

FUEL SYSTEM

CONTENTS

N14AA-

AUTO-CRUISE CONTROL SYSTEM	109	Self-Diagnosis	58
AUTO-CRUISE CONTROL	140	Throttle Position Sensor	63
SERVICE ADJUSTMENT PROCEDURES	135	Vehicle Speed Sensor	64
Accelerator Cable, Throttle Cable and Auto-cruise		MPI SYSTEM INSPECTION <2.0L DOHC Engine>	68
Control Cable Inspection and Adjustment	136	Air Conditioner Power Relay	82
Auto-cruise Control System Inspection	135	Air Conditioner Switch	79
Individual Parts Inspection	137	Components Location	68
SPECIFICATIONS	109	Control Relay	81
General Specifications	109	EGR Control Solenoid Valve	82
Service Specifications	109	EGR Temperature Sensor	79
Torque Specifications	109	Engine Coolant Temperature Sensor	76
TROUBLESHOOTING	110	Fuel Pressure Control Valve	82
Auto-Cruise Control Circuit	128	Idle Position Switch	77
Auto-cruise Control Components Location	126	Idle Speed Control Servo	79
Auto-cruise Control Related Harnesses	125	Injectors	79
Check Chart	114	Intake Air Temperature Sensor	76
Input Check	123	Malfunction Indicator Light	72
Self-diagnosis Check	121	Oxygen Sensor	78
Troubleshooting Quick-reference Chart	110	Power Steering Oil Pressure Switch	79
ENGINE CONTROL	105	Power Transistor	82
ENGINE CONTROL	107	Purge Control Solenoid Valve	82
SERVICE ADJUSTMENT PROCEDURES	106	Self-Diagnosis	73
Accelerator Cable Inspection and Adjustment	106	Throttle Position Sensor	77
Accelerator Switch Inspection and Adjustment	106	Vehicle Speed Sensor	79
SPECIFICATIONS	105	SERVICE ADJUSTMENT PROCEDURES	
Lubricants	105	<1.8L Engine>	41
Sealant	105	Curb Idle Speed Inspection	41
Service Specifications	105	EGR Valve Control Vacuum Check	47
Torque Specifications	105	Fuel Pressure Test	44
TROUBLESHOOTING	105	Fuel Pump Operation Check	44
FUEL SYSTEM	2	Idle Speed Control and Throttle Position	
FUEL FILTER	104	Sensor Adjustment	41
FUEL LINE AND VAPOR LINE	102	Purge Port Vacuum Check	47
FUEL PUMP, FUEL GAUGE UNIT AND		Release of Residual Pressure from	
OVERFILL LIMITER (TWO-WAY VALVE) <AWD>	101	High Pressure Fuel Hose	44
FUEL PUMP, FUEL GAUGE UNIT AND		Throttle Body (Throttle Valve Area) Cleaning	43
OVERFILL LIMITER (TWO-WAY VALVE) <FWD>	99	SERVICE ADJUSTMENT PROCEDURES	
FUEL TANK <AWD>	97	<2.0L DOHC Engine>	48
FUEL TANK <FWD>	93	Basic Idle Speed Adjustment	48
INJECTOR	83	Curb Idle Speed Inspection	48
MPI SYSTEM INSPECTION <1.8L Engine>	56	EGR Valve Control Vacuum Check	55
Air Conditioner Switch	64	Fuel Pressure Test	52
Air Conditioner Power Relay	67	Fuel Pump Operation Check	51
Components Location	56	Idle Position Switch Adjustment	52
Control Relay	66	Purge Port Vacuum Check	55
EGR Control Solenoid Valve	67	Release of Residual Pressure from	
EGR Temperature Sensor	64	High Pressure Fuel Hose	51
Engine Coolant Temperature Sensor	62	Throttle Body (Throttle Valve Area) Cleaning	51
Idle Position Switch	63	Throttle Position Sensor Adjustment	50
Idle Speed Control Servo	65	SPECIAL TOOLS	6
Inhibitor Switch	65	SPECIFICATIONS	2
Injectors	65	General Specifications	2
Intake Air Temperature Sensor	62	Sealant and Adhesive	5
Malfunction Indicator Light	58	Service Specifications	4
Motor Position Sensor	63	Torque Specifications	5
Oxygen Sensor	64	THROTTLE BODY <1.8L Engine>	85
Power Steering Oil Pressure Switch	65	THROTTLE BODY <2.0L DOHC Engine>	89
Power Transistor	67	TROUBLESHOOTING	6
Purge Control Solenoid Valve	67		

FUEL SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

N14CA--

<1.8L Engine>

Items	Specifications
Fuel Tank capacity Return system Filter	liter (gal.) 60 (15.9) Equipped High pressure type
Fuel pump Type Driven by	Electrical, in-tank type Electric motor
Throttle body Throttle bore Throttle position sensor Idle speed control servo Idle position switch Motor position sensor	mm (in.) 50 (1.97) Variable resistor type Electric motor Contact type, within idle speed control servo Variable resistor type
Engine control unit Identification model No. For Federal and Canada For California	E2T33674 E2T33673
Sensors Air flow sensor Barometric pressure sensor Intake air temperature sensor Engine coolant temperature sensor Oxygen sensor Vehicle speed sensor Inhibitor switch No. 1 cylinder top dead center sensor Crank angle sensor EGR temperature sensor <California>	Karman vortex type Semiconductor diffusion type Thermistor type Thermistor type Zirconia type Reed switch type Contact switch type Photo interrupter type Photo interrupter type Thermistor type
Actuators Control relay type Injector type and number Injector identification mark Purge control solenoid valve EGR control solenoid valve <California>	Contact switch type Electromagnetic, 4 N210H ON/OFF type solenoid valve Duty cycle type solenoid valve
Fuel pressure regulator Regulated pressure	kPa (psi) 335 (47.6)

Items	Specifications
Injector coil resistance Ω <Non-Turbo> <Turbo>	13–16 [at 20°C (68°F)] 2–3 [at 20°C (68°F)]

TORQUE SPECIFICATIONS

N14CC-A

Items	Nm	ft.lbs.
Center cover	2.5–3.5	2–3
Oxygen sensor	40–50	30–36
Engine coolant temperature sensor	20–40	15–29
Throttle position sensor attaching screws	1.5–2.5	1.1–1.8
Idle speed control servo attaching screws <2.0L DOHC Engine>	2.5–4.5	1.8–3.3
Delivery pipe mounting bolts	10–13	7–9
High-pressure fuel hose to delivery pipe	4–6	3–4
Fuel pressure regulator to delivery pipe <1.8L Engine>	7–11	5–8
<2.0L DOHC Engine>	8–10	6–7
Accelerator cable clamp	10–13	7–9
Throttle body mounting bolts and nuts	15–22	11–16
Throttle body stay mounting nut <Turbo>	15–22	11–16
Accelerator cable adjusting bolts	4–6	3–4
Lateral rod attaching bolt	80–100	57–72
Self-locking nut	21–31	15–22
Fuel tank drain plug	15–20	11–14
Electrical fuel pump		
Screws	2–3	1.4–2.2
Bolt (at lower side)	9–14	6.5–10
Fuel gauge unit mounting screws	2–3	1.4–2.2
High pressure hose to electrical fuel pump	30–40	22–29
High pressure hose to fuel main pipe	30–40	22–29
Battery tray to battery	2–3	1.5–2
Battery tray mounting bolt	9–14	7–14
Fuel main pipe to fuel filter	30–40	22–29
Eye bolt	25–35	18–25
Fuel filter mounting bolts	9–14	7–10
Fuel pipes clip attaching bolt	9–14	7–10
Vapor pipe assembly mounting bolt	9–14	7–10
Canister holder mounting bolt	9–14	7–10

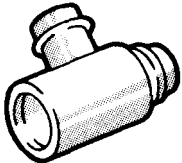
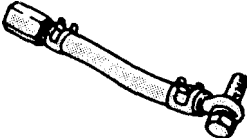
SEALANT AND ADHESIVE

N14CE-A

Items	Specified sealant
Engine coolant temperature sensor threaded portion	MOPAR Part No.4318034 or equivalent
Fuel tank hole cover <AWD>	MOPAR Rope Caulk Sealer 3/16 × 80" roll Part No. 4026044 or equivalent

SPECIAL TOOLS

N14DA-B

Tool	Number	Name	Use
	MD998742	Hose adapter	<ul style="list-style-type: none"> Measurement of fuel pressure (to be used together with MD998709)
	MD998709	Adapter hose	<ul style="list-style-type: none"> Measurement of fuel pressure (to be used together with MD998742)

TROUBLESHOOTING

N14E8BH

When checking and correcting engine troubles, it is important to start with inspection of the basic systems.

In case you have such troubles as (1) engine start failure, (2) rough idling or (3) poor acceleration, therefore, you should first check the following basic systems:

- (1) Power supply
 - Battery
 - Fusible link
 - Fuse
- (2) Body ground
- (3) Fuel supply
 - Fuel line
 - Fuel filter
 - Fuel pump

- (4) Ignition system
 - Spark plugs
 - High tension cable
 - Distributor <1.8L Engine>
 - Crank angle sensor <2.0L DOHC Engine>
 - Ignition coil
- (5) Emission control system
 - Crankcase ventilation system
 - Exhaust gas recirculation system
 - Vacuum leak
- (6) Others
 - Ignition timing
 - Idle speed

Troubles with the MPI system are often caused by poor contact of harness connector. It is, therefore, important to check harness connector contact.

Symptom	Probable cause	Remedy
Engine will not start or start too hard (Crank OK)	Trouble in the MPI system	Check for output of self-diagnosis code. Read the code with a voltmeter.
	Malfunction of the fuel pump drive control system	Check the fuel pump drive control system and the fuel pump.
	Malfunction of the ignition timing control system	Check the ignition timing.
	Malfunction of the power transistor	Check the power transistor as a single unit.
	Power is not supplied to the engine control unit.	Check the power supply circuit.
	Malfunction of the control relay	Replace.
	Malfunction of the injector	Check the injector drive circuit. Check the injector as a single unit.
	The fuel pressure is not proper.	Check the fuel pressure.
	Vacuum hose disconnected or damaged	Repair or replace.
	Malfunction of the engine control unit	Replace.
	Wire breakage or short circuit occurs in the harness, or the connector is improperly connected.	Repair or replace.
Rough idle or engine stumbles	Trouble in the MPI system	Check for output of self-diagnosis code. Read the code with a voltmeter.
	Malfunction of the sensor <ul style="list-style-type: none"> ● Intake air temperature sensor ● Engine coolant temperature sensor ● Barometric pressure sensor ● Ignition switch ● Idle position switch ● Throttle position sensor ● No. 1 cylinder TDC sensor, crank angle sensor <1.8L Engine> ● TDC sensor, crank angle sensor <2.0L DOHC Engine> ● Power steering oil pressure switch ● Air conditioner switch ● Inhibitor switch <A/T> ● Motor position sensor <1.8L Engine> ● Air flow sensor ● Oxygen sensor 	Check the sensor-related circuit. Check the sensor as a single unit
	Malfunction of the engine control system <ul style="list-style-type: none"> ● Stepper motor <2.0L DOHC Engine> ● Injector ● Power transistor 	Check the actuator-related circuit. Check the actuator as a single unit.

Symptom	Probable cause	Remedy
Rough idle or engine unstable	Malfunction of the vehicle speed reed switch	Check the vehicle speed reed switch.
	The fuel pressure is not proper.	Check the fuel pressure.
	Vacuum hose disconnected or damaged.	Repair or replace.
	Malfunction of the engine control unit.	Replace.
	Wire breakage or short circuit occurs in the harness, or the connector is improperly connected.	Repair or replace.
Engine hesitates or poor acceleration	Trouble in the MPI system	Check for output of self-diagnosis code. Read the code with a voltmeter.
	Malfunction of the sensor <ul style="list-style-type: none"> ● Intake air temperature sensor ● Engine coolant temperature sensor ● Barometric pressure sensor ● Ignition switch ● Idle position switch ● Throttle position sensor ● No. 1 cylinder TDC sensor, crank angle sensor <1.8L Engine> ● TDC sensor, crank angle sensor <2.0L DOHC Engine> ● Power steering oil pressure switch ● Air conditioner switch ● Inhibitor switch <A/T> ● Motor position sensor <1.8L Engine> ● Air flow sensor ● Oxygen sensor 	Check the sensor-related circuit. Check the sensor as a single unit.
	Malfunction of the engine control system <ul style="list-style-type: none"> ● Stepper motor <2.0L DOHC Engine> ● Injector ● Power transistor 	Check the actuator-related circuit. Check the actuator as a single unit.
	Malfunction of the air conditioner power relay control system	Check the system, and the components if the system is found defective.
	The fuel pressure is not proper.	Check the fuel pressure.
	Vacuum hose disconnected or damaged.	Repair or replace.
	Malfunction of the engine control unit.	Replace.
	Wire breakage or short circuit occurs in the harness, or the connector is improperly connected.	Repair or replace.

Symptom	Probable cause	Remedy
Poor fuel mileage	Trouble in the MPI system	Check for output of self-diagnosis code. Read the code with a voltmeter.
	Malfunction of the sensor <ul style="list-style-type: none"> ● Intake air temperature sensor ● Engine coolant temperature sensor ● Barometric pressure sensor ● Ignition switch ● Idle position switch ● Throttle position sensor ● No. 1 cylinder TDC sensor, crank angle sensor <1.8L Engine> ● TDC sensor, crank angle sensor <2.0L DOHC Engine> ● Power steering oil pressure switch ● Air conditioner switch ● Inhibitor switch <A/T> ● Motor position sensor <1.8L Engine> ● Air flow sensor ● Oxygen sensor 	Check the sensor-related circuit. Check the sensor as a single unit.
	Malfunction of the engine control system <ul style="list-style-type: none"> ● Stepper motor <2.0L DOHC Engine> ● Injector ● Power transistor 	Check the actuator-related circuit. Check the actuator as a single unit.
	The fuel pressure is not proper.	Check the fuel pressure.

CONTROL FUNCTIONS

N14EE-

<1.8L Engine>

Functional elements		Function	Air-fuel mixture control	Ignition timing control	Idle speed control	Air conditioner power relay control	Fuel pump drive control	Purge control	EGR control
In-put	Power supply (Ignition switch coupled)		X	X	X	X	X	X	X
	Power supply (battery backup)		X	X	X	X	X	X	X
	Air flow sensor		X	X				X	X
	Barometric pressure sensor		X	X				X	
	Intake air temperature sensor		X	X				X	
	Engine coolant temperature sensor		X	X	X			X	X
	Throttle position sensor		X	X	X	X*			
	Idle position switch		X	X	X				
	Motor position sensor				X				
	No. 1 cylinder TDC sensor		X						
	Crank angle sensor		X	X	X	X	X	X	X
	Oxygen sensor		X						
	Vehicle speed sensor			X	X				
	Air conditioner switch				X	X*		X	
	Inhibitor switch <A/T>			X	X	X*			
	Ignition switch ST terminal (start signal)		X	X	X				
Power steering oil pressure switch				X					
Out-put	Injector		X						
	Idle speed control servo				X				
	Power transistor			X					
	Air conditioner power relay					X			
	Control relay						X		
	Purge control solenoid valve							X	
	EGR control solenoid valve <California>								X

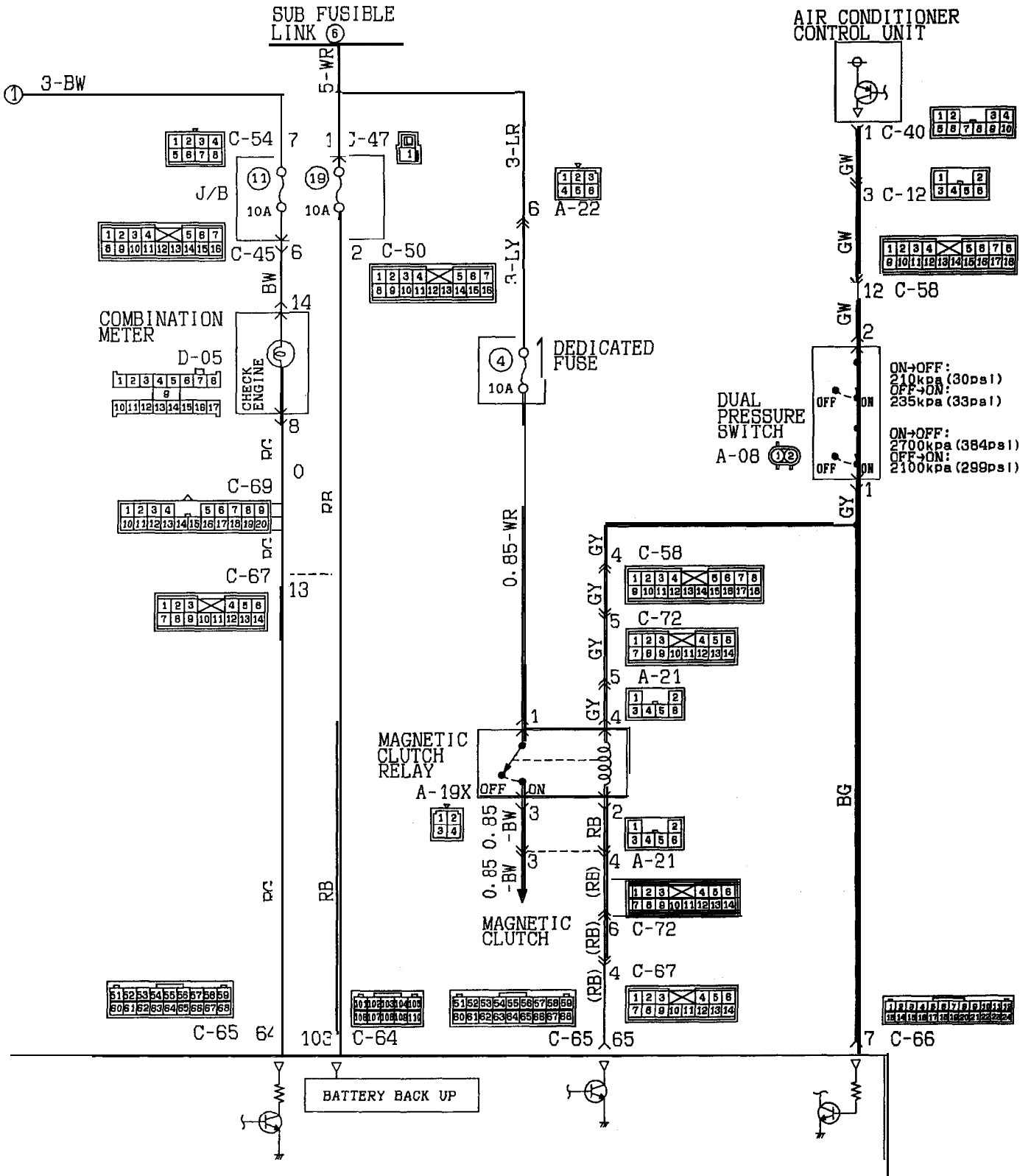
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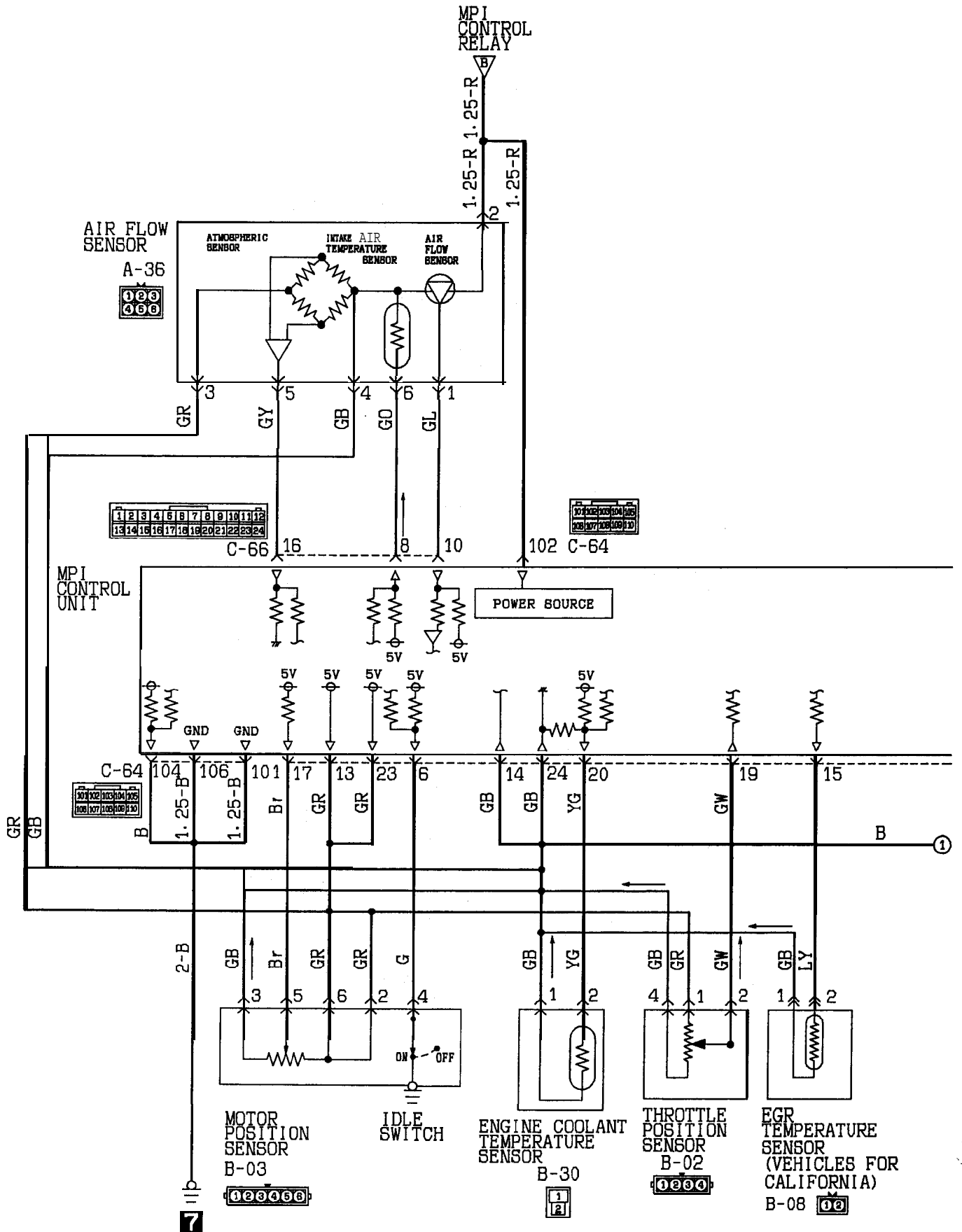
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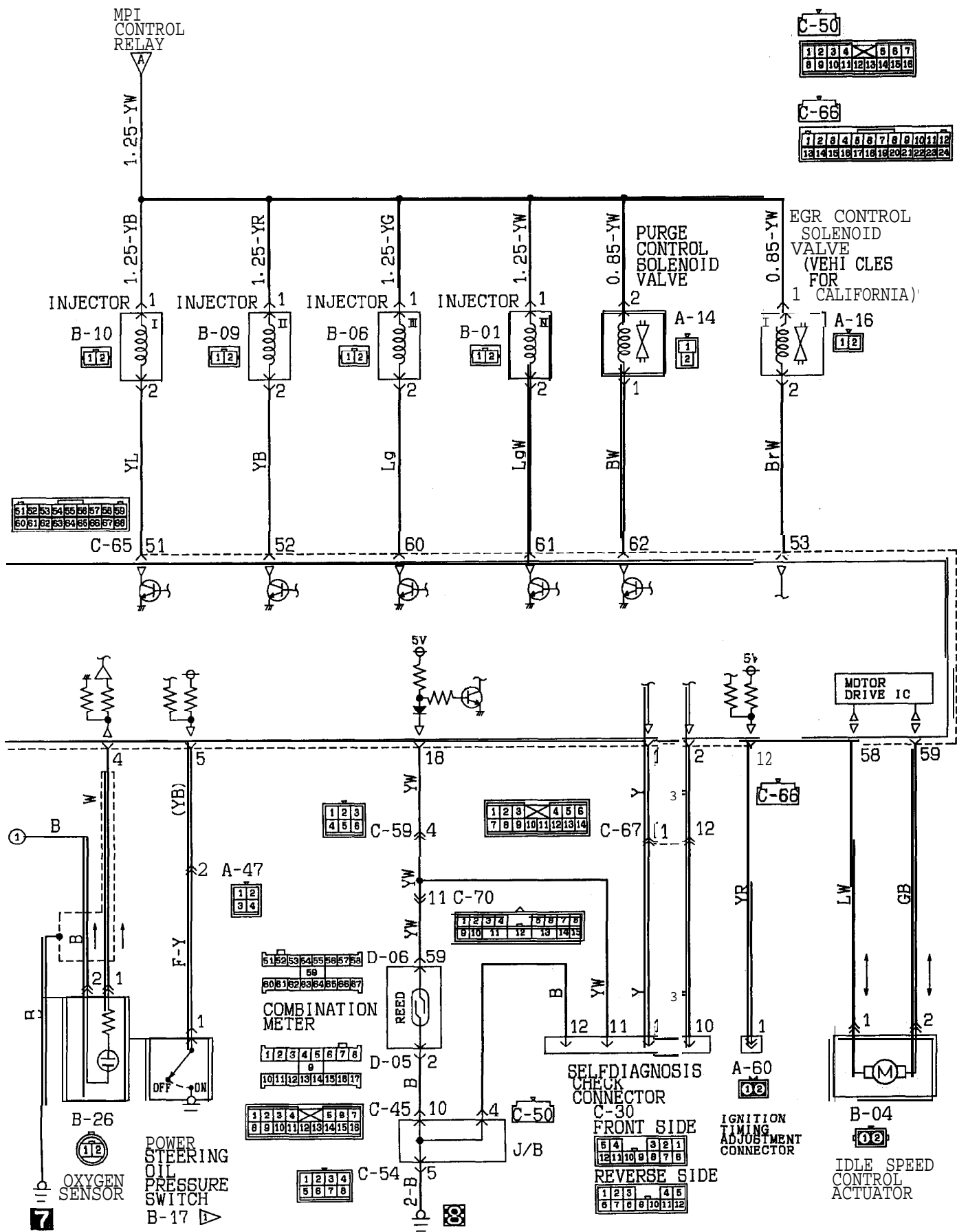
<2.0L DOHC Engine>

Functional elements		Function	Air-fuel mixture control	Ignition timing control	Idle speed control	Air conditioner power relay control	Fuel pump drive control	Fuel pressure control	Purge air control	EGR control
Input	Power supply (ignition switch coupled)		X	X	X	X	X	X	X	X
	Power supply (battery backup)		X	X	X	X	X	X	X	X
	Air flow sensor		X	X	X				X	X
	Barometric pressure sensor		X	X					X	
	Intake air temperature sensor		X	X	X			X	X	
	Engine coolant temperature sensor		X	X	X			X	X	X
	Throttle position sensor		X		X	X*				
	Idle position switch		X	X	X					
	Top dead center sensor		X	X						
	Crank angle sensor		X	X	X	X	X		X	X
	Oxygen sensor		X							
	Vehicle speed sensor			X	X					
	Air conditioner switch				X	X*			X	
	Power steering oil pressure switch				X					
	Detonation sensor <Turbo>			X						
	Ignition switch		X	X	X					
	Ignition switch ST terminal		X	X	X					
Inhibitor switch <A/T>			X	X	X*					
Output	Injector		X							
	Resistor <Turbo>		X							
	Idle speed control servo				X					
	Power transistor			X						
	Air conditioner power relay					X				
	Control relay						X			
	Fuel pressure control valve <Turbo>							X		
	Purge control solenoid valve								X	
EGR control solenoid valve <California>									X	

