# TOYOTA

# REPAIR MANUAL SUPPLEMENT

## FOR CHASSIS & BODY

# LAND CRUISER

## (Hardtop/Canvas Top/Station Wagon)

RJ7_ series
LJ7_ series
FZJ7_, 80 series
PZJ7_ series
HZJ7_, 80 series
HDJ80 series

Aug., 1992

Pub. No. RM315E

# FOREWORD

This supplement has been prepared to provide information covering general service repairs for the chassis and body of the TOYOTA LAND CRUISER (Hardtop, Canvas Top and Station Wagon) which underwent changes in August, 1992.

Applicable models:

| | |
|---|---|
| Hardtop & Canvas Top | RJ70, 73, 77 series<br>LJ70, 72, 73, 77, 79 series<br>FZJ70, 73, 75 series<br>PZJ70, 73, 75 series<br>HZJ70, 73, 75 series |
| Station Wagon | FZJ80 series<br>HZJ80 series<br>HDJ80 series |

For the service specifications and repair procedures of the above model other than those listed in this supplement, refer to the following manuals.

| Manual Name | Pub. No. |
|---|---|
| • Land Cruiser (Hardtop and Canvas Top) Chassis and Body Repair Manual | RM183E |
| • Land Cruiser (Station Wagon) Chassis and Body Repair Manual | RM184E |
| • Land Cruiser (4-Door Hardtop) Chassis and Body Repair Manual Supplement | RM192E |
| • Land Cruiser (Hardtop/Canvas Top/Station Wagon) Chassis and Body Repair Manual Supplement | RM290E |
| • 21R, 22R Engine Repair Manual | RM053E |
| • 22R-E Engine Repair Manual Supplement | RM138E |
| • 2L, 3L Engine Repair Manual | RM123E |
| • 2L-T, 3L Engine Repair Manual Supplement | RM169E |
| • 1FZ-F, 1FZ-FE Engine Repair Manual | RM321E |
| • 1PZ, 1HZ, 1HD-T Engine Repair Manual | RM172E |
| • A441L, A440F, A442F Automatic Transmission Repair Manual | RM188E |
| • A442F Automatic Transmission Repair Manual | RM314E |
| • Land Cruiser Hardtop/Canvas Top Electrical Wiring Diagram | EWD168F |
| • Land Cruiser Station Wagon Electrical Wiring Diagram | EWD169F |

All information in this manual is based on the latest product information at the time of publication. However, specifications and procedures are subject to change without notice.

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TOYOTA MOTOR CORPORATION

INTRODUCTION IN
CLUTCH CL
MANUAL TRANSMISSION MT
AUTOMATIC TRANSMISSION AT
TRANSFER TR
PROPELLER SHAFT PR
SUSPENSION AND AXLE SA
BRAKE SYSTEM BR
BODY ELECTRICAL SYSTEM BE
AIR CONDITIONING SYSTEM AC
ELECTRICAL WIRING DIAGRAMS EWD

# INTRODUCTION

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# HOW TO USE THIS MANUAL

IN002-00

## INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

## GENERAL DESCRIPTION

At the beginning of each section, a General Description is given that pertains to all repair operations contained in that section.
Read these precautions before starting any repair task.

## TROUBLESHOOTING

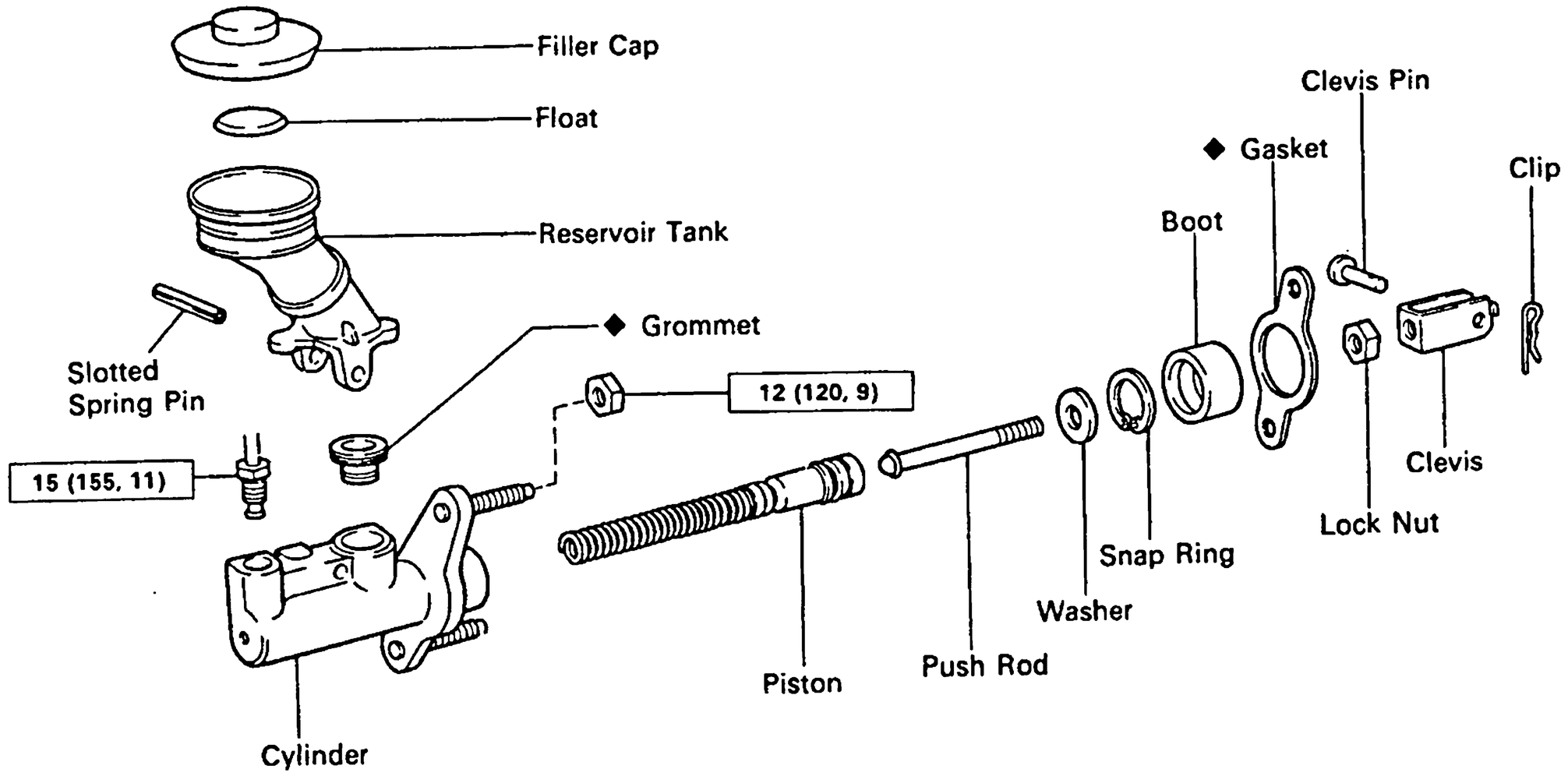
TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause.

## PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

## REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.
Example:

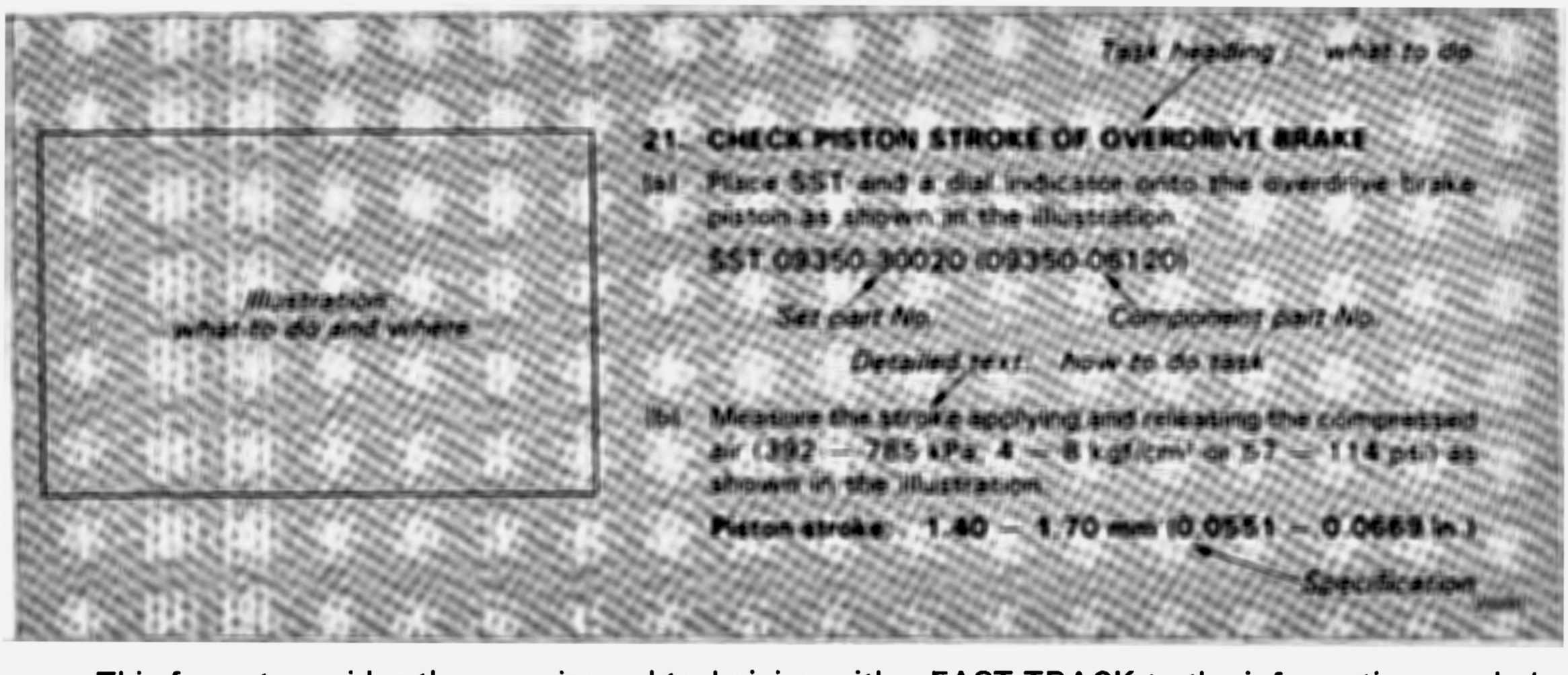



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The procedures are presented in a step—by—step format:

