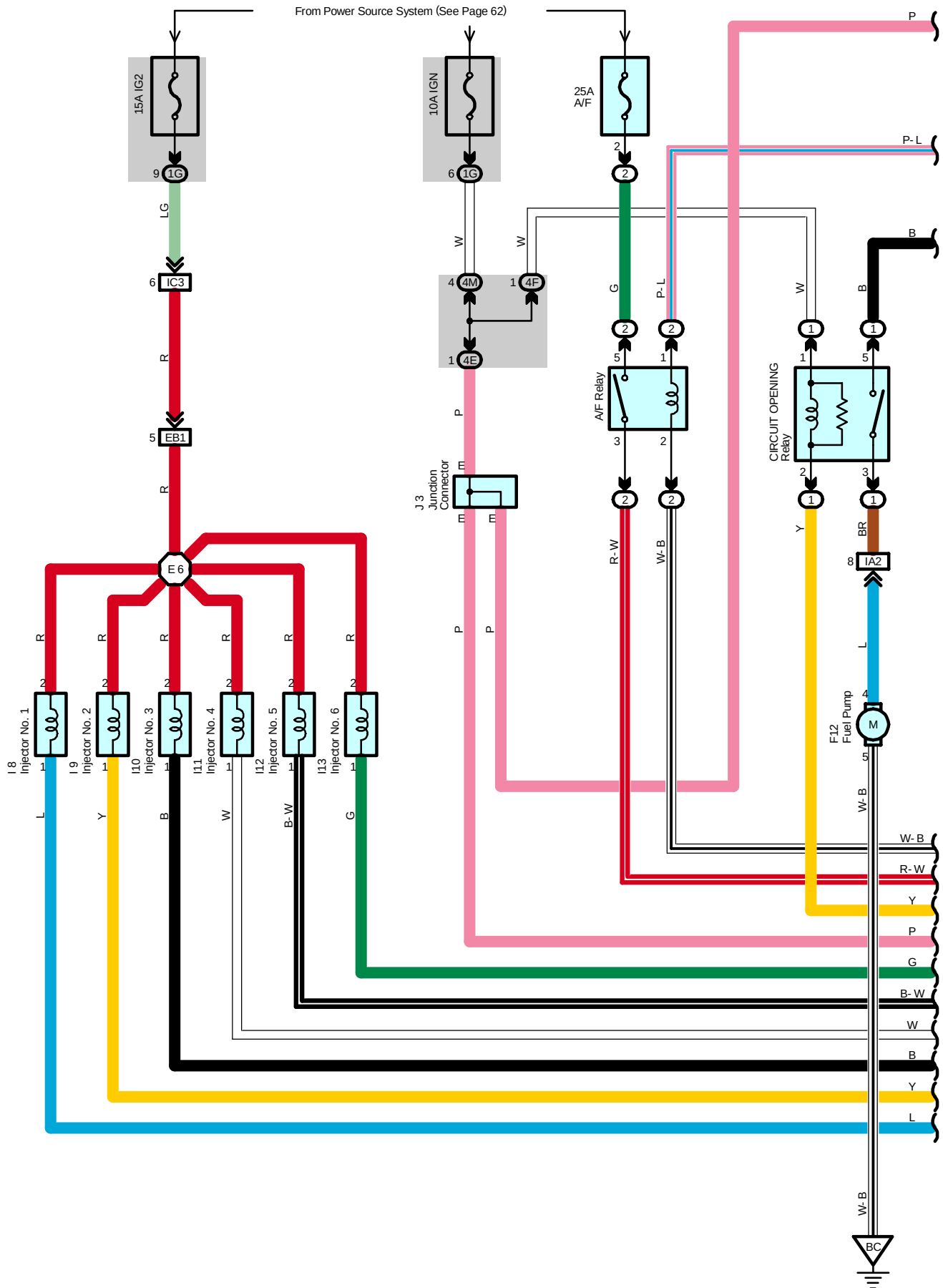
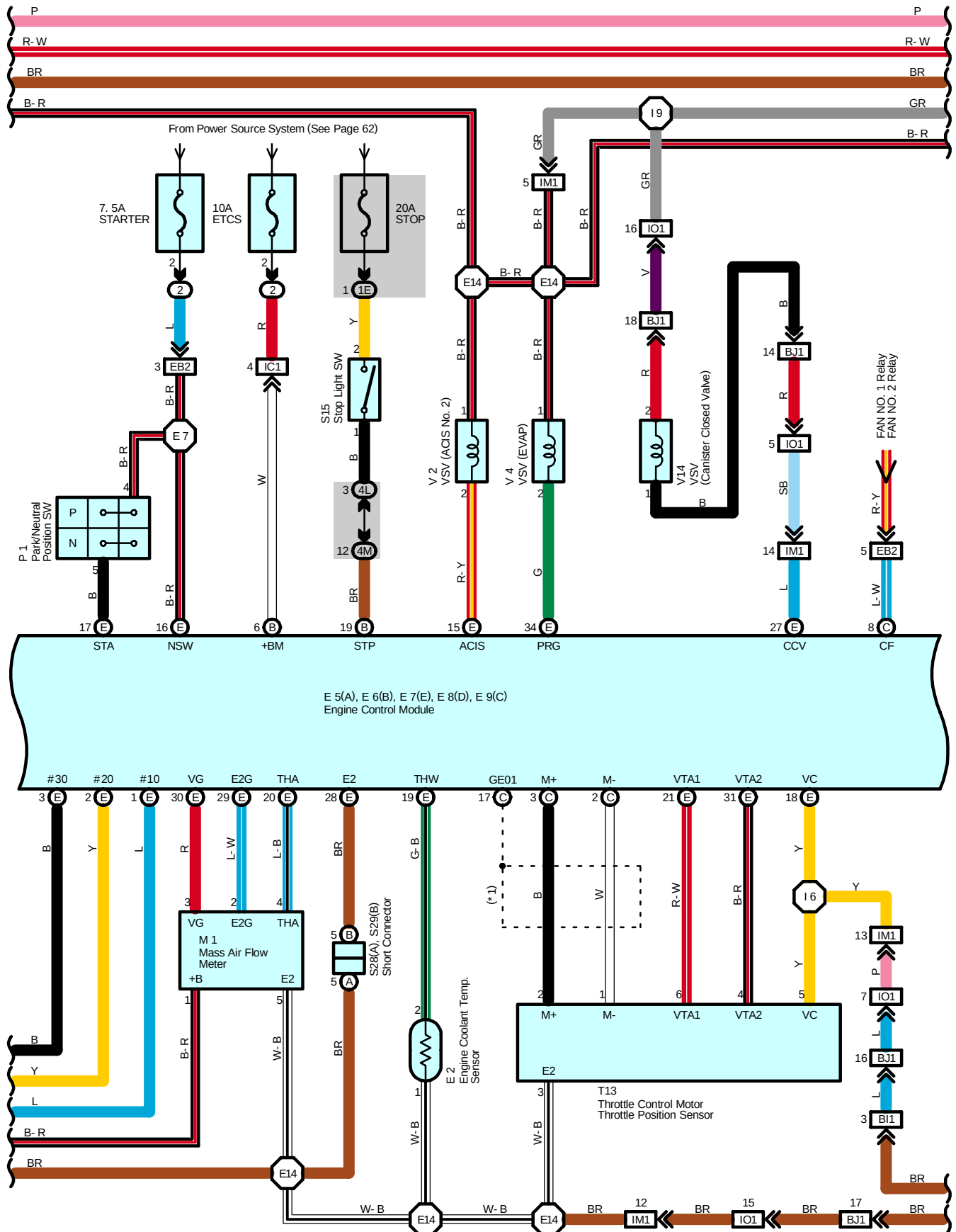