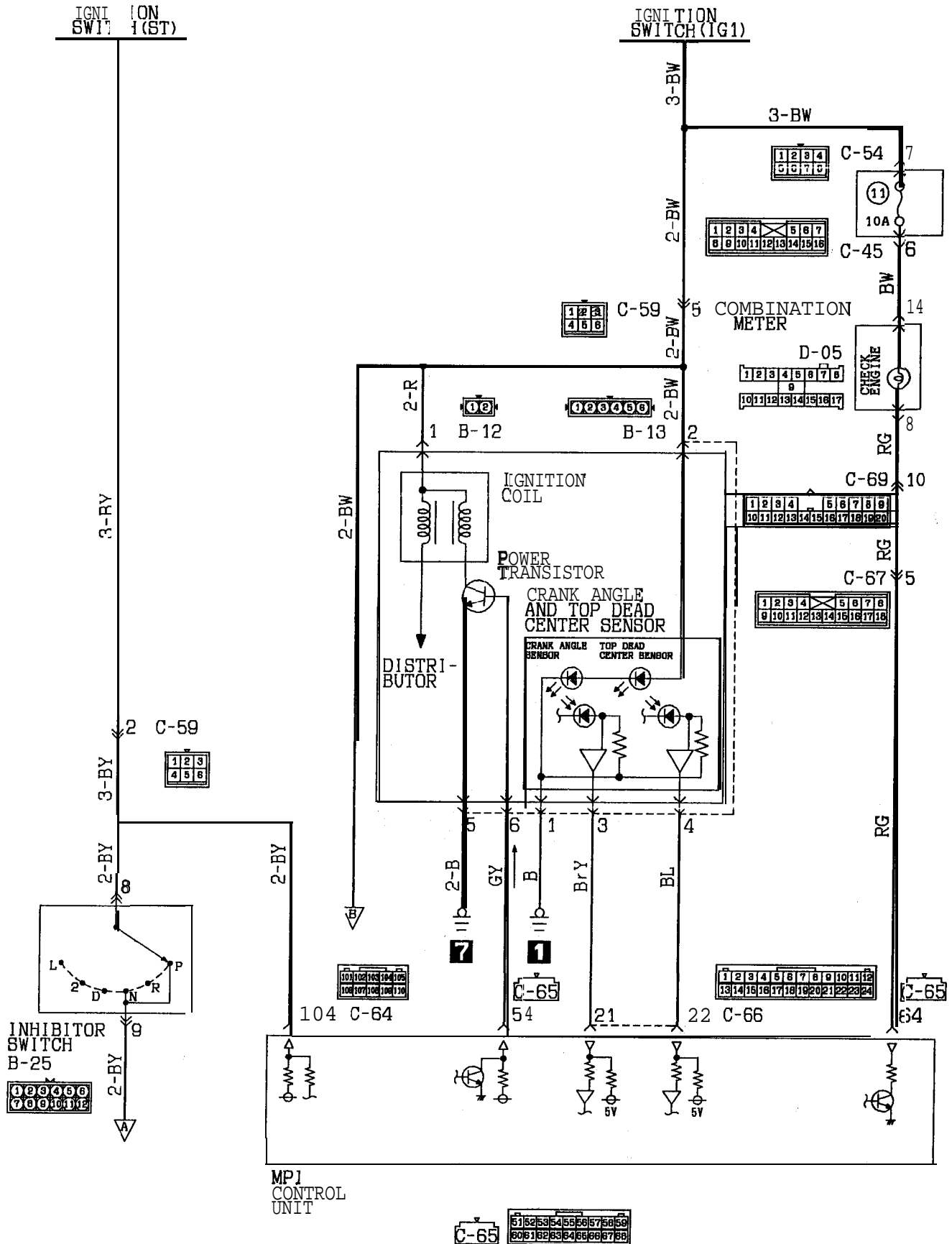
NOTE
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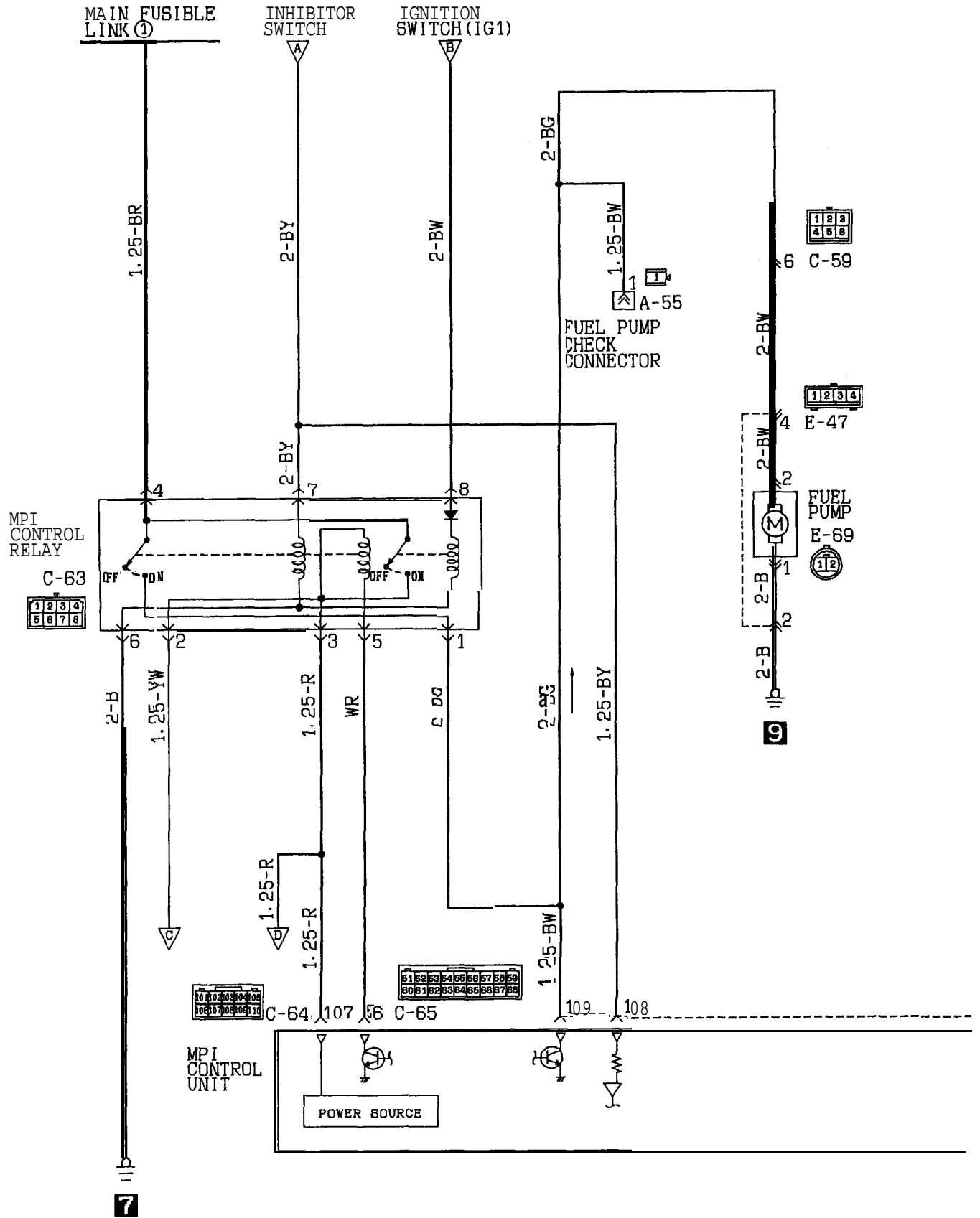


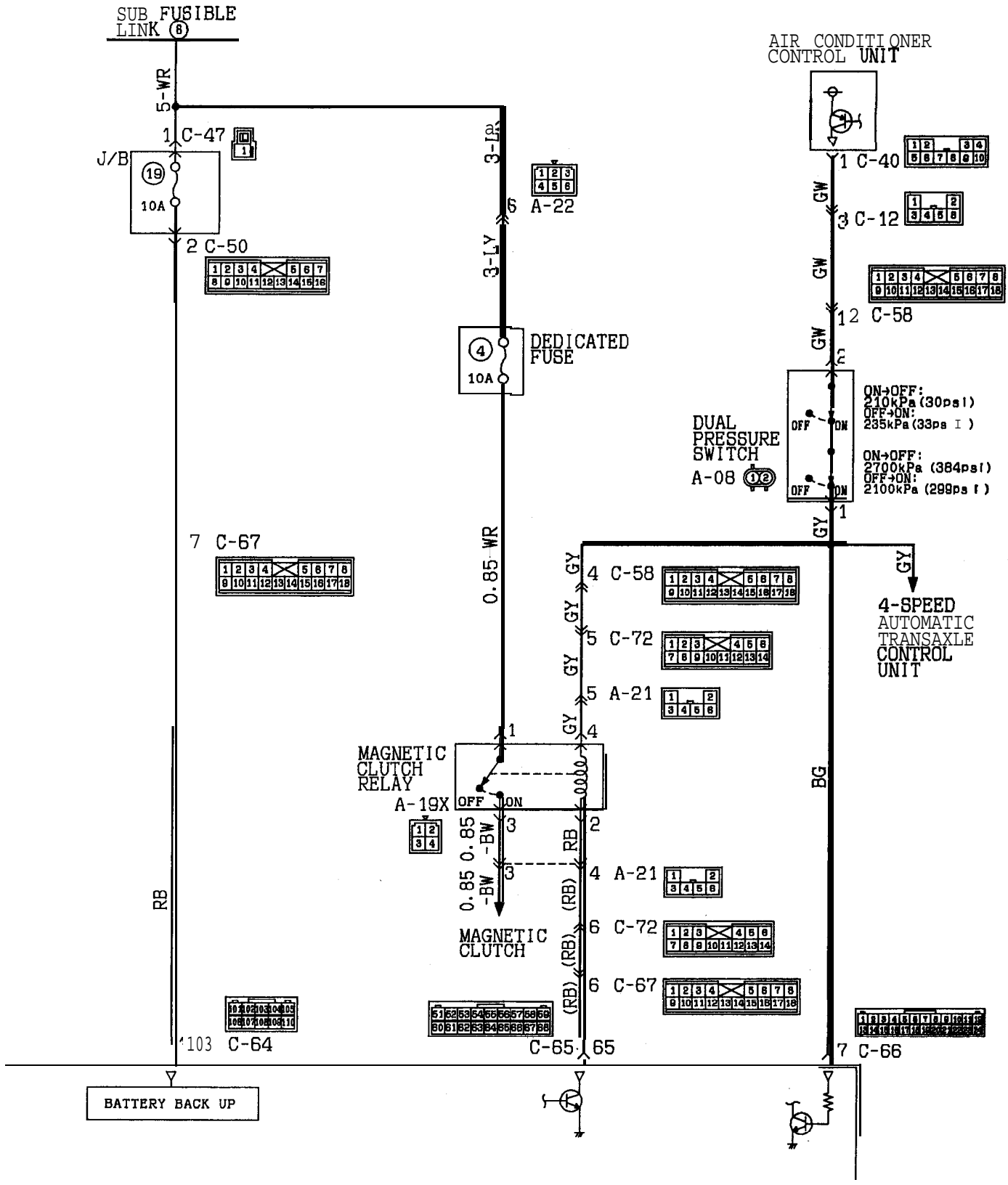


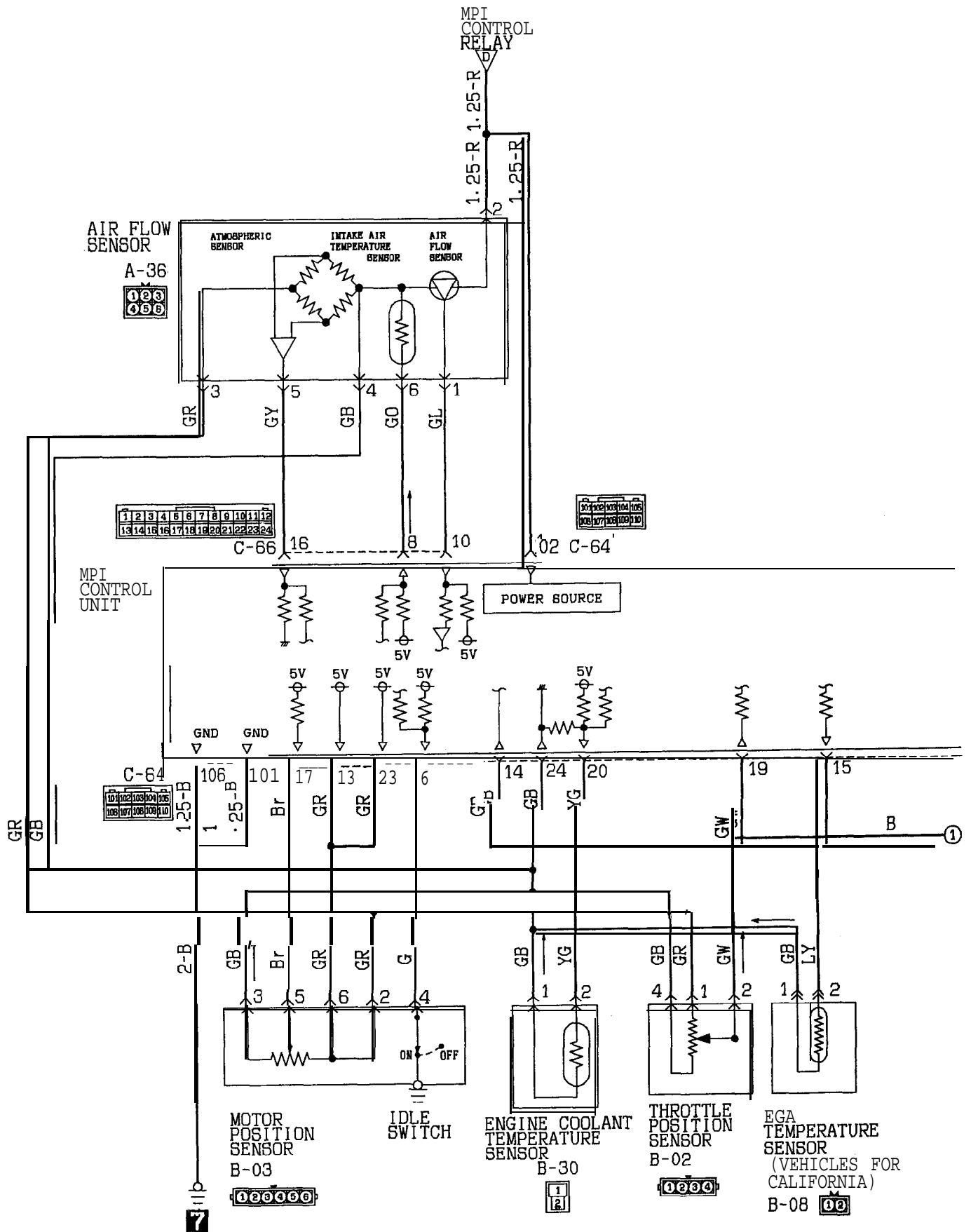


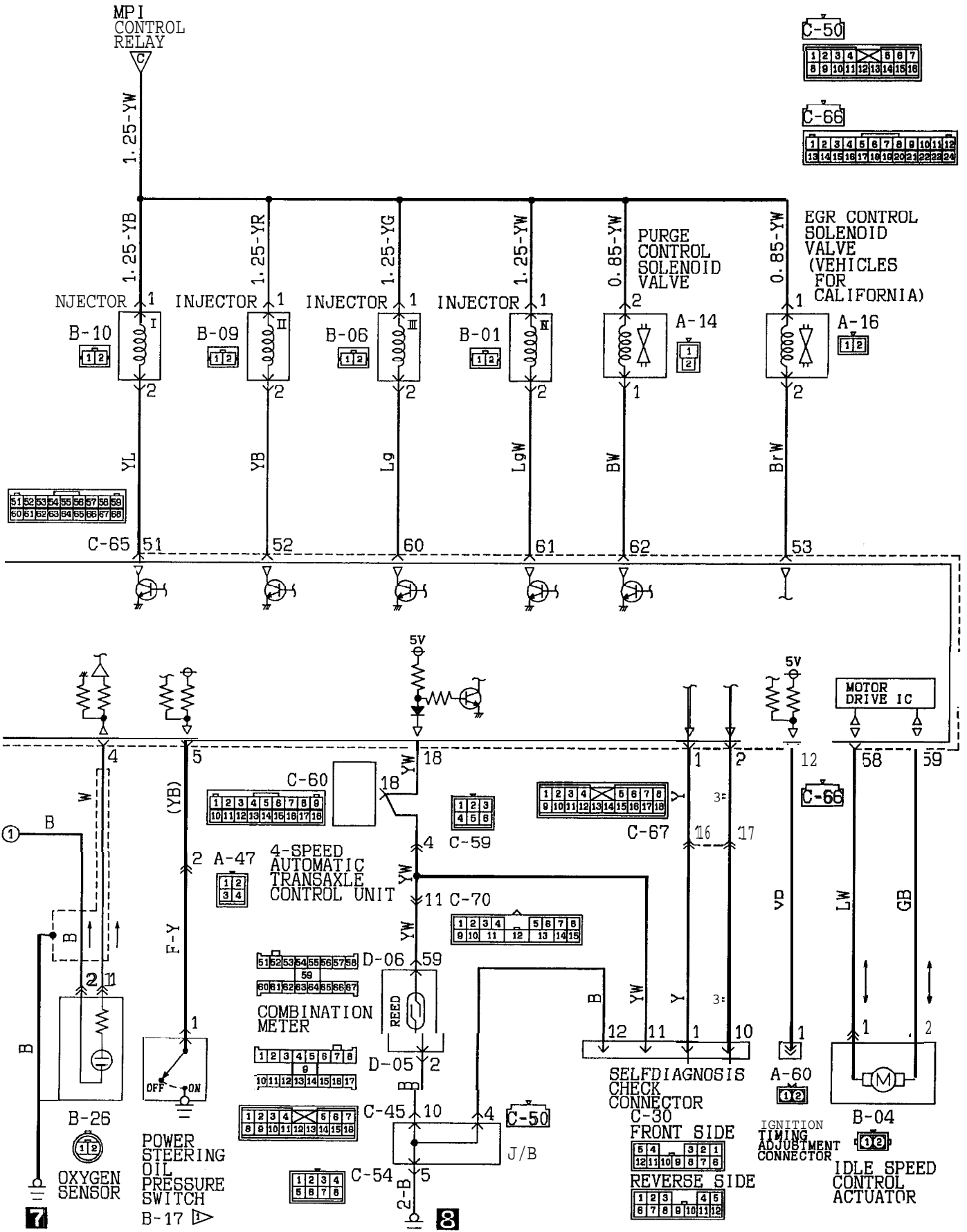
1.8L Engine <A/T>



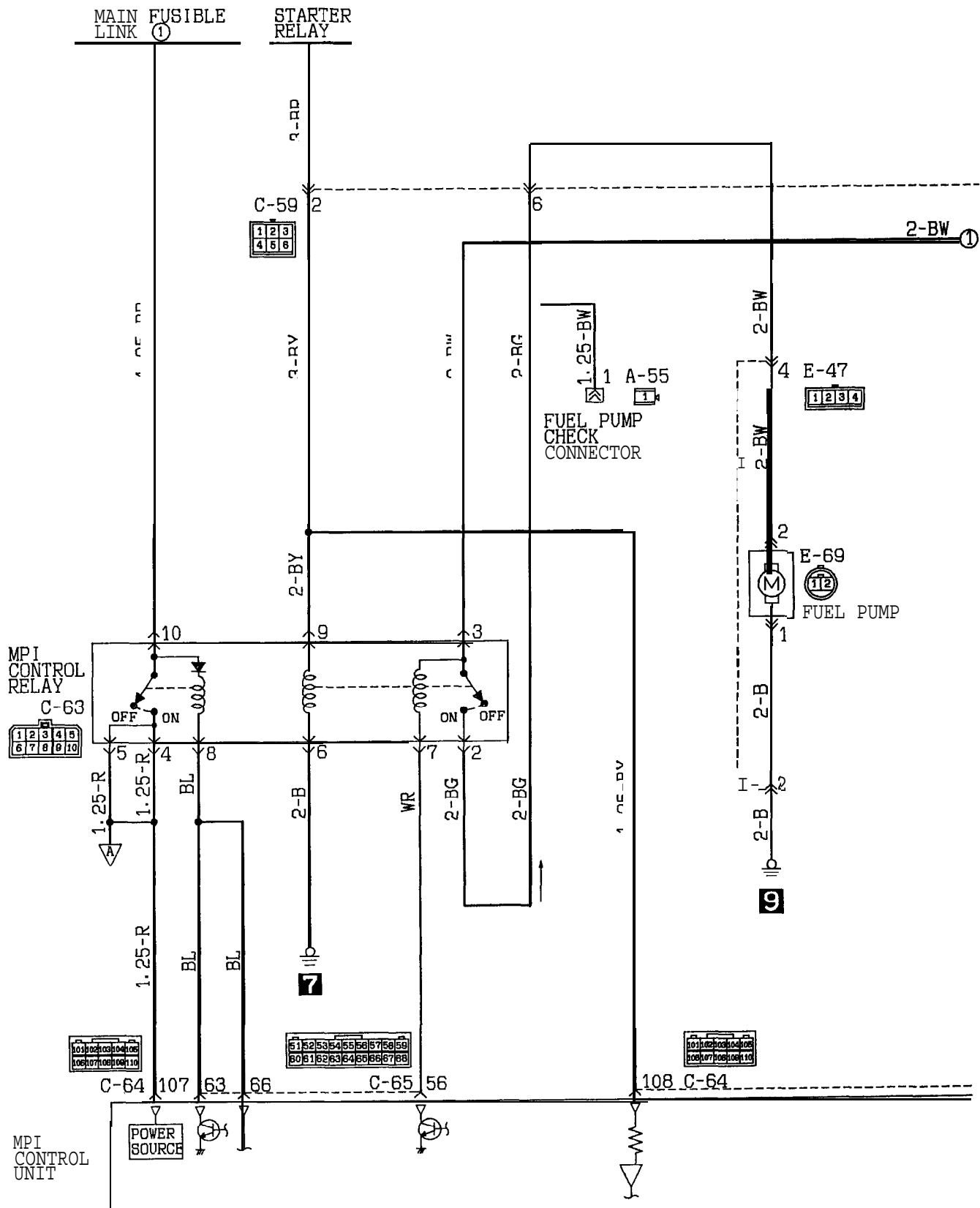


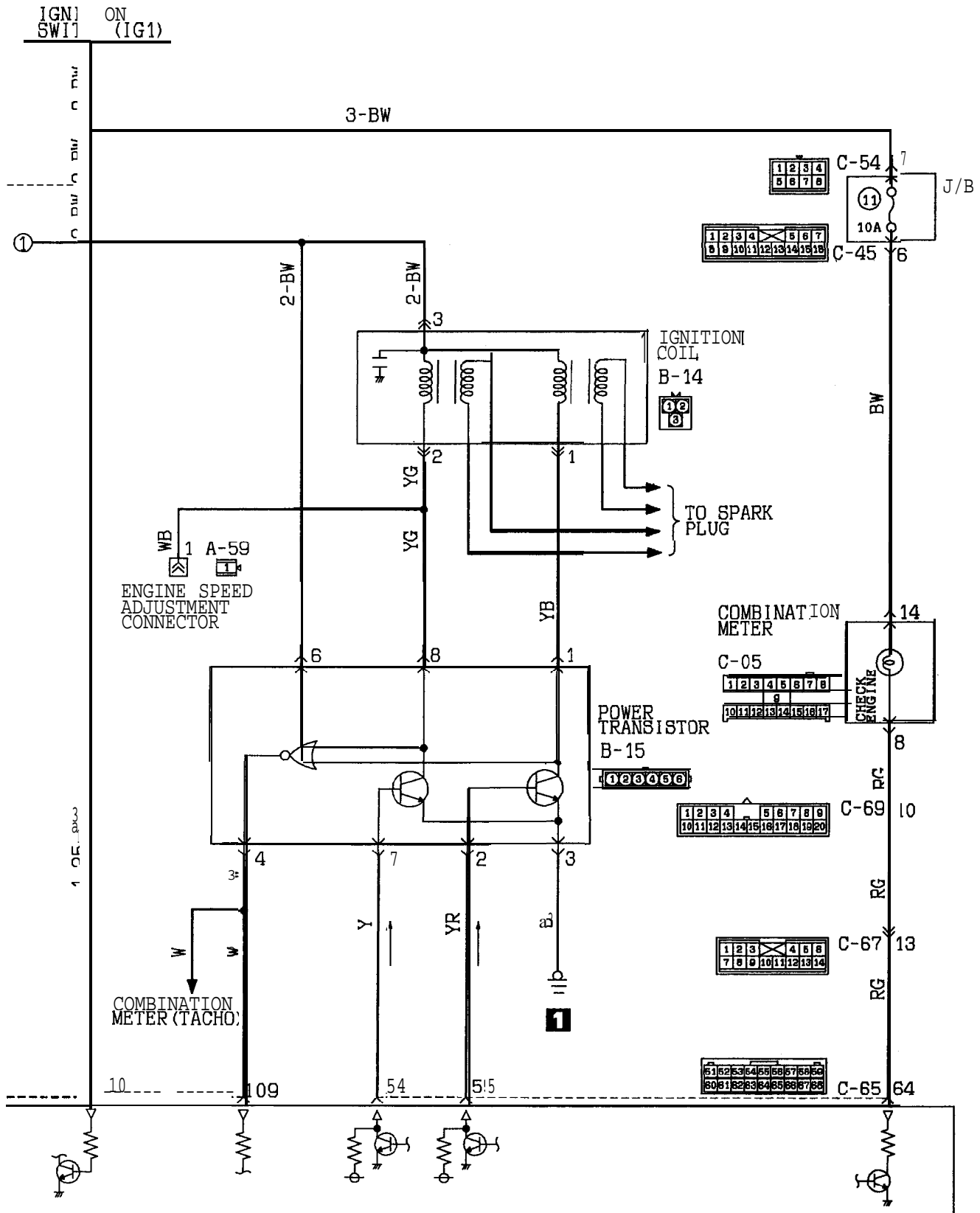


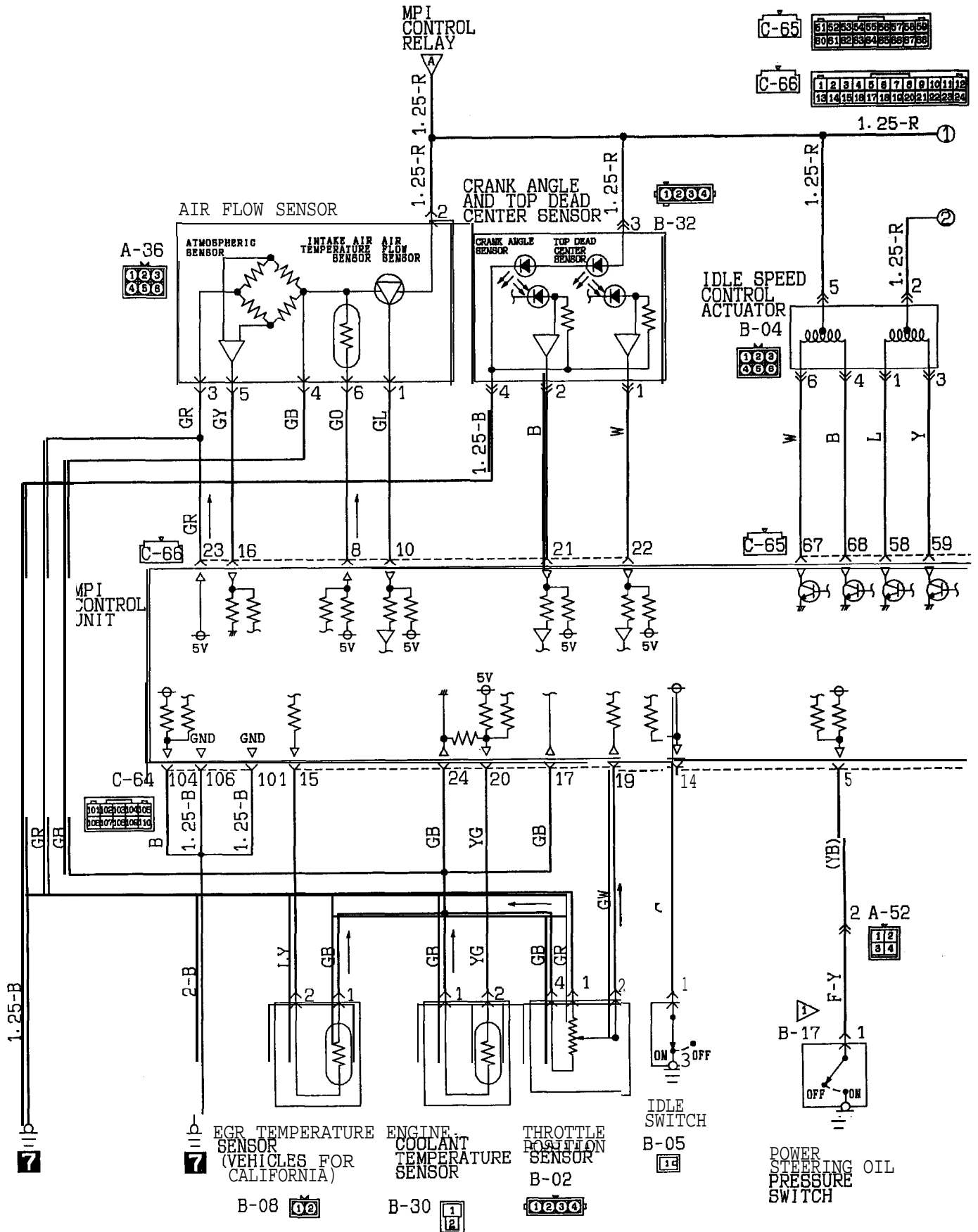


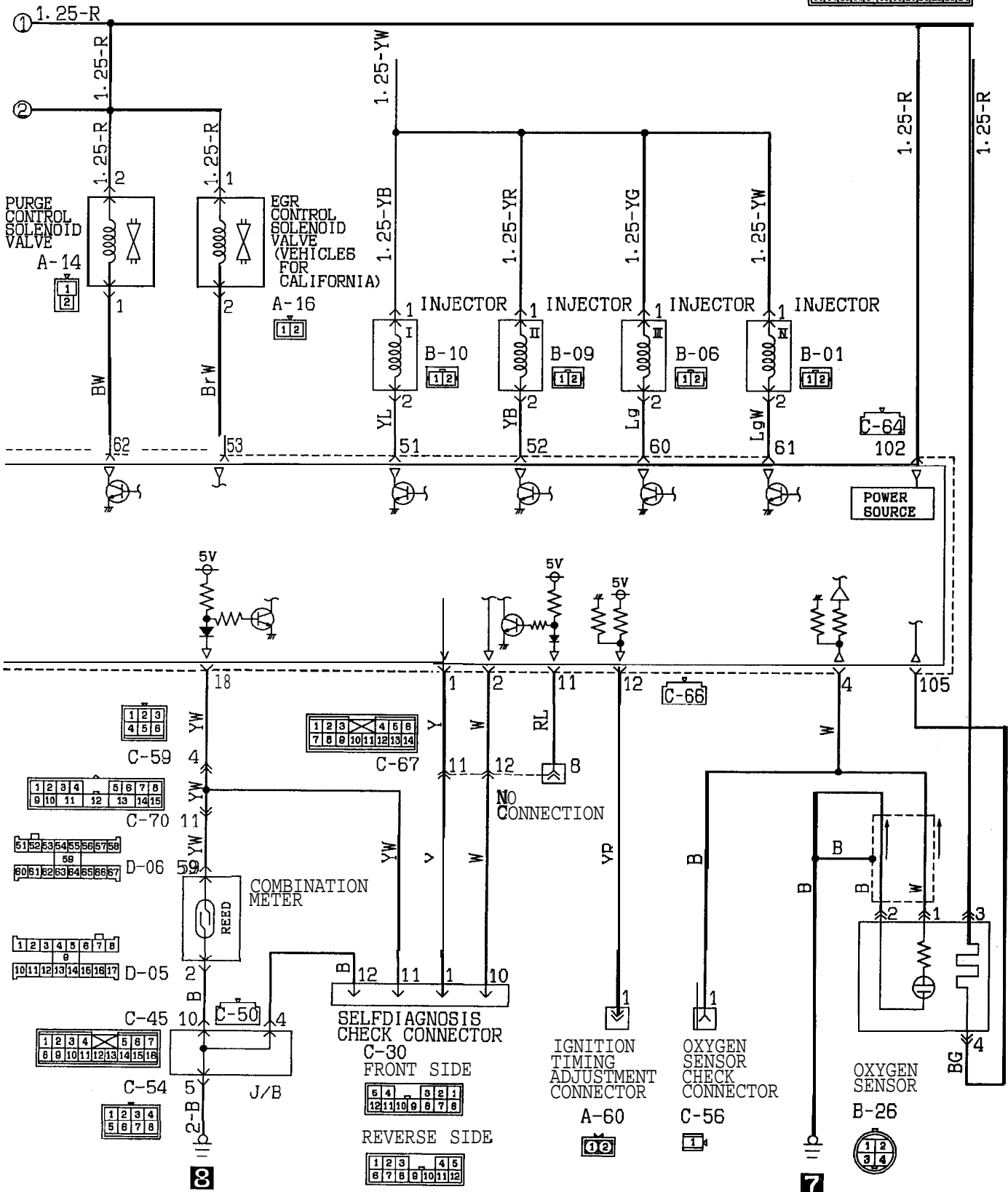
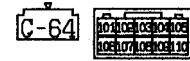