- The illustration shows what to do and where to do it.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:




This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

## REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

## SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found at the end of each section, for quick reference.

## CAUTIONS, NOTICES, HINTS:

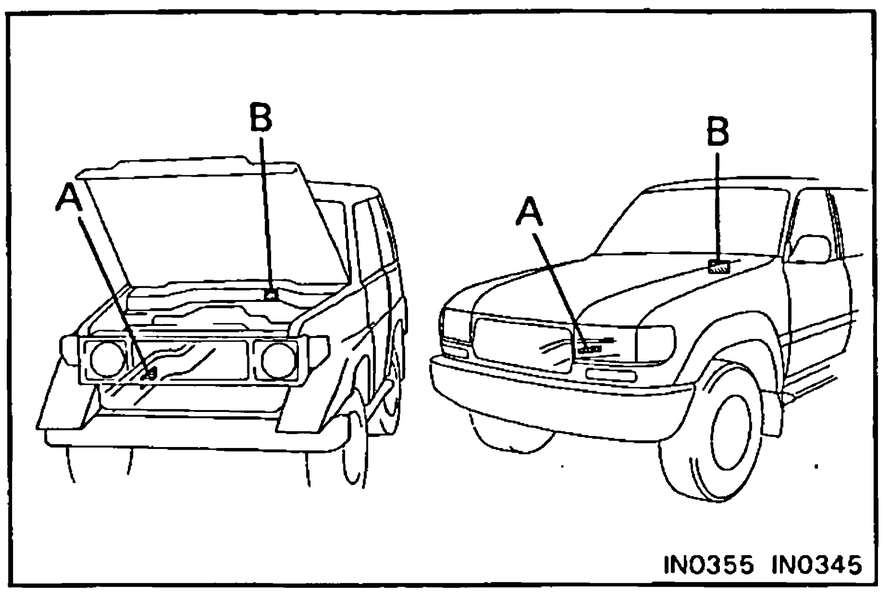
- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

## SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT(International System of Unit), and alternately expressed in the metric system and in the English System.

**Example:**

**Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)**




# IDENTIFICATION INFORMATION

## VEHICLE IDENTIFICATION NUMBER

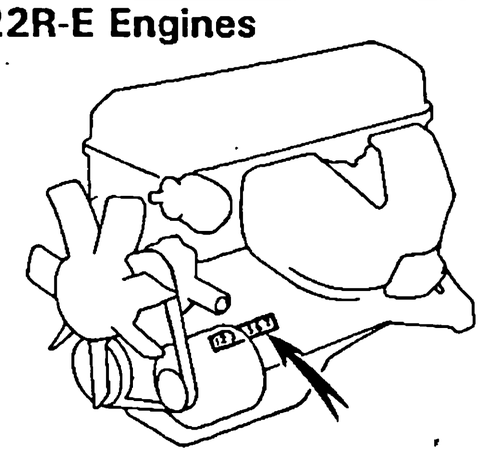
The vehicle identification number is stamped on the outer surface of the front right side frame. This number is also stamped on the manufacturer's name plate.

A: Vehicle Identification Number
B: Manufacturer's Name Plate

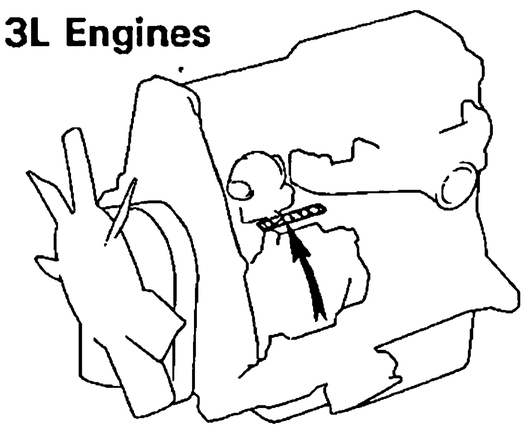
## ENGINE SERIAL NUMBER

The engine serial number is stamped on the right side of the cylinder block.

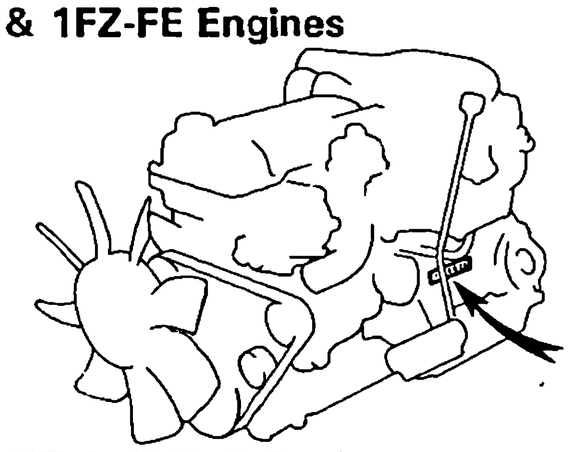
**22R & 22R-E Engines**



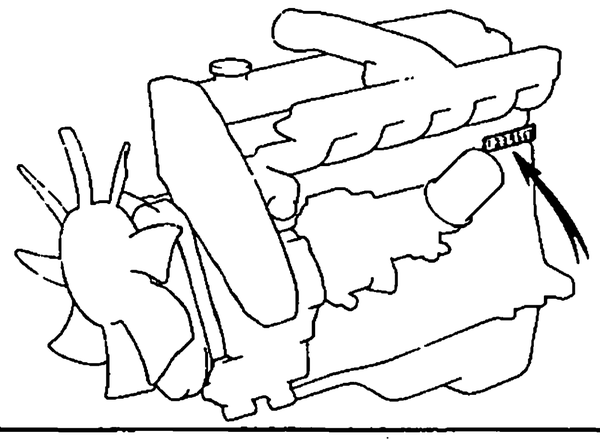
**2L-T & 3L Engines**



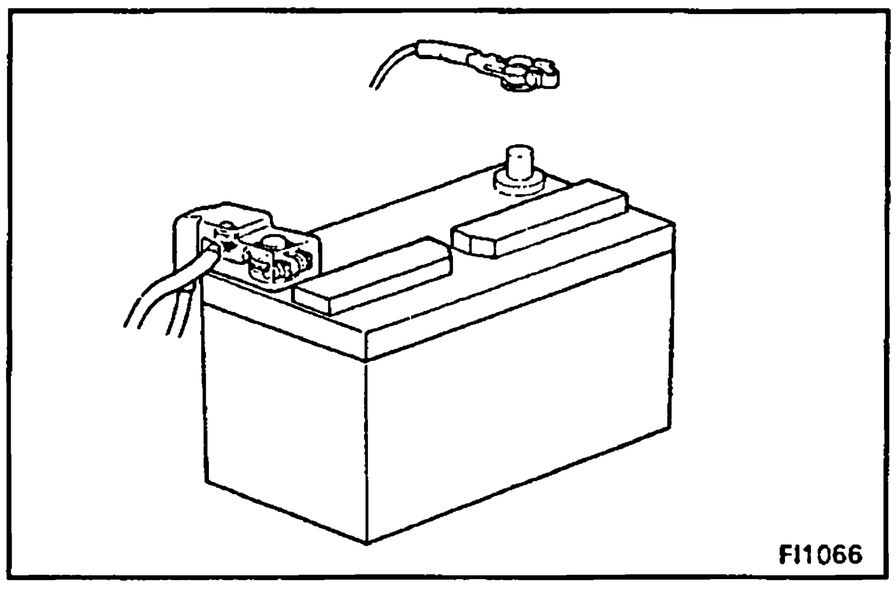
**1FZ-F & 1FZ-FE Engines**



**1PZ, 1HZ & 1HD-T Engines**



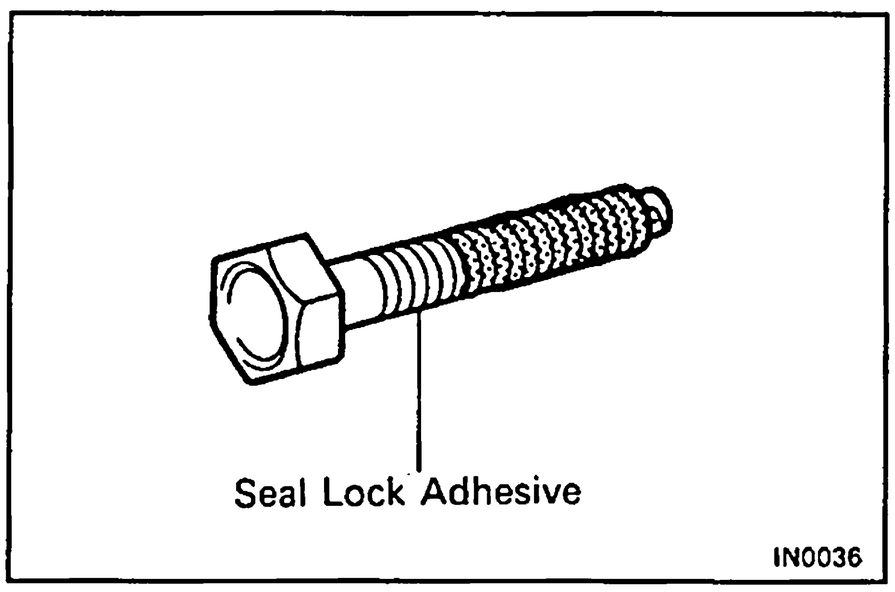
IN0007
IN0209
P03780
IN0294


FI1066

# GENERAL REPAIR INSTRUCTIONS

IN005–09

1. Use fender, seat and floor covers to keep the vehicle clean and prevent damage.
2. During disassembly, keep parts in the appropriate order to facilitate reassembly.
3. Observe the following:
   (a) Before performing electrical work, disconnect the negative cable from the battery terminal.
   (b) If it is necessary to disconnect the battery for inspection or repair, always disconnect the cable from the negative (−) terminal which is grounded to the vehicle body.
   (c) To prevent damage to the battery terminal post, loosen the terminal nut and raise the cable straight up without twisting or prying it.
   (d) Clean the battery terminal posts and cable terminals with a clean shop rag. Do not scrape them with a file or other abrasive objects.
   (e) Install the cable terminal to the battery post with the nut loose, and tighten the nut after installation. Do not use a hammer to tap the terminal onto the post.
   (f) Be sure the cover for the positive (+) terminal is properly in place.
4. Check hose and wiring connectors to make sure that they are secure and correct.
5. Non−reusable parts
   (a) Always replace cotter pins, gaskets, O−rings and oil seals etc. with new ones.
   (b) Non−reusable parts are indicated in the component illustrations by the "◆" symbol.

