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NOTE:

For the screen toned Section in the above table, refer to the same section of the Service Manuals mentioned in FOREWORD of this manual.

Maintenance Schedule

Maintenance Schedule Under Normal Driving Conditions

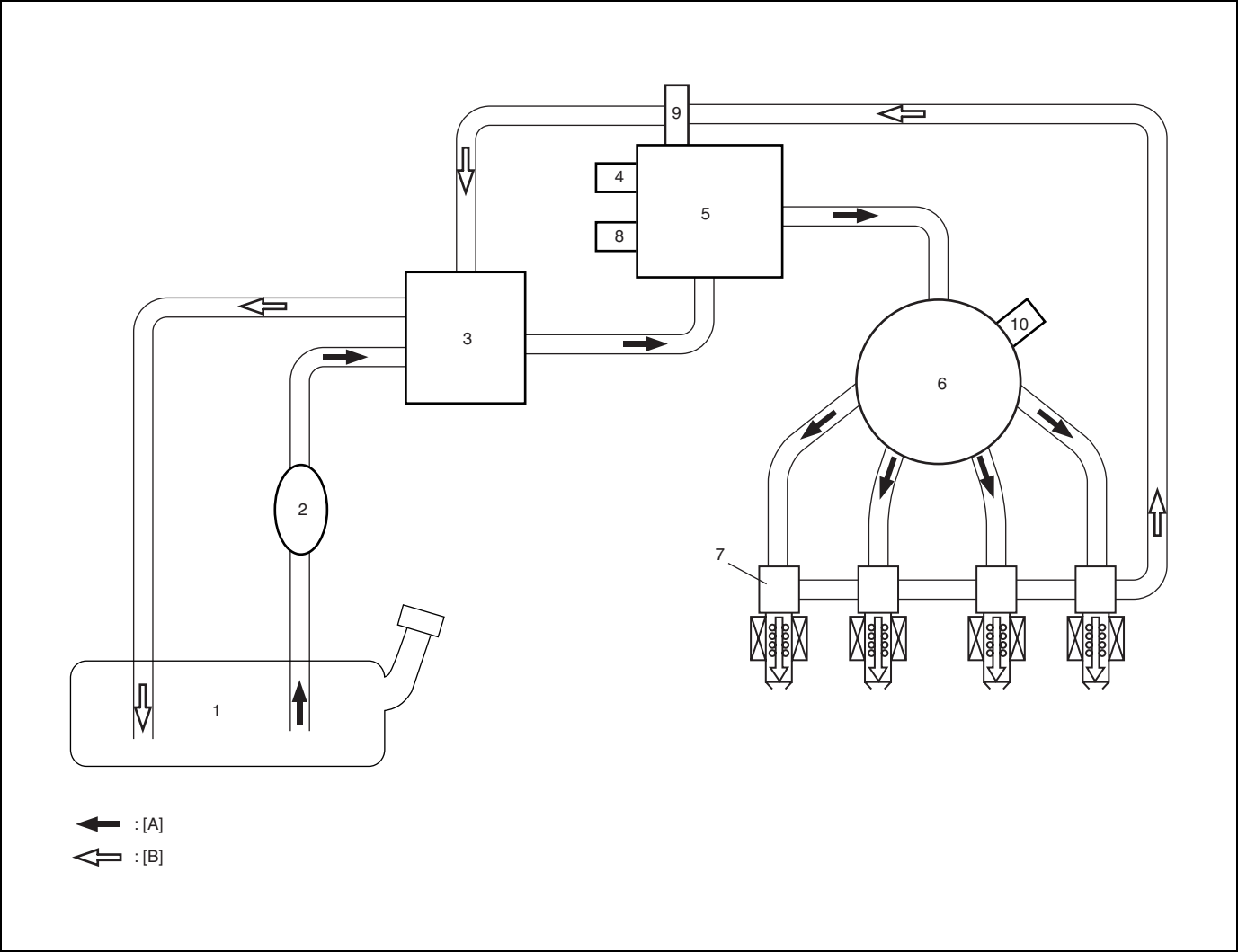
NOTE:

- This interval should be judged by odometer reading or months, whichever comes first.
- This table includes service as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.

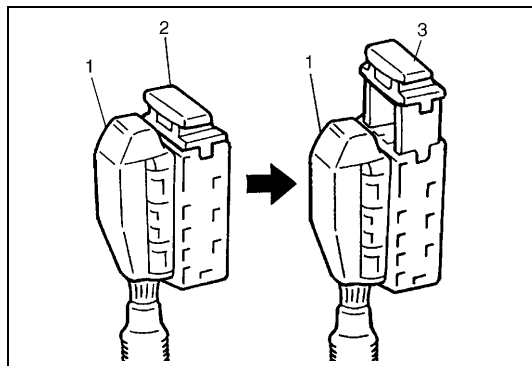
M13 Engine Model:

| | | | | | | | | | |
|--|---|------------------------|---|----|----|----|----|----|---|
| Interval | | Km (x 1,000) | 15 | 30 | 45 | 60 | 75 | 90 | |
| | | Miles (x 1,000) | 9 | 18 | 27 | 36 | 45 | 54 | |
| | | Months | 12 | 24 | 36 | 48 | 60 | 72 | |
| ENGINE | | | | | | | | | |
| Drive belt | | V-belt | I | R | I | R | I | R | |
| | | V-rib belt (Flat type) | — | — | I | — | — | R | |
| Valve lash (clearance) | | | — | I | — | I | — | I | |
| Engine oil and oil filter | | | R | R | R | R | R | R | |
| Engine coolant | | | — | — | R | — | — | R | |
| Exhaust system | | | — | I | — | I | — | I | |
| IGNITION SYSTEM | | | | | | | | | |
| *Spark plugs | When unleaded fuel is used | Vehicle without HO2S | Nickel spark plug | — | R | — | R | — | R |
| | | | Iridium spark plug | — | — | R | — | — | R |
| | | Vehicle with HO2S | Nickel spark plug | — | — | R | — | — | R |
| | | | Iridium spark plug | — | — | — | R | — | — |
| | When leaded fuel is used, refer to “Maintenance Recommended Under Severe Driving Conditions” in this section. | | | | | | | | |
| | FUEL SYSTEM | | | | | | | | |
| Air cleaner filter | | | I | I | R | I | I | R | |
| Fuel lines and connections | | | — | I | — | I | — | I | |
| Fuel filter | | | Replace every 210,000 km (126,000 miles). | | | | | | |
| Fuel tank | | | — | — | I | — | — | I | |
| EMISSION CONTROL SYSTEM | | | | | | | | | |
| Crankcase ventilation hoses and connections (Vehicle without HO2S) | | | — | — | I | — | — | I | |
| *PCV valve | | Vehicle without HO2S | — | — | I | — | — | I | |
| | | Vehicle with HO2S | — | — | — | — | — | I | |
| *Fuel evaporative emission control system | | Vehicle without HO2S | — | I | — | I | — | I | |
| | | Vehicle with HO2S | — | — | — | — | — | I | |