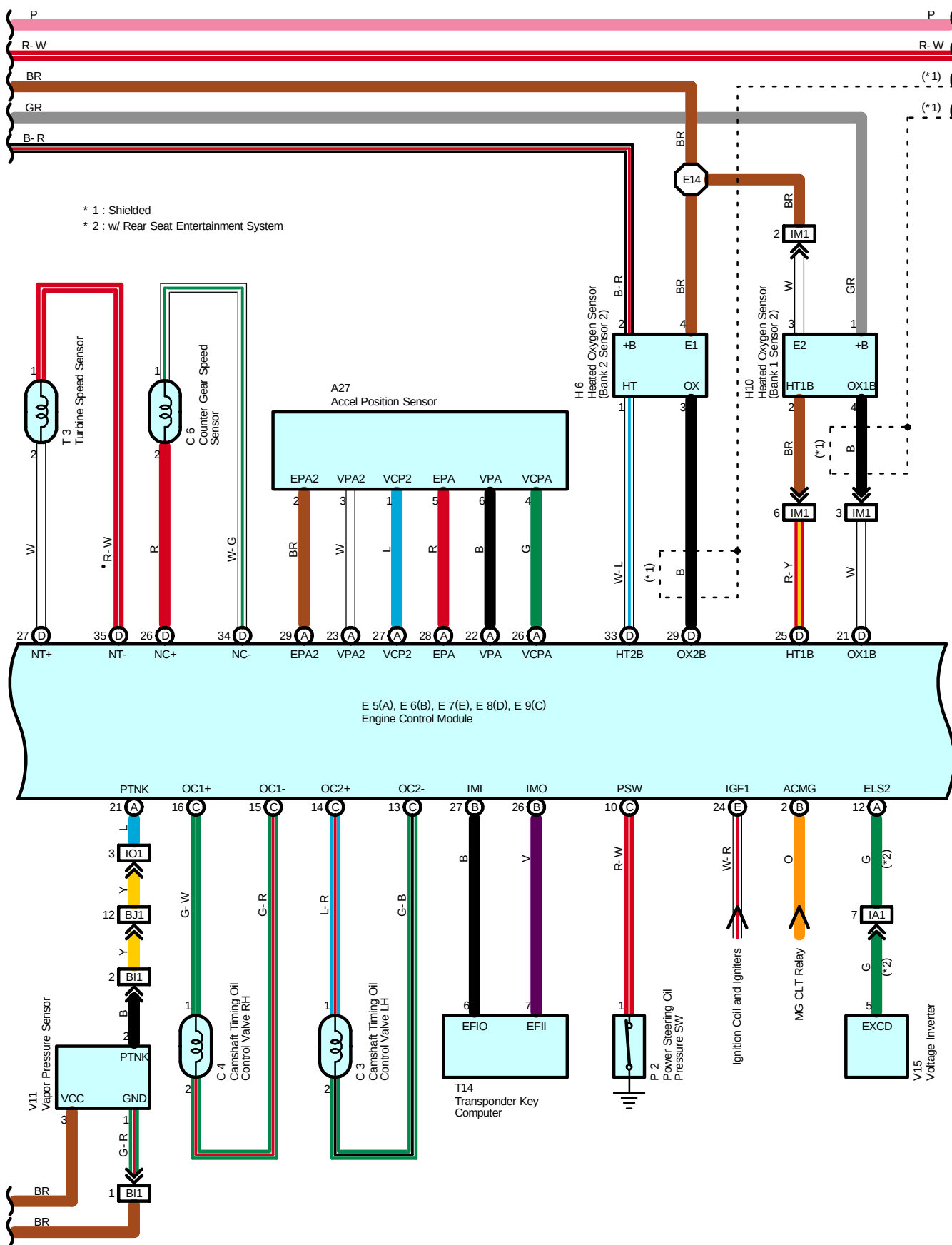