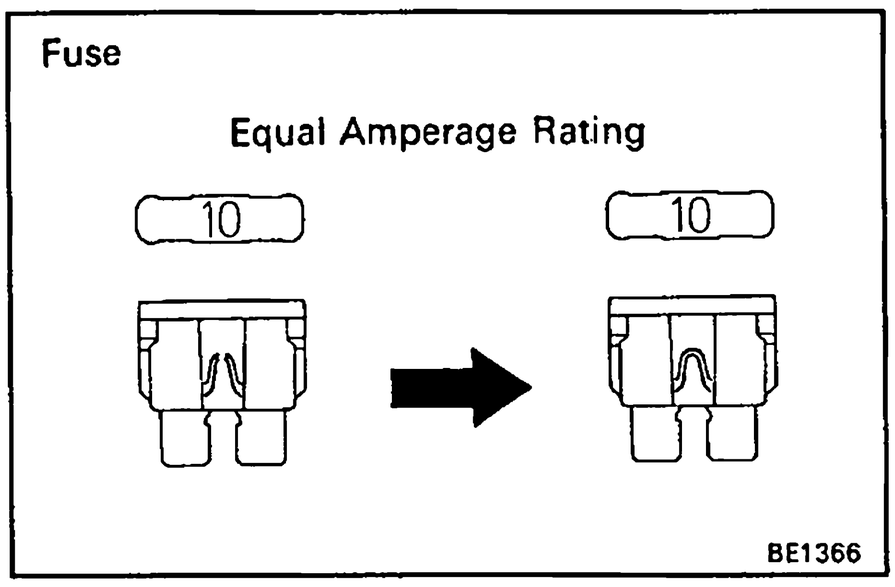


IN0036

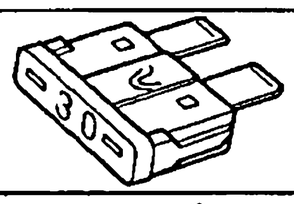
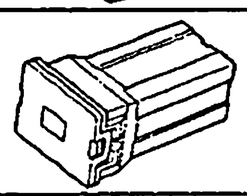
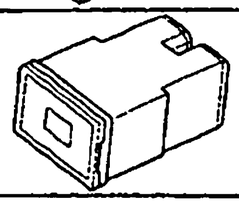
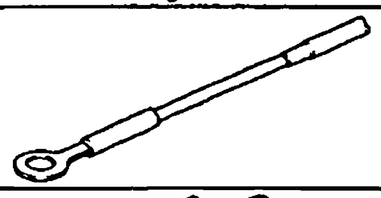
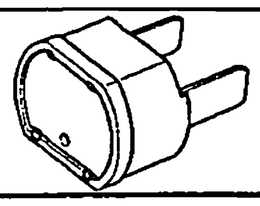
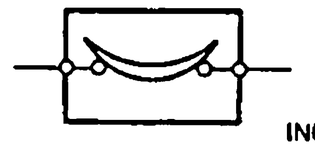
6. Precoated parts
   Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.
   (a) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.

(b) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.
(c) Precoated parts are indicated in the component illustrations by the "★" symbol.

7. When necessary, use a sealer on gaskets to prevent leaks.
8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
9. Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in the preparation part at the front of each section in this manual.

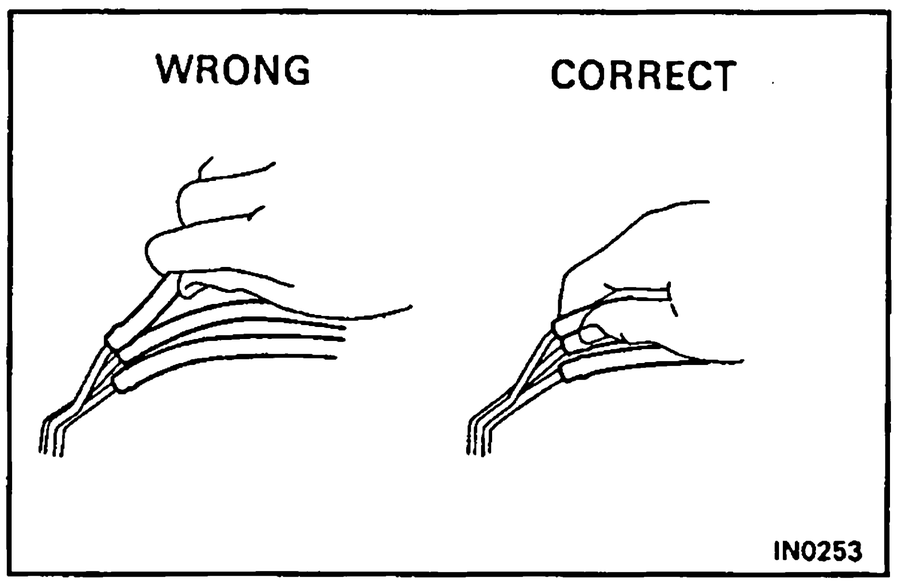



10. When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

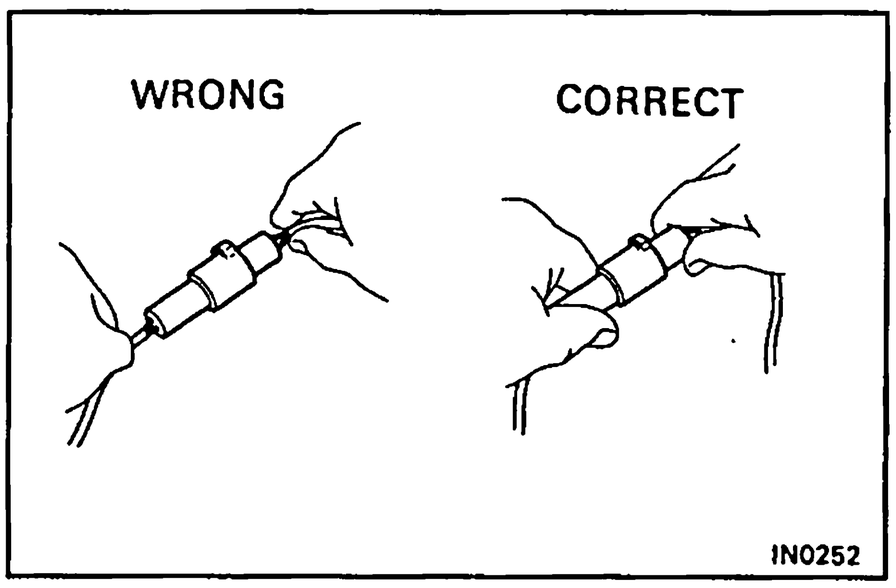
| Illustration | Symbol | Part Name | Abbreviation |
|---|---|---|---|
|  BE5594 |  IN0365 | FUSE | FUSE |
|  BE5595 |  IN0366 | MEDIUM CURRENT FUSE | M-FUSE |
|  BE5596 |  IN0367 | HIGH CURRENT FUSE | H-FUSE |
|  BE5597 |  IN0367 | FUSIBLE LINK | FL |
|  BE5598 |  IN0368 | CIRCUIT BREAKER | CB |

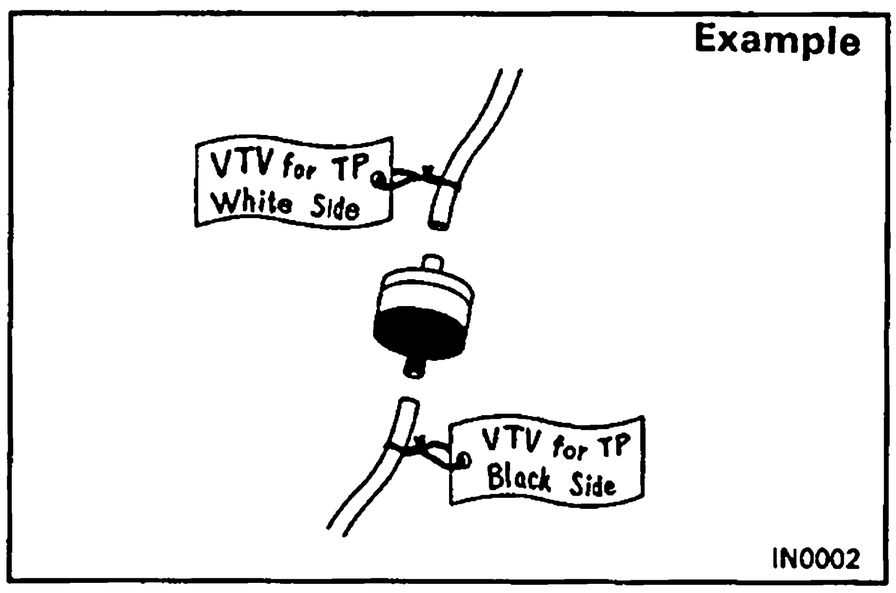
V00076

11. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See pages IN—16 to 18).
    (a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels at the opposite end in order to ensure safety.
    (b) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.
12. Observe the following precautions to avoid damage to the parts:
    (a) Do not open the cover or case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)




    (b) To disconnect vacuum hoses, pull on the end, not the middle of the hose.
    (c) To pull apart electrical connectors, pull on the connector itself, not the wires.
    (d) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.
    (e) When steam cleaning an engine, protect the distributor, air filter, and VCV from water.
    (f) Never use an impact wrench to remove or install temperature switches or temperature sensors.
    (g) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.
    (h) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step—down adapter instead. Once the hose has been stretched, it may leak.