Fuel Delivery System

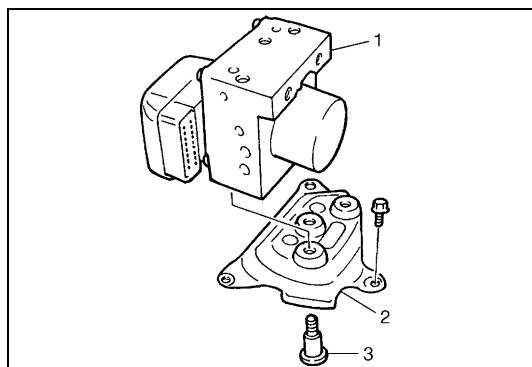


| | | |
|---|--|-----------------------|
| 1. Fuel tank | 6. Common rail (High pressure fuel injection rail) | [A]: Fuel feed line |
| 2. Priming pump | 7. Fuel injector | [B]: Fuel return line |
| 3. Fuel filter | 8. Fuel flow actuator | |
| 4. Fuel temperature sensor | 9. Venturi | |
| 5. Injection pump (including high and low pressure pumps) | 10. Fuel pressure sensor | |



- 3) Disconnect ABS hydraulic unit / control module assembly connector (1) by pulling up lock.
- 4) Remove ABS hydraulic unit / control module assembly with its bracket.

| |
|--------------------|
| 2. Lock position |
| 3. Unlock position |



- 5) Remove three bolts (3) and take out ABS hydraulic unit / control module assembly (1) from bracket (2).

CAUTION:

- Do not give an impact to hydraulic unit.
- Use care not to allow dust to enter hydraulic unit.
- Do not place hydraulic unit on its side or upside down. Handling it in inappropriate way will affect its original performance.

INSTALLATION

- 1) Install hydraulic unit by reversing removal procedure.

Tightening torque

Brake pipe flare nuts

(a) : 16 N·m (1.6 kg-m, 12.0 lb-ft)

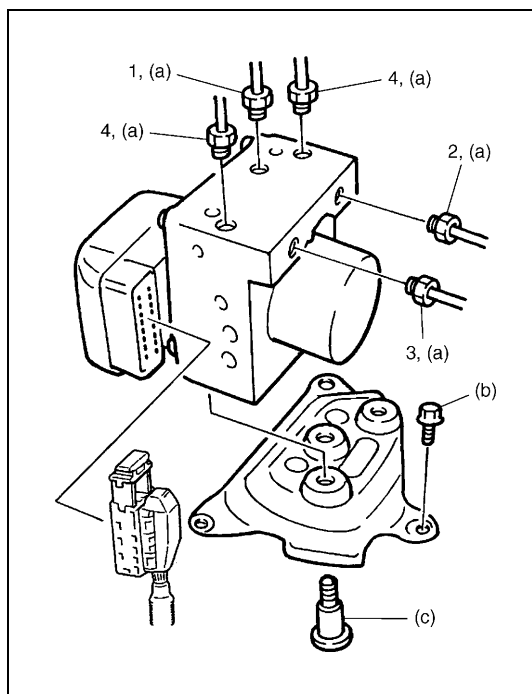
ABS hydraulic unit / control module assembly bracket bolts

(b) : 11 N·m (1.1 kg-m, 8.0 lb-ft)

ABS hydraulic unit / control module assembly bolts

(c) : 9 N·m (0.9 kg-m, 6.5 lb-ft)

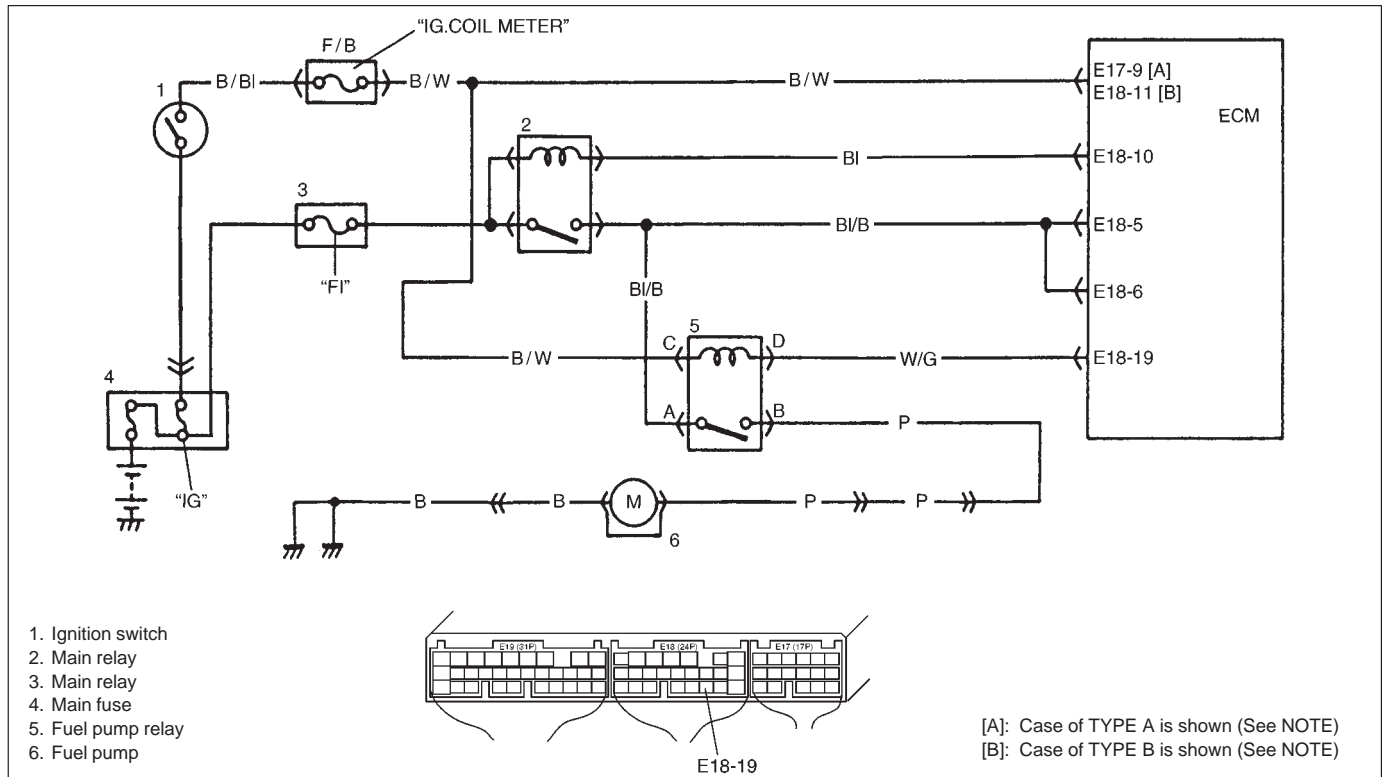
- 2) Bleed air from brake system referring to "Air Bleeding of Brake System" in Section 5.
- 3) Check each installed part for fluid leakage and perform hydraulic unit operation check.