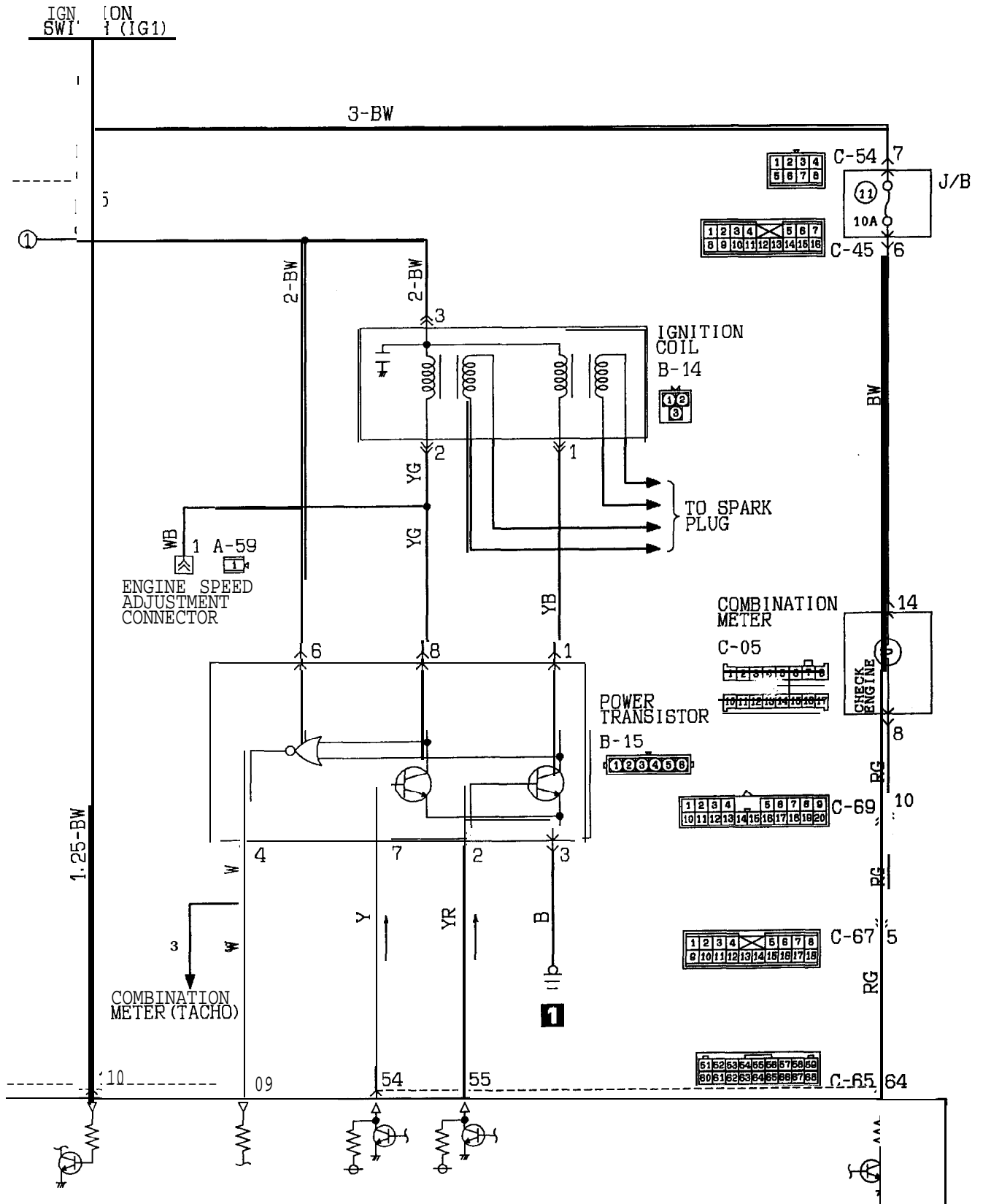
2.0L DOHC Engine (Non-Turbo) <M/T>

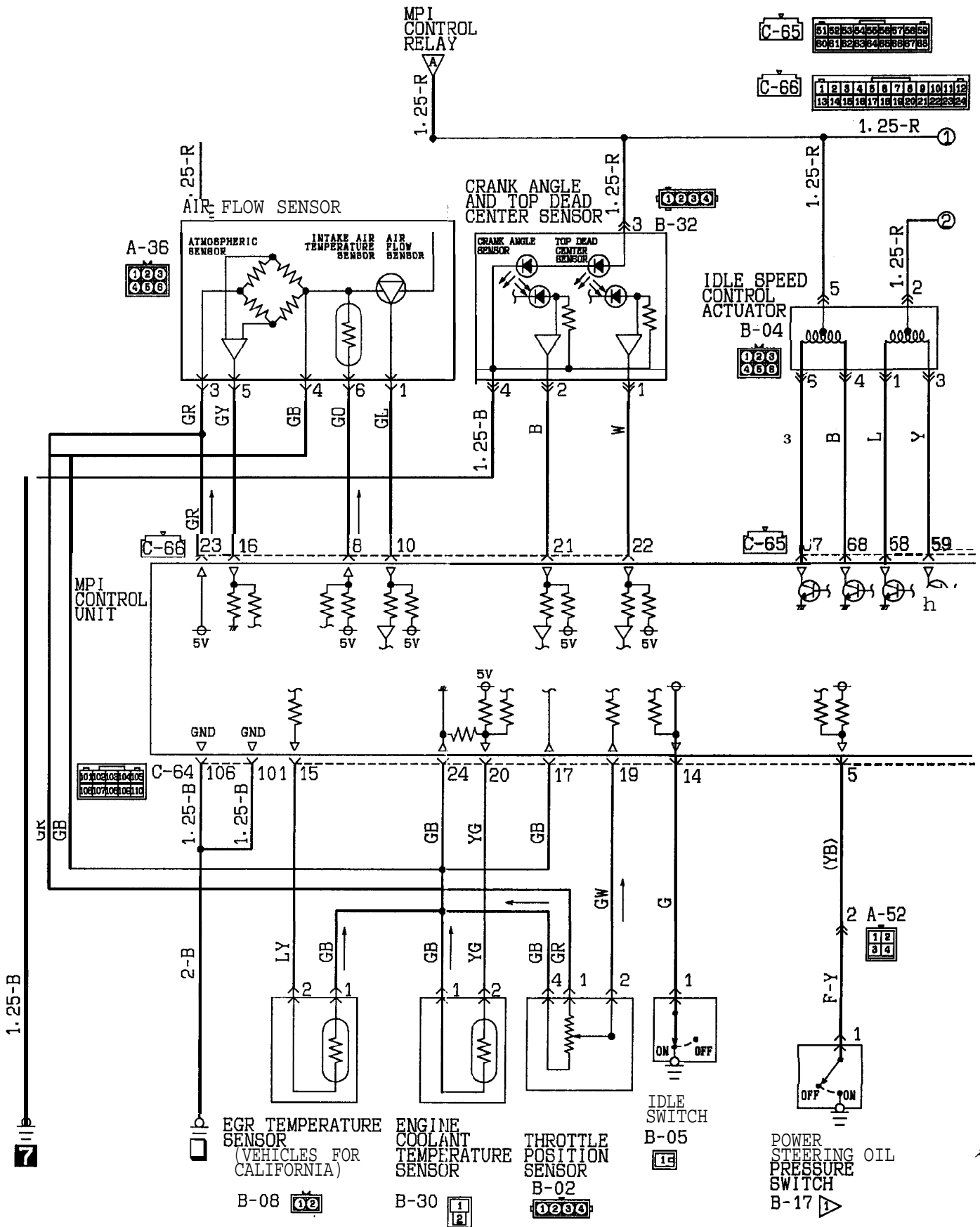


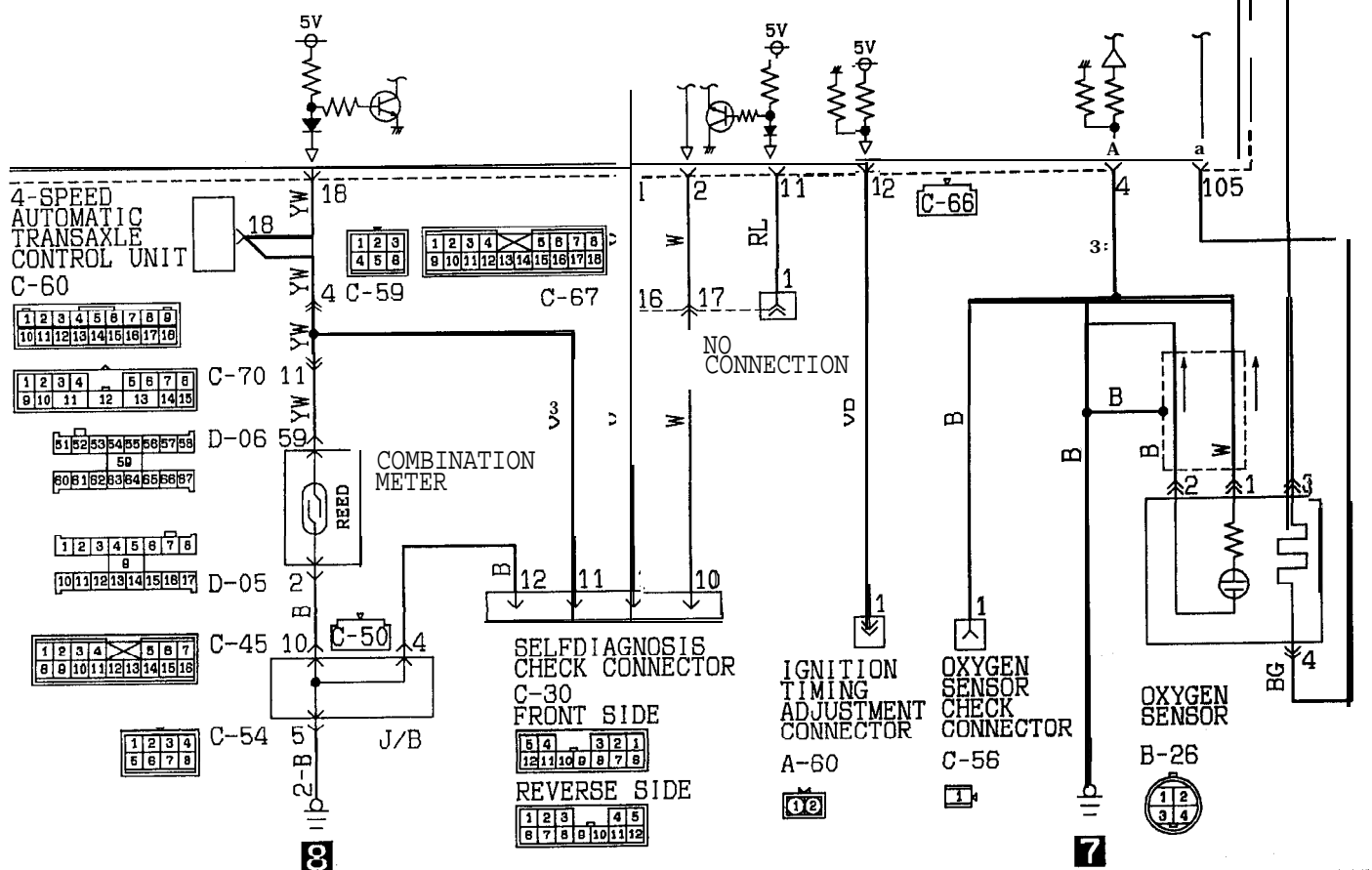
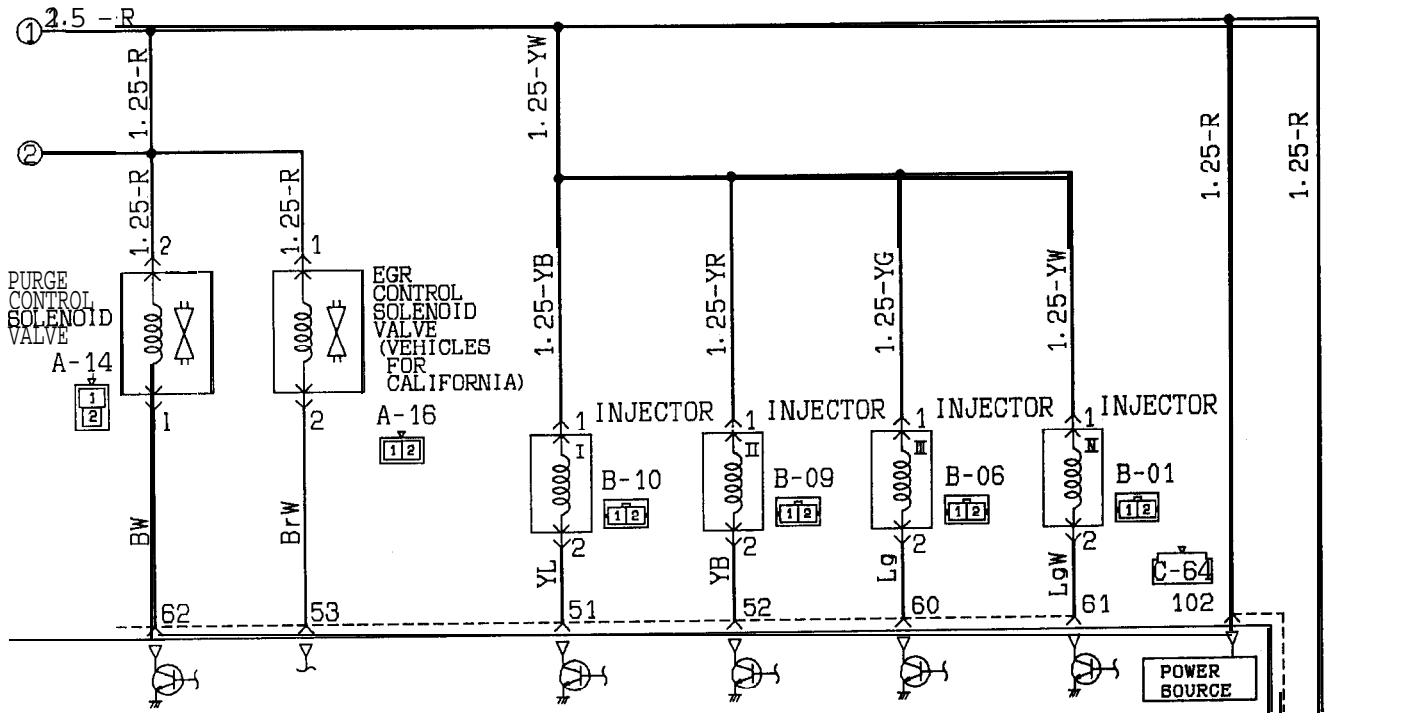