13. Tag hoses before disconnecting them:
    (a) When disconnecting vacuum hoses, use tags to identify how they should be reconnected.
    (b) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

# PRECAUTION

## FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

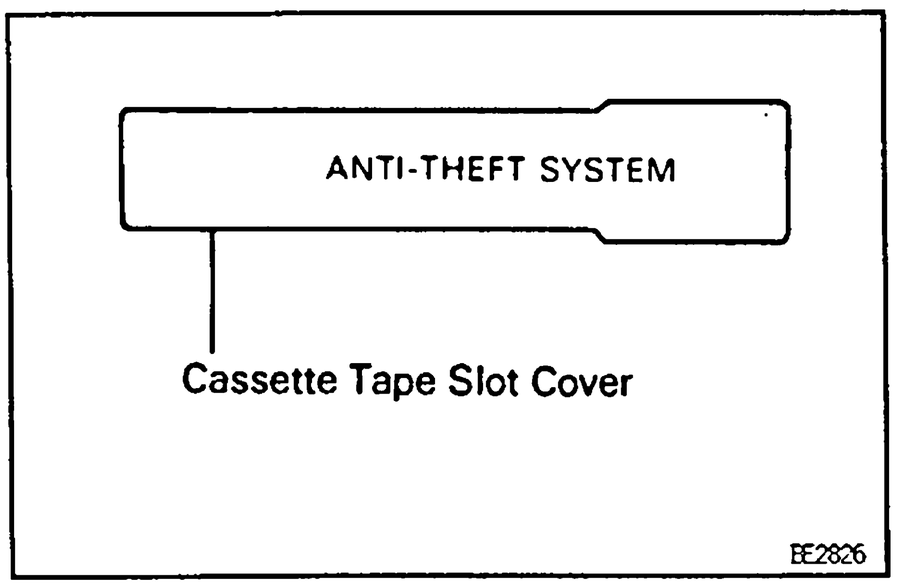
IN006-01

**CAUTION: If large amounts of unburned gasoline flow into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.**

1. **Use only unleaded gasoline.**
2. **Avoid prolonged idling.**
   Avoid running the engine at idle speed for more than 20 minutes.
3. **Avoid spark jump test.**

(a) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(b) While testing, never race the engine.

4. **Avoid prolonged engine compression measurement.**
   Engine compression tests must be done as rapidly as possible.
5. **Do not run engine when fuel tank is nearly empty.**
   This may cause the engine to misfire and create an extra load on the converter.
6. **Avoid coasting with ignition turned off and prolonged braking.**
7. **Do not dispose of used catalyst along with parts contaminated with gasoline or oil.**

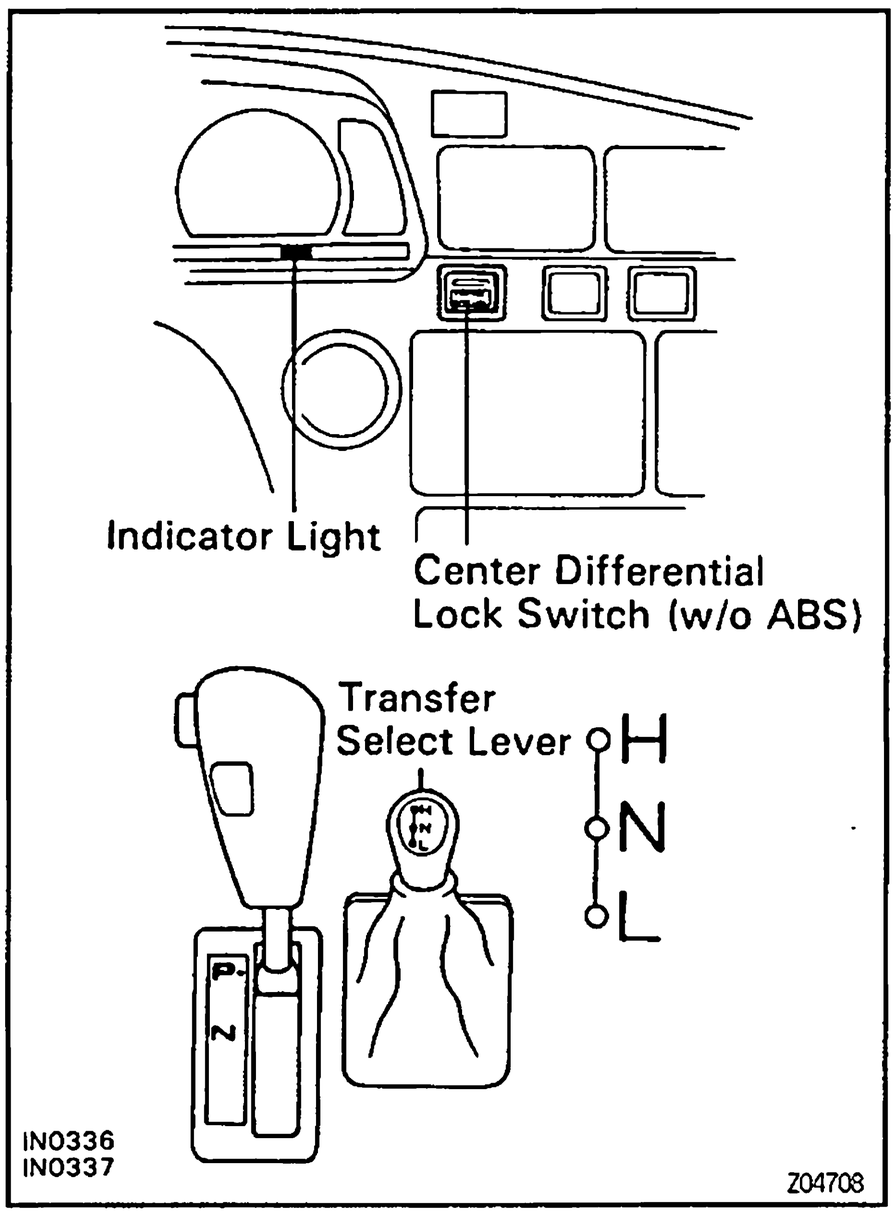



## FOR VEHICLES WITH AN AUDIO SYSTEM WITH BUILT—IN ANTI—THEFT SYSTEM

IN00C-01

Audio System displaying the sign "ANTI — THEFT SYSTEM" shown on the left has a built—in anti—theft system which makes the audio system soundless if stolen.

If the power source for the audio system is cut even once, the anti—theft system operates so that even if the power source is reconnected, the audio system will not produce any sound unless the ID number selected by the customer is input again. Accordingly, when performing repairs on vehicles equipped with this system, before disconnecting the battery terminals or removing the audio system the customer should be asked for the ID number so that the technician can input the ID number afterwards, or else a request made to the customer to input the ID number. For the method to input the ID number or cancel the anti—theft system, refer to the Owner's Manual.




IN01W–01

# WHEN SERVICING FULL–TIME 4WD VEHICLES

The full–time 4WD Land Cruiser Station Wagon is equipped with the mechanical lock type center differential system. When carrying out any kind of servicing or testing on a full–time 4WD in which the front or rear wheels are made to rotate (braking test, speedometer test, on–vehicle wheel balancing, etc.), or when towing the vehicle, be sure to observe the precautions given below. If incorrect preparations or test procedures are used, the test cannot be successfully carried out, and may be dangerous as well. Therefore, before beginning any such servicing or test, be sure to check the following items:

(1) Center differential lock type
(2) (w/o ABS)
Center differential mode position (FREE or LOCK)
(3) Whether wheels should be touching ground or jacked up
(4) Transmission gear position
(5) Transfer gear position (H or L)
(6) Maximum testing vehicle speed
(7) Maximum testing time

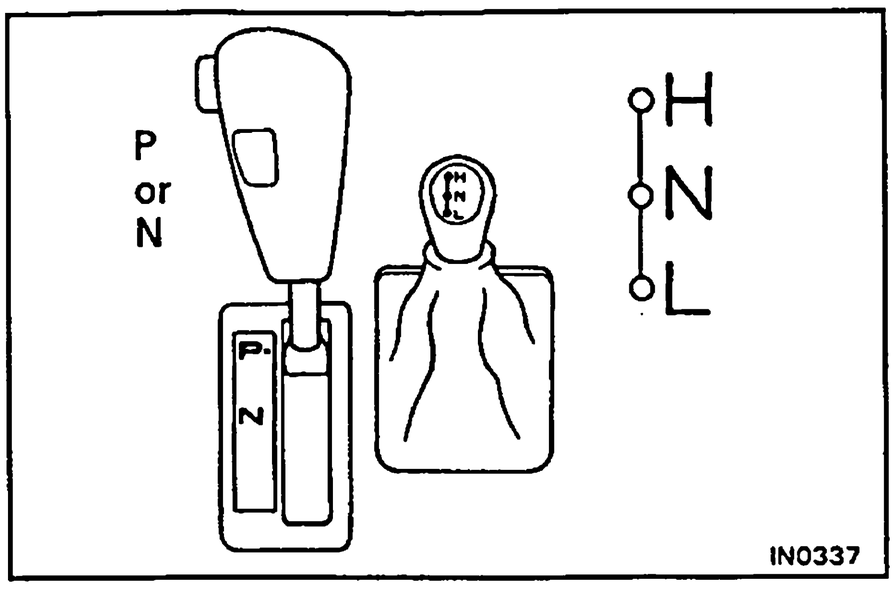
Also be sure to observe the following cautions:

(1) Never accelerate or decelerate the vehicle suddenly.
(2) Observe the other cautions given for each individual test.

## Before Beginning Test

During tests with a brake tester or chassis dynamometer, such as braking force tests or speedometer tests, if only the front or rear wheels are to be rotated, it is necessary to set the position of the center differential to the FREE position or to the LOCK position depending on the type of test being performed.