| |
|-----------------------------|
| 1. To left front |
| 2. To right front |
| 3. To rear |
| 4. From proportioning valve |

Engine & emission control input / output table

| <div>INPUT</div> <div>OUTPUT</div> | | ELECTRIC CONTROL DEVICE | | | | | | | | | | | | |
|---|---|---|---------------|-------------|-----------|----------------------------|-------------------------|---------------------------|-----------------------|-------------------------|-----|------------|-----------------------------|--|
| | | FUEL PUMP RELAY | FUEL INJECTOR | HO2S HEATER | IAC VALVE | IGNITION COIL WITH IGNITER | EGR VALVE (IF EQUIPPED) | EVAP CANISTER PURGE VALVE | A/C COMPRESSOR CLUTCH | A/C CONDENSER FAN RELAY | MIL | MAIN RELAY | TRANSMISSION CONTROL MODULE | |
| SIGNAL FROM SENSOR, SWITCH AND CONTROL MODULE | DIAGNOSIS SWITCH TERMINAL (VEHICLE WITHOUT IMMOBILIZER INDICATOR LAMP) | | | | | | | | | | ○ | | | |
| | BAROMETRIC PRESSURE SENSOR (VEHICLE WITH IMMOBILIZER INDICATOR LAMP) | | ○ | | ○ | | | | | | ○ | | ○ | |
| | STOP LAMP SWITCH | | | | ○ | | | | | | | | | |
| | STARTER SWITCH | ○ | ○ | | ○ | | | | ○ | | ○ | | | |
| | IGNITION SWITCH | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | |
| | LIGHTING SWITCH | | | | ○ | | | | | | | | | |
| | REAR DEFOGGER SWITCH (IF EQUIPPED) | | | | ○ | | | | | | | | | |
| | BLOWER SWITCH | | | | ○ | | | | | | | | | |
| | A/C SWITCH (IF EQUIPPED) | | | | ○ | | | | ○ | ○ | | | | |
| | A/C EVAPORATOR TEMP. SENSOR (IF EQUIPPED) | | | | ○ | | | | ○ | | | | | |
| | VSS | | | | ○ | | | | ○ | ○ | ○ | | ○ | |
| | HEATED OXYGEN SENSOR-1 (IF EQUIPPED) | | ○ | | | | | ○ | | | ○ | | | |
| | HEATED OXYGEN SENSOR-2 (IF EQUIPPED) | For detecting deterioration of three way catalytic converter | | | | | | | | | | ○ | | |
| | IAT SENSOR | | ○ | | ○ | ○ | ○ | ○ | ○ | | ○ | | | |
| | ECT SENSOR | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | |
| | TP SENSOR | | ○ | | ○ | ○ | | | ○ | | ○ | | ○ | |
| | MAP SENSOR | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | |
| | CMP SENSOR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | |
| | CKP SENSOR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | | | |
| | TEST SWITCH TERMINAL (VEHICLE WITHOUT IMMOBILIZER INDICATOR LAMP) | | | | | ○ | | | | | | | | |
| | KNOCK SENSOR | | | | | ○ | | | | | ○ | | | |

TABLE B-2 FUEL PUMP AND ITS CIRCUIT CHECK**NOTE:**

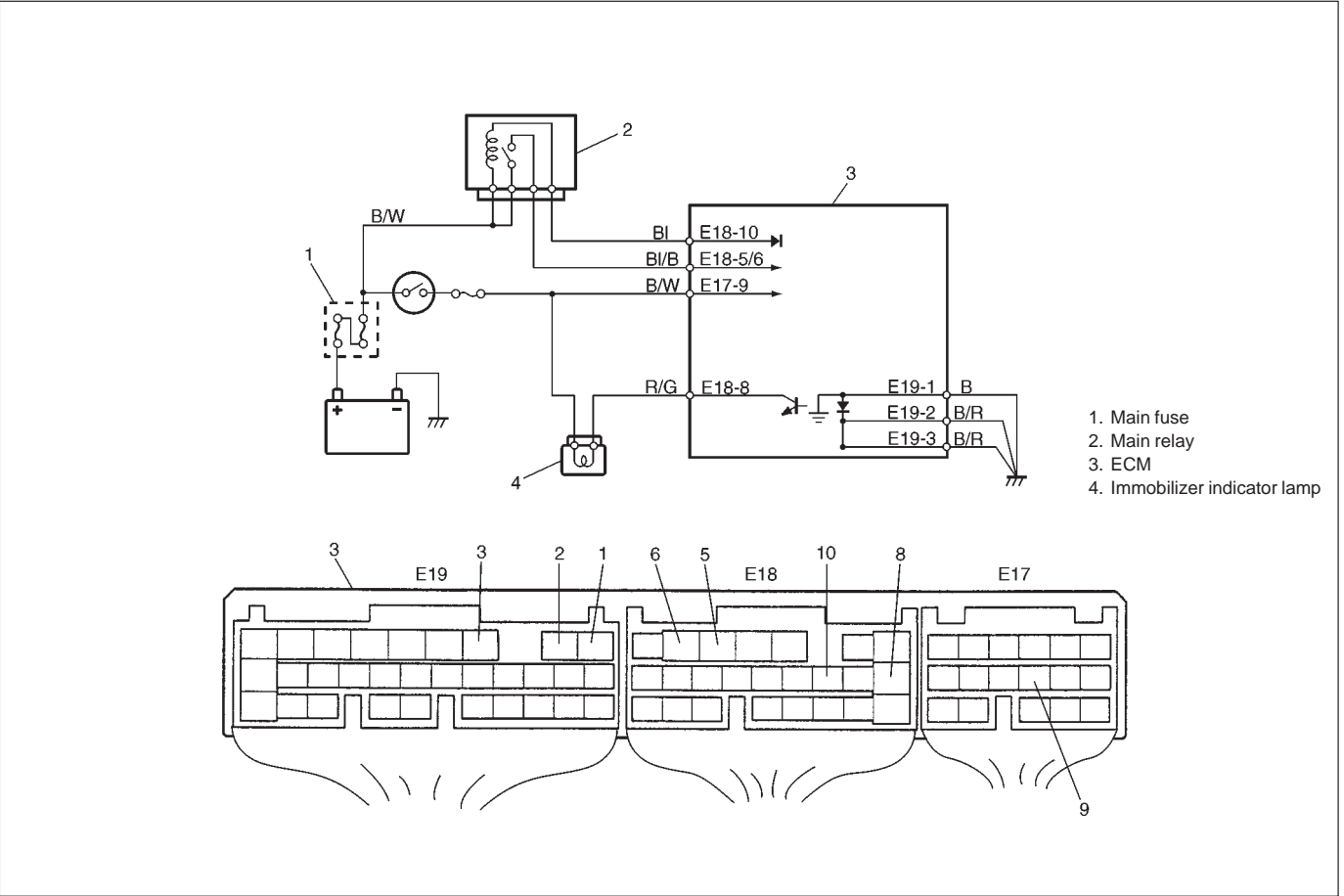
For TYPE A and TYPE B, refer to the NOTE in “ECM TERMINAL VOLTAGE VALUES TABLE” for applicable model.