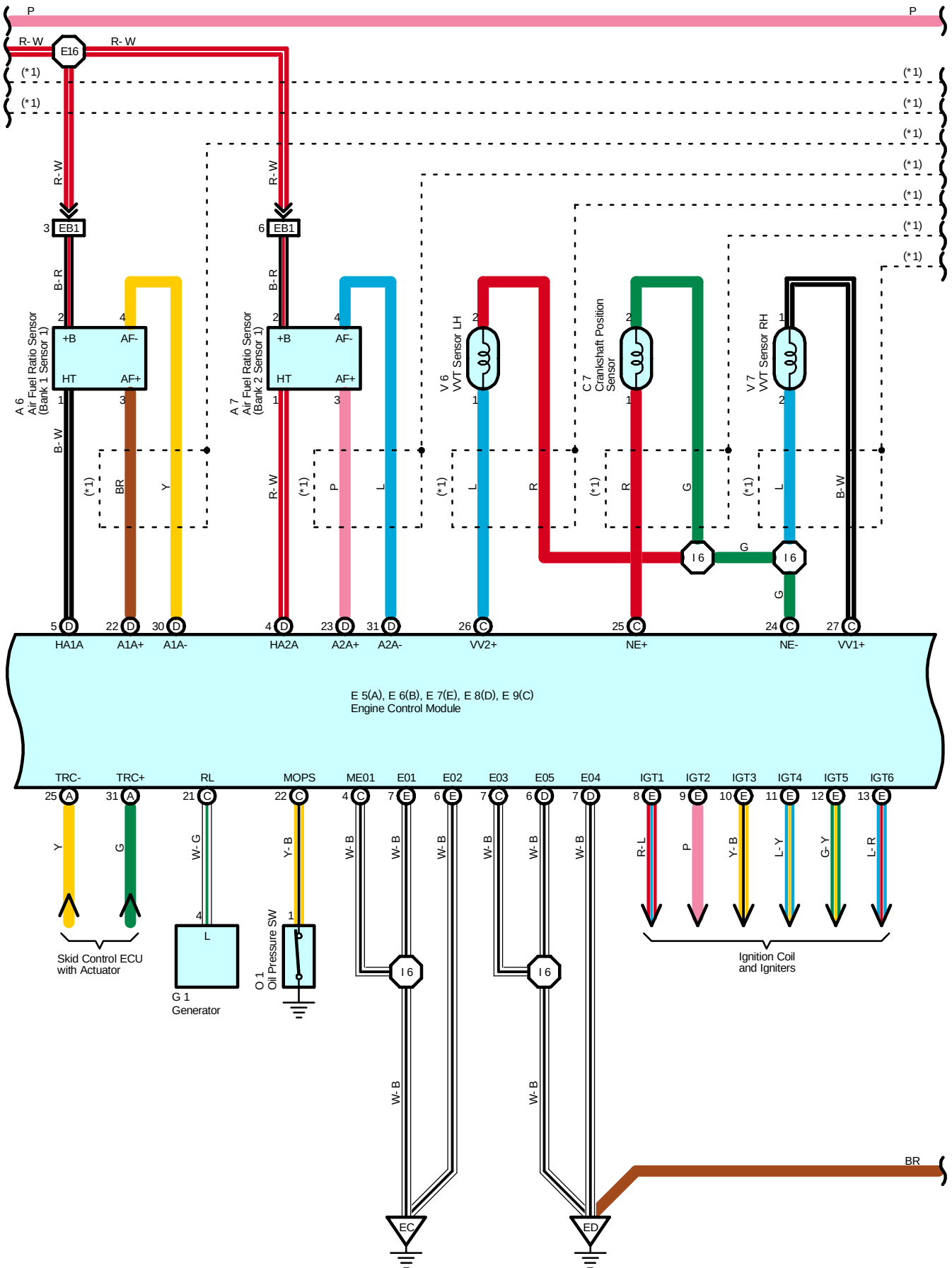


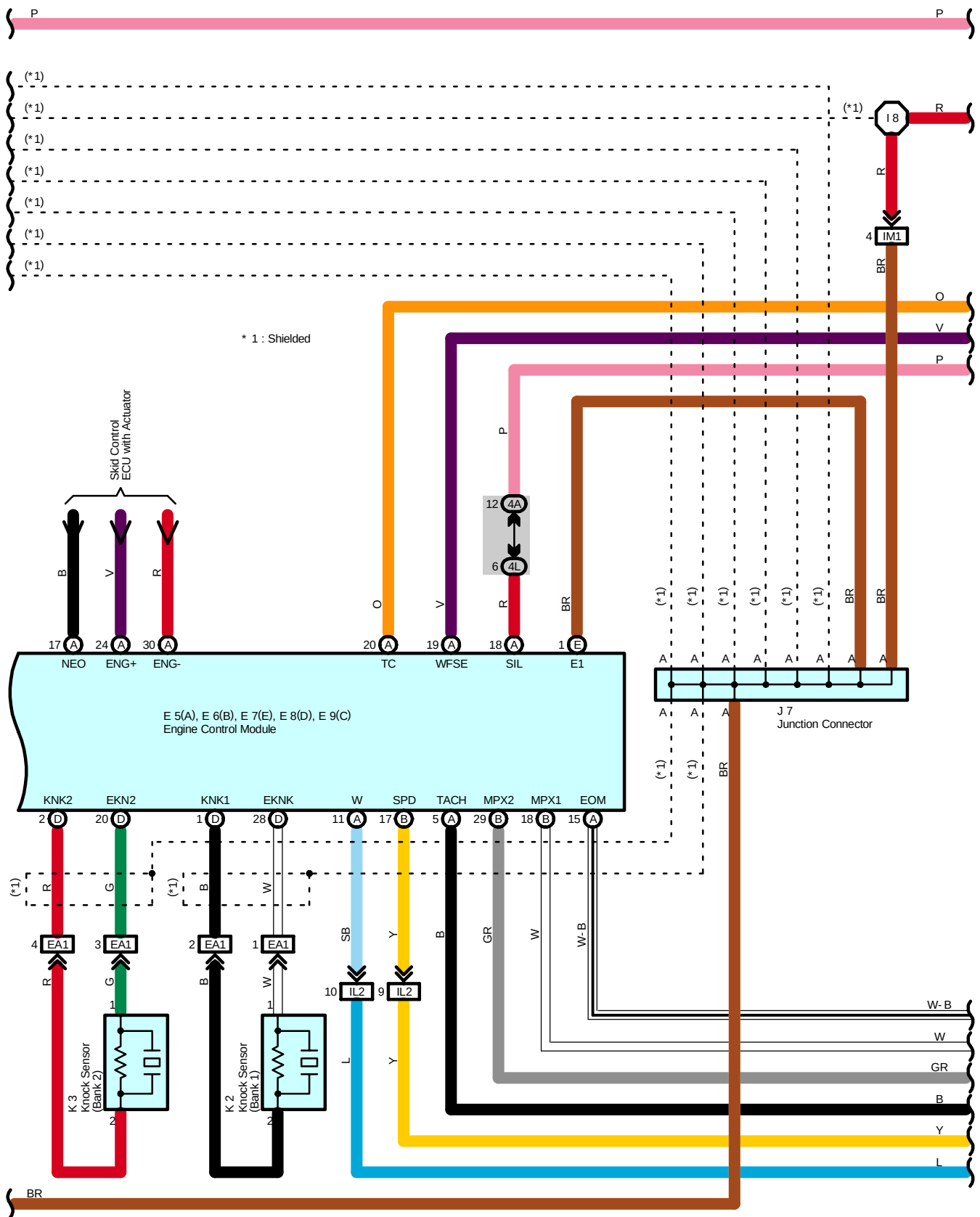
Engine Control for 3MZ-FE



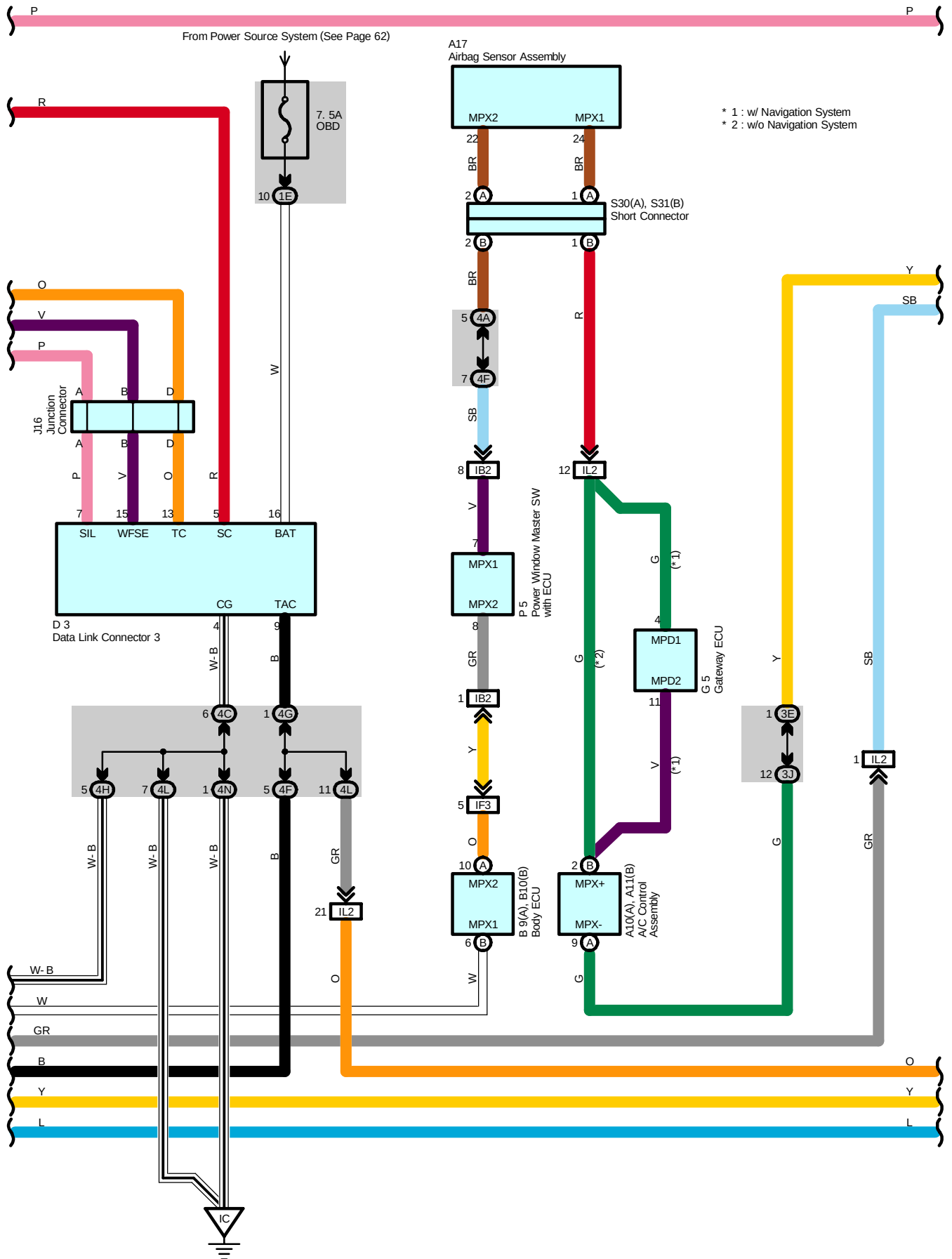


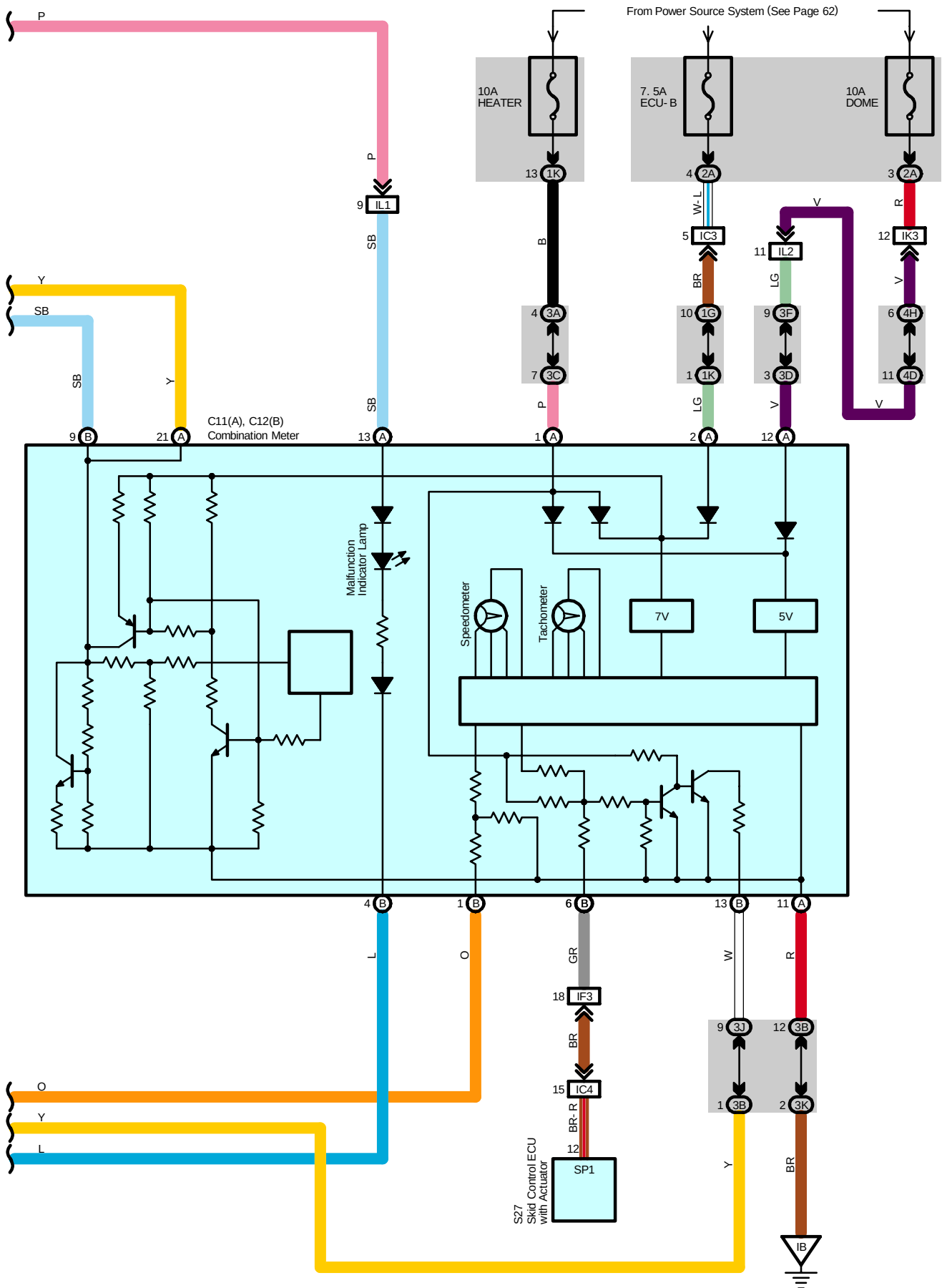
Engine Control for 3MZ-FE





Engine Control for 3MZ-FE





System Outline

The engine control system utilizes a microcomputer and maintains overall control of the engine, transmission etc. An outline of the engine control is given here.

1. Input Signals

(1) Engine coolant temp. signal circuit

The engine coolant temp. sensor detects the engine coolant temp. and has a built-in thermistor with a resistance, which varies according to the engine coolant temp. The engine coolant temp. which is input into TERMINAL THW of the engine control module as a control signal.

(2) Intake air temp. signal circuit

The intake air temp. sensor is installed in the mass air flow meter and detects the intake air temp. which is input as a control signal to TERMINAL THA of the engine control module.

(3) Vehicle speed signal circuit

The vehicle speed signal is input from the ABS speed sensor to skid control ECU with actuator, and are sent to the engine control module through communication control.

(4) RPM signal circuit

Camshaft position is detected by the VVT sensors and its signal is input to TERMINALS VV1+ and VV2+ of the engine control module as a control signal. Also, engine RPM is detected by the crankshaft position sensor and is input as a control signal to TERMINAL NE+.

(5) Throttle position signal circuit

The throttle control motor and sensor detects the throttle valve opening angle as a control signal, which is input into TERMINALS VTA1 and VTA2 of the engine control module.

(6) Battery signal circuit

Voltage is constantly applied to TERMINAL BATT of the engine control module. With the ignition SW turned on, the voltage for engine control module start-up power supply is applied to TERMINALS +B and +B2 of the engine control module via the EFI relay.