(1) (w/o ABS)
Select the position of the center differential by pushing the center differential lock switch with the transfer select lever to "H" position.
(2) After selecting the position, confirm the operation of indicator light.




HINT:

- (w/o ABS)
  Move the vehicle backward or forward slightly if the indicator light does not operate correctly when the center differential lock switch is turned ON or OFF.
- When the transfer select lever is put in "L" position, the center differential is put in LOCK condition regardless of the position of the center differential lock switch.
- Transfer H ↔ L Gear Shifting Procedure:
  When shifting, always put the shift lever of the automatic transmission in P or N range. In other ranges, the gears of the transfer clash, and switching cannot occur.

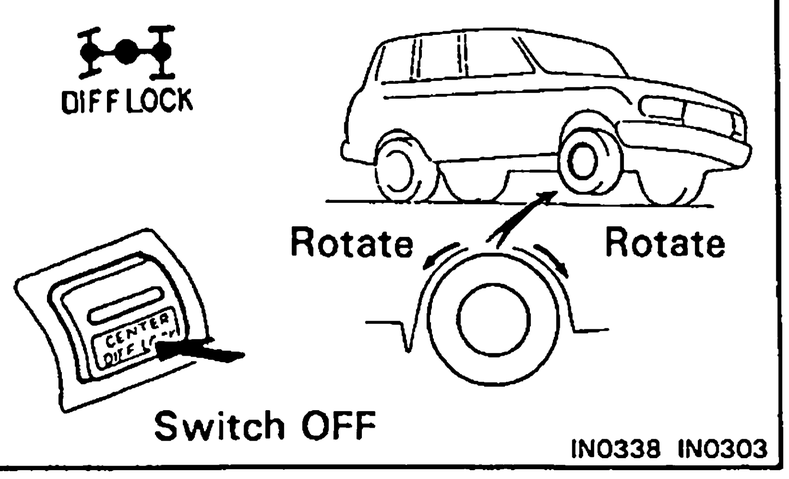
**(w/o ABS)**

**CAUTIONS WHEN CENTER DIFFERENTIAL CONTROL SWITCH IS TURNED ON**

- Operate the switch only when all four wheels are stopped or when driving with the wheels in a straight line.
- Never operate the switch under the following conditions.

(1) When any tire is slipping.
(2) When any tire is spinning freely.
(3) When swerving or cornering.

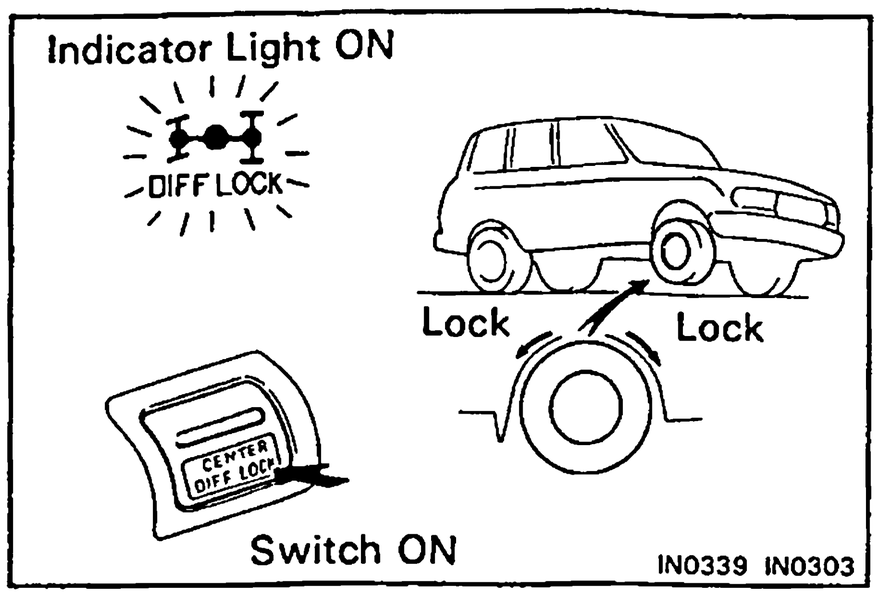
Indicator Light OFF




FREE Position

| Center Differential Lock | | Transfer Select Lever | Wheel |
|---|---|---|---|
| Control Switch | Indicator Light | | |
| OFF | OFF | H | A lifted wheel can be rotated even if only one wheel is lifted up, as long as transmission is in N range. |

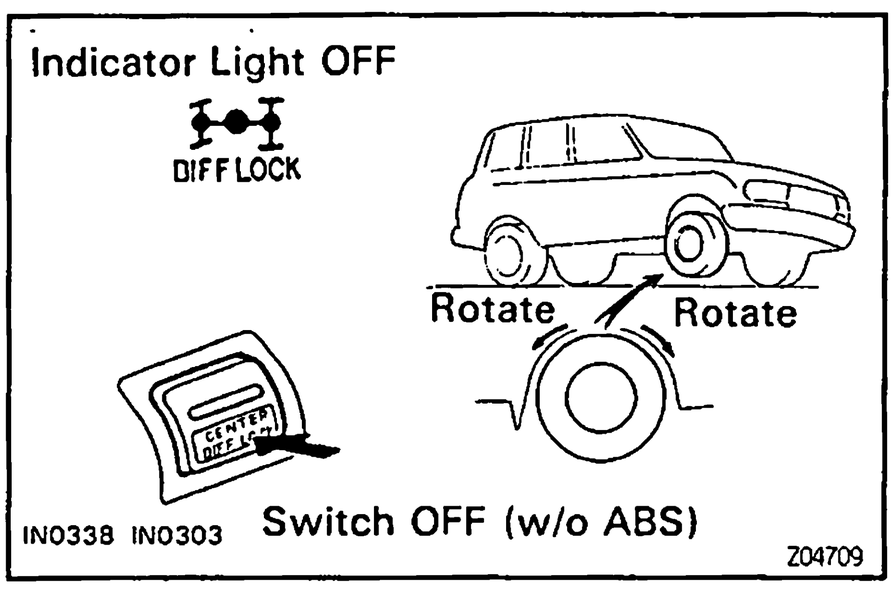
V00593

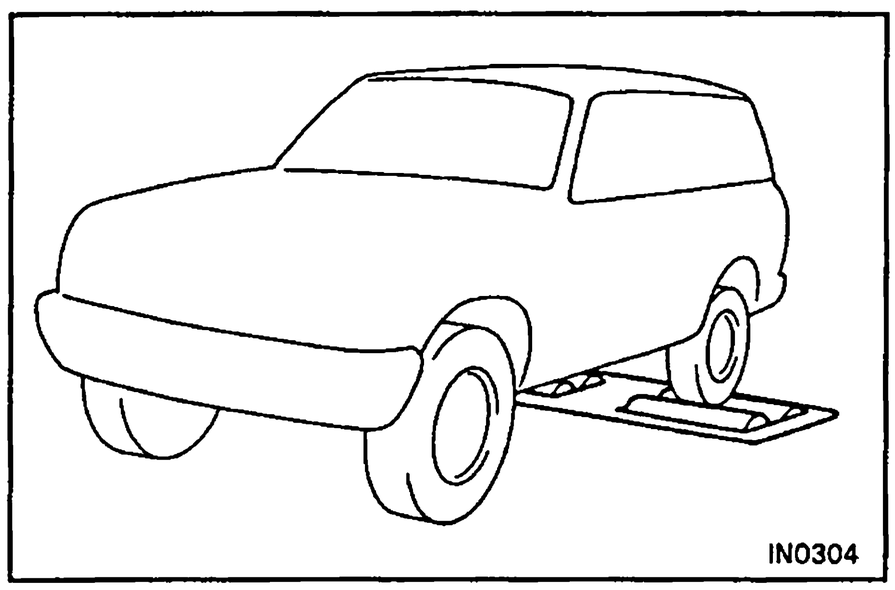



LOCK Position

| Center Differential Lock | | Transfer Select Lever | Wheel |
|---|---|---|---|
| Control Switch | Indicator Light | | |
| ON | ON | H | A lifted wheel cannot be rotated if only one wheel is lifted up, even if transmission is in N range. |
| OFF | ON | L | |

V00599



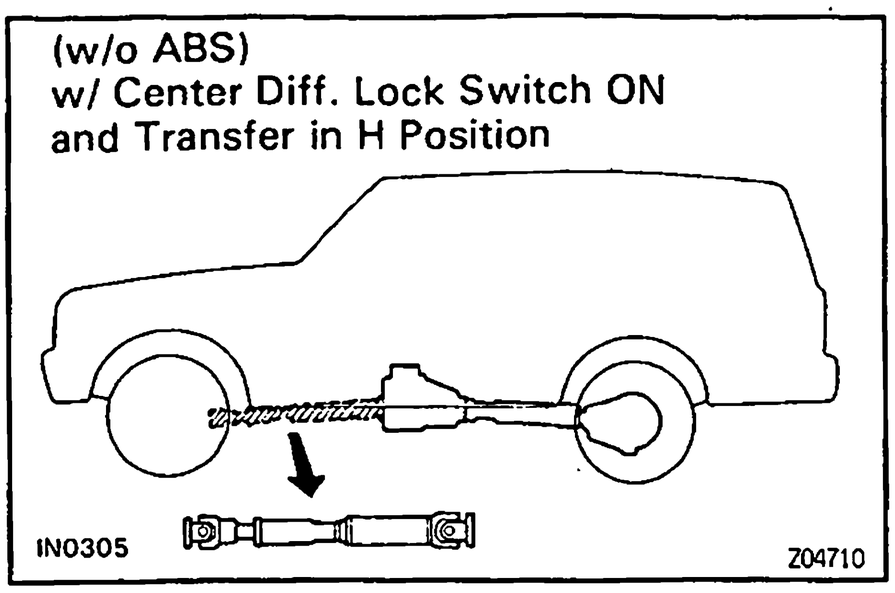




## Braking Force Test (Vehicle Speed: Below 0.5 km/h or 0.3 mph)

When performing low – speed type brake tester measurements, observe the following instructions.