INSPECTION

| STEP | ACTION | YES | NO |
|------|--|---|---|
| 1 | Was “ENGINE DIAG. FLOW TABLE” performed? | Go to Step 2. | Go to “ENGINE DIAG. FLOW TABLE”. |
| 2 | Check Fuel Pump Control System for Operation. See Fig. 1. Is fuel pump heard to operate for 2 sec. after ignition switch ON? | Fuel pump circuit is in good condition. | Go to Step 3. |
| 3 | Check Fuel Pump for Operation. 1) Remove fuel pump relay from relay box with ignition switch OFF. 2) Check for proper connection to relay at each terminals. 3) If OK, using service wire, connect terminals “A” and “B” of relay connector. See Fig. 2. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> CAUTION: Check to make sure that connection is made between correct terminals. Wrong connection can cause damage to ECM, wire harness, etc. </div> Is fuel pump heard to operate at ignition switch ON? | Go to Step 4. | “P”, “B” or “BI/B” circuit open or fuel pump malfunction. |
| 4 | Check Fuel Pump Relay for Operation. 1) Check resistance between each two terminals of fuel pump relay. See Fig.3. Between terminals “A” and “B”: Infinity Between terminals “C” and “D”: 100 – 150 Ω 2) Check that there is continuity between terminals “A” and “B” when battery is connected to terminals “C” and “D”. See Fig. 3. Is fuel pump relay in good condition? | “W/G” circuit open or poor E18-19 connection. If wire and connection are OK, substitute a known-good ECM and recheck. | Replace fuel pump relay. |

TABLE C

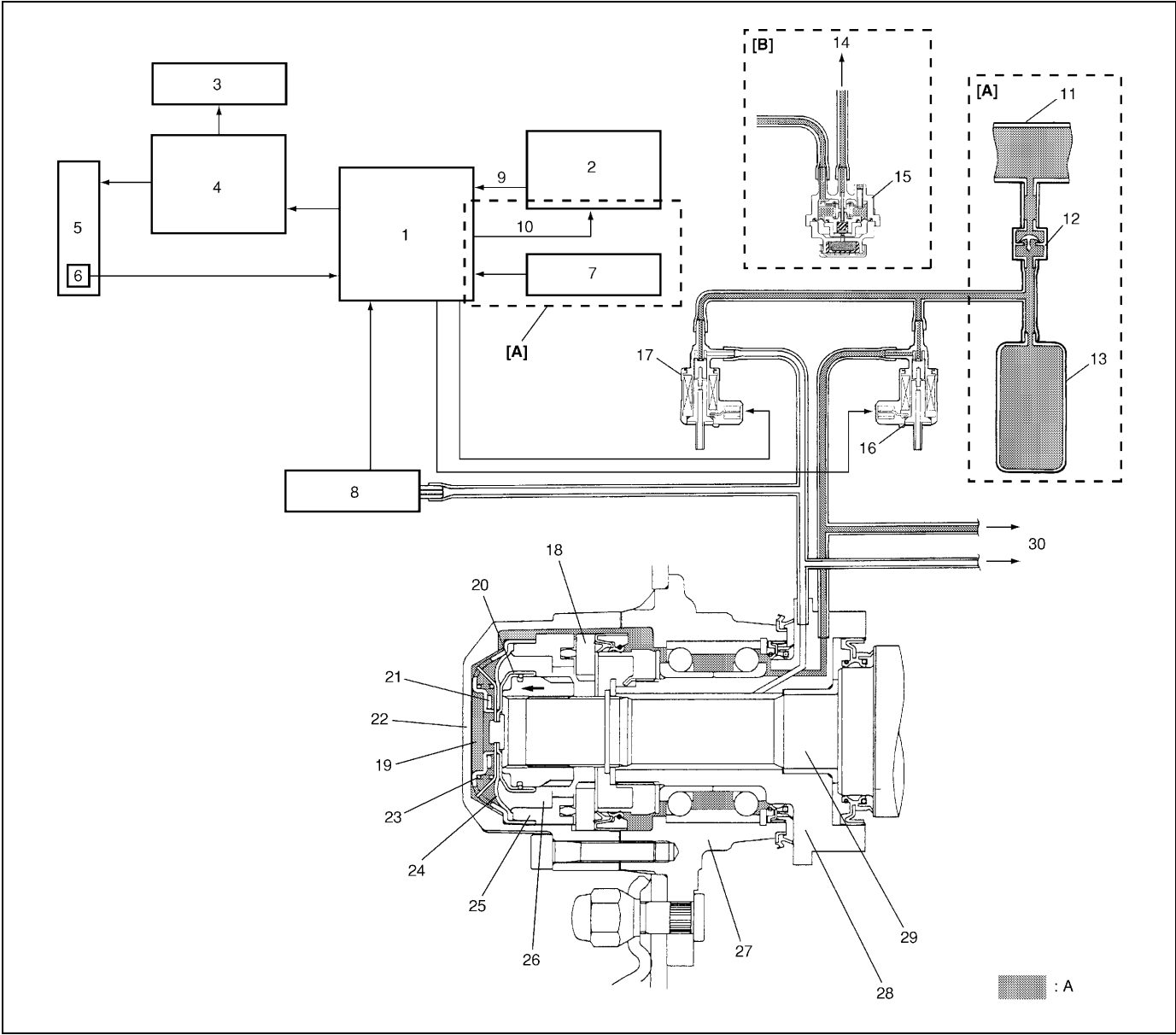
IMMOBILIZER INDICATOR LAMP CHECK FOR VEHICLE
EQUIPPED WITH IMMOBILIZER INDICATOR LAMP
(IMMOBILIZER INDICATOR LAMP REMAINS ON AFTER ENGINE
STARTS)



| STEP | ACTION | YES | NO |
|------|--|---------------------------------------|--|
| 1 | 1) With ignition switch OFF, disconnect couplers from ECM. Does immobilizer indicator lamp turn ON at ignition switch ON? | "R/G" wire shorted to ground circuit. | Substitute a known-good ECM and recheck. |