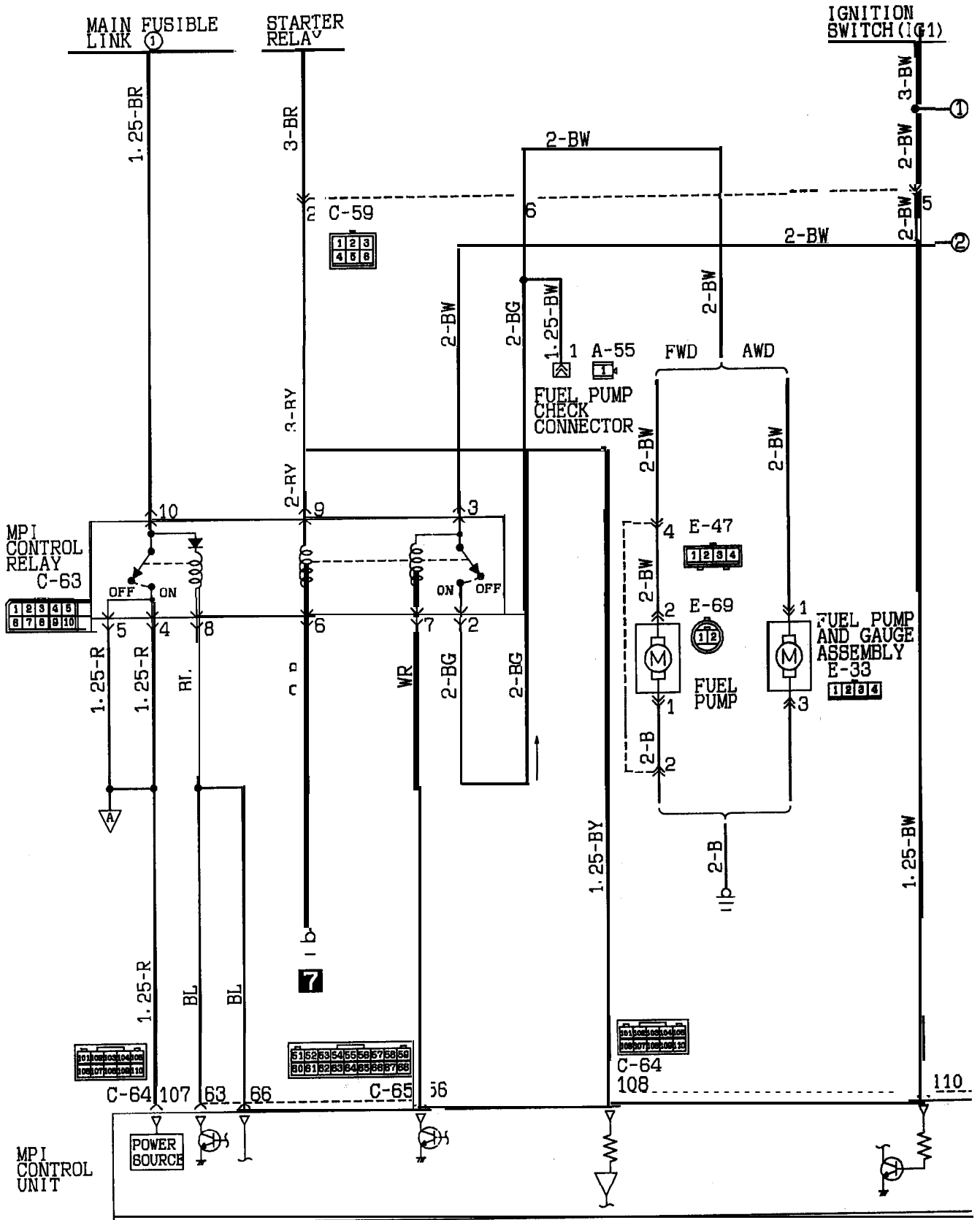


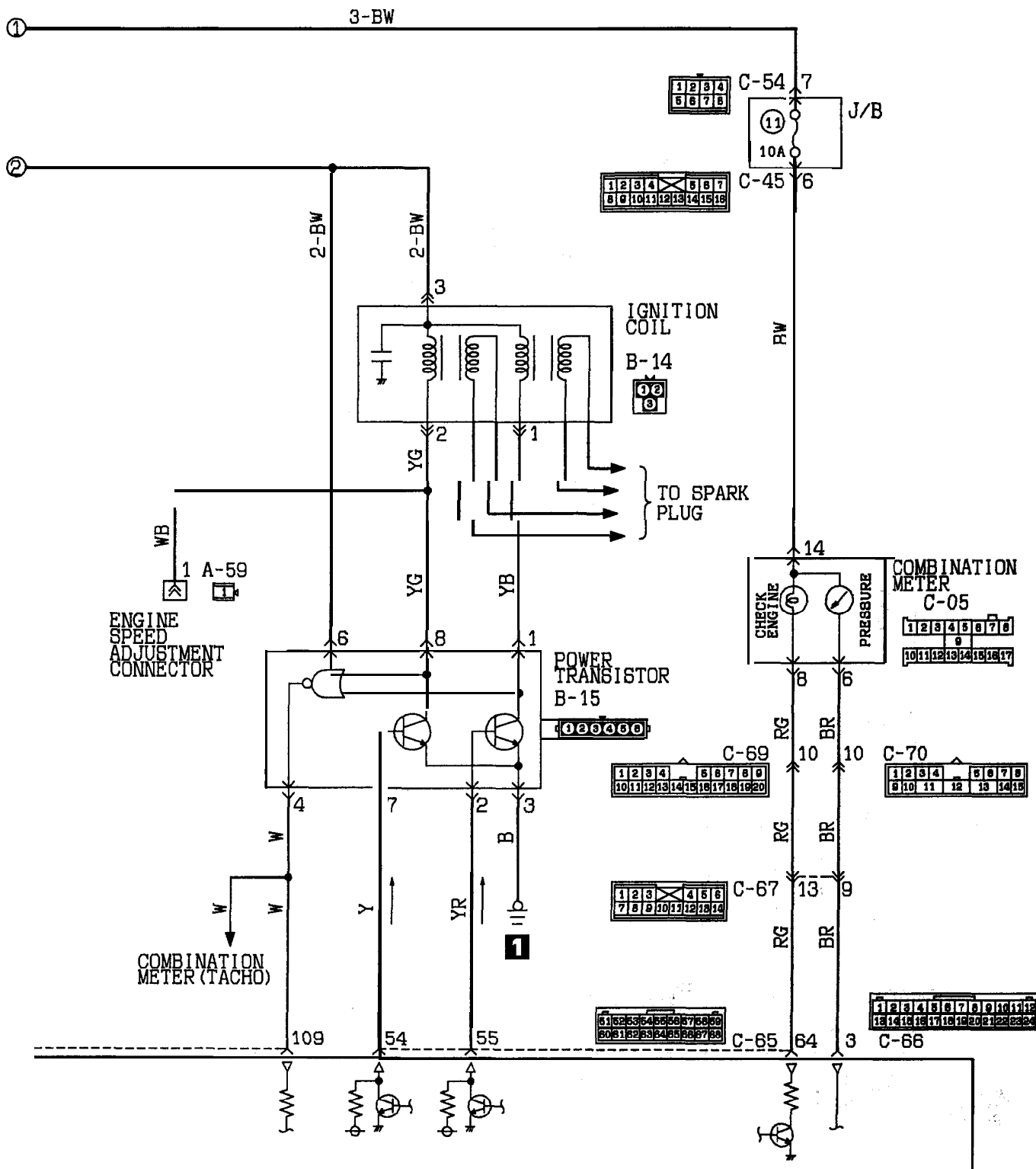


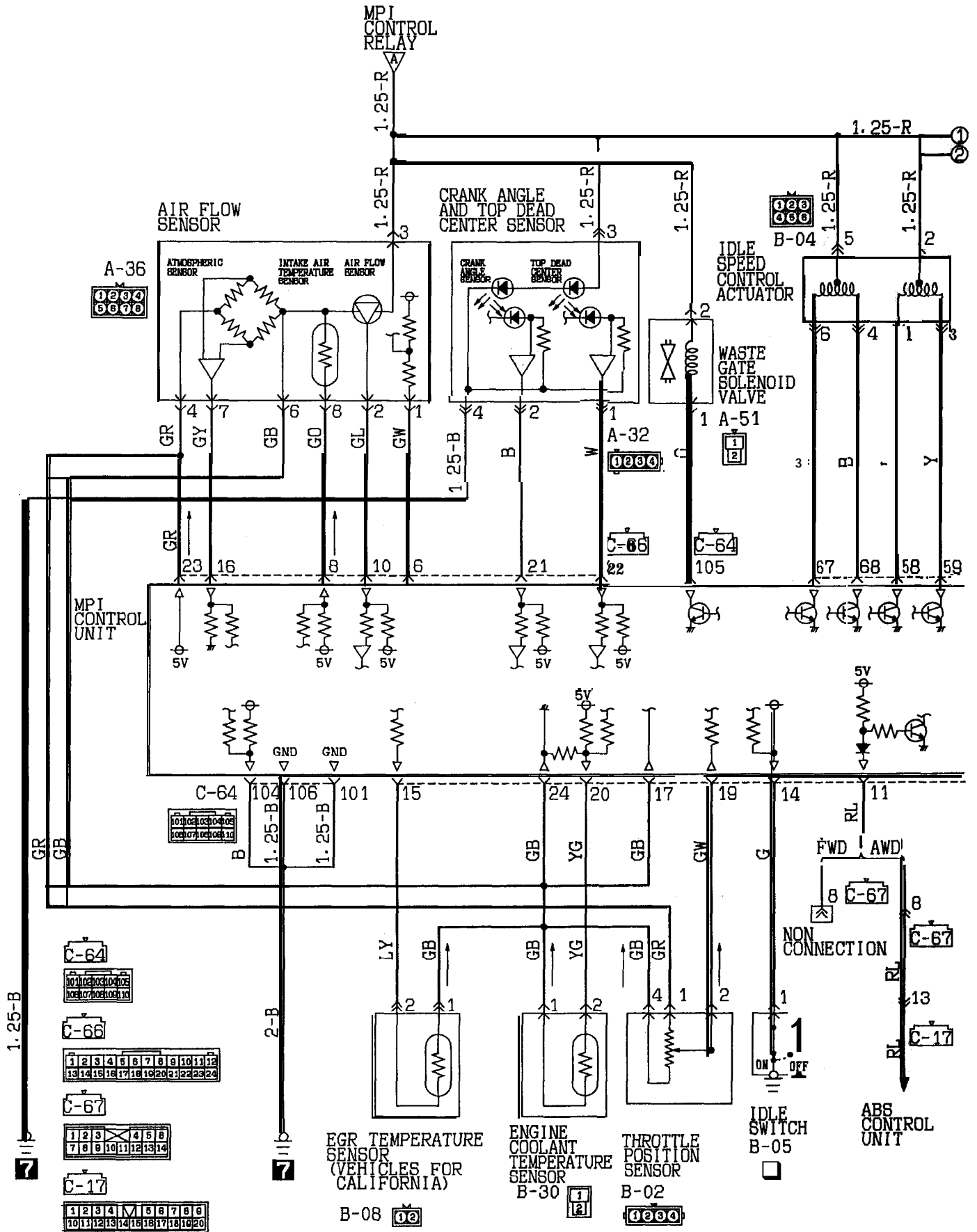


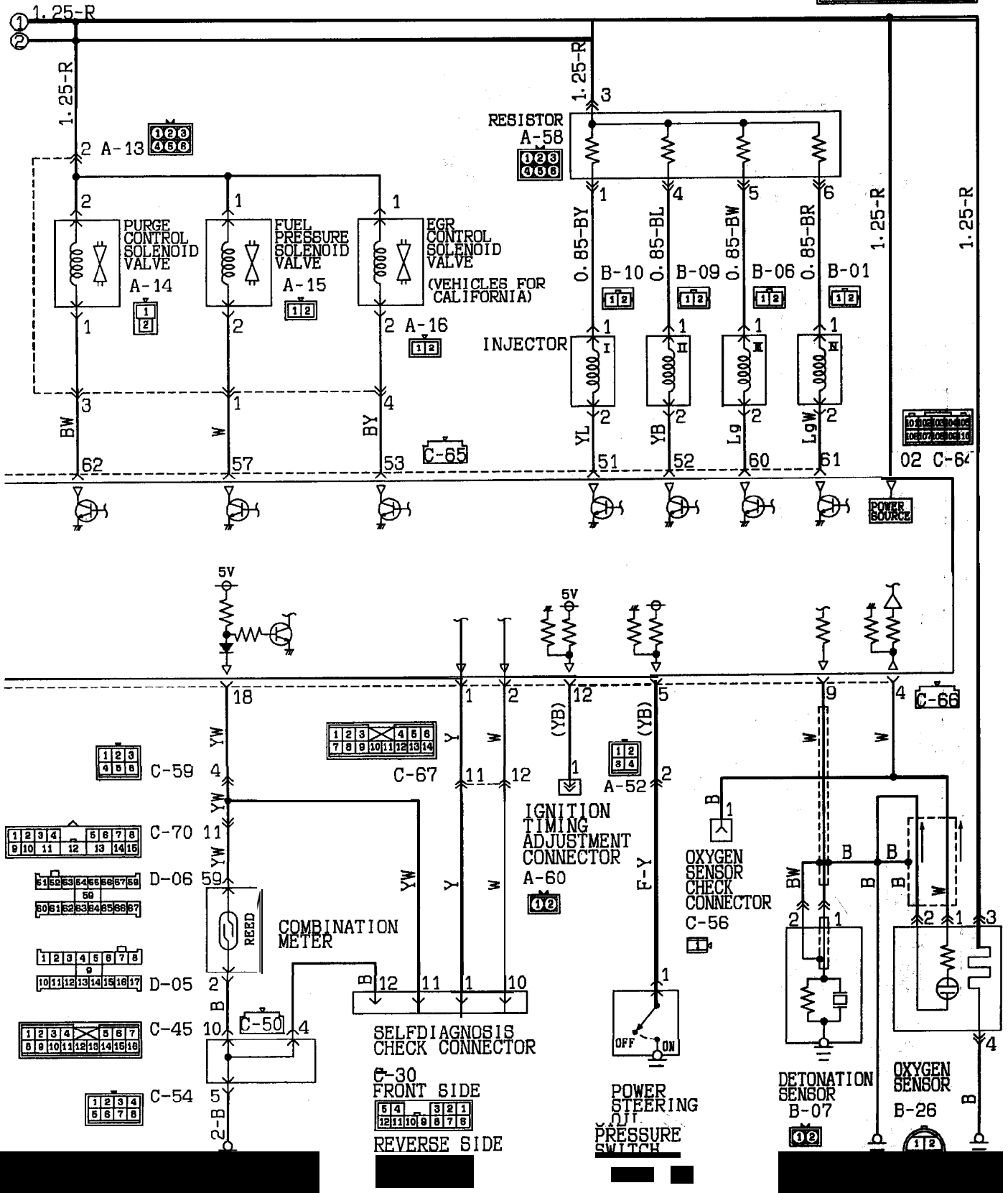


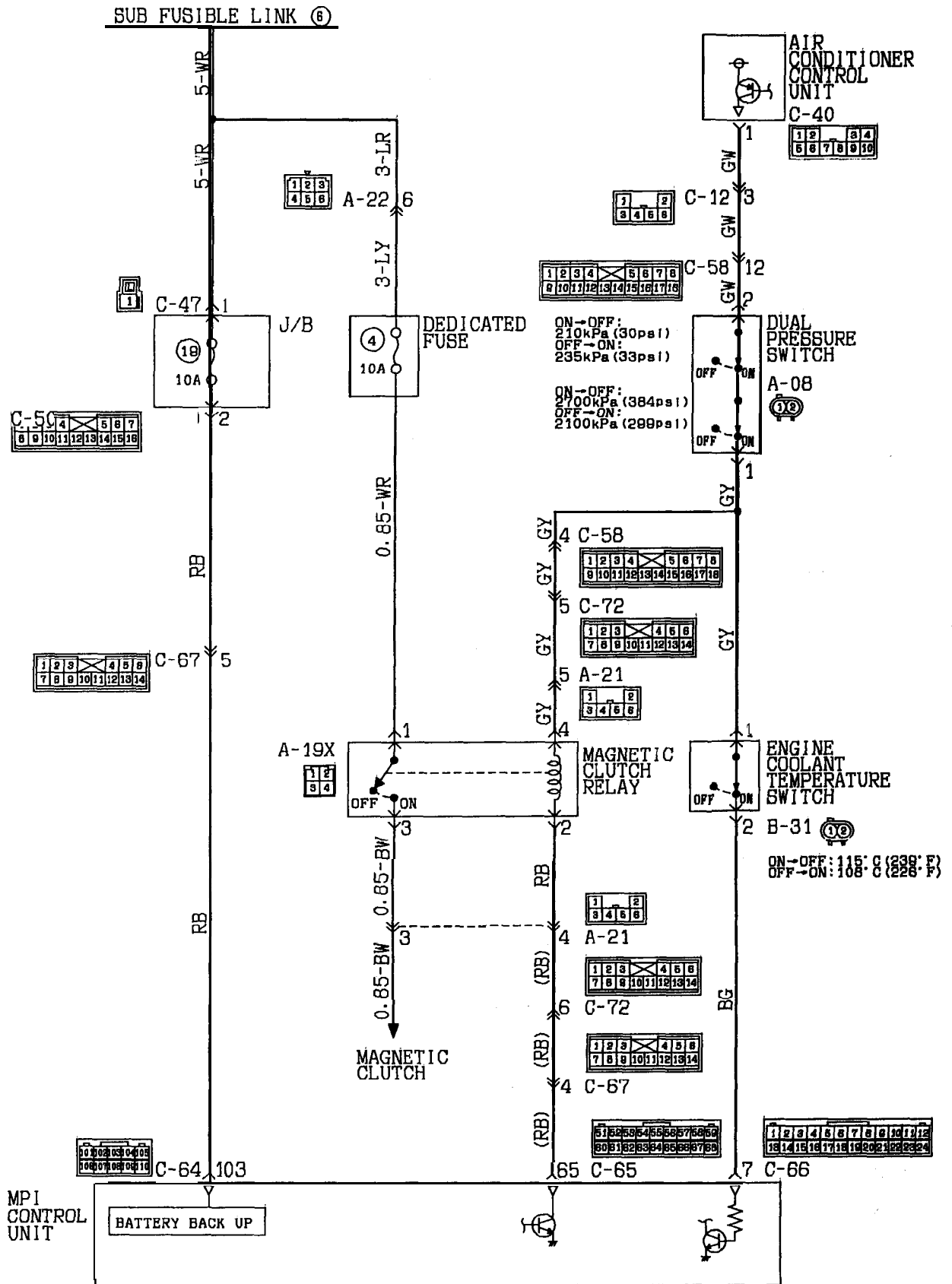
2.0L DOHC Engine (Turbo) <M/T>



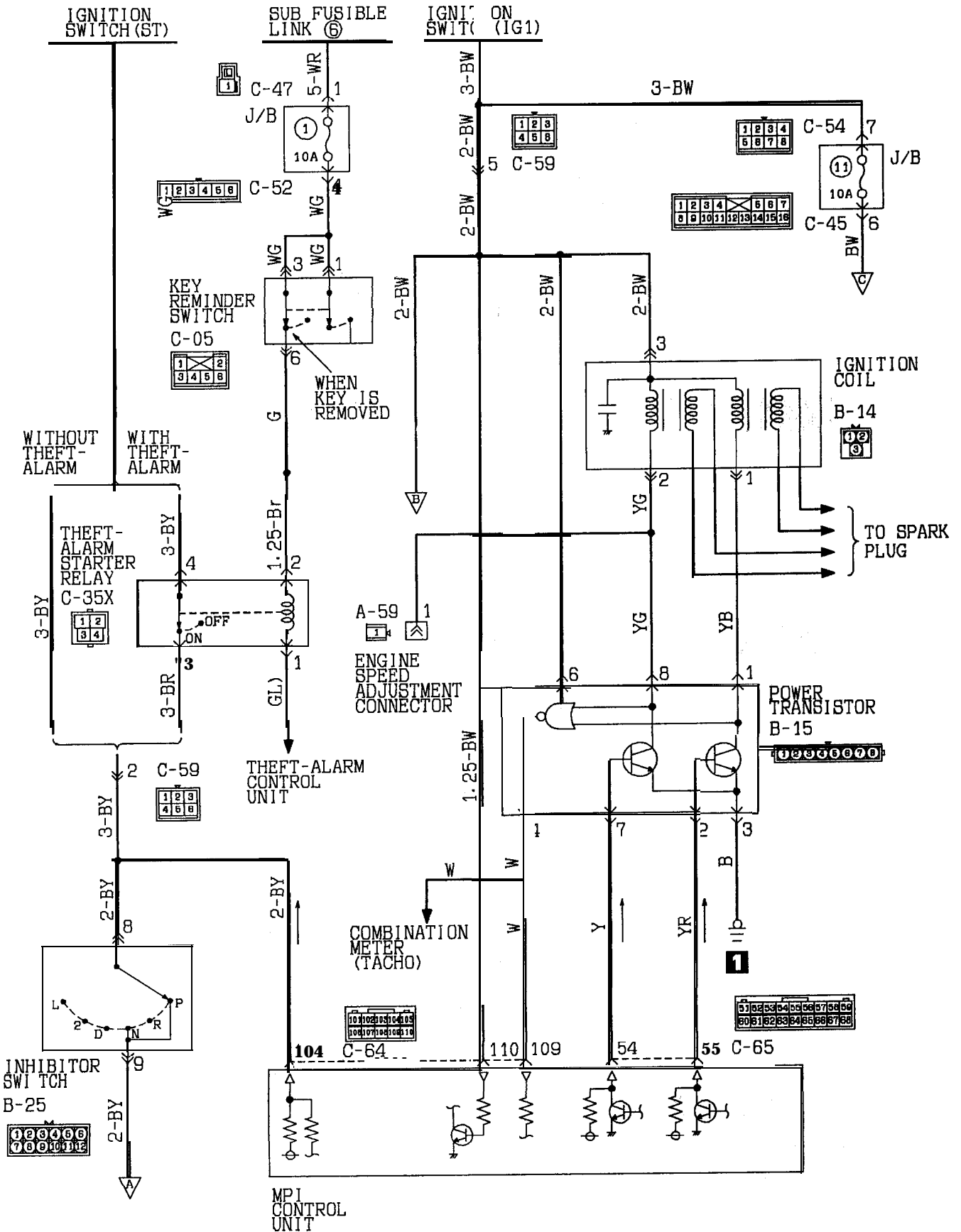


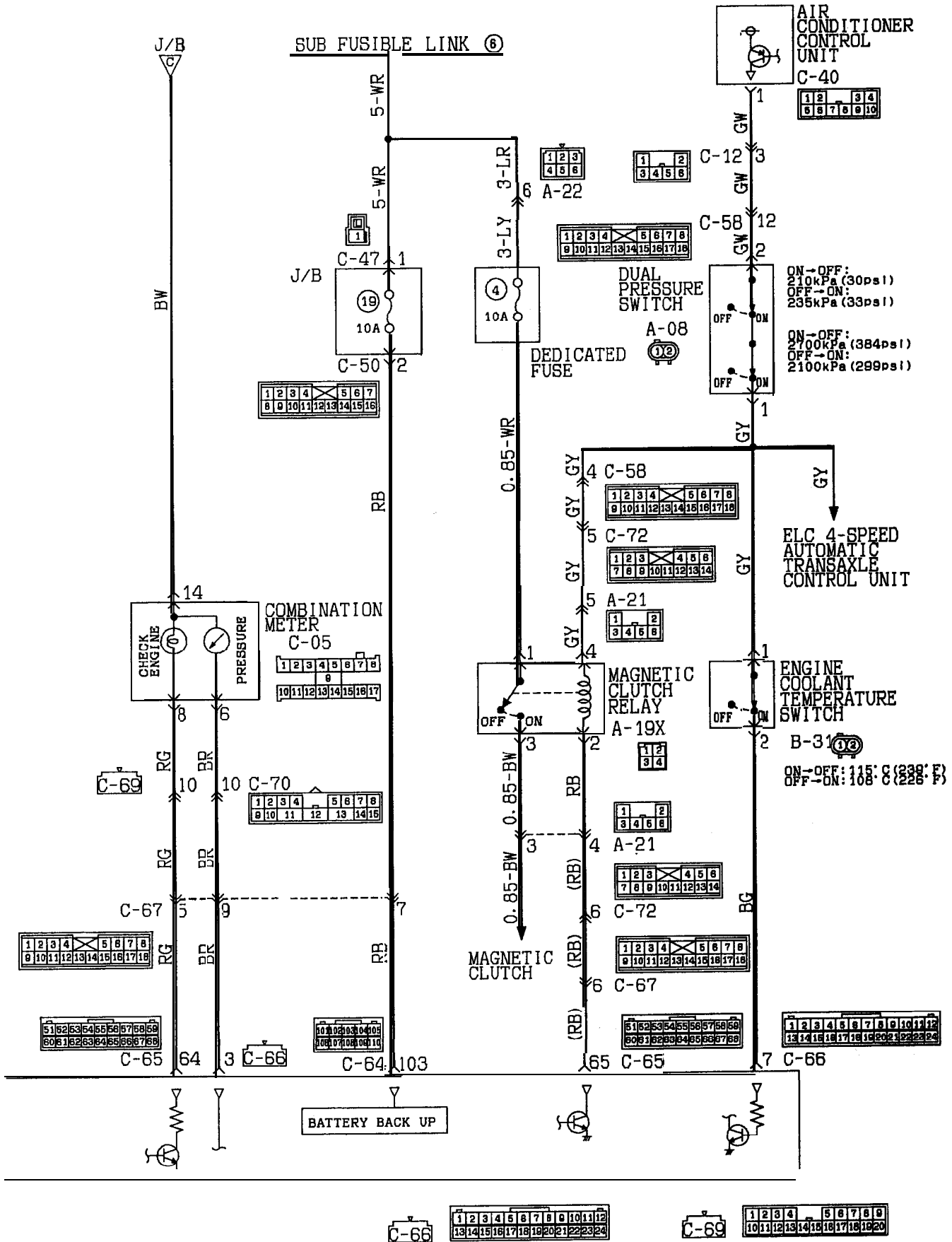


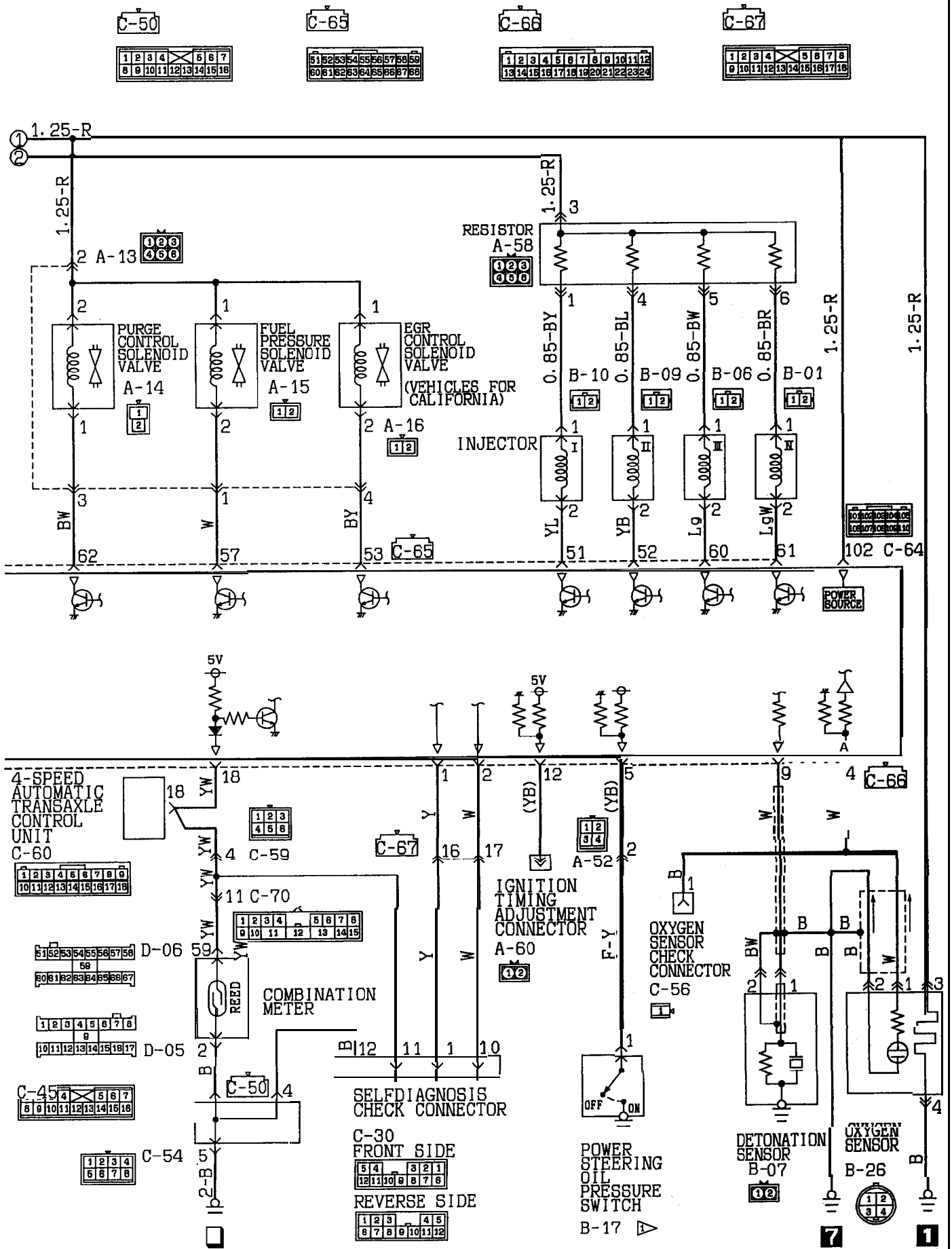




2.0L DOHC Engine (Turbo) <A/T>







SERVICE ADJUSTMENT PROCEDURES <1.8L Engine>

CURB IDLE SPEED INSPECTION

N14FHA E

Caution

The improper setting (throttle valve opening) will increase exhaust gas temperature at deceleration, reducing catalyst life greatly and deteriorating exhaust gas cleaning performance. It also has effect on fuel consumption and engine braking.

Pre-conditions for inspection

- Engine coolant temperature: 85–95°C (185–205°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: Neutral (P for vehicles with an automatic transaxle)
- Steering wheel: Neutral position (vehicles with a power steering)
- Check ignition timing and adjust if necessary. Refer to GROUP 8.

NOTE

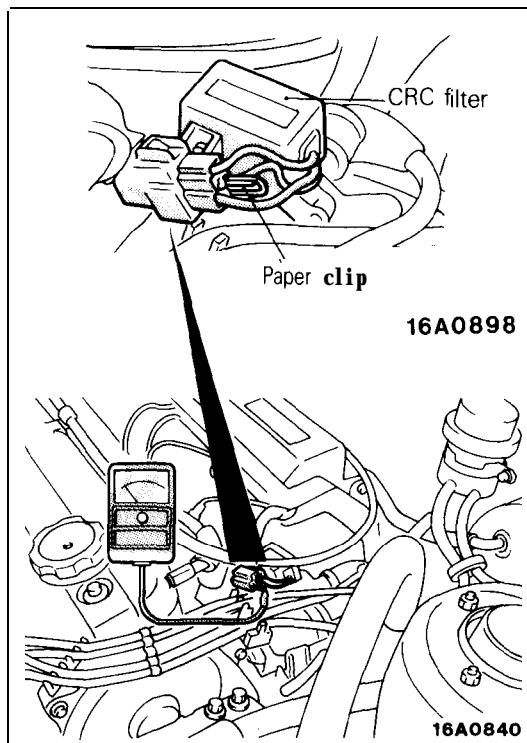
With vehicles for Canada, the headlights and taillights, etc. remain on even when the lighting switch is turned OFF, but this causes no problems during inspection.

- (1) Insert the paper clip to the connector.
- (2) Connect the tachometer to the inserted clip.
- (3) Run the engine for more than 5 seconds at an engine speed of 2,000 to 3,000 rpm.
- (4) Run the engine at idle for 2 minutes.
- (5) Read the idling rpm. If it is not within the specified speed, check the idle speed control system.

Curb idle speed: 700 ± 100 rpm

NOTE

Adjustment of the idling speed is usually unnecessary, because this system controls the idling speed.



IDLE SPEED CONTROL AND THROTTLE POSITION SENSOR ADJUSTMENT

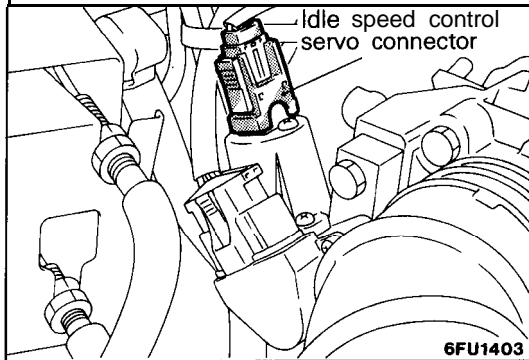
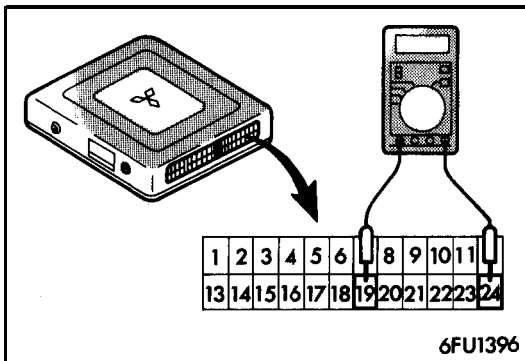
N14FIAT

Adjustment conditions

- Engine coolant temperature: 85–95°C (185–205°F)
- Lights, electric cooling fan and accessories: Set to OFF
- Transaxle: Neutral (P for vehicles with an automatic transaxle)
- Steering wheel: Neutral position (vehicles with a power steering)

- (1) Slacken the accelerator cable enough.
- (2) Connect a tachometer.

14-42 FUEL SYSTEM – Service Adjustment Procedures <1.8L Engine>



- (3) Connect a digital voltmeter between terminal 19 (throttle position sensor output voltage) of the engine control unit and terminal 24 (ground).
- (4) Set the ignition switch at ON (without starting the engine) hold it in that position for more than 15 seconds or more.
- (5) Set the ignition switch at OFF.

- (6) Disconnect the connectors of the idle speed control servo and lock the idle speed control plunger at the initial position.
- (7) Back out the fixed SAS enough.

- (8) Start the engine and let it run at idle.
- (9) Check to ensure that the engine is running at the standard basic idle speed.

Basic idle speed: 700 ± 50 rpm

Caution

1. On a new vehicle [driven less than 500 km (300 miles)], the engine speed may be 20 to 100 rpm lower, but no adjustment is necessary.
2. If the engine stalls or the engine speed is low after the vehicle has been driven a distance of 500 km (300 miles) or more, a deposit on the throttle valve area is suspected. Clean the throttle valve area.

- (10) If the engine speed does not conform to the standard value, adjust it with the idle speed control adjusting screw.

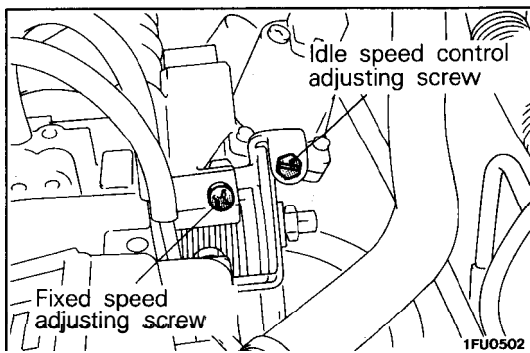
Caution

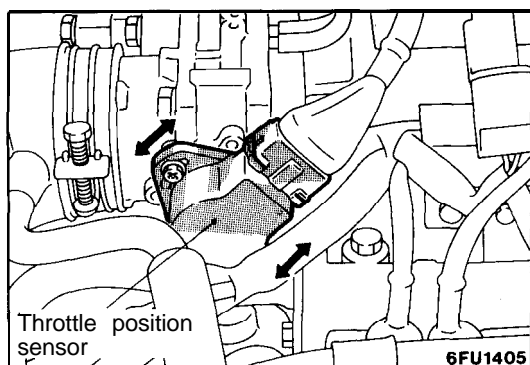
When adjusting the idle speed control, use a hexagon wrench whenever possible.

- (11) Turn in the fixed SAS until the engine speed rises. Then back out the fixed SAS until the "touch point" where the engine speed does not fall any longer is found. Back out the fixed SAS an additional half a turn from the touch point.
- (12) Stop the engine.

- (13) Set the ignition switch at ON (do not start the engine) and check that the output voltage from the throttle position sensor is as specified.

Standard value: $0.48-0.52$ V





- (14) If it is out of specification, adjust by loosening the throttle position sensor mounting screws and rotating the throttle position sensor. After adjustment, tighten the screws firmly.

NOTE

Clockwise rotation of the throttle position sensor increases the output voltage.

- (15) Set the ignition switch at OFF.
 (16) Adjust the free play of the accelerator cable.
 (17) Reconnect the connectors of the idle speed control servo.
 (18) Remove the voltmeter.
 (19) Start the engine and check that the engine is running at the curb idle speed.

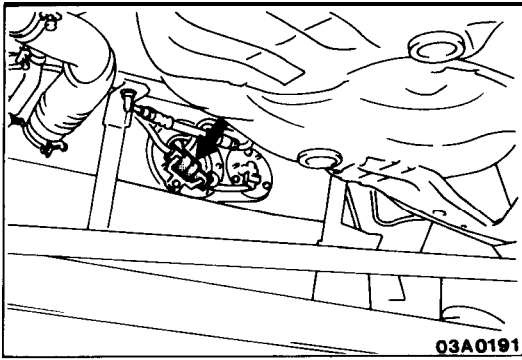
Curb idle speed: 700 ± 100 rpm

- (20) Set the ignition switch at OFF, disconnect the negative battery cable and reconnect it more than 10 seconds later (By doing so, the memory storing the diagnosis data during the idle speed control adjustment is cleared.)
 (21) Restart the engine, let it run at idle for about 5 minutes, and check that the engine is running in good idle quality.

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

N14FCK

- (1) Warm up the engine, then stop it.
- (2) Remove the air intake hose from the throttle body.
- (3) Spray cleaning solvent into the valve through the throttle body intake port and leave it for about 5 minutes.
- (4) Start the engine, race it several times and idle it for about 1 minute. If the idling speed becomes unstable slightly open the throttle valve to keep the engine running.
- (5) If the throttle valve deposits are not removed, repeat steps (3) and (4).
- (6) Attach the air intake hose.
- (7) Disconnect the battery terminal for 10 seconds or more, and then reconnect it.
- (8) Adjust the idle speed control and throttle position sensor.

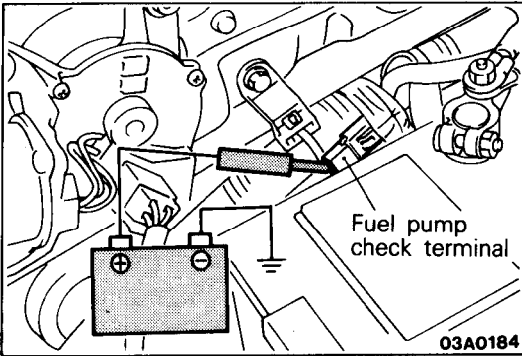


RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

N14FGAE

Make the following operations to release the pressure remaining in fuel pipe line so that fuel will not flow out.

- (1) Disconnect the fuel pump harness connector at the fuel tank rear side.
- (2) Start the engine and after it stops by itself, turn the ignition switch to OFF.
- (3) Disconnect the battery (-) terminal.
- (4) Connect the fuel pump harness connector.



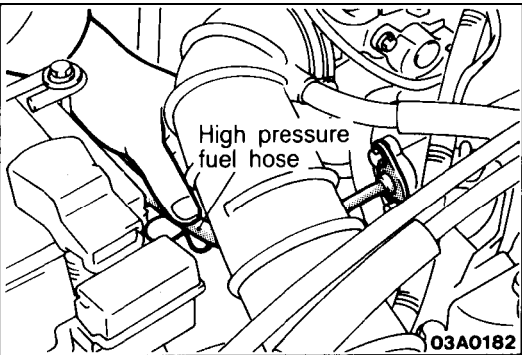
FUEL PUMP OPERATION CHECK

N14FDAG

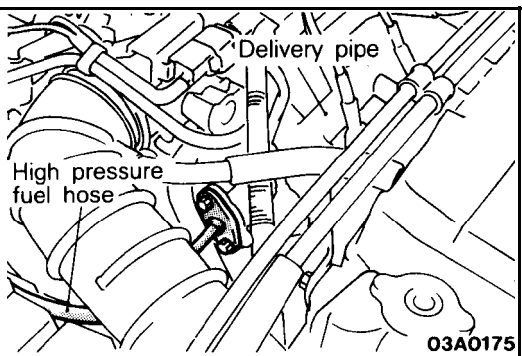
- (1) Set the ignition switch at OFF.
- (2) Check that when the battery voltage is directly applied to the fuel pump check terminal, the operating sound of the pump can be heard.

NOTE

Since the fuel pump is installed in the fuel tank, its operating sound cannot be readily heard. Remove the fuel tank cap and listen to the operating sound through the filler port.



- (3) Hold the high pressure fuel hose between your fingers and check that the fuel pressure can be felt.



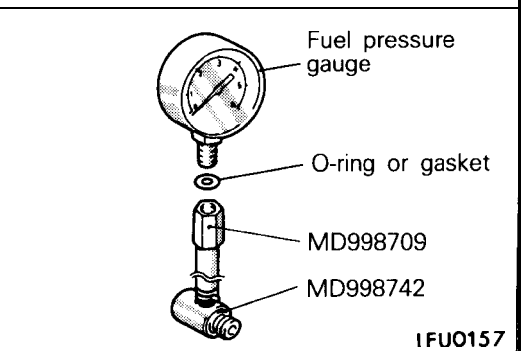
FUEL PRESSURE TEST

N14FNAN

- (1) Reduce the fuel pressure in the fuel line.
- (2) Disconnect the high pressure fuel hose from the delivery pipe.

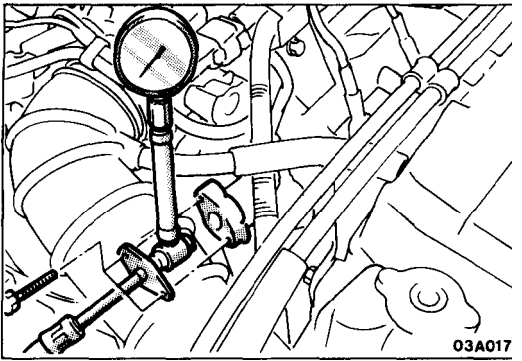
Caution

Cover the hose connection with shop towel to prevent splash of fuel that could be caused by residual pressure in the fuel pipe line.

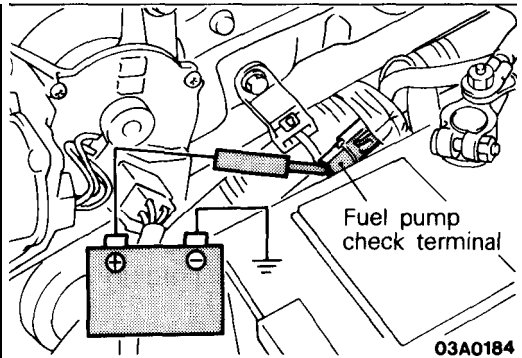


- (3) Connect a fuel pressure gauge to the special tool (hose adapter).

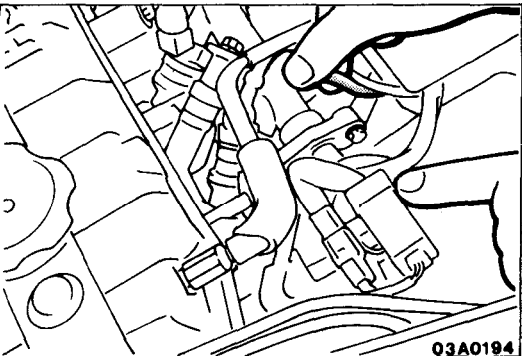
Use a suitable O-ring or gasket between the fuel pressure gauge and the special tool so as to seal in order to prevent fuel leakage at this time.



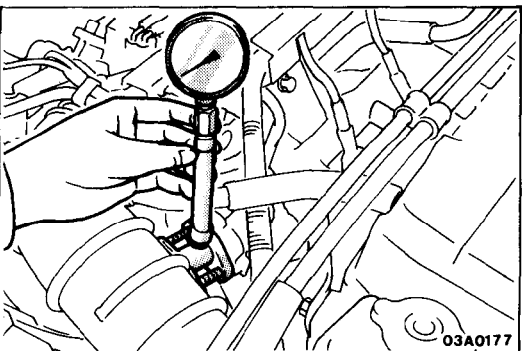
- (4) Install the special tool, which was set in place in step (3), between the delivery pipe and the high pressure fuel hose.
- (5) Connect the \ominus terminal of the battery/.



- (6) Apply battery voltage to the fuel pump check terminal and activate the fuel pump; then, with fuel pressure thus applied, check to be sure that there is no fuel leakage from the pressure gauge or the special tool connection part.



- (7) Start the engine and run at curb idle speed.
- (8) Disconnect the vacuum hose from the pressure regulator and clog the vacuum hose end. Measure the fuel pressure.
Standard value: 330–350 kPa (47–50 psi) at curb idle



- (9) Measure the fuel pressure when the vacuum hose is connected to the pressure regulator:
Standard value: Approx. 270 kPa (38 psi) at curb idle
- (10) Race the engine repeatedly in two or three series. Then check that the fuel pressure does not fall when the engine is running at idle.
- (11) Check to be sure that there is fuel pressure in the return hose also (by gently pressing the fuel return hose with a finger while repeatedly racing the engine).

NOTE

There will be no fuel pressure in the return hose when the volume of fuel flow is not sufficient.

- (12) If the results of the measurements made in steps (8) and (9) above are not within the standard value, use the table below to determine the probable cause, and then make the necessary repair.

14-46 FUEL SYSTEM – Service Adjustment Procedures <1.8L Engine>

Condition	Probable cause	Remedy
Fuel pressure too low	a. Clogged fuel filter b. Fuel leaking toward return port due to improper seating of valve in fuel pressure regulator c. Low delivery pressure of fuel pump	a. Replace fuel filter. b. Replace fuel pressure regulator. c. Replace fuel pump.
Fuel pressure too high	a. Stuck valve in fuel pressure regulator b. Clogged or bent fuel return hose or pipe	a. Replace fuel pressure regulator. b. Repair or replace hose or pipe.
Fuel pressure with vacuum hose connected not different from fuel pressure with vacuum hose not connected	a. Clogged or broken vacuum hose or nipple b. Stuck valve in fuel pressure regulator or defective valve seating	a. Repair or replace the vacuum hose or nipple. b. Replace fuel pressure regulator.

(13) Stop the engine and check for change in fuel pressure gauge indication, which should not drop.

If the gauge indication drops, observe the rate of drop and determine and remove the causes according to the following table.

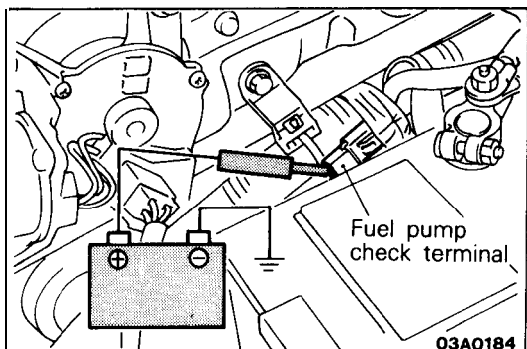
Condition	Probable cause	Remedy
Fuel pressure drops slowly after engine is stopped.	Leakage from injector	Replace injector.
Fuel pressure drops immediately after engine is stopped.	Check valve in fuel pump does not close	Replace fuel pump.