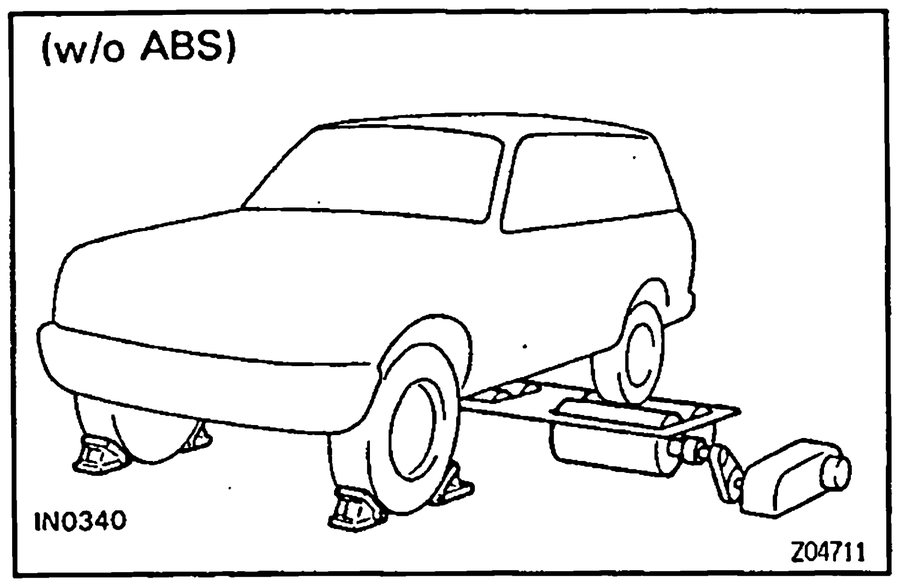
(1) Put the center differential in FREE position.
- Shift the transfer select lever to H position.
- (w/o ABS)
  Turn the center differential lock switch to OFF and check that the center differential lock indicator light goes off.

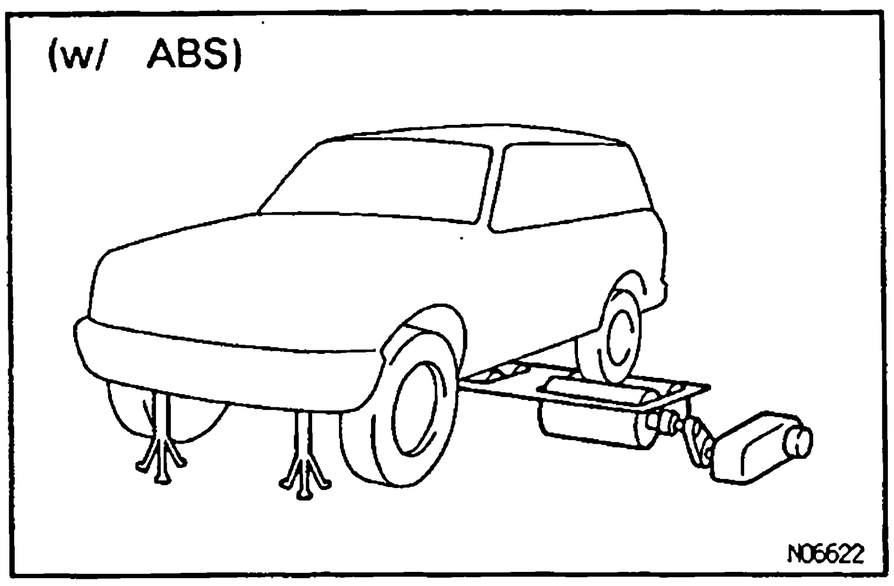
(2) Shift the transmission shift lever to N range.
(3) Idle the engine, operate the brake booster and perform the test.




## Speedometer Test or Other Tests (Using Speedometer Tester or Chassis Dynamometer)

(1) (w/o ABS)
Remove the front propeller shaft, put the center differential in LOCK position, then put the rear wheels on the tester roller and perform the test.



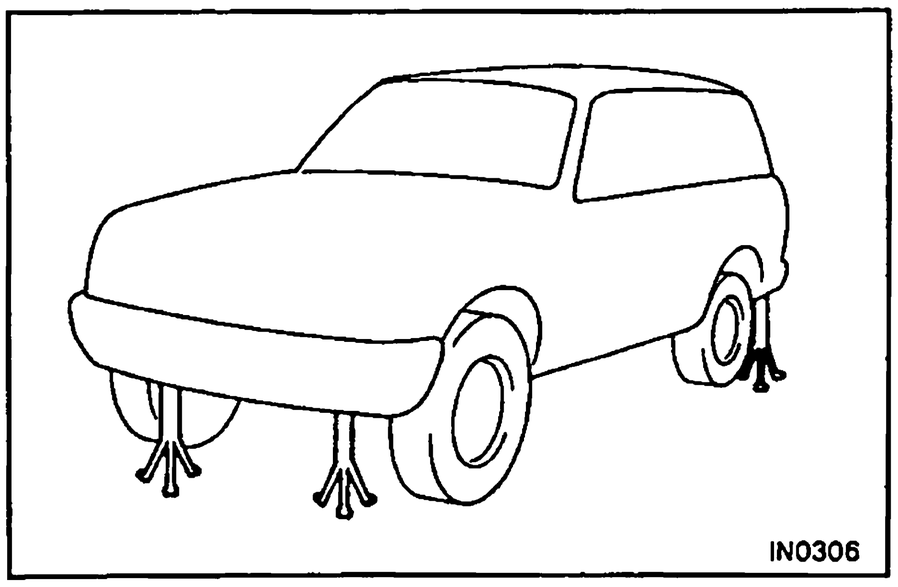

(2) (w/ ABS)
Shift the transfer select lever to H position, jack up the front wheels, then put the rear wheels on the tester roller and perform the test.

(3) When performing tests, observe the following precautions.

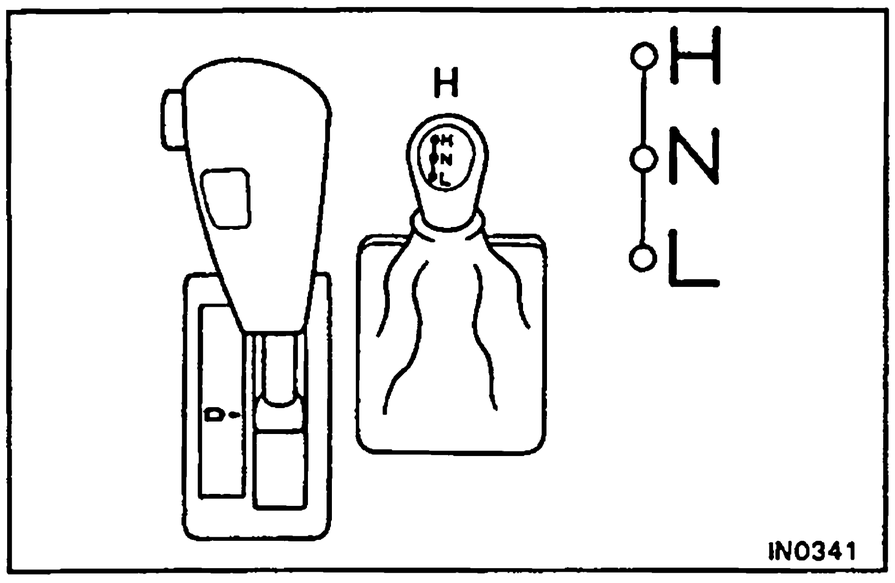
- (w/o ABS)
  Check that the center differential is securely in LOCK condition.
- Confirm that the vehicle is securely immobilised.
- Never operate the brakes suddenly, suddenly drive the wheels, or suddenly decelerate.

## On–Vehicle Wheel Balancing

**When doing on–vehicle wheel balancing on a full–time 4WD vehicle, to prevent the wheels from rotating at different speeds or in different directions from each other (which could lead to damage to the center differential or transfer gears), always be sure to observe the following precautions:**