The current flowing through the IGN fuse flows to TERMINAL IGSW of the engine control module.

(7) Intake air volume signal circuit

Intake air volume is detected by the mass air flow meter and the signal is input to TERMINAL VG of the engine control module as a control signal.

(8) Stop light SW signal circuit

The stop light SW is used to detect whether the vehicle is braking or not and the signal is input into TERMINAL STP of the engine control module as a control signal.

(9) Starter signal circuit

To confirm whether the engine is cranking, the voltage is applied to the starter motor during cranking is detected and the signal is input into TERMINAL STA of the engine control module as a control signal.

(10) Engine knock signal circuit

Engine knocking is detected by knock sensors and the signal is input into TERMINALS KNK1 and KNK2 as a control signal.

(11) Air fuel ration signal circuit

The air fuel ration is detected and input as a control signal into TERMINALS A1A+ and A2A+ of the engine control module.

(12) Oxygen sensor signal circuit

The oxygen density in the exhaust gases is detected and input as a control signal into TERMINALS OX1B and OX2B of the engine control module.

To maintain stable detection performance by the heated oxygen sensor, a heater is used for warming the sensor. The heater is also controlled by the engine control module (HT1B and HT2B).

(13) Fuel cut in a collision

The system receives the collision signal from airbag sensor assembly in the vehicle has a collision and stops the fuel pump operation on the side of the engine control module.

2. Control System

* SFI system

The SFI system monitors the engine condition through the signals input from each sensor (Input signals from (1) to (12) etc.) to the engine control module. And the control signal is output to TERMINALS #10, #20, #30, #40, #50 and #60 of the engine control module to operate the injector (Inject the fuel). The SFI system controls the fuel injection operation by the engine control module in response to the driving conditions.

* ESA system

The ESA system monitors the engine condition through the signals input to the engine control module from each sensor (Input signals from (1) to (12) etc.). The best ignition timing is decided according to this data and the memorized data in the engine control module and the control signal is output to TERMINALS IGT1, IGT2, IGT3, IGT4, IGT5 and IGT6. This signal controls the igniter to provide the best ignition timing for the driving conditions.

* ACIS

The ACIS includes a valve in the bulkhead separating the surge tank into two parts. This valve is opened or closed according to the driving conditions to control the intake manifold length in three stages, for increased engine output in all ranges from low to high speeds, when idling.

3. Diagnosis System

With the diagnosis system, when there is a malfunction in the engine control module signal system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed by the malfunction indicator lamp.

4. Fail-Safe System

When a malfunction has occurred in any system, if there is a possibility of engine trouble being caused by continued control based on the signals from that system, the fail-safe system either controls the system by using data (Standard values) recorded in the engine control module memory or else stops the engine.

Service Hints

CIRCUIT OPENING Relay

5-3 : Closed with the starter running

EFI Relay

5-3 : Closed with the ignition SW at ON or ST position

E5 (A), E6 (B), E7 (E), E8 (D), E9 (C) Engine Control Module

Voltage at engine control module wiring connector

BATT-E1 : Always 9.0-14.0 volts

VC-E2 : Always 4.5-5.5 volts (Ignition SW at ON position)

VG-E2G : 1.1-1.5 volts (Engine idling and A/C SW off)

THA-E2 : 0.5-3.4 volts (Engine idling and intake air temp. 20°C, 68°F)

THW-E2 : 0.2-1.0 volts (Engine idling and coolant temp. 80°C, 176°F)

IGF-E1 : 4.5-5.5 volts (Ignition SW at ON position)

Pulse generation (Engine idling)

SIL-E1 : Pulse generation (During transmission)

TACH-E1 : Pulse generation (Engine idling)

STA-E1 : 6.0 volts or more (Engine cranking)

FC-E1 : 9.0-14.0 volts (Ignition SW at ON position)

0-3.0 volts (Engine idling)

SPD-E1 : Pulse generation (Ignition SW on and rotate driving wheel slowly)

W-E1 : Below 3.0 volts (Ignition SW at ON position)

NSW-E1 : 9.0-14.0 volts (Ignition SW on and other shift position in P or N position)

0-3.0 volts (Ignition SW on and shift position in P or N position)

PRG-E01 : 9.0-14.0 volts (Ignition SW at ON position)

TC-E1 : 9.0-14.0 volts (Ignition SW at ON position)

STP-E1 : 7.5-14.0 volts (Ignition SW on and brake pedal depressed)

0-1.5 volts (Ignition SW on and brake pedal depressed)

PTNK-E1 : 3.0-3.6 volts (Ignition SW at ON position)

1.3-2.1 volts (Ignition SW on and apply vacuum 2.0 kpa)

OX1B, OX2B-E1 : Pulse generation (Maintain engine speed at 2500 rpm for two minutes after warming up)