(14) Reduce the fuel pressure in the fuel line.

(15) Disconnect the high pressure fuel hose and remove the fuel pressure gauge from the delivery pipe.

Caution

Cover the hose connection with shop towel to prevent splash of fuel that could be caused by residual pressure in the fuel pipe line.



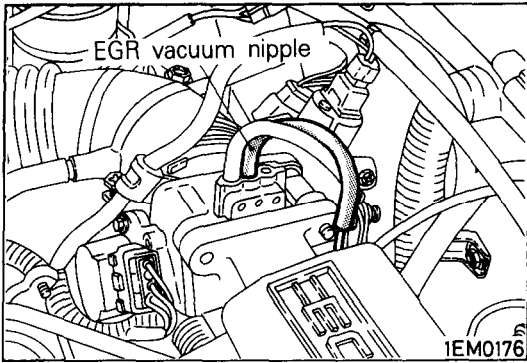
(16) Mount a new O-ring in the groove at the end of the high pressure fuel hose.

(17) Connect the high pressure fuel hose to the delivery pipe, and tighten the screws to the specified torque.

(18) Check for fuel leaks.

① Apply battery voltage to the fuel pump check terminal to operate the fuel pump.

② With fuel pressure acting, check the fuel line for leaks.



EGR VALVE CONTROL VACUUM CHECK N14FVBB
 <California>

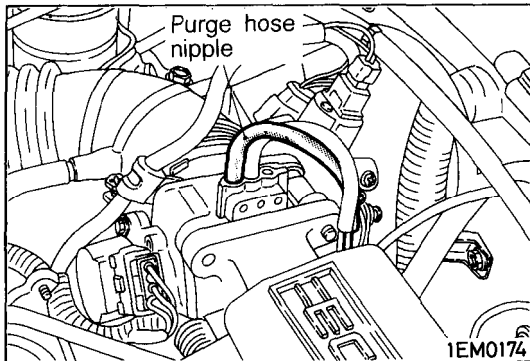
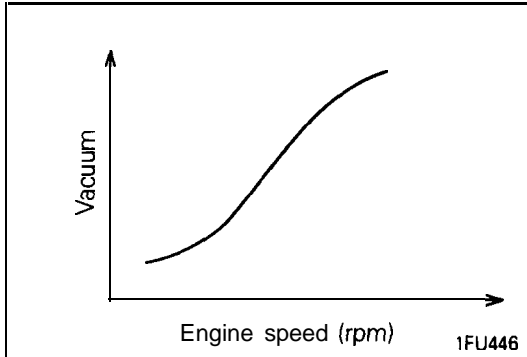
Check Condition

Engine coolant temperature: 85–95°C (185–205°F)

- (1) Disconnect the vacuum hose from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.
- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum raises proportionately with the rise in engine speed.

NOTE

If there is a problem with the change in vacuum, it is possible that the throttle body port may be clogged and require cleaning.



PURGE PORT VACUUM CHECK N14FVBC

Check Condition

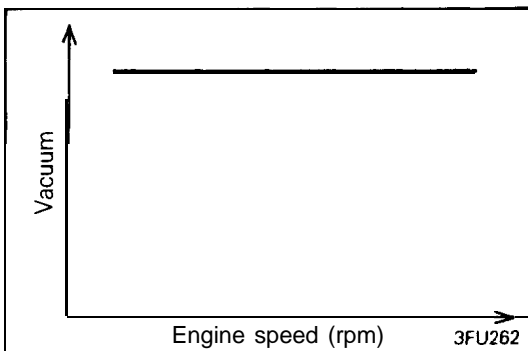
Engine coolant temperature: 85–95°C (185–205°F)

- (1) Disconnect the vacuum hose from the throttle body purge hose nipple and connect a hand vacuum pump to the nipple.

- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum remains fairly constant.

NOTE

If there is no vacuum created, it is possible that the throttle body port may be clogged and require cleaning.



SERVICE ADJUSTMENT PROCEDURES <2.0L DOHC Engine>

CURB IDLE SPEED INSPECTION

N14FHAD

Caution

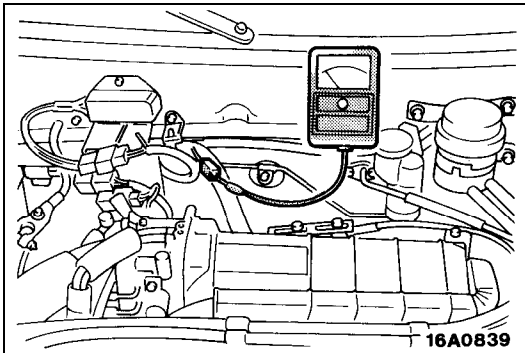
The improper setting (throttle valve opening) will increase exhaust gas temperature at deceleration, reducing catalytic converter life greatly and deteriorating exhaust gas cleaning performance. It also has effect on fuel consumption and engine braking.

Pre-conditions for inspection

- Engine coolant temperature: 85–95°C (185–205°F)
- Lights, electric cooling fan and accessories: OFF
- Transaxle: Neutral (P for vehicles with automatic transaxle)
- Steering wheel: Neutral position (vehicles with a power-steering)
- Check ignition timing and adjust if necessary. Refer to GROUP 8.

NOTE

With vehicles for Canada, the headlights and taillights, etc. remain on even when the lighting switch is turned OFF, but this causes no problems during inspection.



- (1) Connect the tachometer to the engine speed detection terminal.
- (2) Run the engine for more than 5 seconds at an engine speed of 2,000 to 3,000 rpm.
- (3) Run the engine at idle for 2 minutes.
- (4) Read the idling rpm. If it is not within the specified speed, check the idle speed control system.

Curb idle speed: 750 ± 100 rpm

NOTE

1. Adjustment of the idling speed is usually unnecessary, because this system controls the idling speed.
2. For rpm, one-half of the actual engine rpm is indicated, so the actual engine rpm is two times the indicated value shown by the tachometer.

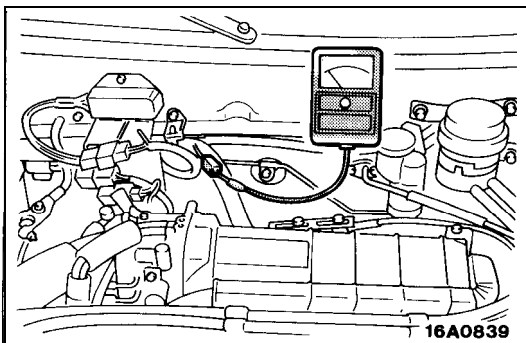
BASIC IDLE SPEED ADJUSTMENT

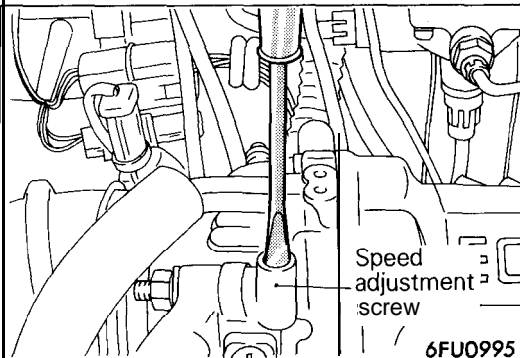
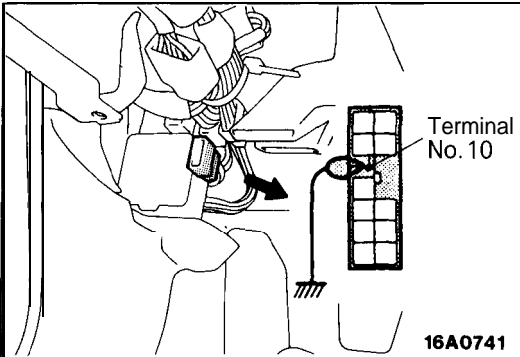
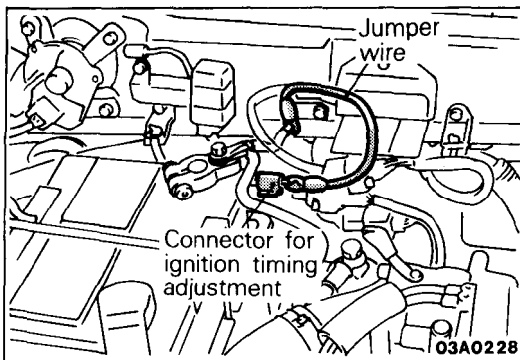
N14FHBI

Pre-conditions for inspection

- Engine coolant temperature: 85–95°C (185–205°F)
- Lights, electric cooling fan, and accessories: OFF
- Transaxle: Neutral (P for vehicles with automatic transaxle)
- Steering wheel: Neutral position (vehicles with a power-steering)

- (1) Connect a tachometer.





- (2) Disconnect the female connector (for waterproof protection of the connector) from the connector for ignition timing adjustment.
- (3) Connect the ignition timing adjusting terminal to the ground using a jumper wire with alligator clips.

- (4) Connect terminal No. 10 of the self-diagnosis connector to the ground with a jumper wire with alligator clips.
- (5) Start the engine and run at idle.
- (6) Check to be sure that the engine idling speed is the basic idle speed.

Basic idle speed: 750 ± 50 rpm

If there is a deviation of the engine speed from the basic idle speed, first determine whether or not the conditions described below exist, and then use the speed adjustment screw to adjust to the basic idle speed.

- (a) The engine speed may be 20–100 rpm low for a new vehicle [driven about 500 km (300 miles) or less], but adjustment is not necessary.
- (b) If engine stalling occurs or the engine speed is low even though the vehicle has been driven about 500 km (300 miles) or more, it is probable that these are deposits adhered to the throttle valve, so it should be cleaned.

(Refer to P.14–51.)

- (c) If the engine speed is higher than the standard value even though the speed adjusting screw is fully close, check for any indication that the idle position switch (fixed speed adjusting screw) position has changed; if there is such an indication, adjust the idle position switch (fixed speed adjusting screw).

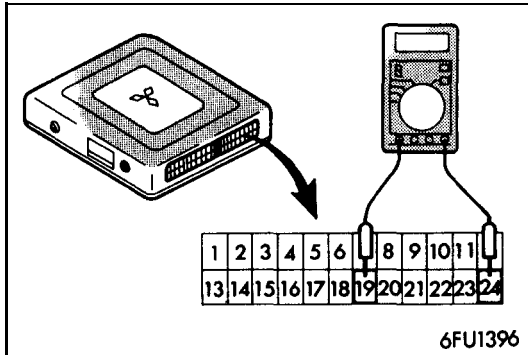
If there is no evidence of a change of position, it is probable that there is leakage resulting from deterioration of the fast-idle air valve (FI AV), so replace the throttle body.

- (7) Turn OFF the ignition switch and stop the engine.
- (8) Disconnect the grounding jumper wire from the diagnosis connector.
- (9) Disconnect the grounding jumper wire from the ignition timing connector and mount a waterproof connector.
- (10) Disconnect the tachometer.
- (11) Start the engine once again and let it idle for about 5 minutes; check to be sure that the idling condition is normal.

THROTTLE POSITION SENSOR ADJUSTMENT

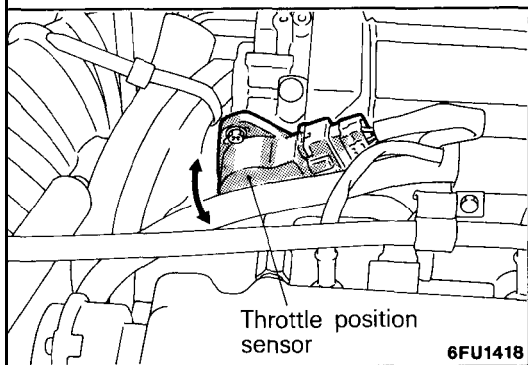
N14FIAUa

- (1) Slacken the accelerator cable enough.



- (2) Connect a digital voltmeter between terminal 19 (throttle position sensor output voltage) of the engine control unit and terminal 24 (ground).
- (3) Set the ignition switch at ON (do not start the engine) and check that the output voltage from the throttle position sensor is as specified.

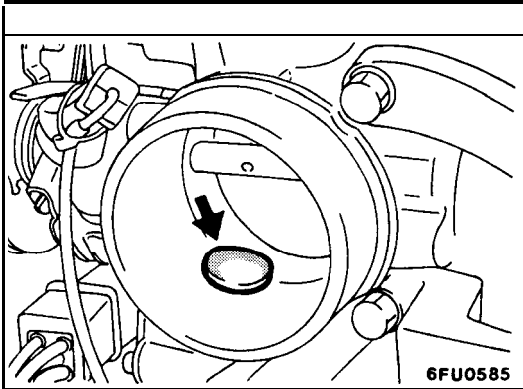
Standard value: 0.48–0.52 V



- (4) If it is out of specification adjust by loosening the throttle position sensor mounting screws and rotating the throttle position sensor. After adjustment, tighten the screws firmly.

NOTE

1. Clockwise rotation of the throttle position sensor increases the output voltage.
 2. For information concerning the removal and installation of the throttle body, refer to P.14-89.
- (5) Set the ignition switch at OFF.
- (6) Adjust the free play of the accelerator cable.
- (7) Remove the voltmeter.
- (8) Disconnect the negative battery cable, and reconnect it more than 10 seconds later. (By doing so, the memory storing the diagnosis data during the idle speed control adjustment is cleared.)



THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

N14FCL

- (1) Warm up the engine, then stop it.
- (2) Remove the air intake hose from the throttle body.
- (3) Plug the bypass passage inlet of the throttle body.

Caution

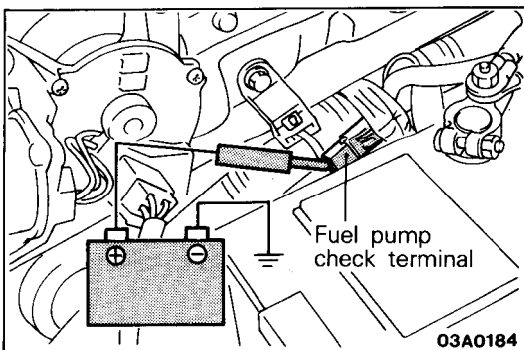
Do not allow cleaning solvent to enter the bypass passage.

- (4) Spray cleaning solvent into the valve through the throttle body intake port and leave it for about 5 minutes.
- (5) Start the engine, race it several times and idle it for about 1 minute. If the idling speed becomes unstable (or if the engine stalls), slightly open the throttle valve to keep the engine running.
- (6) If the throttle valve deposits are not removed, repeat steps (4) and (5).
- (7) Unplug the bypass passage inlet.
- (8) Attach the air intake hose.
- (9) Disconnect the battery terminal for 10 seconds or more, and then reconnect it.
- (10) Adjust the basic idle speed. (Refer to P.14-48.)

RELEASE OF RESIDUAL PRESSURE FROM HIGH PRESSURE FUEL HOSE

N14FGAF

Refer to P.14-44.



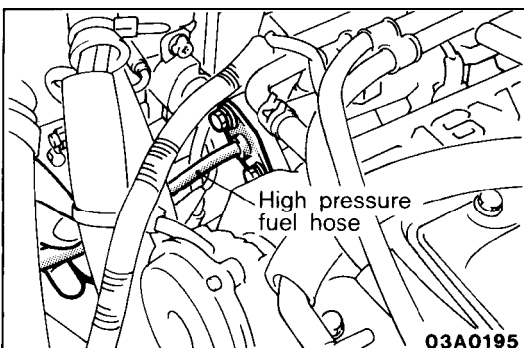
FUEL PUMP OPERATION CHECK

N14FDAG

- (1) Set the ignition switch at OFF.
- (2) Check that when the battery voltage is directly applied to the fuel pump check terminal, the operating sound of the pump can be heard.

NOTE

Since the high pressure fuel pump is installed in the fuel tank, its operating sound cannot be readily heard. Remove the fuel tank cap and listen to the operating sound through the filler port.



- (3) Hold the high pressure fuel hose between your fingers and check that the fuel pressure can be felt.

IDLE POSITION SWITCH ADJUSTMENT

N14FIDA

Caution

The idle position switch has been adjusted by the manufacturer.

Do not, therefore, disturb the setting of the idle-position switch.

If the setting is disturbed as a result of carelessness, or if the idle-position switch is replaced, make the necessary setting as described below.

- (1) Sufficiently loosen the tension of the accelerator cable.
- (2) Disconnect the connector of the idle position switch (fixed speed adjusting screw).
- (3) Loosen the lock nut of the idle position switch (fixed speed adjusting screw).
- (4) Sufficiently loosen the idle position switch by turning it in the counterclockwise direction and fully close the throttle valve.

Caution

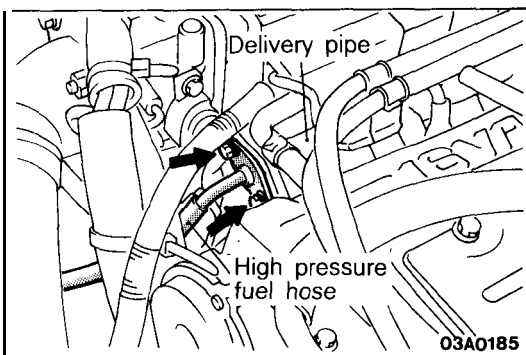
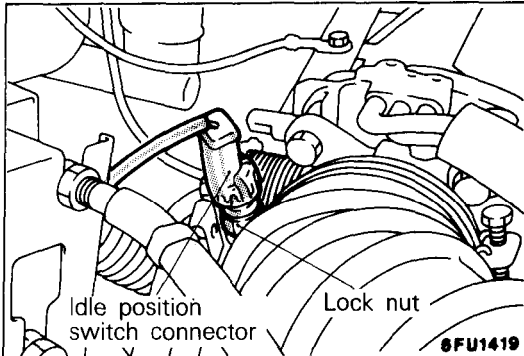
Be sure to completely close the throttle valve.

- (5) Connect a tester (ohm range) between the switch's terminal and the body.
- (6) Turn down the idle position switch until it enter the "ON" state where the switch establishes a continuity to body (this point is called "touch point"). Turn the switch down 15/16 of a turn more from that point.

NOTE

The "touch point" refers to the point where the throttle valve begins opening.

- (7) While holding the idle position switch to make sure that it does not turn, tighten the lock nut.
- (8) Adjust the accelerator cable.
- (9) Adjust the basic idle speed. (Refer to P.14-48.)
- (10) Setting the throttle position sensor.



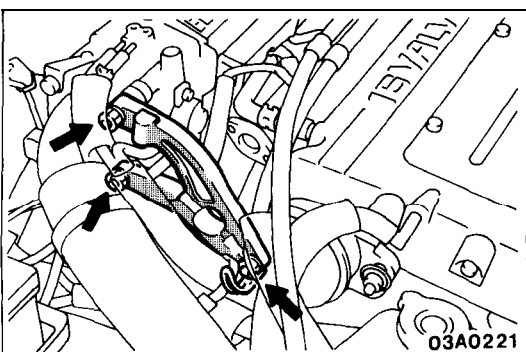
FUEL PRESSURE TEST

N14FNAO

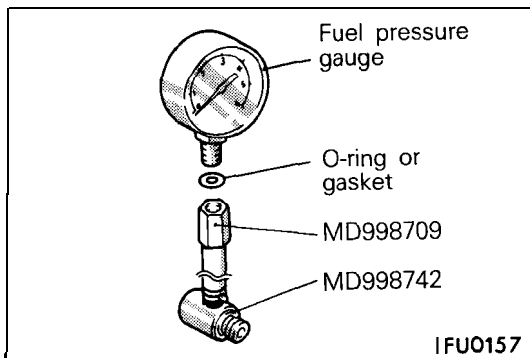
- (1) Reduce the fuel pressure in the fuel line. (Refer to P.14-44.)
- (2) Disconnect the high pressure fuel hose from the delivery pipe.

Caution

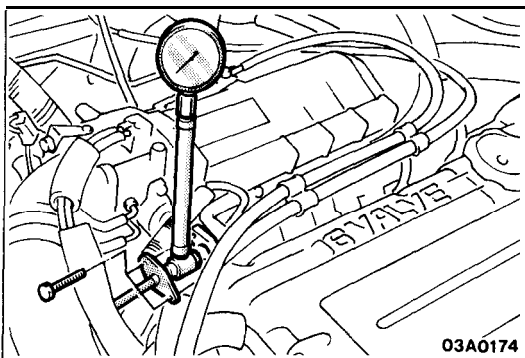
Cover the hose connection with shop towel to prevent splash of fuel that could be caused by residual pressure in the fuel pipe line.



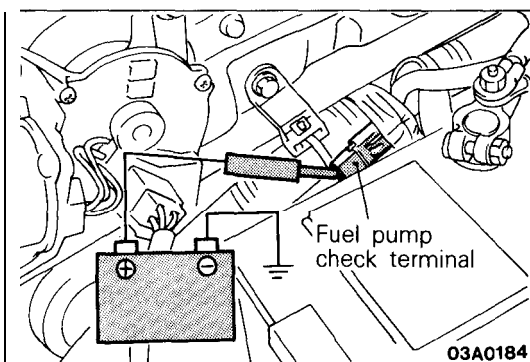
- (3) Remove the throttle body stay.



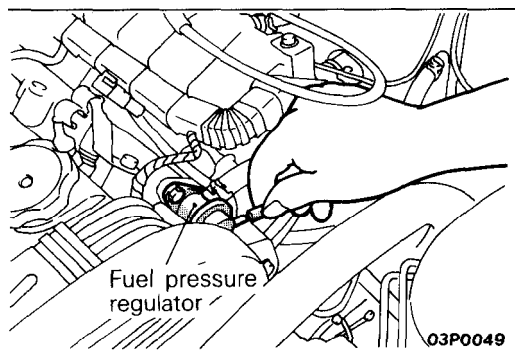
- (4) Connect a fuel pressure gauge to the special tool (hose adapter).
Use a suitable O-ring or gasket between the fuel-pressure gauge and the special tool so as to seal in order to prevent fuel leakage at this time.



- (5) Install the special tool, which was set in place in step (4), between the delivery pipe and the high-pressure fuel hose.
(6) Connect the ⊖ terminal of the battery.



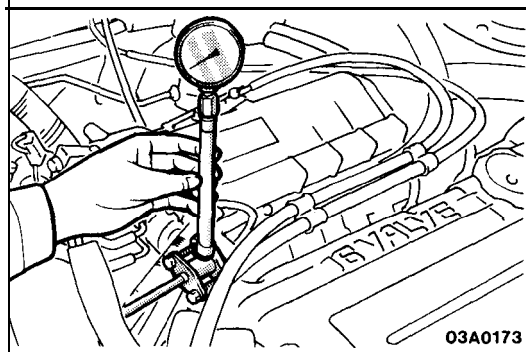
- (7) Apply battery voltage to the fuel pump check terminal and activate the fuel pump; then, with fuel pressure thus applied, check to be sure that there is no fuel leakage from the pressure gauge or the special tool connection part.



- (8) Start the engine and run at curb idle speed.
(9) Disconnect the vacuum hose from the pressure regulator and clog the vacuum hose end. Measure the fuel pressure.

Standard value:

- <Non Turbo> 330–350 kPa (47–50 psi) at curb idle
- <Turbo-M/T> 250–270 kPa (36-38 psi) at curb idle
- <Turbo-A/T> 290–320 kPa (41-46 psi) at curb idle



- (10) Measure the fuel pressure when the vacuum hose is connected to the pressure regulator:

Standard value:

- <Non Turbo> Approx. 270 kPa (38 psi) at curb idle
- <Turbo-M/T> Approx. 190 kPa (27 psi) at curb idle
- <Turbo-A/T> Approx. 230 kPa (33 psi) at curb idle

(11) Race the engine repeatedly in two or three series. Then check that the fuel pressure does not fall when the engine is running at idle.

(12) Check to be sure that there is fuel pressure in the return hose also (by gently pressing the fuel return hose with a finger while repeatedly racing the engine).

NOTE

There will be no fuel pressure in the return hose when the volume of fuel flow is not sufficient.

(13) If the results of the measurements made in steps (9) and (10) above are not within the standard value, use the table below to determine the probable cause, and then make the necessary repair.

Condition	Probable cause	Remedy
Fuel pressure too low	a. Clogged fuel filter b. Fuel leaking toward return port due to improper seating of valve in fuel pressure regulator c. Low delivery pressure of fuel pump	a. Replace fuel filter. b. Replace fuel pressure regulator. c. Replace fuel pump.
Fuel pressure too high	a. Stuck valve in fuel pressure regulator b. Clogged or bent fuel return hose or pipe	a. Replace fuel pressure regulator. b. Repair or replace hose or pipe.
Fuel pressure with vacuum hose connected not different from fuel pressure with vacuum hose not connected	a. Clogged or broken vacuum hose or nipple b. Stuck valve in fuel pressure regulator or defective valve seating	a. Repair or replace vacuum hose or nipple. b. Replace fuel pressure regulator.

(14) Stop the engine and check for change in fuel pressure gauge indication, which should not drop.

If the gauge indication drops, observe the rate of drop and determine and remove the causes according to the following table.

Condition	Probable cause	Remedy
Fuel pressure drops slowly after engine is stopped.	Leakage from injector	Replace injector.
Fuel pressure drops immediately after engine is stopped.	Check valve in fuel pump does not close	Replace fuel pump.

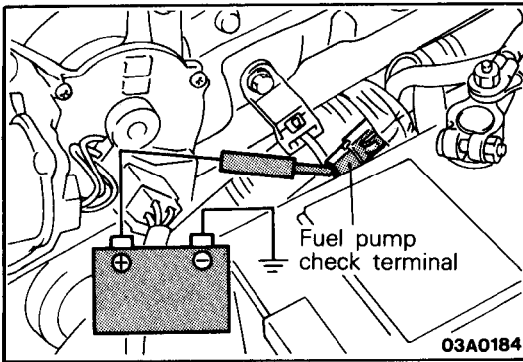
(15) Reduce the fuel pressure in the fuel line.

(16) Disconnect the high pressure fuel hose and remove the fuel-pressure gauge from the delivery pipe.

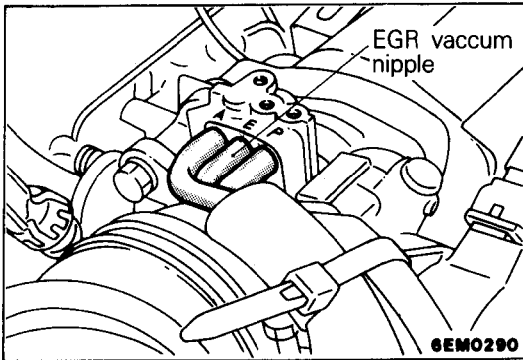
Caution

Cover the hose connection with shop towel to prevent splash of fuel that could be caused by residual pressure in the fuel pipe line.

(17) Mount a new O-ring in the groove at the end of the high pressure fuel hose.



- (18) Connect the high-pressure fuel hose, to the delivery pipe and tighten the screws to the specified torque.
- (19) Check for fuel leaks.
 - ① Apply battery voltage to the fuel pump check terminal to operate the fuel pump.
 - ② With fuel pressure acting, check the fuel line for leaks.



EGR VALVE CONTROL VACUUM CHECK N14FVBB1

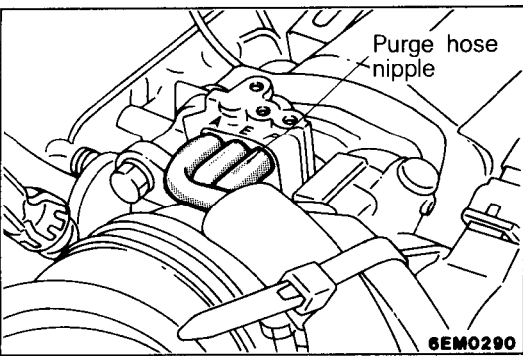
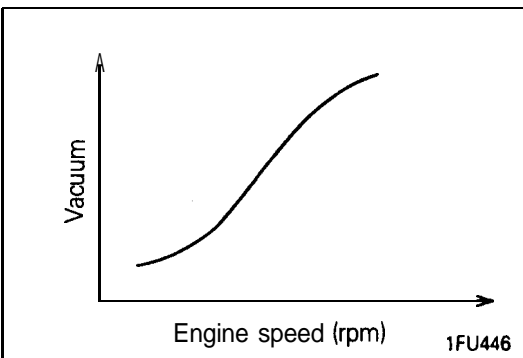
Check Condition

Engine coolant temperature: 85–95°C (185–205°F)

- (1) Disconnect the vacuum hose from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.
- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum raises proportionately with the rise in engine speed.

NOTE

If there is a problem with the change in vacuum, it is possible that the throttle body port may be clogged and require cleaning.



PURGE PORT VACUUM CHECK N14FVBC1

Check Condition

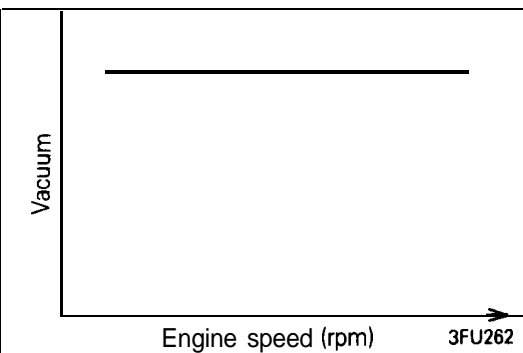
Engine coolant temperature: 85–95°C (185–205°F)

- (1) Disconnect the vacuum hose from the throttle body purge hose nipple and connect a hand vacuum pump to the nipple.

- (2) Start the engine and check to see that, after raising the engine speed by racing the engine, vacuum remains fairly constant.

NOTE

If there is no vacuum created, it is possible that the throttle body port may be clogged and require cleaning.