4WD → 2WD

When the transfer is shifted from the 4WD (4H or 4L) to the 2WD (2H) position, the 4WD controller activates VSV1 and the intake manifold vacuum or vacuum from vacuum pump is applied to the chamber “A” in the hub housing. As the slide gear is shifted to the wheel side by the vacuum force and disengaged from the outer gear, rotation of the front wheel hub is not transmitted to the front axle shaft.



| | | | |
|-----------------------------|---------------------------------|-----------------|---------------------------|
| 1. 4WD controller | 10. A/C ON signal (if equipped) | 19. Chamber "A" | 28. Spindle |
| 2. ECM | 11. Intake manifold | 20. Piston A | 29. Front axle shaft |
| 3. 4WD indicator | 12. Check valve | 21. Magnet | 30. To opposite side |
| 4. Transfer control module | 13. Vacuum tank | 22. Housing | A: Vacuum circuit |
| 5. Transfer | 14. To vacuum pump | 23. Spring | [A]: For M13 engine model |
| 6. 4WD switch | 15. Vacuum control valve | 24. Diaphragm | [B]: For K9K engine model |
| 7. A/C switch (if equipped) | 16. VSV1 | 25. Sleeve | |
| 8. Vacuum switch | 17. VSV2 | 26. Slide gear | |
| 9. Engine revolution signal | 18. Outer gear | 27. Wheel hub | |

DTC Troubleshooting

| Step | Action | Yes | No |
|-------------|---|--|--|
| 1 | Was "Engine and Emission Control System Check" performed? | Go to Step 2. | Go to "Engine and Emission Control System Check" in this section. |
| 2 | IAT sensor and its circuit check 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Turn ignition switch to ON position. 3) Check intake air temp. displayed on scan tool. Is -40 °C (-40 °F) or 119 °C (246 °F) indicated? | Go to Step 3. | Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. |
| 3 | Wire harness check 1) Disconnect MAF and IAT sensor connector (1) with ignition switch turned OFF. 2) Check for proper connection to MAF and IAT sensor connector (1) at "LT GRN/BLK" and "BLK/BLU" wire terminals. See Fig. 1. 3) If OK, then with ignition switch turned ON. Is voltage applied to "LT GRN/BLK" wire terminal about 4 – 6 V? | Go to Step 8. | Go to Step 4. |
| 4 | ECM voltage check 1) Turn OFF ignition switch. 2) Check for proper connection of ECM connector at "E119-17" terminal. 3) If OK, then turn ON ignition switch, measure voltage between "E119-17" terminal of ECM connector and vehicle body ground. Is voltage about 4 – 6 V at terminal? | Open wire in "LT GRN/BLK" circuit. If wire and connection are OK, go to Step 5. | Go to Step 5. |
| 5 | Wire circuit check 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Measure resistance between "LT GRN/BLK" wire terminal of MAF and IAT sensor connector and vehicle body ground. Is resistance infinity? | Go to Step 6. | "LT GRN/BLK" wire shorted to ground or other circuits. If wire are OK, substitute a known-good ECM and recheck. |
| 6 | Wire circuit check 1) Turn ignition switch to ON position. 2) Measure voltage between "LT GRN/BLK" wire terminal of MAF and IAT sensor connector and body ground. Is voltage about 0 V? | Go to Step 7. | "LT GRN/BLK" wire shorted to other circuits. If wire are OK, substitute a known-good ECM and recheck. |
| 7 | Wire circuit check 1) Measure resistance between "E119-17" terminal of ECM connector and "LT GRN/BLK" wire terminal of MAF and IAT sensor connector with ignition switch turned OFF. Is resistance below 3 Ω? | Go to Step 8. | High resistance wire in "LT GRN/BLK" circuit. |

Tightening Torque Specification

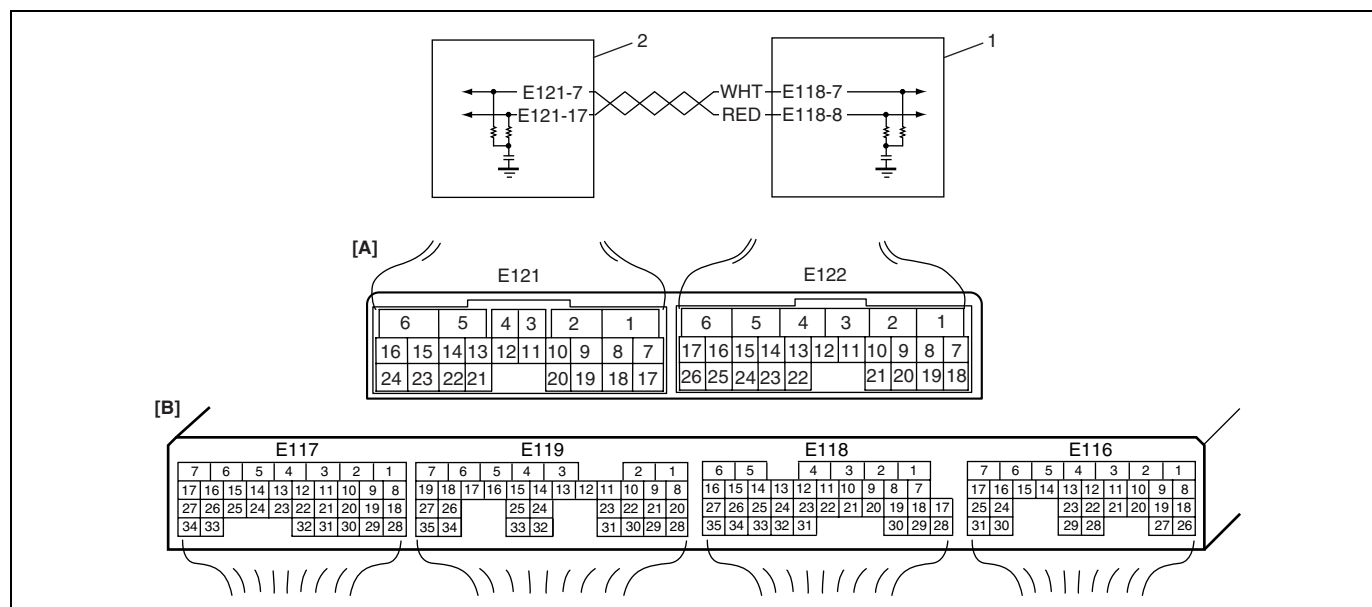
| Fastening part | Tightening torque | | |
|------------------------------------|-------------------|------|-------|
| | N•m | kg-m | lb-ft |
| Transmission oil level / filler | 23 | 2.3 | 17.0 |
| Transmission oil drain plug | 23 | 2.3 | 17.0 |
| Gear shift control boot cover bolt | 23 | 2.3 | 17.0 |
| Shift lever No.1 nut | 23 | 2.3 | 17.0 |
| Shift lever No.2 bolt | 23 | 2.3 | 17.0 |
| Back up lamp switch | 23 | 2.3 | 17.0 |
| Reverse shaft bolt | 23 | 2.3 | 17.0 |
| Gear shift locating bolt | 13 | 1.3 | 9.0 |
| Extension case bolt | 23 | 2.3 | 17.0 |
| Gear shift lever case bolt | 23 | 2.3 | 17.0 |
| 5th gear shift inverse lever bolt | 23 | 2.3 | 17.0 |
| Transmission case to engine bolt | 90 | 9.0 | 65.0 |
| Transmission case to engine nut | 90 | 9.0 | 65.0 |
| Gear shift control joint nut | 3.5 | 0.35 | 2.5 |
| Gear shift control boot plate nut | 3.5 | 0.35 | 2.5 |
| Gear shift stop bolt | 23 | 2.3 | 17.0 |
| Rear mounting bracket No.1 bolt | 23 | 2.3 | 17.0 |
| Rear mounting bracket No.2 bolt | 23 | 2.3 | 17.0 |
| Rear mounting bolt | 23 | 2.3 | 17.0 |
| Transmission case bolt | 23 | 2.3 | 17.0 |

