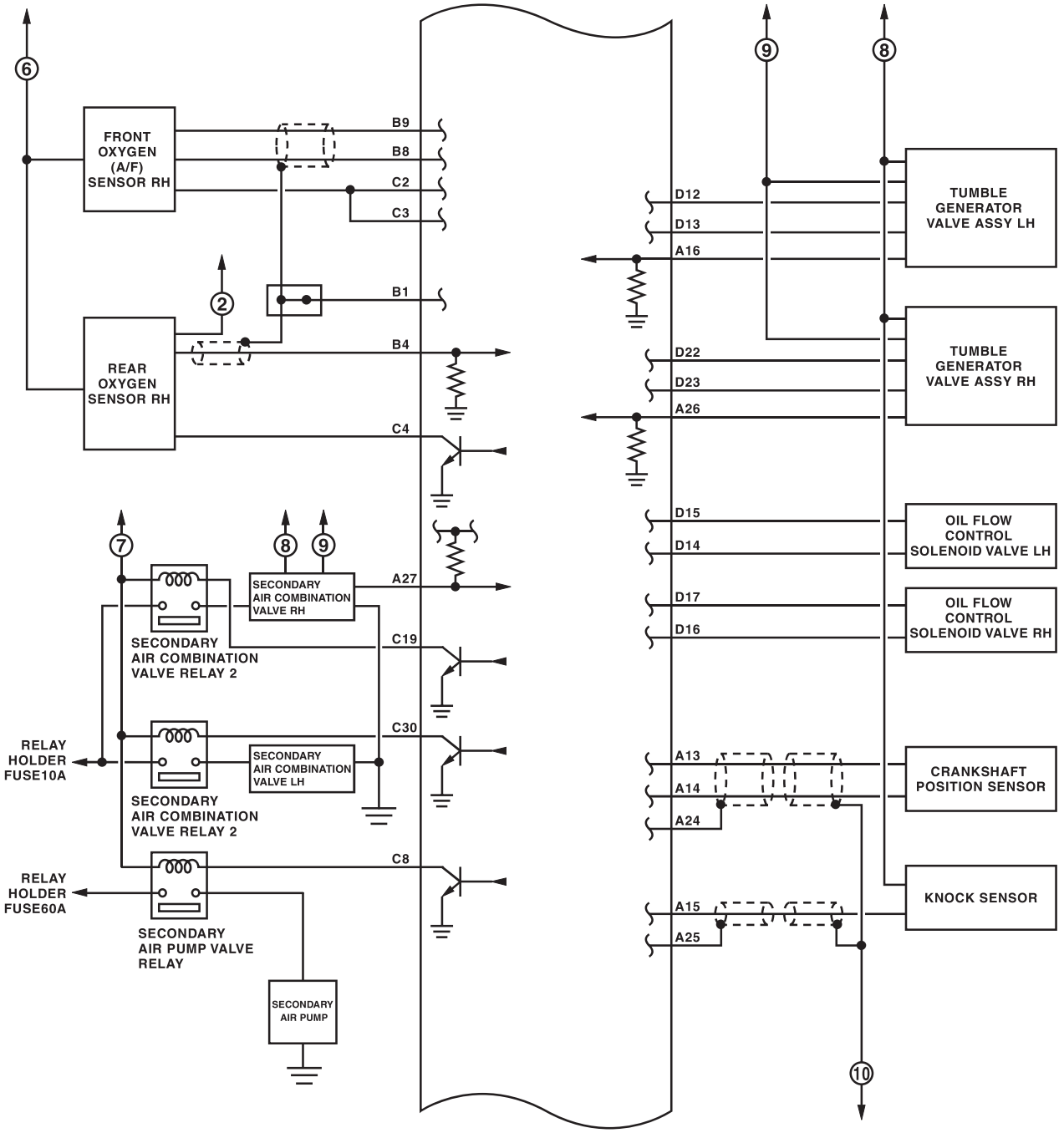
Engine Control Module (ECM) I/O Signal



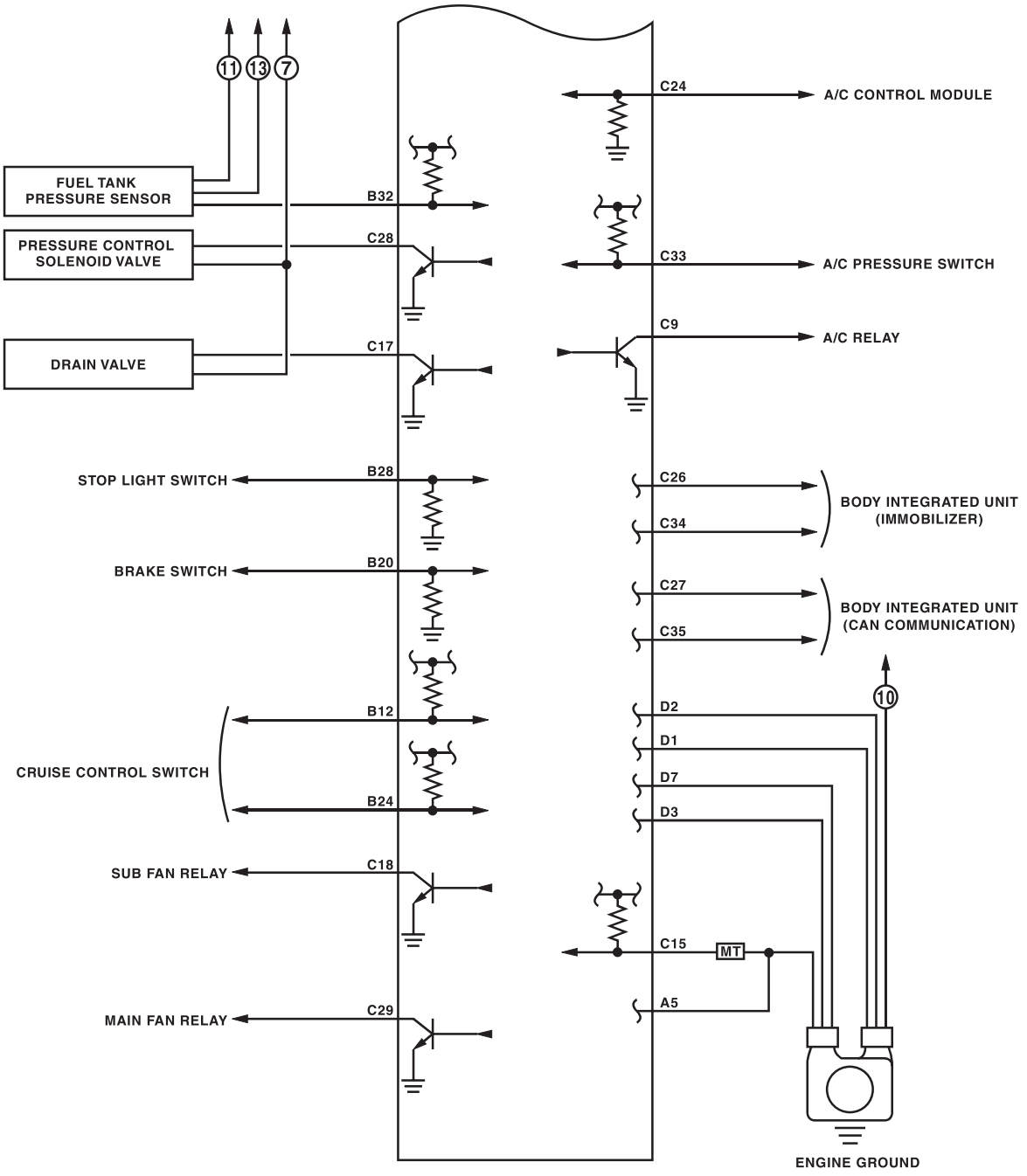
EN-05715


7
3
FUEL INJECTOR No.1
D8
FUEL INJECTOR No.2
D9
FUEL INJECTOR No.3
D10
FUEL INJECTOR No.4
D11
WASTEGATE SOLENOID VALVE
D27
4
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR
B18
B34
B26
B35
A18
A28
D4
D5
A19
ELECTRONIC THROTTLE CONTROL
A6
A29
MANIFOLD ABSOLUTE PRESSURE SENSOR
A34
ENGINE COOLANT TEMPERATURE SENSOR
7
8
9

EN-05716


6
FRONT OXYGEN (A/F) SENSOR RH
B9
B8
C2
C3
2
B1
REAR OXYGEN SENSOR RH
B4
C4
7
8
9
SECONDARY AIR COMBINATION VALVE RH
A27
SECONDARY AIR COMBINATION VALVE RELAY 2
C19
RELAY HOLDER FUSE10A
C30
SECONDARY AIR COMBINATION VALVE LH
SECONDARY AIR COMBINATION VALVE RELAY 2