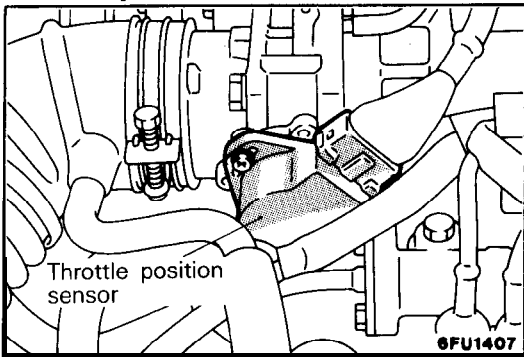


MPI SYSTEM INSPECTION <1.8L Engine>

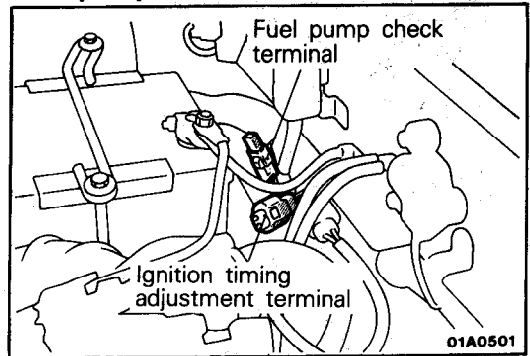
N14PAAM

COMPONENTS LOCATION

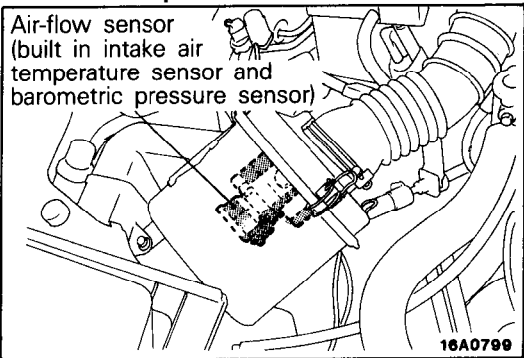
Throttle position sensor



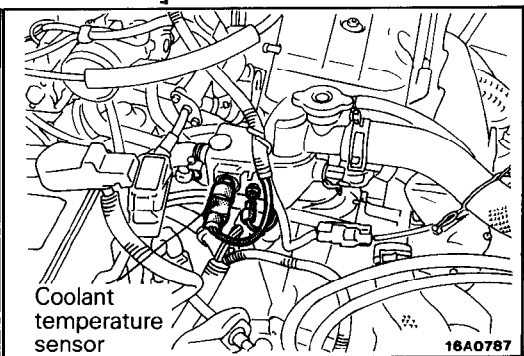
Ignition timing adjustment terminal Fuel pump check terminal



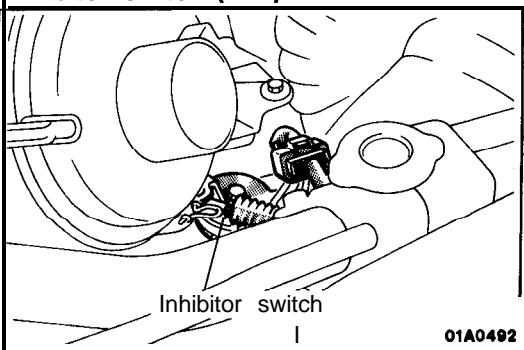
Air-flow sensor Intake air temperature sensor Barometric pressure sensor



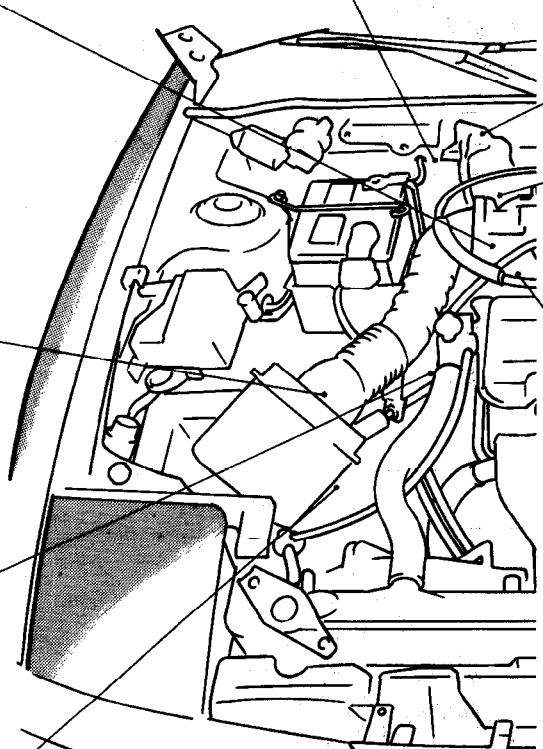
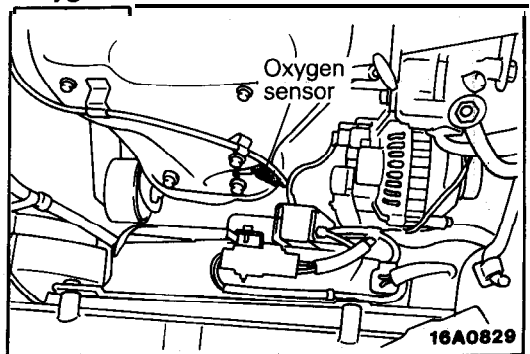
Coolant temperature sensor



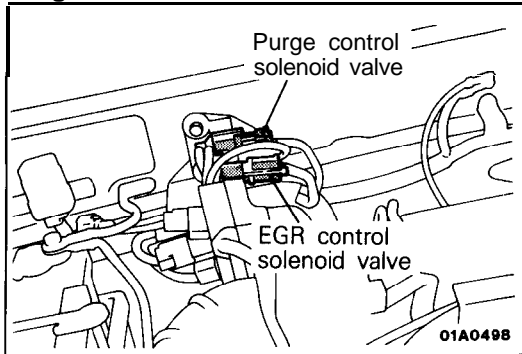
Inhibitor switch (A/T)



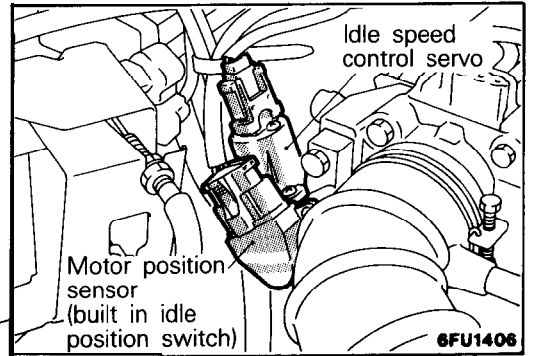
Oxygen sensor



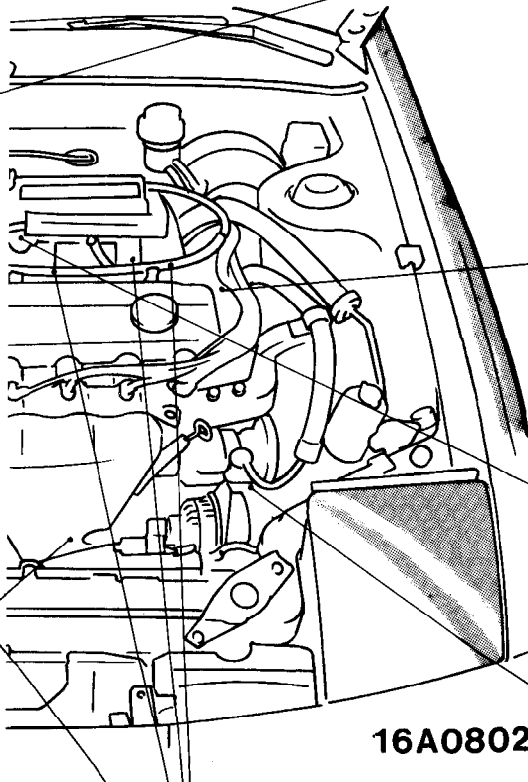
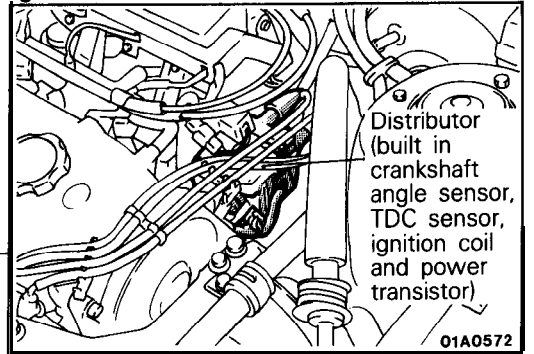
EGR control solenoid valve [Calif. only]
Purge control solenoid valve



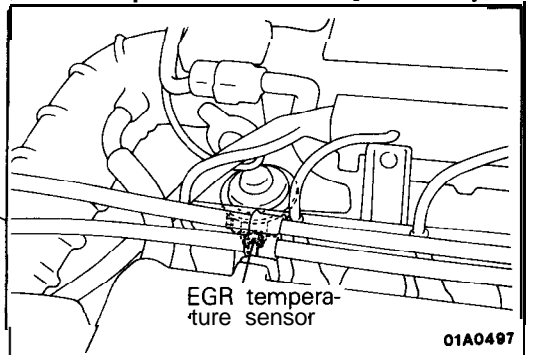
ISC servo, Idle position switch, MPS



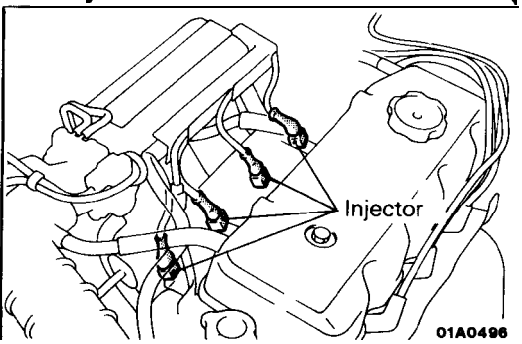
Crankshaft angle sensor, TDC sensor
Ignition coil, Power transistor



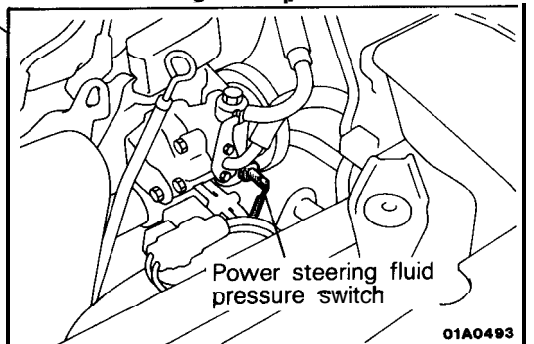
EGR temperature sensor [Calif. only]



In ject o r



Power steering fluid pressure switch



MALFUNCTION INDICATOR LIGHT

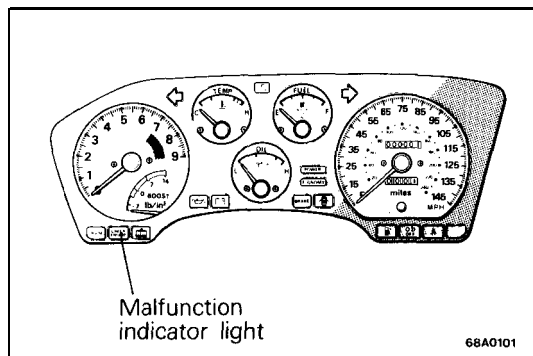
N14PQAB

Among the self-diagnosis items, a malfunction indicator light comes on to notify the driver of the emission control items when an irregularity is detected.

However, when an irregular signal returns to normal and the engine control unit judges that it has returned to normal, the malfunction indicator light goes out.

Moreover, when the ignition switch is turned off, the light goes out. Even if the ignition switch is turned on again, the light does not come on until the irregularity is detected.

Here, immediately after the ignition switch is turned on, the malfunction indicator light is lit for 5 seconds to indicate that the malfunction indicator light operates normally.

Items indicated by the lightening malfunction light

Engine control unit
Oxygen sensor
Air-flow sensor
Intake air temperature sensor
Throttle position sensor
Motor position sensor
Engine coolant temperature sensor
Crank angle sensor
No. 1 cylinder TDC sensor
Barometric pressure sensor
Ignition timing adjustment signal
Injector
Fuel pump
EGR system <California>

Caution

The malfunction indicator light lights up when the ignition timing adjustment terminal is short-circuited to ground. Consequently, it lights up when the ignition timing adjustment is grounded when adjusting ignition timing, but in this case there is no abnormality.

MALFUNCTION INDICATOR LIGHT INSPECTION

When turning on the ignition switch, check that the light comes on.

NOTE

If the light does not come on, check the harness and light for breakage.

SELF-DIAGNOSIS

N14PAAFa

The engine control unit monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control unit.

When it is noticed that an irregularity has continued for a specified time or longer from when the irregular signal is initially monitored. Passing a certain number, the engine control unit judges that an irregularity has occurred, memorizes the malfunction code, and outputs the signal to the self-diagnosis output terminal.

There are 14 diagnosis items, and the diagnosis results can be read out with a voltmeter.

Moreover, since memorization of the malfunction codes is backed up directly by the battery, the diagnosis results are memorized even if the ignition key is turned off. The malfunction codes will, however, be erased when the battery terminal or the engine control unit connector is disconnected.

Caution

If the sensor connector is disconnected with the ignition switch turned on, the malfunction code is memorized. In this case, disconnect the battery terminal' (-) for 10 seconds or more, and the diagnosis memory will be erased.

The 14 diagnosis items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

Malfunction code	Diagnosis item	Malfunction code	Diagnosis item
11	Oxygen sensor	24	Vehicle speed sensor (reed switch)
12	Air flow sensor	25	Barometric pressure sensor
13	Intake air temperature sensor	36	Ignition timing adjustment signal
14	Throttle position sensor	41	Injector
15	Motor position sensor	42	Fuel pump
21	Engine coolant temperature sensor	43	EGR <California>
22	Crank angle sensor	-	-
23	No.1 cylinder TDC sensor		

Caution

For the malfunction code of the ignition timing adjustment signal, the light for the ignition timing adjustment terminal lights up when short-circuited to ground.

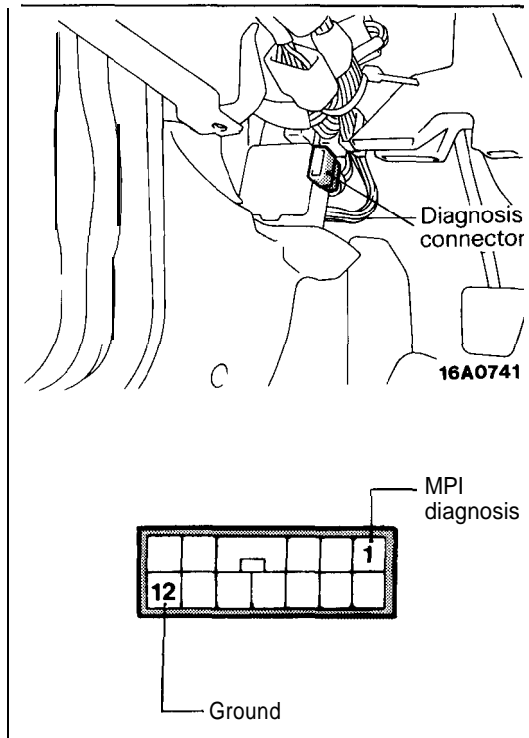
Consequently, it is output when the ignition timing adjustment is grounded when adjusting ignition timing, but in this case there is not abnormality.

CHECK PROCEDURE (SELF-DIAGNOSIS)

N14PCA1

Precautions for Operation

- (1) When battery voltage is low, no detection of failure is possible. Be sure to check the battery for voltage and other conditions before starting the test.
- (2) Diagnosis item is erased if the battery or the engine control unit connector is disconnected. Do not disconnect the battery before the diagnosis result is completely read.
- (3) After check and correction are over, disconnect ground cable for 10 seconds or more from negative terminal of battery and connect it again to make sure that failure code is erased.



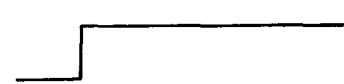





INSPECTION PROCEDURE – USING VOLTMETER




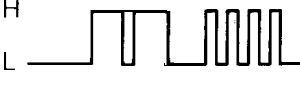




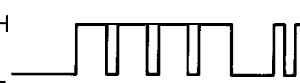

N14PCAG1

- (1) Connect an analogue voltmeter to the self-diagnosis connector.
- (2) Turn ignition switch to ON, and indication of engine control unit memory contents will immediately start. If the system is in normal condition, pointer of voltmeter indicates normal pattern. If any abnormality is in memory, the pointer of voltmeter will deflect, indicating abnormal item as described in "Diagnosis Chart".
After recording the abnormal item, check and repair each part according to the check items in "Diagnosis Chart".
- (3) If the defective parts have been repaired, disconnect the negative terminal of battery cable for 10 seconds or more and connect it again to make sure that the abnormal code has been erased.

DIAGNOSIS CHART (FAULT TREE)

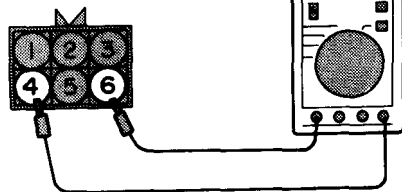
N14PRAC

output preference order	Diagnosis item	Diagnosis code			Check item (Remedy)
		Output signal pattern	No.	Memory	
1	Engine control unit	H L 	–	–	(Replace engine control unit)
2	Oxygen sensor	H L 	11	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Fuel, pressure ● Injectors (Replace if defective) ● Intake air leaks ● Oxygen sensor
3	Air flow sensor	H L 	12	Retained	<ul style="list-style-type: none"> ● Harness and connector (If harness and connector are normal, replace air flow sensor assembly.)
4	Intake air temperature sensor	H L 	13	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Intake air temperature sensor
5	Throttle position sensor	H L 	14	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Throttle position sensor ● Idle position switch
6	Motor position sensor	H L 	15	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Motor position sensor ● Throttle position sensor

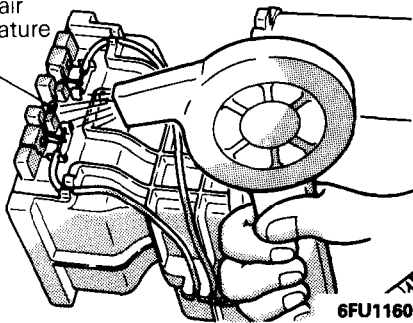
output reference order	Diagnosis item	Diagnosis code			Check item (Remedy)
		Output signal pattern	No.	Memory	
7	Engine coolant temperature sensor	H L  12A0107	21	Retained	<ul style="list-style-type: none"> • Harness and connector • Engine coolant temperature sensor
8	Crank angle sensor	H L  12A0107	22	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace distributor assembly.)
9	No. 1 cylinder top dead center sensor	H L  12A0107	23	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace distributor assembly.)
10	Vehicle speed sensor (reed switch)	H L  12A0107	24	Retained	<ul style="list-style-type: none"> • Harness and connector • Vehicle speed sensor (reed switch)
11	Barometric pressure sensor	H L  12A0107	25	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace barometric pressure sensor assembly.)
12	Ignition timing adjustment signal	H L  12R0468	36	—	<ul style="list-style-type: none"> • Harness and connector
13	Injector	H L  12A0105	41	Retained	<ul style="list-style-type: none"> • Harness and connector • Injector coil resistance
14	Fuel pump	H L  12A0105	42	Retained	<ul style="list-style-type: none"> • Harness and connector • Control relay
15	EGR <California>	H L  12A0105	43	Retained	<ul style="list-style-type: none"> • Harness and connector • EGR temperature sensor • EGR valve • EGR valve control solenoid valve • EGR valve control vacuurr
16	Normal state	H L  12A0104	—	—	—

NOTE

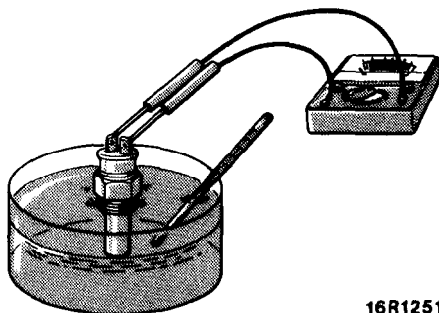
Replace the engine control unit if a malfunction code is output although the inspection reveals that there is no problem with the check items.

Air flow sensor
side connector

6FU0622

Intake air
temperature
sensor

6FU1160



16R1251

INTAKE AIR TEMPERATURE SENSOR INSPECTION

N14QHAB

- (1) Disconnect the air flow sensor connectors.
- (2) Measure resistance between terminals ④ and ⑥.

Temperature °C (°F)	Resistance kΩ
0 (32)	6.0
20 (68)	2.7
80 (176)	0.4

- (3) Measure resistance while heating the sensor using a hair drier.

Temperature °C (°F)	Resistance kΩ
Higher	Smaller

- (4) If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

ENGINE COOLANT TEMPERATURE SENSOR

N14QABE

INSPECTION

- (1) Remove engine coolant temperature sensor from the intake manifold.
- (2) With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Temperature °C (°F)	Resistance kΩ
0 (32)	5.9
20 (68)	2.5
40 (104)	2.7
80 (176)	0.3

- (3) If the resistance deviates from the standard value greatly, replace the sensor.

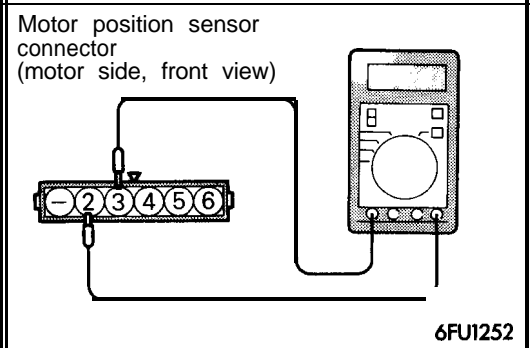
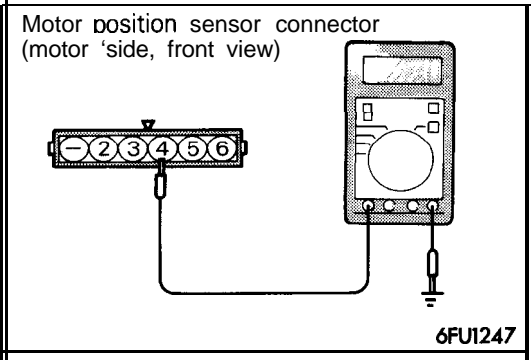
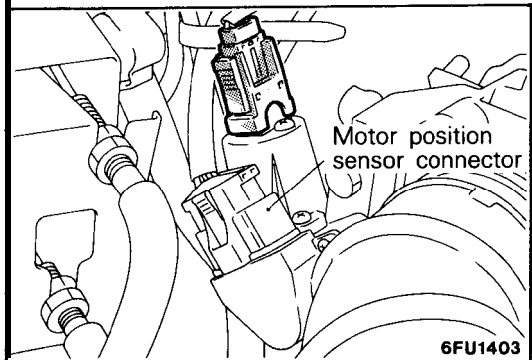
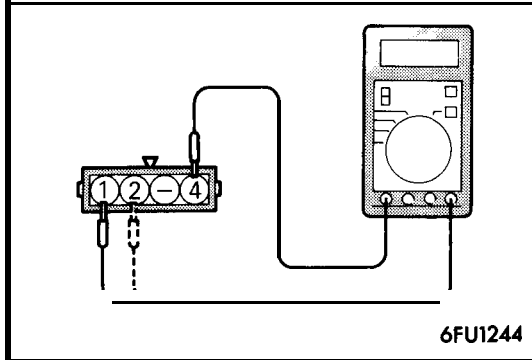
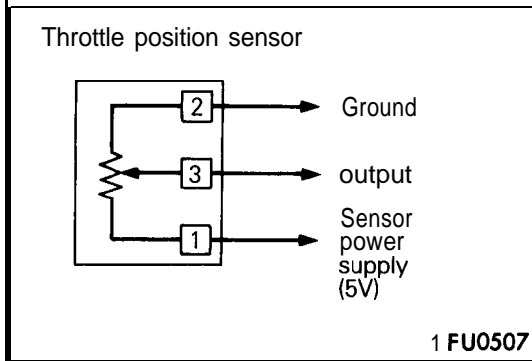
INSTALLATION

- (1) Apply specified sealant to threaded portion and tighten to specified torque.

**Specified sealant: MOPAR Part No. 4318034
or equivalent**

Specified torque: 20 – 40 Nm (15 – 29 ft.lbs.)

- (2) Fasten harness connectors securely.



THROTTLE POSITION SENSOR INSPECTION

N14QBBKa

- (1) Disconnect the throttle position sensor connector.
- (2) Measure resistance between terminal ④ (sensor ground) and terminal ① (sensor power).

Standard value: 3.5-6.5 kΩ

- (3) Connect a pointer type ohmmeter between terminal ④ (sensor ground) and terminal ② (sensor output).
- (4) Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
- (5) If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

**Throttle position sensor installation torque:
1.5 – 2.5 Nm (1.1 – 1.6 ft.lbs.)**

IDLE POSITION SWITCH INSPECTION

N14QKADa

- (1) Disconnect the connectors of the motor position sensor.

- (2) Check the continuity between terminal ④ and the body ground.

Accelerator pedal	Continuity
Depressed	Non-conductive ($\infty \Omega$)
Released	Conductive (0Ω)

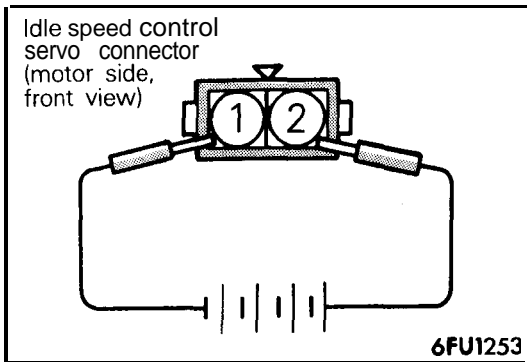
- (3) If defective, replace the idle speed control servo assembly.

MOTOR POSITION SENSOR INSPECTION

N14QLAJ

- (1) Disconnect the motor position sensor connector.
- (2) Measure the resistance between terminals ② and ③.

Standard value: 4 – 6 kΩ



- (3) Disconnect the idle speed control servo connector.
- (4) Connect DC 6V between terminals ① and ② of the idle speed control servo connector, and then measure the resistance between terminals ③ and ⑤ of the motor position sensor connector when the idle speed control servo is activated (caused to expand and contract).

Standard value: Smooth increase/decrease in accordance with extension and retraction of idle speed control servo plunger.

Caution

Apply only a 6V DC or lower voltage. Application of higher voltage could cause locking of the servo gears.

- (5) If there is a deviation from the standard value, or if the change is not smooth, replace the idle speed control servo assembly.

OXYGEN SENSOR

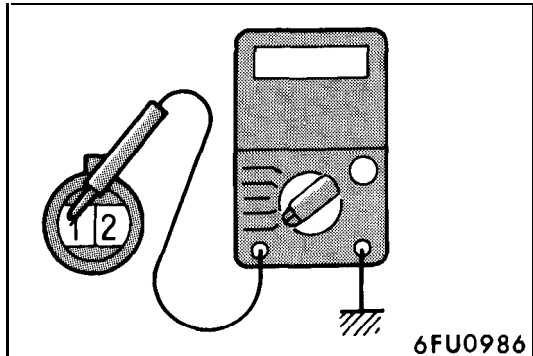
N14QDBAb

INSPECTION

Caution

- 1. Before checking, warm up the engine until engine coolant temperature reaches 85 to 95°C (185 to 205°F).
- 2. Use an accurate digital voltmeter.

- (1) Disconnect the oxygen sensor connector and connect a voltmeter to the oxygen sensor connector.
- (2) While repeating engine racing, measure the oxygen sensor output voltage.



Engine	Oxygen sensor output voltage	Remarks
Race	0.6– 1.0V	Make air-fuel mixture rich by accelerator operation

NOTE

For removal and installation of the oxygen sensor, refer to GROUP 11 – Exhaust Manifold.

Oxygen sensor installation torque:

40 – 50 Nm (30 – 36 **ft.lbs.**)

EGR TEMPERATURE SENSOR <California> N14RCHAa

Refer to GROUP 25 – Exhaust Gas Recirculation System.

VEHICLE SPEED SENSOR

N14QEBBa

Refer to GROUP 8 – Meters and Gauges.

AIR CONDITIONER SWITCH

N14QOABa

Refer to GROUP 8 – Column Switch.

INHIBITOR SWITCH

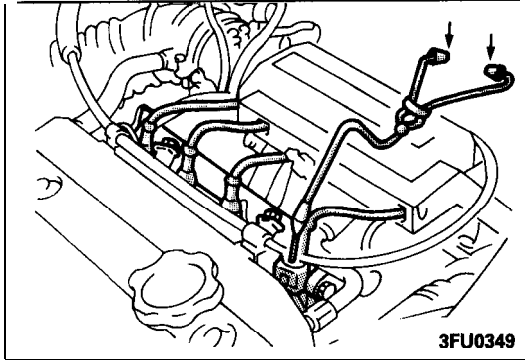
N14QRACa

Refer to GROUP 21 – Service Adjustment Procedures.

POWER STEERING OIL PRESSURE SWITCH

N14RCJB

Refer to GROUP 19 for power steering system inspection.



INJECTORS

N14QTAG

CHECKING OPERATION SOUND

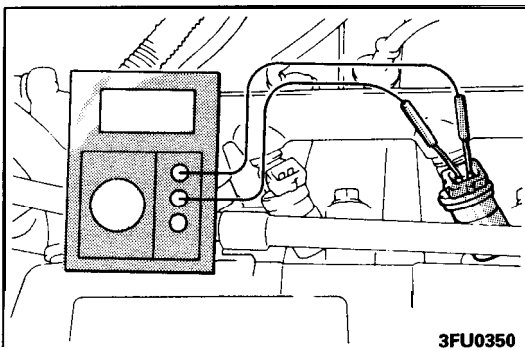
Using a sound-scope, check the operation sound (“chi-chi-chi”) of injectors during idling or during cranking. Check that as the rotating speed increases, the frequency of the operating sound also increases.

Caution

Note that even if the injector you are checking is not operating, you will hear the operating sound of the other injectors.

NOTE

If no operating sound is heard from the injector that is being checked, check the injector drive circuit. If there is nothing wrong with the circuit, a defective injector or engine control unit is suspected.

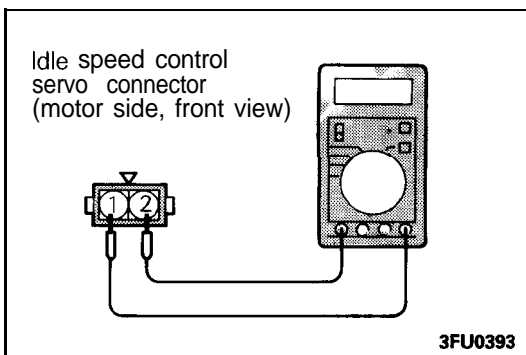


MEASURING RESISTANCE BETWEEN TERMINALS

- (1) Remove the injector connector.
- (2) Measure the resistance between the terminals.

Standard value: 13 – 16 Ω [at 20°C (68°F)]

- (3) Install the injector connector.

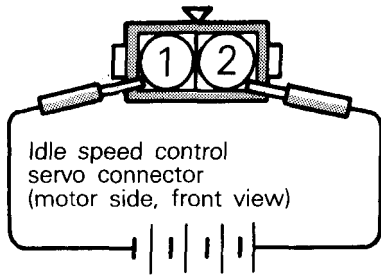


IDLE SPEED CONTROL SERVO INSPECTION

N14QUAAb

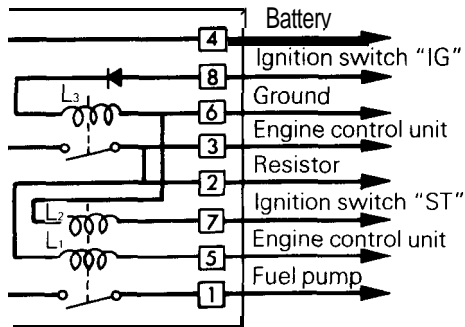
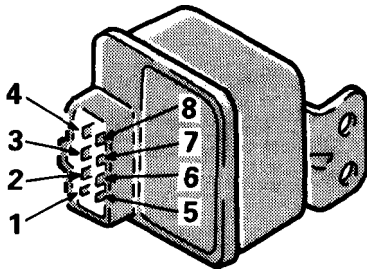
- (1) Disconnect the idle speed control servo connector.
- (2) Check continuity of the idle speed control servo coil.