Required Service Material

| Material | Recommended SUZUKI product (Part Number) | Use |
|--------------------|---|---|
| Lithium grease | SUZUKI SUPER GREASE A (99000-25010) | <ul style="list-style-type: none"> • Oil seal lips • Locating springs • Gear shift shaft balls • Gear shift control joint • Gear shift control arm • Gear shift control shaft bush • Gear shift control joint washer • Gear shift control shaft |
| Sealant | SUZUKI BOND NO.1217G (99000-31260) | <ul style="list-style-type: none"> • Oil drain plug and filler / level plug • Mating surface of transmission front case • Mating surface of transmission rear case • Mating surface of gear shift lever case |
| Thread lock cement | THREAD LOCK 1322 (99000-32110) | <ul style="list-style-type: none"> • Reverse shaft bolt • 5th gear shift inverse lever bolt • Locating bolt • Gear shift stop bolt • Gear shift lever case bolt |

DTC P1777 (No.76) TCM Lost Communication with ECM (Reception Error) (M13 Engine Model with VVT)

Wiring Diagram



| | |
|--------|---|
| 1. ECM | [A]: Terminal arrangement of TCM connector (viewed from harness side) |
| 2. TCM | [B]: Terminal arrangement of ECM connector (viewed from harness side) |

DTC Detecting Condition and Trouble Area

| DTC DETECTING CONDITION | TROUBLE AREA |
|--|---|
| Reception error of communication data for ECM is detected more than specified time continuously. | <ul style="list-style-type: none"> ECM TCM CAN circuit |

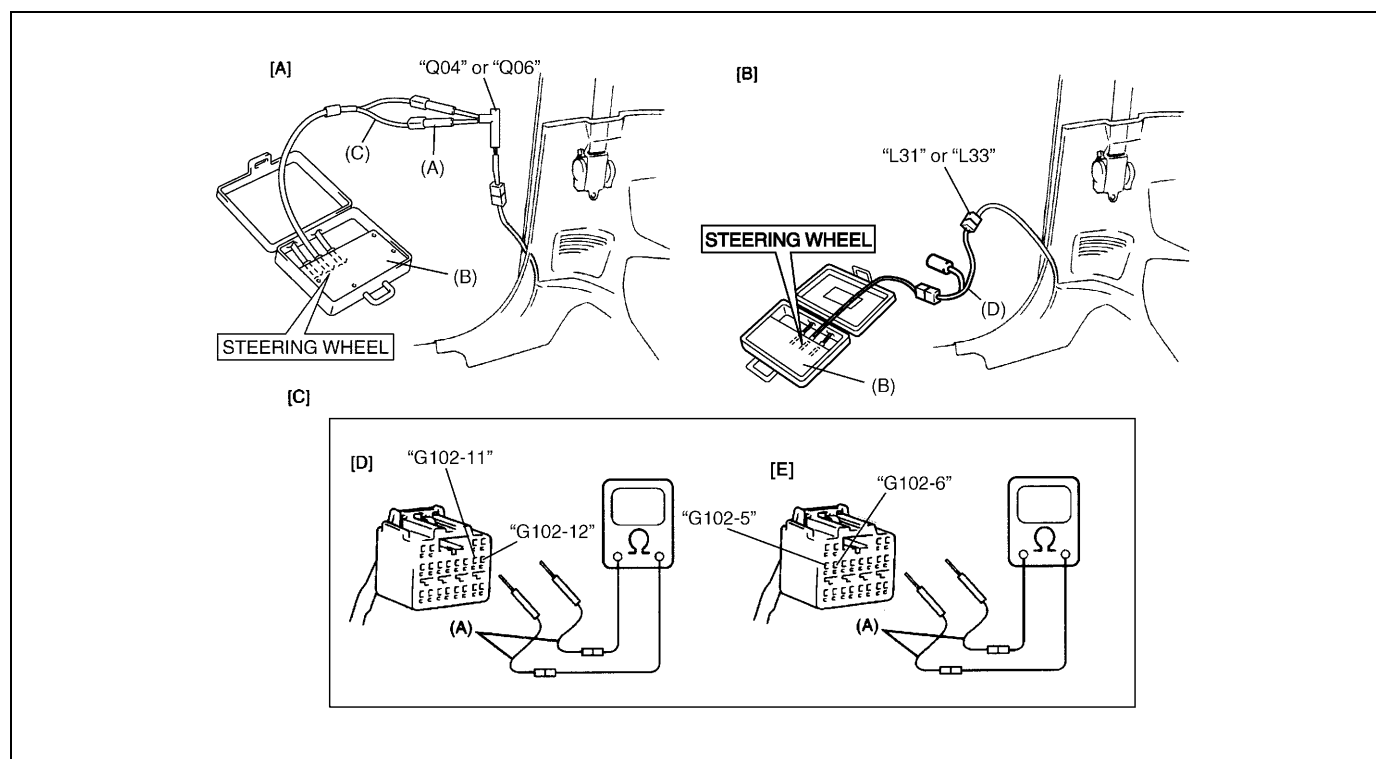
DTC Confirmation Procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories.
- 3) Start engine and run it for 1 min. or more.
- 4) Check DTC.