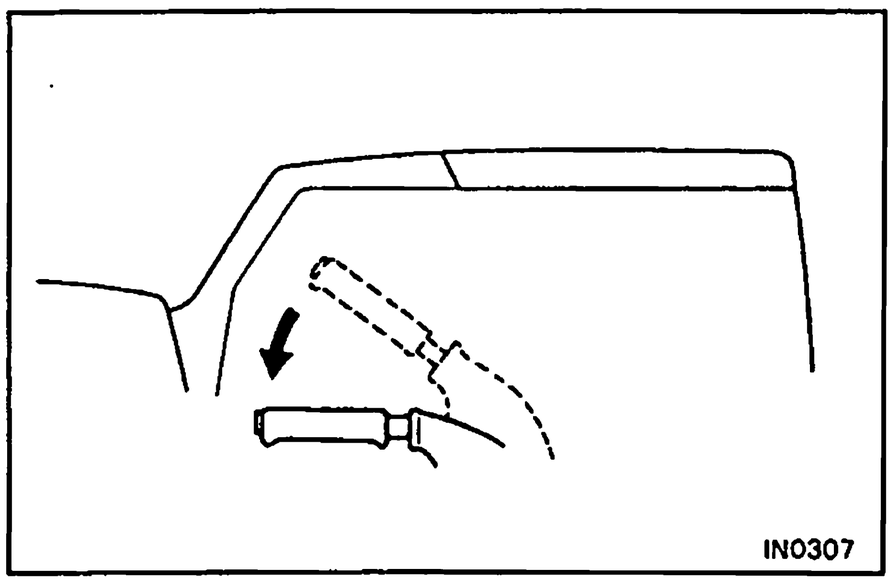



**(1) All four wheels should be jacked up, clearing the ground completely.**

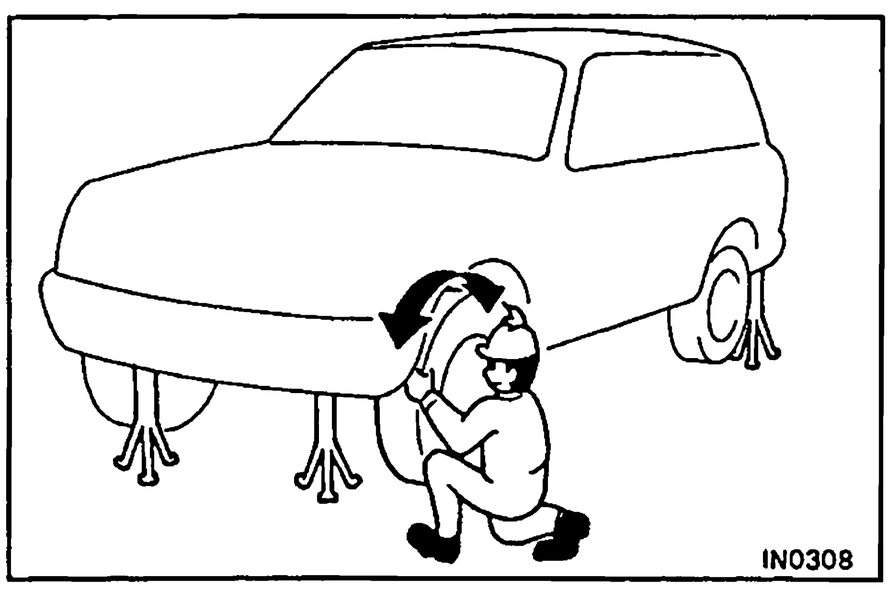



**(2) (w/o ABS)**
**The center differential should be in the LOCK position with the transfer gear in H position.**

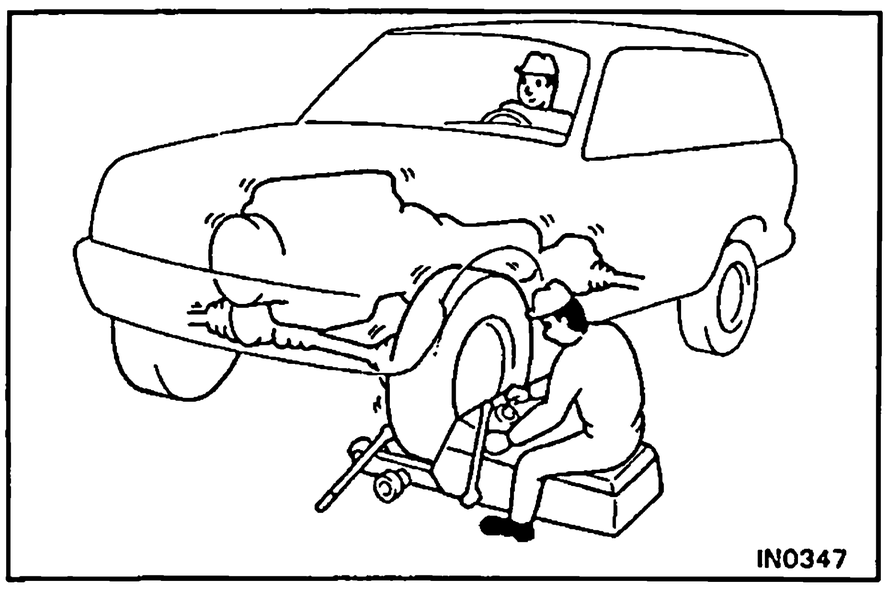
**(3) (w/ ABS)**
**Shift the transfer select lever to H position.**




**(4) The parking brake lever should be fully released.**




**(5) None of the brakes should be allowed to drag.**




**(6) The wheels should be driven with both the engine and the wheel balancer.**
HINT: When doing this, be careful of the other wheels, which will rotate at the same time.

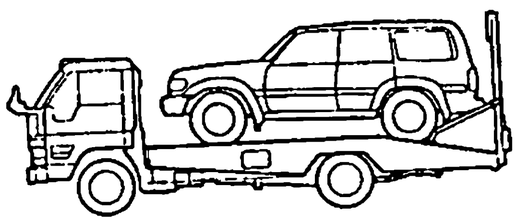
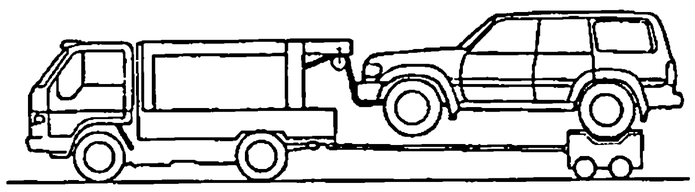
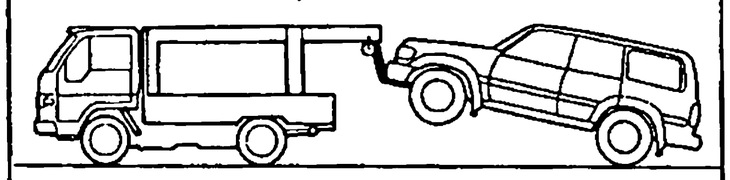
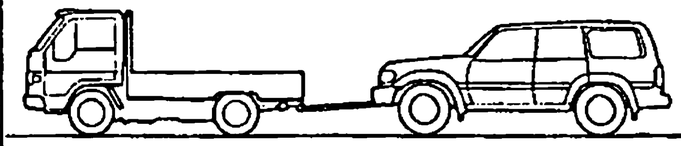
**(7) Avoid sudden acceleration, deceleration and braking.**

**(8) Carry out the wheel balancing with the transmission in "D" or "3" range.**

IN00Y-01

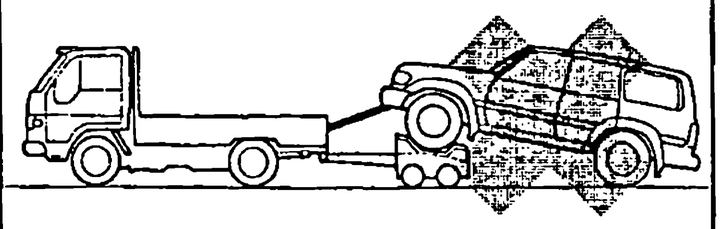
# WHEN TOWING FULL–TIME 4WD VEHICLES

1. Use one of the methods shown below to tow the vehicle.
2. When there is trouble with the chassis and drive train, use method ① (flat bed truck) or method ② (sling type tow truck with dollies)
3. Recommended Methods: No. ①, ② or ③
   Emergency Method: No. ④

| Towing Method \ Condition | Parking Brake | Transmission Shift Lever Position | Transfer Shift Lever Position | (w/o ABS) Center Differential Lock Switch | Center Differential |
|---|---|---|---|---|---|
| ① Flat Bed Truck  IN0309 | Applied | "P" Range | "H" Position | OFF | FREE (Normal Driving) |
| ② Sling-Type Tow Truck with Dollies  IN0310 | | | | | |
| ③ Sling-Type Tow Truck (Front wheels must be able to rotate freely)  IN0311 | Released | "N" Range | "N" Position | OFF | ↑ |
| ④ Towing with Rope  IN0312 | Released | "N" Range | "N" Position | OFF | ↑ |
| | HINT: Do not tow the vehicle at a speed faster than 45 km/h (30 mph) or a distance greater than 80 km (50 miles). | | | | |

HINT: **Do not use any towing methods other than those shown above.**

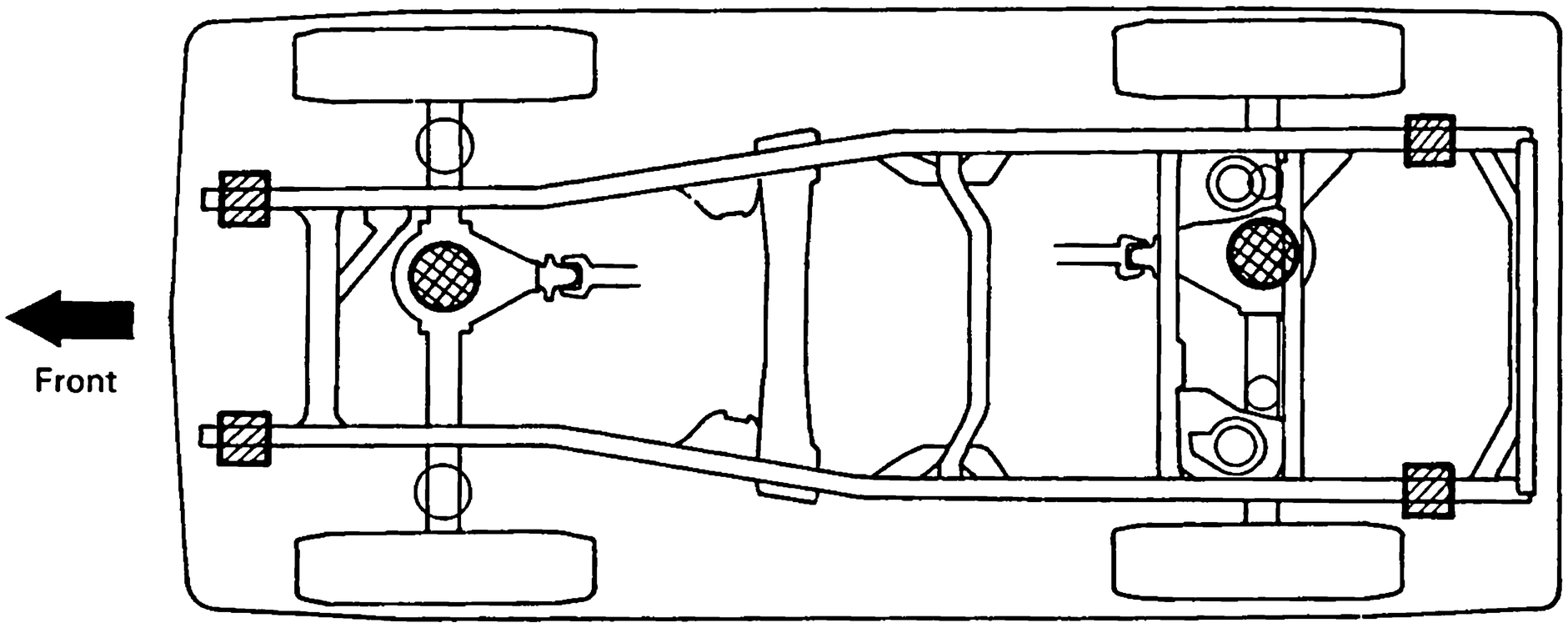
For example, the towing method shown below is dangerous, so do not use it.