Measuring terminals	Continuity
① – ② Conductive	5 to 35 Ω resistance at 20°C (68°F)

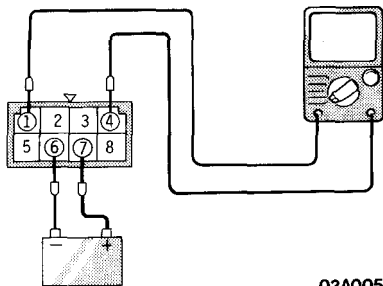


Idle speed control servo connector (motor side, front view)

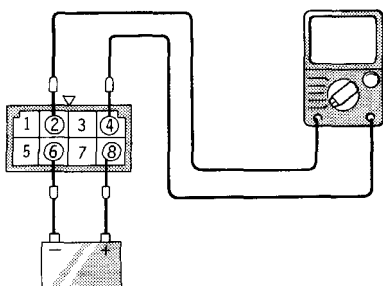
6FU1253



6FU0751



03A0058



03A0057

- (3) Connect 6V DC between terminal ① and terminal ② of the idle speed control servo connector, and check to be sure that the idle speed control servo operates.

Caution

Apply only a 6V DC or lower voltage. Application of higher voltage could cause locking of the servo gears.

- (4) If not, replace idle speed control servo as an assembly.

CONTROL RELAY INSPECTION

N14QYAE

- (1) Remove the control relay.
- (2) Inspect the continuity between the control relay terminals.

Inspection terminals	Continuity
③-⑤	Yes (approx. 95 Ω)
②-⑤	
⑥-⑦	Yes (approx. 35 Ω)
⑥-⑧	Yes in 1 direction only

- (3) Use jumper wires and connect control relay terminal ⑦ to the battery ⊕ terminal and terminal ⑥ to the battery ⊖ terminal.

Caution

Be very careful when connecting the jumper wires because the relay will be damaged if a mistake is made with the contact terminals.

- (4) With the battery ⊖ terminal jumper wire connected and disconnected, check the continuity between control relay terminals ①-④.

Jumper wire	Continuity between terminals ①-④
Connection	Yes (0 Ω)
Not connected	No (∞ Ω)

- (5) Use jumper wires to connect control relay terminal ⑧ to the battery ⊕ terminal and terminal ⑥ to the battery ⊖ terminal.

- (6) With the battery ⊖ terminal jumper wire connected and disconnected, check the continuity between control relay terminals ②-④.

Jumper wire	Continuity between terminals ②-④
Connection	Yes (0 Ω)
Not connected	No (∞ Ω)

- (7) Replace the control relay if faulty.

POWER TRANSISTOR

N14RCGA

Refer to GROUP 8 – Ignition System

AIR CONDITIONER POWER RELAY

N14RCLB

Refer to GROUP 24 – Air Conditioner.

PURGE CONTROL SOLENOID VALVE

N14RCKA

Refer to GROUP 25 – Evaporative Emission Control System.

EGR CONTROL SOLENOID VALVE <California>

N14RCLA

Refer to GROUP 25 – Exhaust Gas Recirculation System.

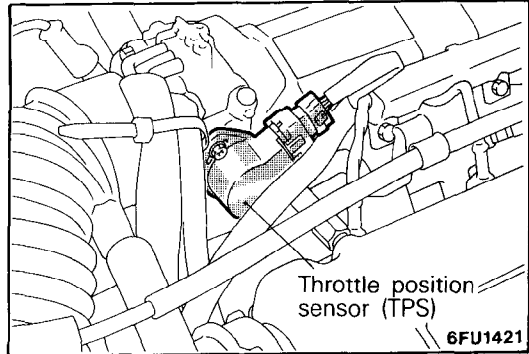
MPI SYSTEM INSPECTION <2.0L DOHC Engine>

N14PAAN

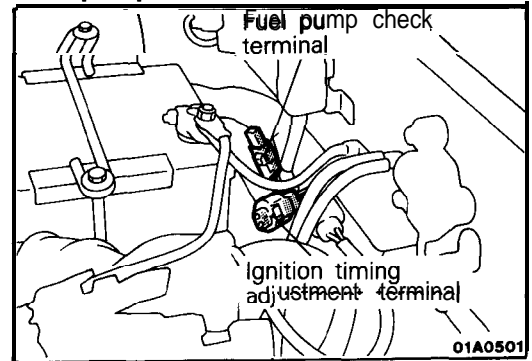
COMPONENTS LOCATION

<Non-Turbo>

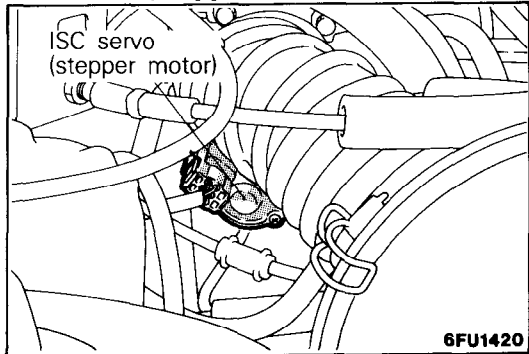
Throttle position sensor



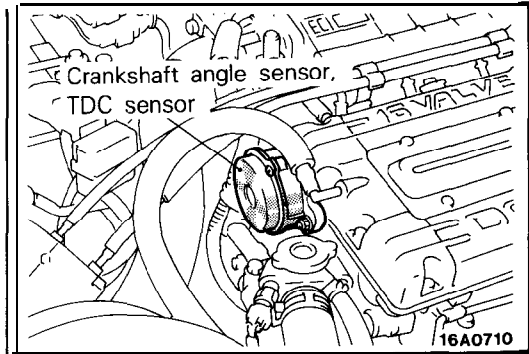
**Ignition timing adjustment terminal
Fuel pump check terminal**



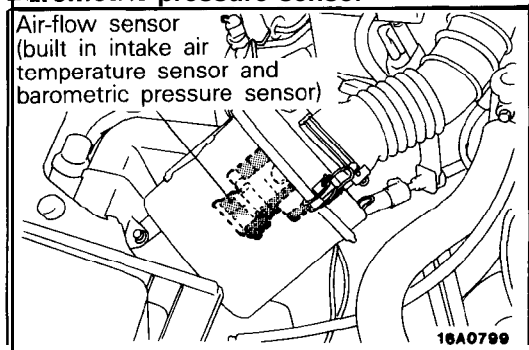
ISC servo (stepper motor)



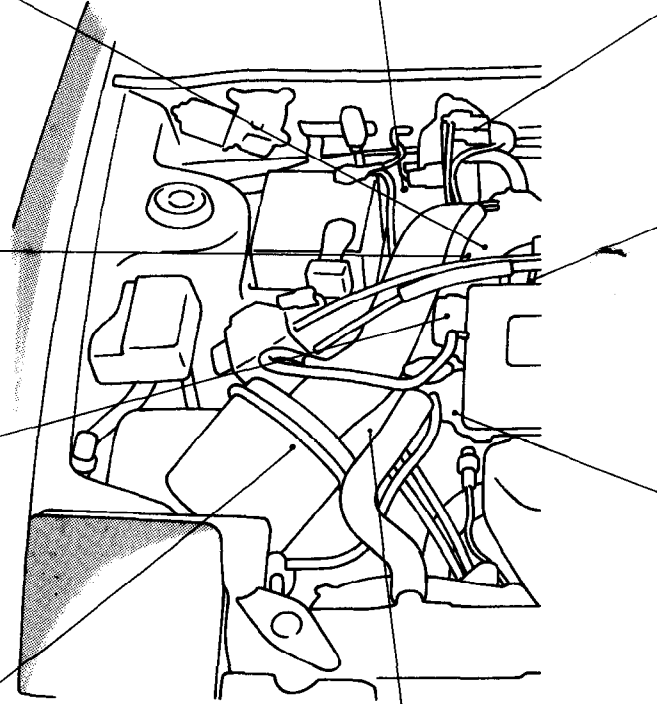
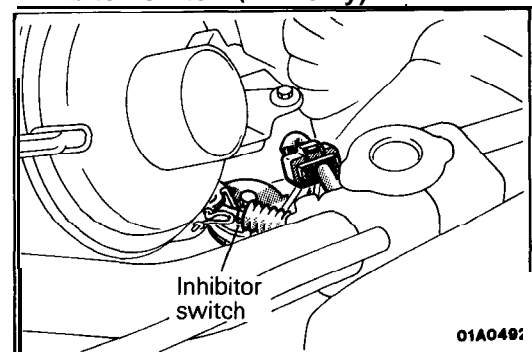
**Crankshaft angle sensor
TDC sensor**



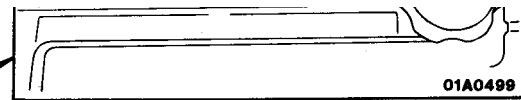
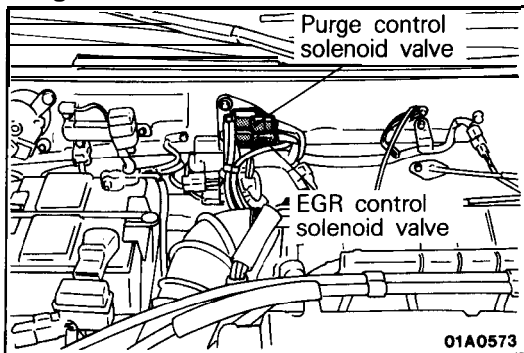
**Air-flow sensor
Intake air temperature sensor
Barometric pressure sensor**



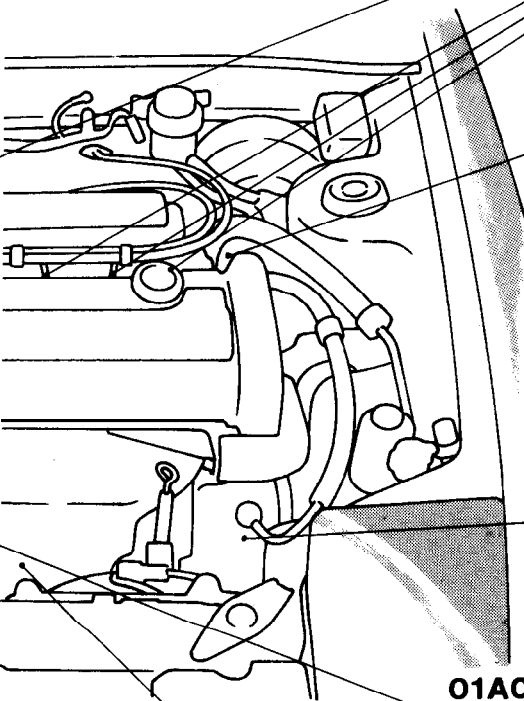
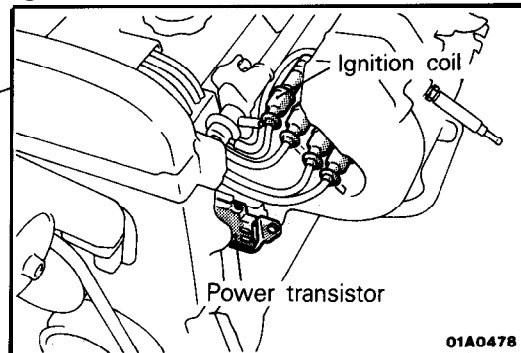
Inhibitor switch (A/T only)



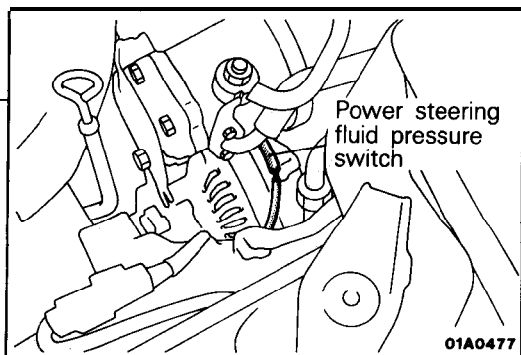
EGR control solenoid valve [Calif. only]
Purge control solenoid valve



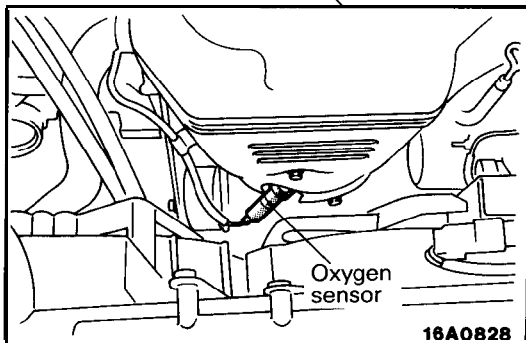
Ignition coil, Power transistor



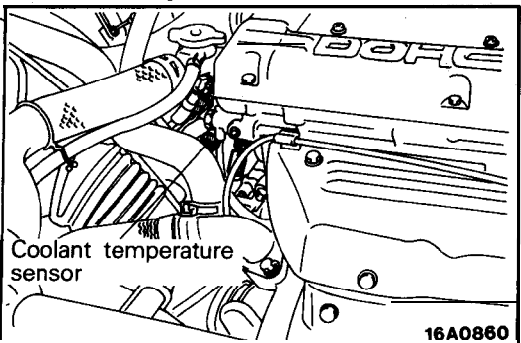
Power steering fluid pressure switch



Oxygen sensor

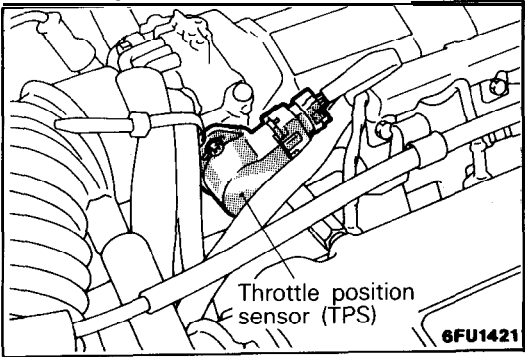


Coolant temperature sensor

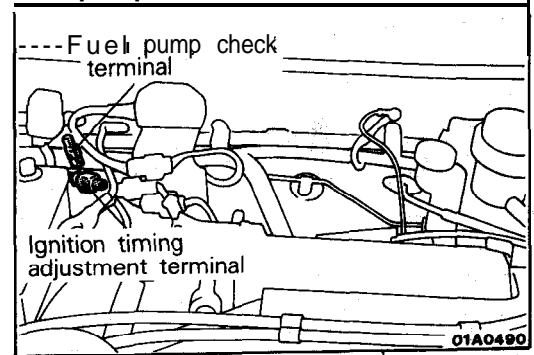


<Turbo>

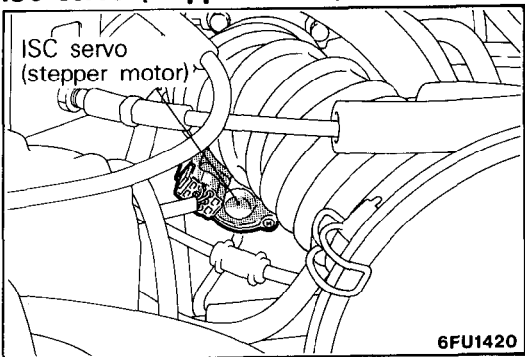
Throttle position sensor



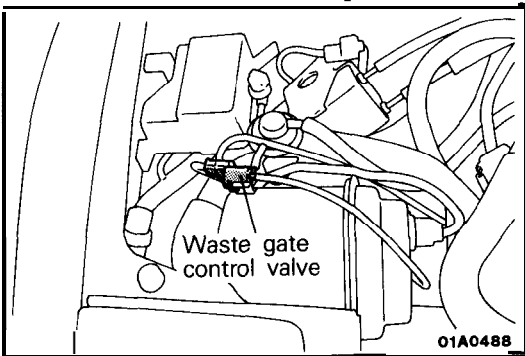
Ignition timing adjustment terminal
Fuel pump check terminal



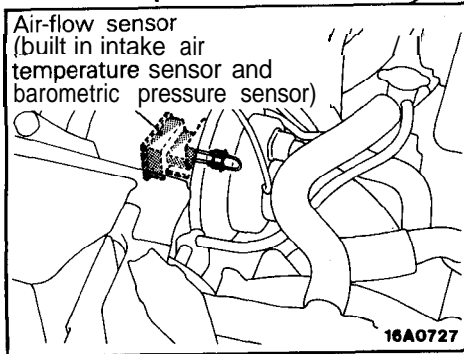
ISC servo (stepper motor)



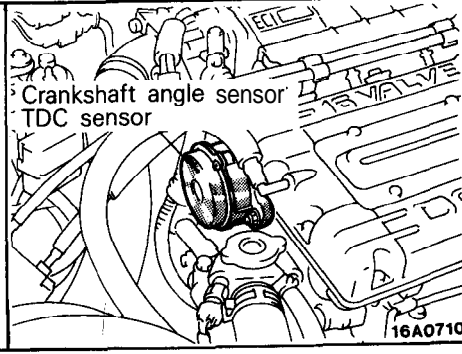
Waste gate control valve [Turbo only]



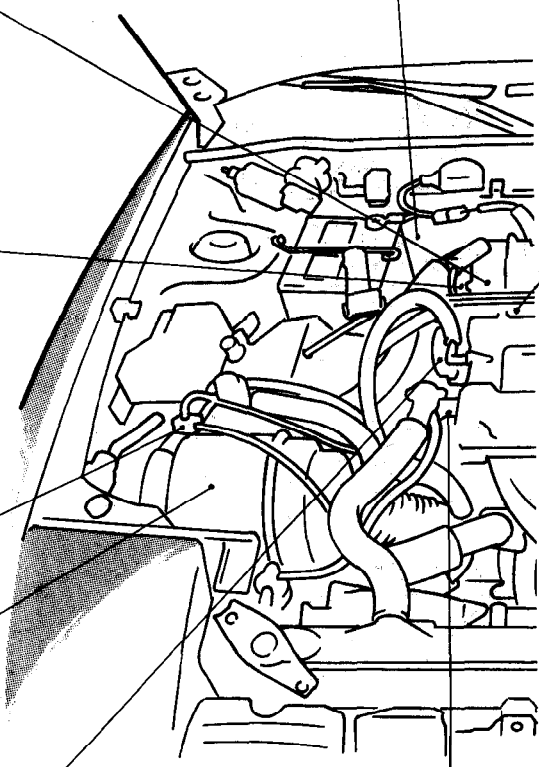
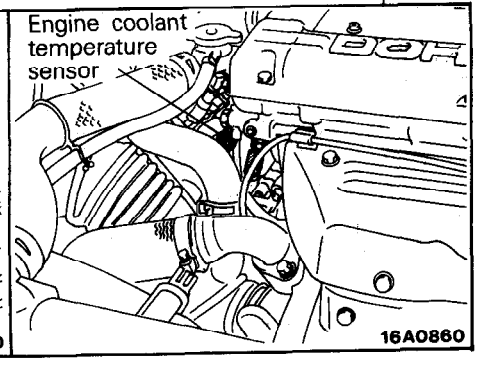
Air-flow sensor
Intake air temperature sensor
Barometric pressure sensor



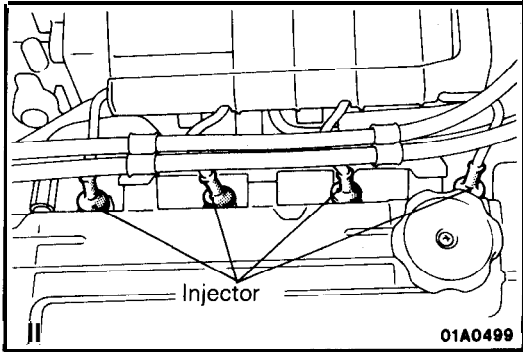
Crankshaft angle sensor
TDC sensor



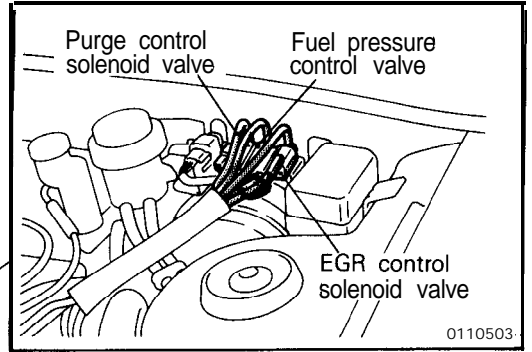
Engine coolant temperature sensor



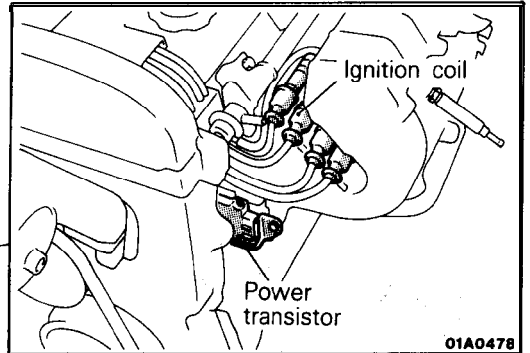
Injector



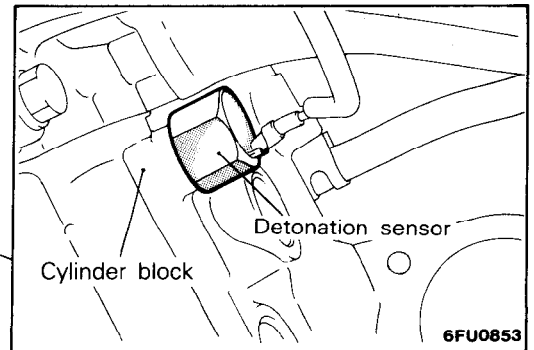
EGR control solenoid valve [Calif. only]
Purge control solenoid valve
Fuel pressure control valve [Turbo only]



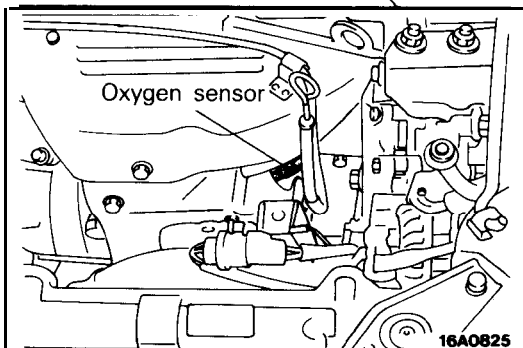
Ignition coil, Power transistor



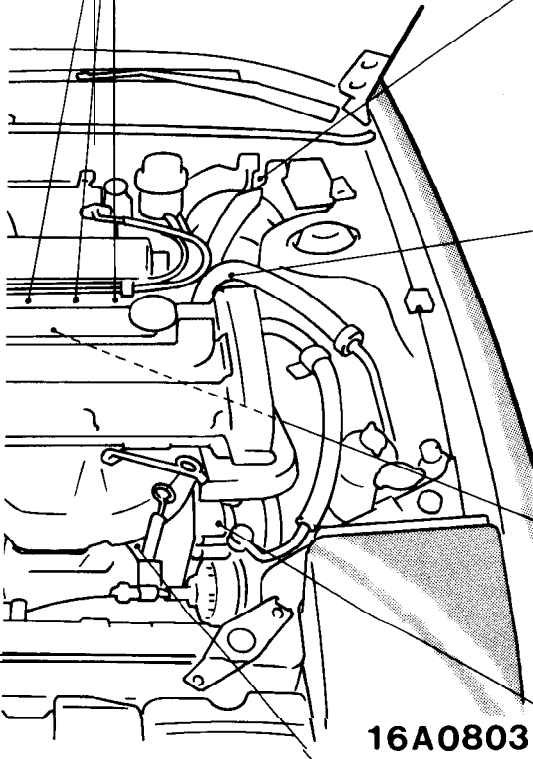
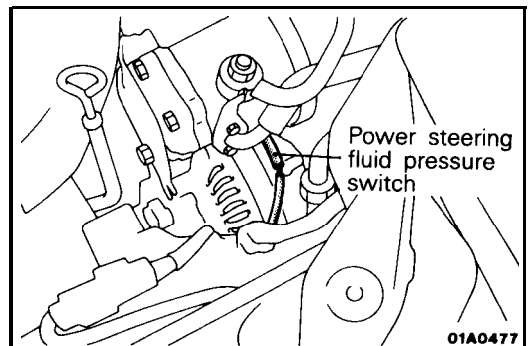
Detonation sensor



Oxygen sensor



Power steering fluid pressure switch



MALFUNCTION INDICATOR LIGHT

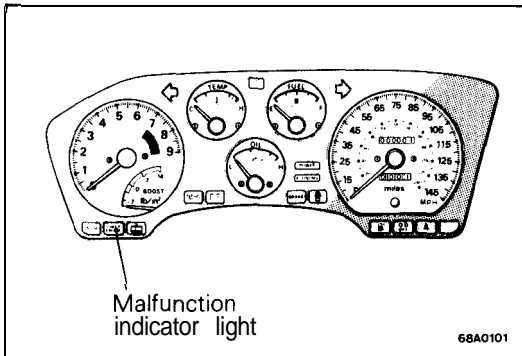
N14PQAC

Among the self-diagnosis items, a malfunction indicator light comes on to notify the driver of the emission control items when an irregularity is detected.

However, when an irregular signal returns to normal and the engine control unit judges that it has returned to normal, the malfunction indicator light goes out.

Moreover, when the ignition switch is turned off, the light goes out. Even if the ignition switch is turned on again, the light does not come on until the irregularity is detected.

Here, immediately after the ignition switch is turned on, the malfunction indicator light is lit for 5 seconds to indicate that the malfunction indicator light operates normally.

**Items indicated by the lighting malfunction light**

Engine control unit
Oxygen sensor
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Top dead center sensor
Barometric pressure sensor
Detonation sensor <Turbo>
Injector
Fuel pump
EGR <California>
Ignition coil

MALFUNCTION INDICATOR LIGHT INSPECTION

When turning on the ignition switch, check that the light comes on.

NOTE

If the light does not come on, check the harness and light for breakage.

SELF-DIAGNOSIS

N14PAAE

The engine control unit monitors the input/output signals (some signals at all times and the others under specified conditions) of the engine control unit.

When it is noticed that an irregularity has continued for a specified time or longer from when the irregular signal is initially monitored. Passing a certain number, the engine control unit judges that an irregularity has occurred, memorizes the malfunction code, and outputs the signal to the self-diagnosis output terminal.

There are 14 diagnosis items, and the diagnosis results can be read out with a voltmeter.

Moreover, since memorization of the malfunction codes is backed up directly by the battery, the diagnosis results are memorized even if the ignition key is turned off. The malfunction codes will, however, be erased when the battery terminal or the engine control unit connector is disconnected.

Caution

If the sensor connector is disconnected with the ignition switch turned on, the malfunction code is memorized. In this case, disconnect the battery terminal (–) for 10 seconds or more, and the diagnosis memory will be erased.

The 14 diagnosis items are provided as follows, and if plural items are activated, they are all indicated sequentially from the smallest code number.

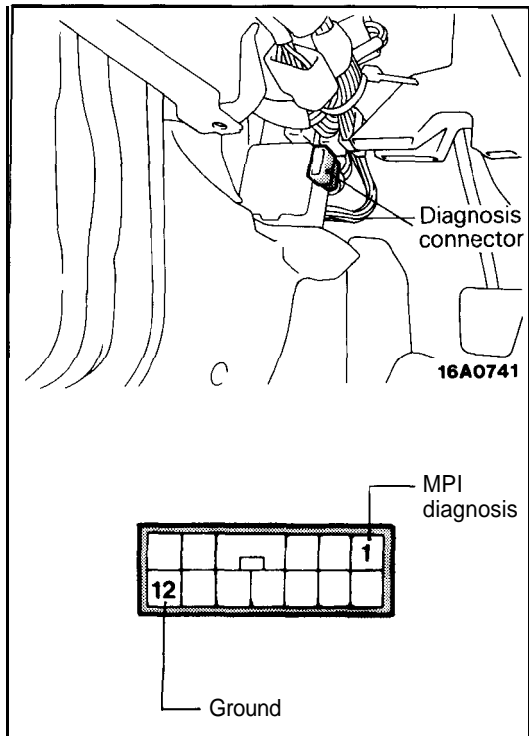
Malfunction code	Diagnosis item	Malfunction code	Diagnosis item
11	Oxygen sensor	24	Vehicle speed sensor (reed switch)
12	Air flow sensor	25	Barometric pressure sensor
13	Intake air temperature sensor	31	Detonation sensor <Turbo>
14	Throttle position sensor	41	Injector
21	Engine coolant temperature sensor	42	Fuel pump
22	Crank angle sensor	43	EGR <California>
23	Top dead center sensor	44	Ignition coil

CHECK PROCEDURE (SELF-DIAGNOSIS)

N14PCAE2

Precautions for Operation

- (1) When battery voltage is low, no detection of failure is possible. Be sure to check the battery for voltage and other conditions before starting the test.
- (2) Diagnosis item is erased if the battery or the engine control unit connector is disconnected. Do not disconnect the battery before the diagnosis result is completely read.
- (3) After check and correction are over, disconnect ground cable for 10 seconds or more from negative terminal of battery and connect it again to make sure that failure code is erased.



INSPECTION PROCEDURE – USING VOLTMETER






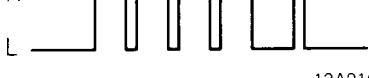

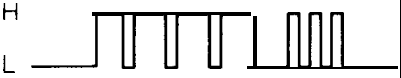


N14PCAG2

- (1) Connect an analogue voltmeter to the self-diagnosis connector.
- (2) Turn ignition switch to ON, and indication of engine control unit memory contents will immediately start. If the system is in normal condition, pointer of voltmeter indicates normal pattern. If any abnormality is in memory, the pointer of voltmeter will deflect, indicating abnormal item as described in "Diagnosis Chart".
After recording the abnormal item, check and repair each part according to the check items in "Diagnosis Chart".
- (3) If the defective parts have been repaired, disconnect the negative terminal of battery cable for 10 seconds or more and connect it again to make sure that the abnormal code has been erased.