Troubleshooting

| Step | Action | Yes | No |
|------|---|----------------------------------|---|
| 1 | Was "Automatic Transmission Diagnostic Flow" performed? | Go to Step 2. | Go to "Automatic Transmission Diagnostic Flow" in this section. |
| 2 | Check DTC 1) Connect scan tool to DLC with ignition switch turned OFF. 2) Check DTC for ECM and TCM. Is there any DTC(s) (other than DTC P1674, P1675, P1676 for ECM and DTC P1774, P1775, P1777 for TCM)? | Go to applicable DTC diag. flow. | Go to Step 3. |

| Step | Action | Yes | No |
|------|---|--|--|
| 3 | 1) With ignition switch OFF, disconnect SDM connector "G102". 2) Check proper connection between "G102-11" and "G102-12" or "G102-6" and "G102-5". 3) If OK, measure resistance with connected special tools (B) and (D). <ul style="list-style-type: none"> • DTC B1042: between "G102-11" and "G102-12" terminals • DTC B1046: between "G102-5" and "G102-6" terminals. Is resistance 1.4 Ω or more? | Substitute a known-good SDM and recheck. | DTC B1042: Repair short from "PNK" wire circuit to "WHT" wire circuit or from "PNK" or "WHT" wire circuit to other wire circuit. DTC B1046: Repair short from "BRN" wire circuit to "LT GRN" wire circuit or from "BRN" or "LT GRN" wire circuit to other wire circuit. |



[A]: Fig. for STEP 1

[C]: Fig. for STEP 3

[E]: For DTC B1046

[B]: Fig. for STEP 2 and 3

[D]: For DTC B1042

Special tool

(A): 09932-76010

(B): 09932-75010

(C): 09932-78310

(D): 09932-78340

NOTE:

Upon completion of inspection and repair work, perform the following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes referring to "DTC Clearance" in this section, if any.
- Repeat "Air Bag Diagnostic System Check" in this section to confirm that the trouble has been corrected.

Pistons, Piston Rings, Connecting Rods and Cylinders Removal and Installation

CAUTION:

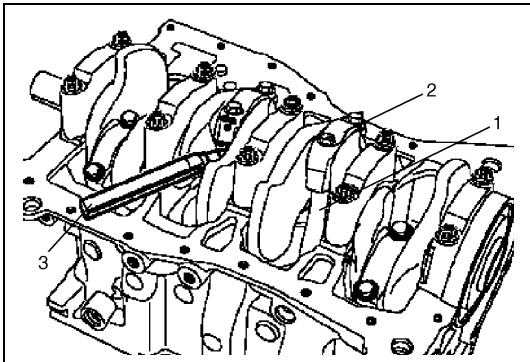
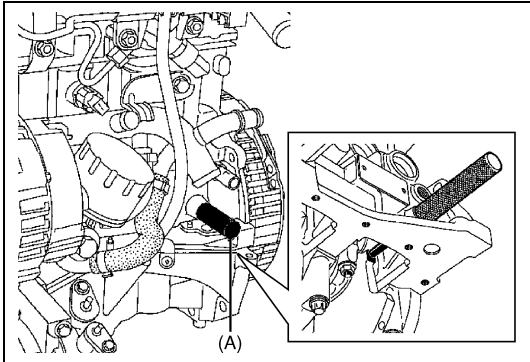
Connecting rod and connecting rod bearing must be replaced as a set when either replacement becomes necessary.

Removal

- 1) Remove engine assembly from vehicle referring to "Engine Assembly Removal and Installation" in this section.
- 2) Remove cylinder head referring to "Valves and Cylinder Head Removal and Installation" in this section.
- 3) Remove upper oil pan referring to "Oil Pan and Oil Pump Strainer Removal and Installation" in this section.
- 4) Remove oil pump referring to "Oil Pump and Oil Pump Chain Removal and Installation" in this section.
- 5) Remove special tool (A).

Special tool

(A): 09919-58110

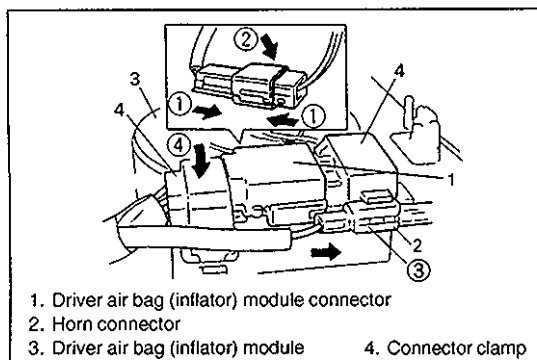


- 6) Mark cylinder number on all pistons, connecting rods (1) and rod bearing caps (2) using silver pencil or quick drying paint (3) for installation.
- 7) Remove connecting rod bearing caps.
- 8) Decarbon top of cylinder bore before removing piston from cylinder.
- 9) Push piston and connecting rod assembly out through the top of cylinder bore.

Installation

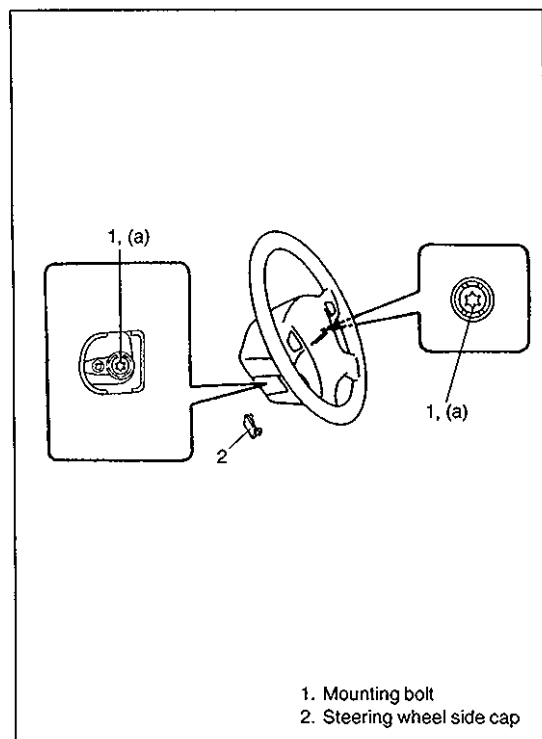
NOTE:

- All parts to be installed must be perfectly clean.
- Main bearings, main bearing caps, connecting rods, connecting rod bearings, rod bearing caps, pistons and piston rings are in combination sets. Do not disturb such combination and make sure that each part goes back to where it came from, when installing.