KNK1, KNK2-E1 : Pulse generation (Engine idling)

IGT1, IGT2, IGT3, IGT4, IGT5, IGT6-E1 : Pulse generation (Engine idling)

#10, #20, #30, #40, #50, #60-E01 : 9.0-14.0 volts (ignition SW at ON position)

Pulse generation (Engine idling)

Engine Control for 3MZ-FE

○ : PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A6		38 (3MZ-FE)	E9	C	42	P1	39 (3MZ-FE)	
A7		38 (3MZ-FE)	F12		44	P2	39 (3MZ-FE)	
A10	A	42	G1		38 (3MZ-FE)	P5	44	
A11	B	42	G5		43	S15	43	
A17		42	H6		38 (3MZ-FE)	S27		39 (3MZ-FE)
A27		42	H10		43	S28	A	43
B9	A	42	I8		39 (3MZ-FE)	S29	B	43
B10	B	42	I9		39 (3MZ-FE)	S30	A	43
C3		38 (3MZ-FE)	I10		39 (3MZ-FE)	S31	B	43
C4		38 (3MZ-FE)	I11		39 (3MZ-FE)	T3		39 (3MZ-FE)
C6		38 (3MZ-FE)	I12		39 (3MZ-FE)	T13		39 (3MZ-FE)
C7		38 (3MZ-FE)	I13		39 (3MZ-FE)	T14		43
C11	A	42	J2		39 (3MZ-FE)	V2	39 (3MZ-FE)	
C12	B	42	J3		39 (3MZ-FE)	V4	39 (3MZ-FE)	
D3		42	J7		43	V5	39 (3MZ-FE)	
E2		38 (3MZ-FE)	J16		43	V6	39 (3MZ-FE)	
E5	A	42	K2		39 (3MZ-FE)	V7	39 (3MZ-FE)	
E6	B	42	K3		39 (3MZ-FE)	V11	45	
E7	E	42	M1		39 (3MZ-FE)	V14	45	
E8	D	42	O1		39 (3MZ-FE)	V15	45	

○ : RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	24	R/B No.1 (Lower Finish Panel)
2	22	Engine Room R/B (Engine Compartment Left)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	29	Cowl Wire and Instrument Panel J/B (Lower Finish Panel)
1G		
1K	28	Instrument Panel Wire and Instrument Panel J/B (Lower Finish Panel)
2A	27	Engine Room Main Wire and Engine Room J/B (Engine Compartment Left)
2B		
2D		
2F		
2G		
3A	30	Instrument Panel Wire and Center J/B (Behind the Instrument Panel Center)
3B		
3C		
3D		
3E		
3F	31	
3J		
3K		
4A	33	Cowl Wire and Passenger Side J/B (Right Side of Grove Box)
4C		
4D		
4E		
4F		
4G		
4H		
4L	32	
4M		
4N		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	48 (3MZ-FE)	Engine Wire and Sensor Wire (Right Side of Cylinder Head)
EB1	48 (3MZ-FE)	Engine Wire and Engine Room Main Wire (Front Side of Engine Room R/B)
EB2		
IA1	52	Cowl Wire and Floor No.2 Wire (Left Kick Panel)
IA2		
IB2	52	Front Door LH Wire and Cowl Wire (Left Kick Panel)
IC1	52	Engine Room Main Wire and Cowl Wire (Left Cowl Side Panel)
IC2		
IC3		
IC4		
IF3	52	Instrument Panel Wire and Cowl Wire (Right Side of Instrument Panel J/B)
IK2	54	Engine Room Main Wire and Cowl Wire (Right Cowl Side Panel)
IK3		
IL1	54	Instrument Panel Wire and Cowl Wire (Upper Side of Passenger Side J/B)
IL2		
IM1	54	Engine Wire and Cowl Wire (Right Kick Panel)
IO1	54	Cowl Wire and Floor Wire (Right Kick Panel)
BI1	56	Floor No.4 Wire and Fuel Tank Wire (Right Side of Rear Floor Crossmember)
BJ1	56	Floor Wire and Floor No.4 Wire (Right Side of Rear Floor Crossmember)

Engine Control for 3MZ-FE



: GROUND POINTS

Code	See Page	Ground Points Location
EC	48 (3MZ-FE)	Left Side of Cylinder Head
ED	48 (3MZ-FE)	Rear Side of Cylinder Head
EH	48 (3MZ-FE)	Under the Left Headlight
IB	52	Right Instrument Panel Brace
IC	52	Right Cowl Side Panel
BC	56	Left Side of Rear Cross Member



: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E6	48 (3MZ-FE)	Engine Wire	I6	54	Engine Wire
E7			I7	54	Cowl Wire
E14			I8		
E16	48 (3MZ-FE)	Engine Room Main Wire	I9		