DIAGNOSIS CHART (FAULT TREE)

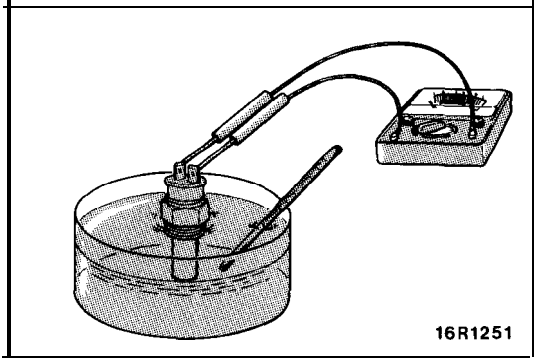
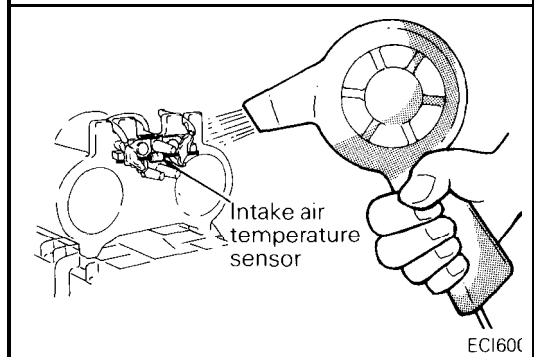
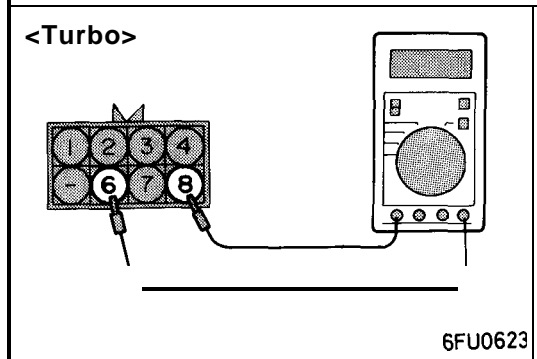
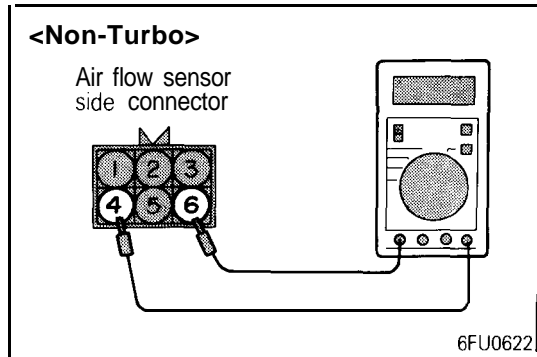
N14PRAD

output reference order	Diagnosis item	Diagnosis code			Check item (Remedy)
		Output signal pattern	No.	Memory	
1	Engine control unit	H (Replace unit) L 12A0104		engine	control
2	Oxygen sensor	: - J - I - J - 12A0104	11	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Oxygen sensor ○ Fuel pressure ● Injectors (Replace if defective) ● Intake air leaks
3	Air flow sensor	H L 12A0104	12	Retained	<ul style="list-style-type: none"> ● Harness and connector (If harness and connector are normal, replace air flow sensor assembly.)
4	Intake air temperature sensor	H L 12A0104	13	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Intake air temperature sensor
5	Throttle position sensor	H L 12A0104	14	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Throttle position sensor ● Idle position switch
6	Engine coolant temperature sensor	H L 12A0107	21	Retained	<ul style="list-style-type: none"> ● Harness and connector ● Engine coolant temperature sensor

output reference order	Diagnosis item	Diagnosis code			Check item (Remedy)
		Output signal pattern	No.	Memory	
7	Crank angle sensor	 <p>12A0107</p>	22	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
8	Top dead center sensor (No. 1 and No. 4 cylinder)	 <p>12A0107</p>	23	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace crank angle sensor assembly.)
9	Vehicle speed sensor (reed switch)	 <p>12A0107</p>	24	Retained	<ul style="list-style-type: none"> • Harness and connector • Vehicle speed sensor (reed switch)
10	Barometric pressure sensor	 <p>12A0107</p>	25	Retained	<ul style="list-style-type: none"> • Harness and connector (If harness and connector are normal, replace barometric pressure sensor assembly.)
11	Detonation sensor <Turbo>	 <p>12R0468</p>	31	Retained	<ul style="list-style-type: none"> • Harness and connector • Detonation sensor
12	Injector	 <p>12A0105</p>	41	Retained	<ul style="list-style-type: none"> • Harness and connector • Injector coil resistance
13	Fuel pump	 <p>12A0105</p>	42	Retained	<ul style="list-style-type: none"> • Harness and connector • Control relay
14	EGR <California>	 <p>12A0105</p>	43	Retained	<ul style="list-style-type: none"> • Harness and connector • EGR temperature sensor • EGR valve • EGR valve control solenoid valve • EGR valve control vacuum
15	Ignition coil	 <p>12A0105</p>	44	Retained	<ul style="list-style-type: none"> • Harness and connector • Ignition coil • Power transistor
16	Normal state	 <p>12A0104</p>	--	--	--

NOTE

Replace the engine control unit if a malfunction code is output although the inspection reveals that there is no problem with the check items.



INTAKE AIR TEMPERATURE SENSOR

N14QHAB

INSPECTION

- (1) Disconnect the air flow sensor connectors.
- (2) Measure resistance between terminals ④ and ⑥ <Non-Turbo>
- (3) Measure resistance between terminals ⑥ and ⑧ <Turbo>

Temperature °C (°F)	Resistance kΩ
0 (32)	6.0
20 (68)	2.7
80 (176)	0.4

- (4) Measure resistance while heating the sensor using a hair drier.

Temperature °C (°F)	Resistance kΩ
Higher	Smaller

- (5) If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

ENGINE COOLANT TEMPERATURE SENSOR

N14QABE1

INSPECTION

- (1) Remove engine coolant temperature sensor from the intake manifold.
- (2) With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Temperature °C (°F)	Resistance kΩ
0 (32)	5.9
20 (68)	2.5
40 (104)	2.7
80 (176)	0.3

- (3) If the resistance deviates from the standard value greatly, replace the sensor.

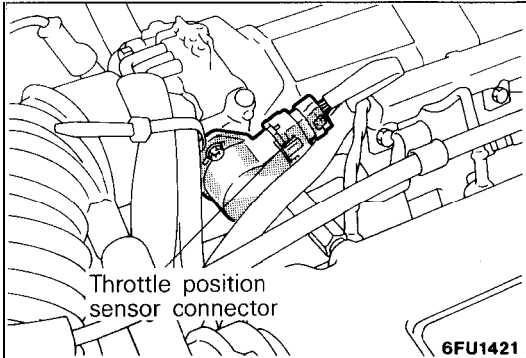
INSTALLATION

- (1) Apply specified sealant to threaded portion and tighten to specified torque.

Specified sealant: MOPAR Part No.4318034 or equivalent

Specified torque: 20 – 40 Nm (15 – 29 ft.lbs.)

- (2) Fasten harness connectors securely.

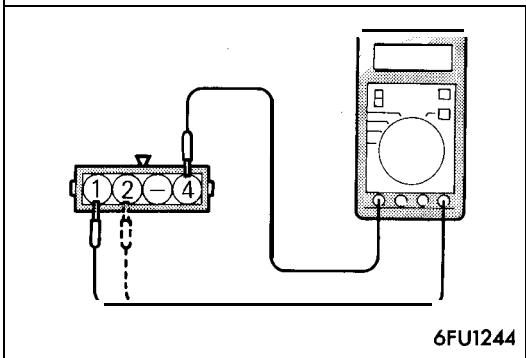


THROTTLE POSITION SENSOR INSPECTION

N140BBK1

- (1) Disconnect the throttle position sensor connector.
- (2) Measure resistance between terminal ④ (sensor ground) and terminal ① (sensor power).

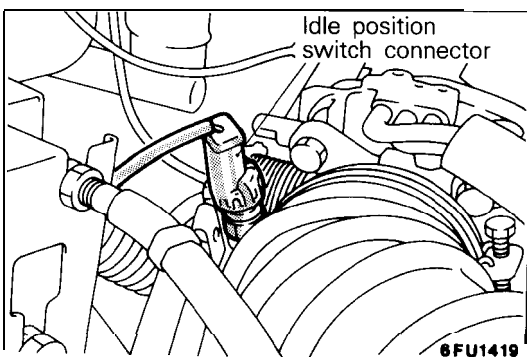
Standard value: 3.5 – 6.5 kΩ



- (3) Connect a pointer type ohmmeter between terminal ④ (sensor ground) and terminal ② (sensor output).
- (4) Operate the throttle valve slowly from the idle position to the full open position and check that the resistance changes smoothly in proportion with the throttle valve opening angle.

- (5) If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

**Throttle position sensor installation torque:
1.5 – 2.5 Nm (1.1 – 1.8 ft.lbs.)**



IDLE POSITION SWITCH

N140KAEa

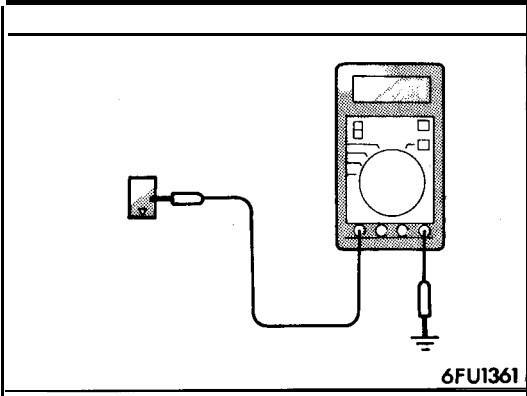
INSPECTION

- (1) Keeping the acceleration pedal released, check that the throttle valve lever or the idle position switch is pushed.

NOTE

If it is not pushed, adjust the idle position switch (fixed speed adjusting screw). (Refer to P.14-52.)

- (2) Disconnect the idle position switch connector.
- (3) Check the continuity between terminal ① to the ground.

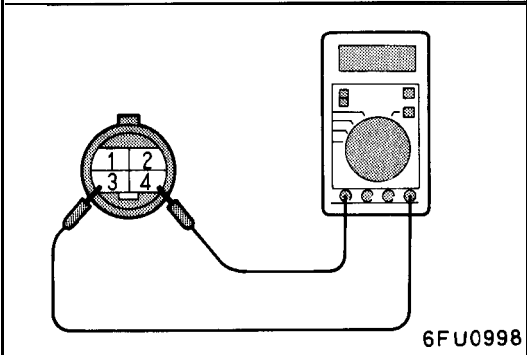


Accelerator pedal	Continuity
Depressed	Non-conductive ($\infty \Omega$)
Released	Conductive (0Ω)

(4) Replace the idle position switch if faulty.

NOTE

For replacement procedure, refer to the idle position switch (fixed speed adjusting screw) adjustment section (P.14-52.).



OXYGEN SENSOR

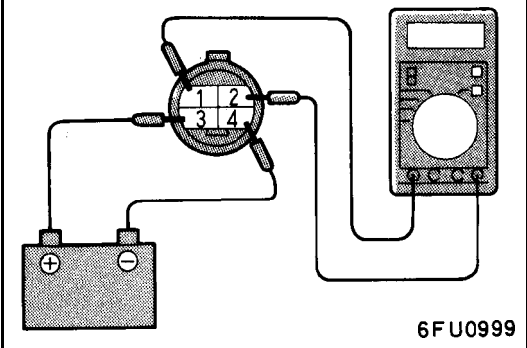
N14QDBJ

INSPECTION

- (1) Disconnect the oxygen sensor connector.
- (2) Check that there is continuity [approx. 12Ω at 20°C (68°F)] between oxygen sensor connector terminal ③ and terminal ④.
- (3) If there is no continuity, replace the oxygen sensor.
- (4) Warm up the engine until the engine coolant temperature exceeds 80°C (176°F).
- (5) Use jumper wires to connect oxygen sensor terminal ③ and terminal ④ to the battery \oplus terminal and \ominus terminal.

Caution

Be very careful when connecting the jumper wires because the oxygen sensor will be damaged if a mistake is made in the connecting terminals.



- (6) Connect a digital voltmeter between terminal ① and terminal ②.
- (7) While repeatedly racing the engine, measure the 'output voltage of the oxygen sensor.

Engine	Oxygen sensor output voltage	Remark
When racing engine	0.6–1.0 V	When the air/fuel mixture ratio becomes rich by repeatedly racing the engine, the normal oxygen sensor output is approximately 1 V.

INSTALLATION

1. For removal and installation of oxygen sensor, refer to GROUP 11 – Exhaust Manifold.
2. Oxygen sensor tighten to specified torque.

Specified torque: 40 – 50 Nm (29 – 36 ft.lbs.)

EGR TEMPERATURE SENSOR

N14RCHAa

Refer to GROUP 25 – Exhaust Gas Recirculation System.

VEHICLE SPEED SENSOR

N14QEBBa

Refer to GROUP 8 – Meters and Gauges.

AIR CONDITIONER SWITCH

N14QQABa

Refer to GROUP 8 – Column Switch.

POWER STEERING OIL PRESSURE SWITCH

N14RCJB

Refer to GROUP 19 for power steering system inspection.

INJECTORS

N14QTAH

CHECKING OPERATION SOUND

Using a sound-scope, check the operation sound (“chi-chi-chi”) of the injectors during idling or during cranking. Check to be sure that the operation sound increases when the engine speed is increased.

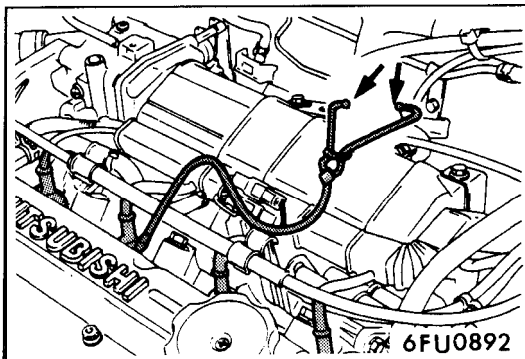
Caution

Note that the sounds of other injectors may be heard even though the injector being checked is not operating, so care must be taken when checking.

NOTE

If the operation sounds cannot be heard, check the injector activation circuit.

If this circuit is normal, there is probably a malfunction of the injector or of the engine control unit.



MEASURING OF RESISTANCE BETWEEN TERMINALS

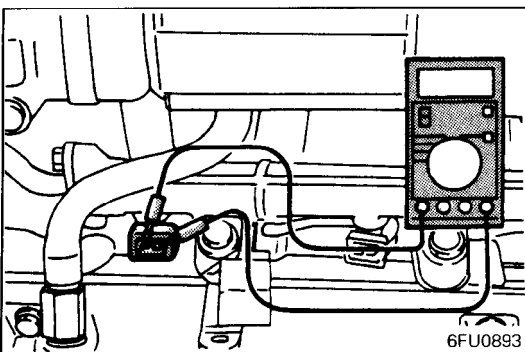
- (1) Disconnect the connector for the injectors.
- (2) Measure the resistance between terminals.

Standard value:

<Non-Turbo> 13 – 16 Ω [at 20°C (68°F)]

<Turbo> 2 – 3 Ω [at 20°C (68°F)]

- (3) Connect the connector for the injectors.

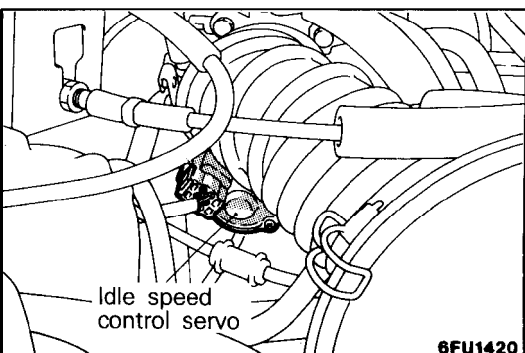


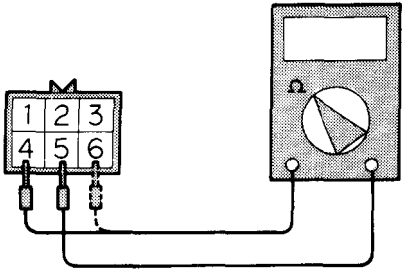
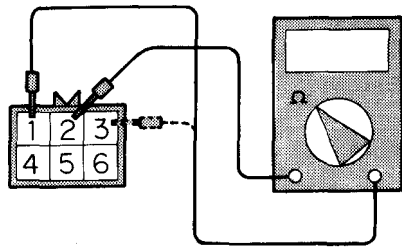
IDLE SPEED CONTROL SERVO

N14QUAD

CHECKING OPERATING SOUND

- (1) Check that when the ignition switch is placed in the ON position (the engine not started), the operating sound of the stepper motor can be heard over the idle speed control servo.
- (2) If no operating sound can be heard, check the stepper motor drive circuit.
(If the circuit is good, a defective stepper motor or engine control unit is suspected.)





7FU0010

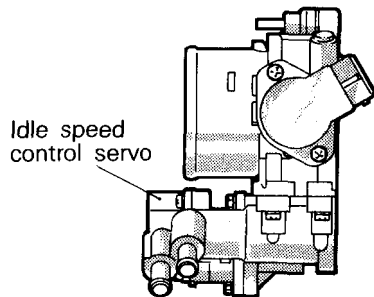
CHECKING COIL RESISTANCE

- (1) Disconnect the idle speed control servo connector.
- (2) Measure the resistance between terminals ② and ① or between terminals ② and ③ of the idle speed control servo connector.

Standard resistance: 28 – 33 Ω [at 20°C (68°F)]

- (3) Measure the resistance between terminals ⑤ and ⑥ or between terminals ⑤ and ④ of the idle speed control servo connector.

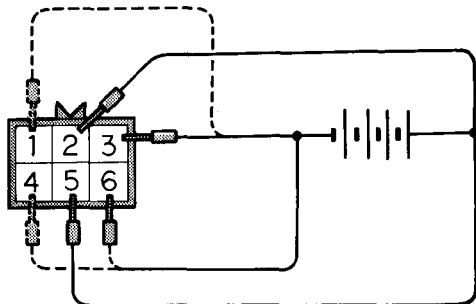
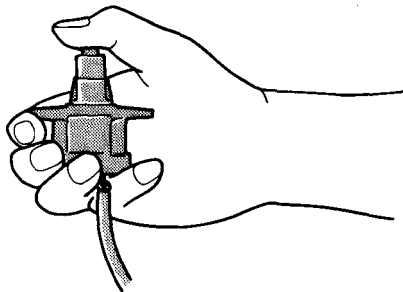
Standard resistance: 28 – 33 Ω [at 20°C (68°F)]



6FU1426

OPERATION CHECK

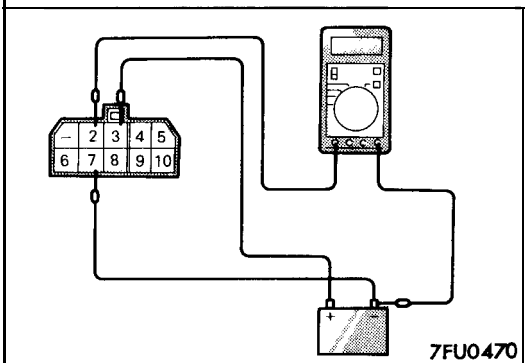
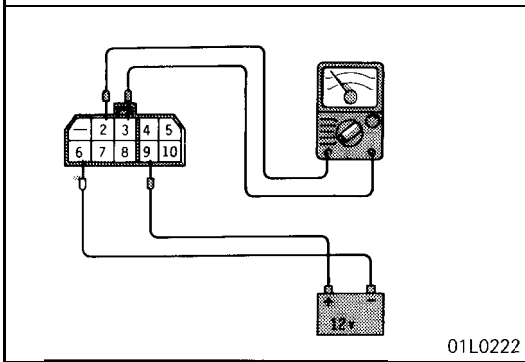
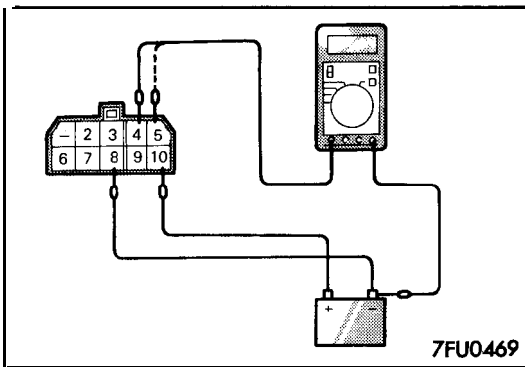
- (1) Remove the throttle body.
- (2) Remove the stepper motor.



7FU0011

- (3) Apply voltage as indicated below and check for presence/absence of vibration due to stepper motor operation.
 1. Connect the positive terminal of the power supply (about 6V) to terminals ② and ⑤ of the connector.
 2. Connect the negative terminal of the power supply to terminals ③ and ⑥.
 3. Connect the negative terminal to terminals ① and ⑥.
 4. Connect the negative terminal to terminals ① and ④.
 5. Connect the negative terminal to terminals ③ and ④.
 6. Connect the negative terminal to terminals ③ and ⑥.
 7. Connect the terminals in sequence from step 6 to 2.
- (4) If vibration is felt as a result of the inspections, the stepper motor can be judged as normal.

N14QYAC



CONTROL RELAY

INSPECTION

- (1) Remove the control relay.
- (2) Use jumper wires and connect control relay terminal ⑩ to the battery ⊕ terminal and terminal ⑧ to the battery ⊖ terminal.

Caution

Be very careful when connecting the jumper wires because the relay will be damaged if a mistake is made with the contact terminals.

- (3) With battery ⊖ terminal jumper wire connected and disconnected, measure the voltage at control relay terminals ④ and ⑤.

Jumper wire	Terminal voltage ④	Terminal voltage ⑤
Connection	SV	SV
Not connected	0V	0V

- (4) Use jumper wires to connect control relay terminal ⑨ to the battery ⊕ terminal and terminal ⑥ to the battery ⊖ terminal.
- (5) With the battery ⊖ terminal jumper wire connected and disconnected, measure the voltage at control relay terminals ② and ③.

Jumper wire	Continuity between terminals ②-③
Connection	Yes
Not connected	No

- (6) Use jumper wires and connect control relay terminal ③ to the battery ⊕ terminal and terminal ⑦ to the battery ⊖ terminal.
- (7) With the battery ⊖ terminal jumper wire disconnected, measure the voltage at control relay terminal ②.

Jumper wire	Terminal voltage ②
Connection	SV
Not connected	0V

- (8) Replace the control relay if faulty.

POWER TRANSISTOR

N14RCGA1

Refer to GROUP 8 – Ignition System

AIR CONDITIONER POWER RELAY

N14RCLB

Refer to GROUP 24 – Air Conditioner.

PURGE CONTROL SOLENOID VALVE

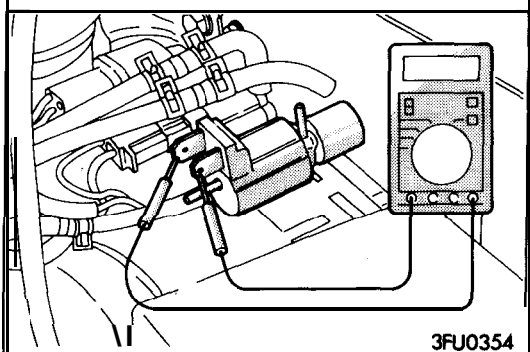
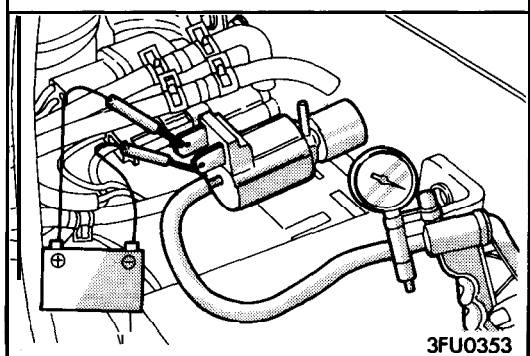
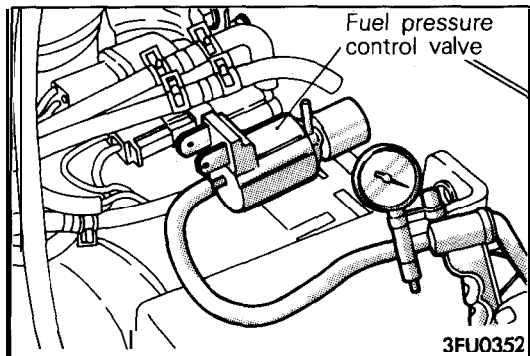
N14RCKA

Refer to GROUP 25 – Evaporative Emission Control System.

EGR CONTROL SOLENOID VALVE <California>

N14RCLA

Refer to GROUP 25 – Exhaust Gas Recirculation System.



FUEL PRESSURE CONTROL VALVE <Turbo>

N14RCMAa

OPERATIONAL CHECK

NOTE

Before the vacuum hoses are removed, make a mark on the hose for visual identification so that they can be reconnected in their original positions.

- (1) Remove the vacuum hoses (blue stripes and black) from the solenoid valve.
- (2) Disconnect the harness connector.
- (3) Apply vacuum with a hand vacuum pump to the nipple to which the black vacuum hose was connected and check for air tightness both when a voltage is applied to the solenoid valve terminal and when the voltage is removed.

Battery voltage	Other nipple of solenoid valve	Normal condition
When voltage is removed	Open	Vacuum leaks
	Blocked by finger	Vacuum is retained
When voltage is applied	Open	Vacuum is retained

CHECKING COIL RESISTANCE

Measure the coil resistance with a tester.

Standard resistance: 36 – 46 Ω [at 20°C (68°F)]

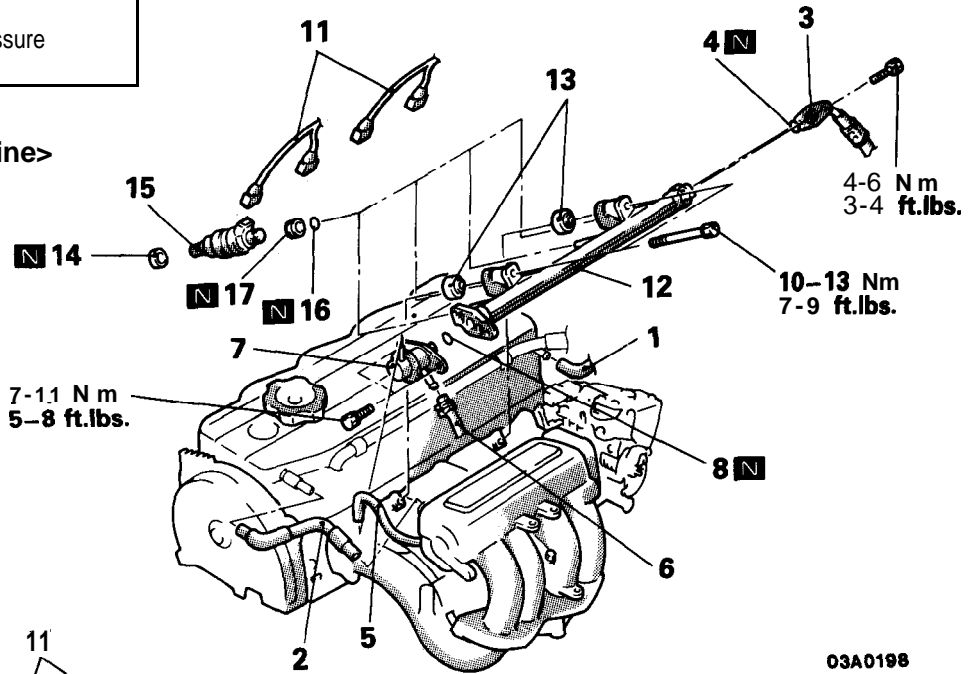
INJECTOR

REMOVAL AND INSTALLATION

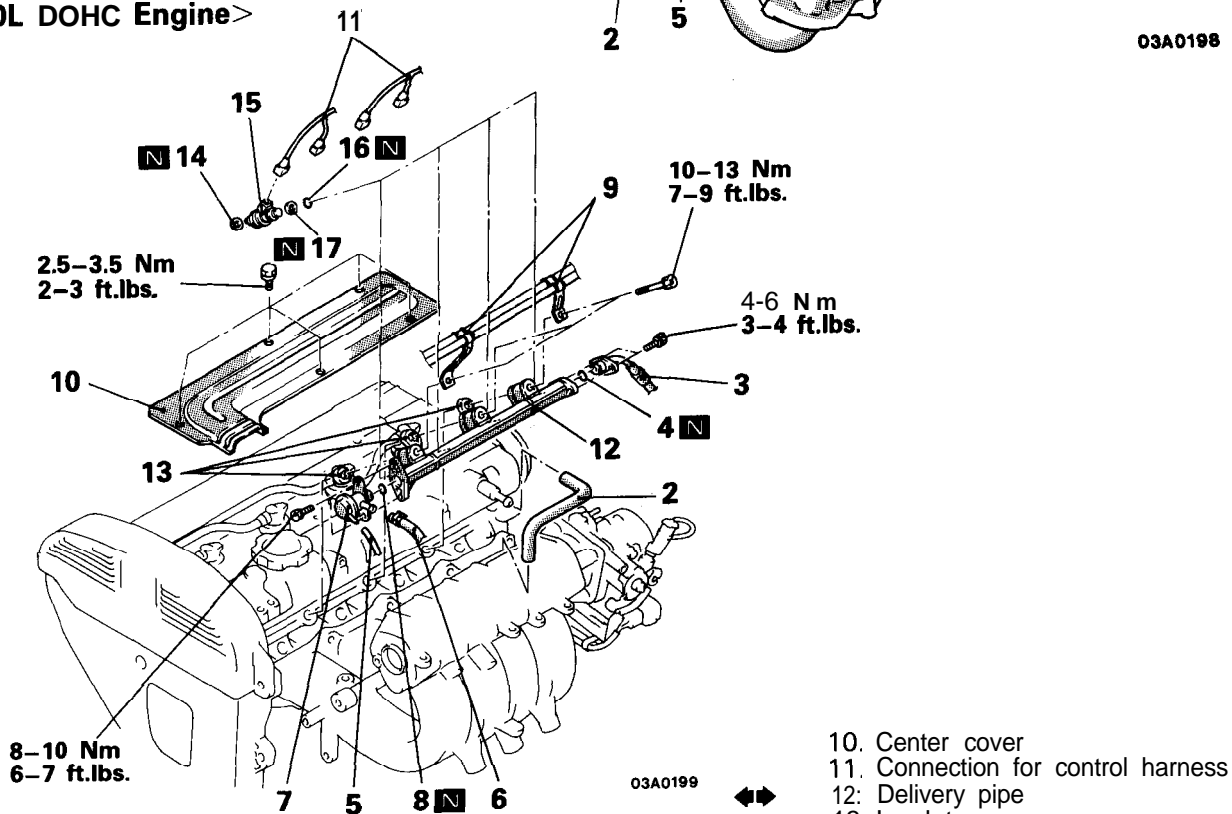
N14SA-A

Post-installation Operation
 ● Measurement of Fuel Pressure
 (Refer to P.14-44, 52.)

<1.8L Engine>



<2.0L DOHC Engine>



Removal steps

1. Connection for breather hose
2. Connection for PCV hose
- ◆◆◆◆ 3. Connection for high pressure fuel hose
4. O-ring
5. Connection for vacuum hose
6. Connection for fuel return hose
- + 7. Fuel pressure regulator
8. O-ring
9. Accelerator cable clamp

10. Center cover
11. Connection for control harness
- ◆◆ 12. Delivery pipe
13. Insulator
14. Insulator
- ◆◆ ● + 15. Injector
- ◆◆◆◆ ● 16. O-ring
- + 17. Grommet

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆◆◆: Refer to "Service Points of Removal".
- (3) ● ◆◆◆◆: Refer to "Service Points of Installation".
- (4) [N]: Non-reusable parts