INSTALLATION

- 1) Check that horn wire is connected to horn terminal securely.
- 2) Connect yellow connector of driver air bag (inflator) module and horn connector in order (① ~ ④) shown in the figure securely.



- 3) Install driver air bag (inflator) module to steering wheel, taking care so that no part of wire harness is caught between them.
- 4) Make sure that clearance between module and steering wheel is uniform all the way.
- 5) Tighten driver air bag (inflator) module mounting bolts to specified torque.

Tightening Torque

(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

- 6) Install steering wheel side cap.
- 7) Connect negative battery cable.
- 8) Enable air bag system. Refer to "Enabling Air Bag System" under "Service Precautions" in SECTION 10B.

STEERING WHEEL

CAUTION:

For vehicle with air bag system

Removal of the steering wheel allows the contact coil to turn freely but do not turn the contact coil (on the combination switch) more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively), or coil will break.

REMOVAL

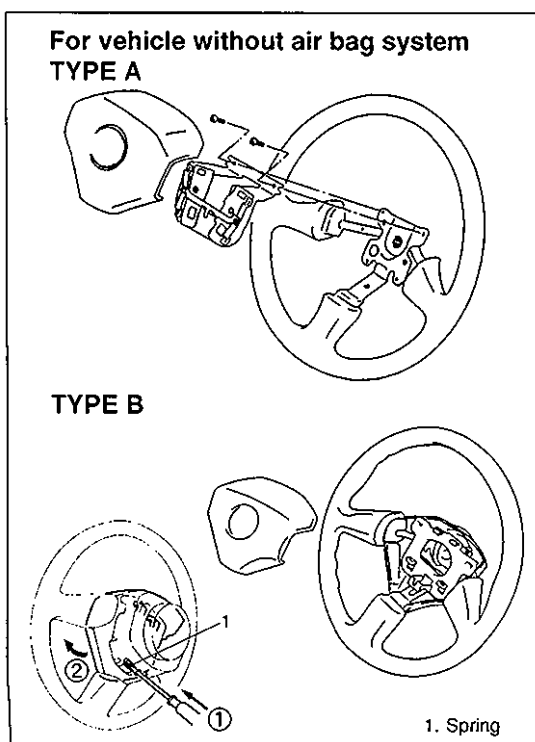
- 1) [For vehicle without air bag system]
 - i) Disconnect negative battery cable at battery terminal.

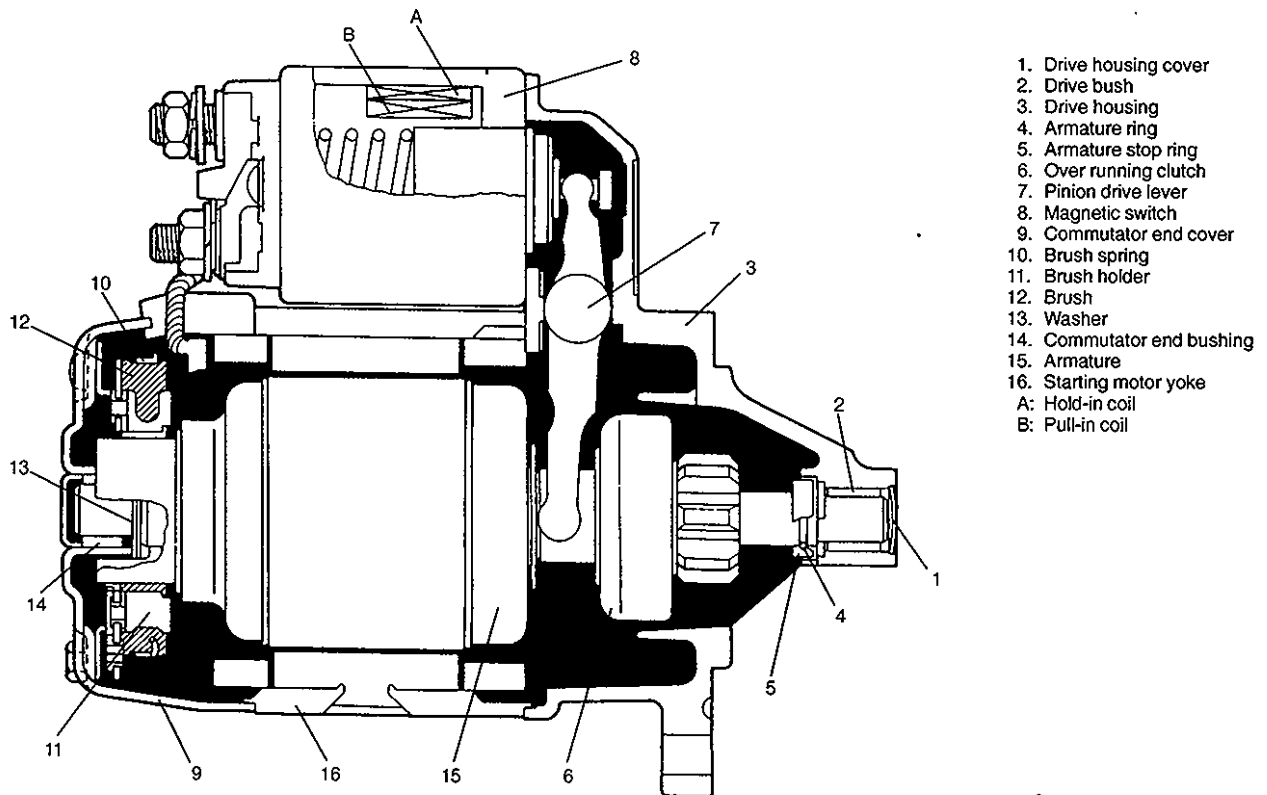
For TYPE A

 - ii) Remove steering wheel pad.
 - iii) Disconnect horn connector.

For TYPE B

 - ii) As shown in the figure, while pushing the set spring with a screwdriver or the like inserted in the hole of the steering wheel, pull the lower part of the pad forward and remove the steering wheel pad.





1. Drive housing cover
2. Drive bush
3. Drive housing
4. Armature ring
5. Armature stop ring
6. Over running clutch
7. Pinion drive lever
8. Magnetic switch
9. Commutator end cover
10. Brush spring
11. Brush holder
12. Brush
13. Washer
14. Commutator end bushing
15. Armature
16. Starting motor yoke
- A: Hold-in coil
- B: Pull-in coil

"A" : Apply grease (99000-25010)