C8
RELAY HOLDER FUSE60A
SECONDARY AIR PUMP VALVE RELAY
SECONDARY AIR PUMP
9
8
D12
D13
A16
TUMBLE GENERATOR VALVE ASSY LH
D22
D23
A26
TUMBLE GENERATOR VALVE ASSY RH
D15
D14
OIL FLOW CONTROL SOLENOID VALVE LH
D17
D16
OIL FLOW CONTROL SOLENOID VALVE RH
A13
A14
A24
CRANKSHAFT POSITION SENSOR
A15
A25
KNOCK SENSOR
10

EN-05717


11
13
7
FUEL TANK PRESSURE SENSOR
PRESSURE CONTROL SOLENOID VALVE
DRAIN VALVE
B32
C28
C17
STOP LIGHT SWITCH
B28
BRAKE SWITCH
B20
B12
CRUISE CONTROL SWITCH
B24
SUB FAN RELAY
C18
MAIN FAN RELAY
C29
C24
A/C CONTROL MODULE
C33
A/C PRESSURE SWITCH
C9
A/C RELAY
C26
C34
BODY INTEGRATED UNIT (IMMOBILIZER)
C27
C35
BODY INTEGRATED UNIT (CAN COMMUNICATION)
10
D2
D1
D7
D3
C15
MT
A5
ENGINE GROUND

EN-05718