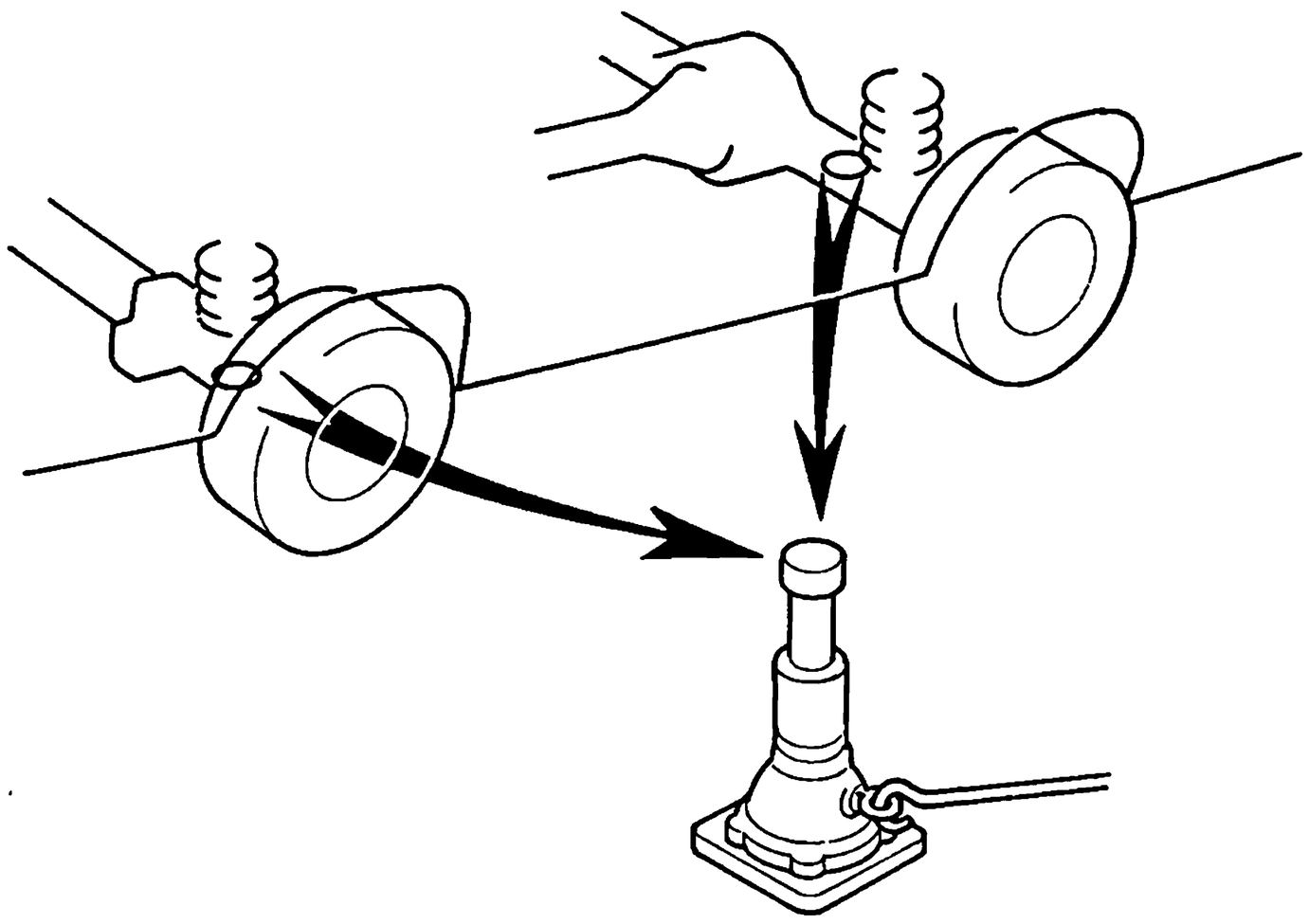
| | |
|---|---|
| NO  IN0313 | During towing with this towing method, there is a danger of the drive train heating up and causing breakdown, or of the front wheels flying off the dolly. |

V02129

# VEHICLE LIFT AND SUPPORT LOCATIONS
## (Hardtop & Canvas Top)

**Coil Spring Type (LJ and RJ series)**



**JACK POSITION** ——————————

Front ..... Under the front differential
Rear ..... Under the rear differential

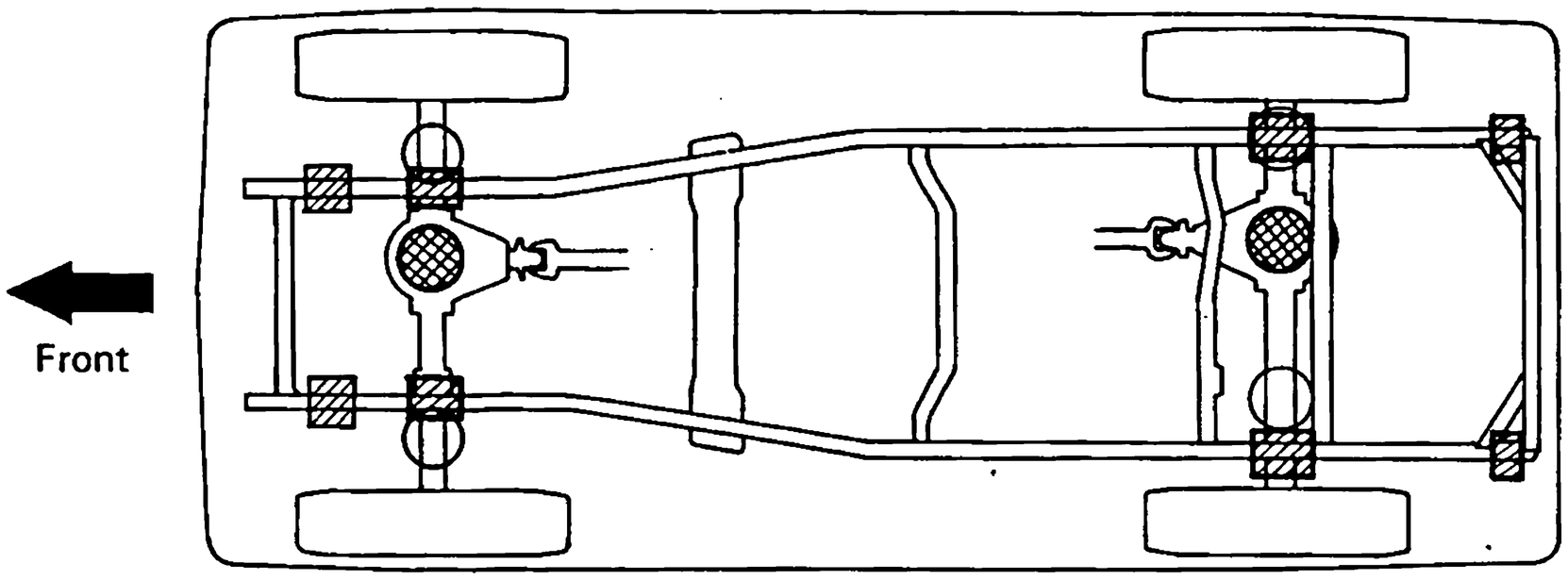
**SUPPORT POSITION**

Safety stand .....

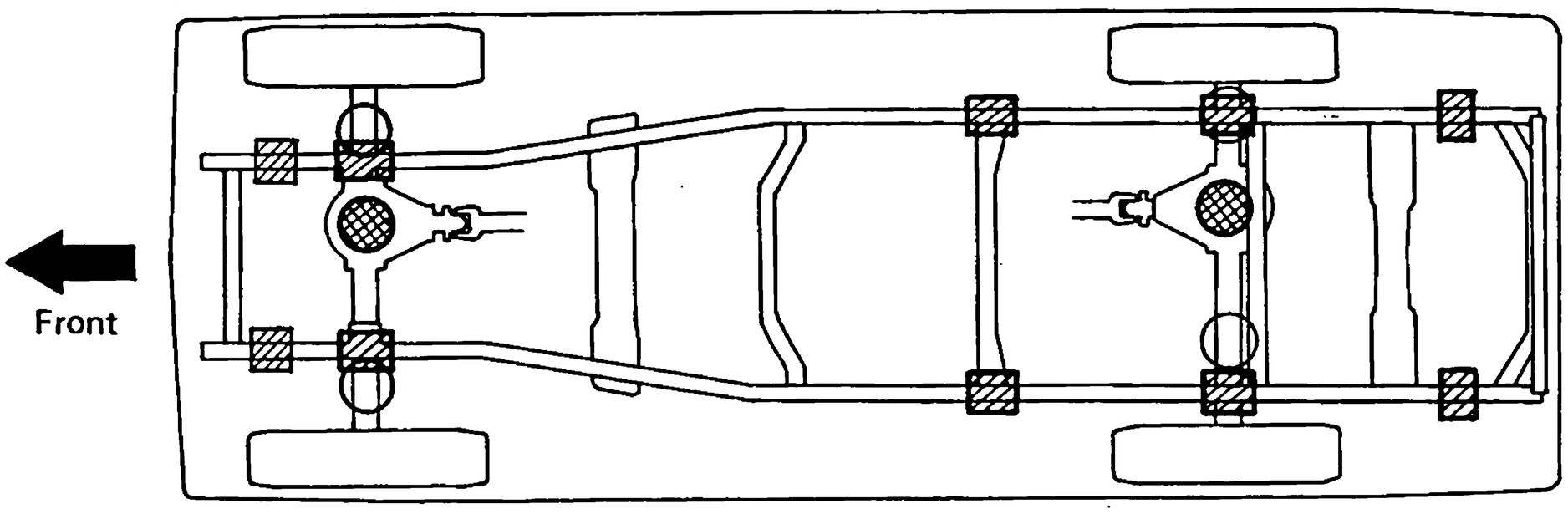
**SCREW TYPE JACK POSITION** .....

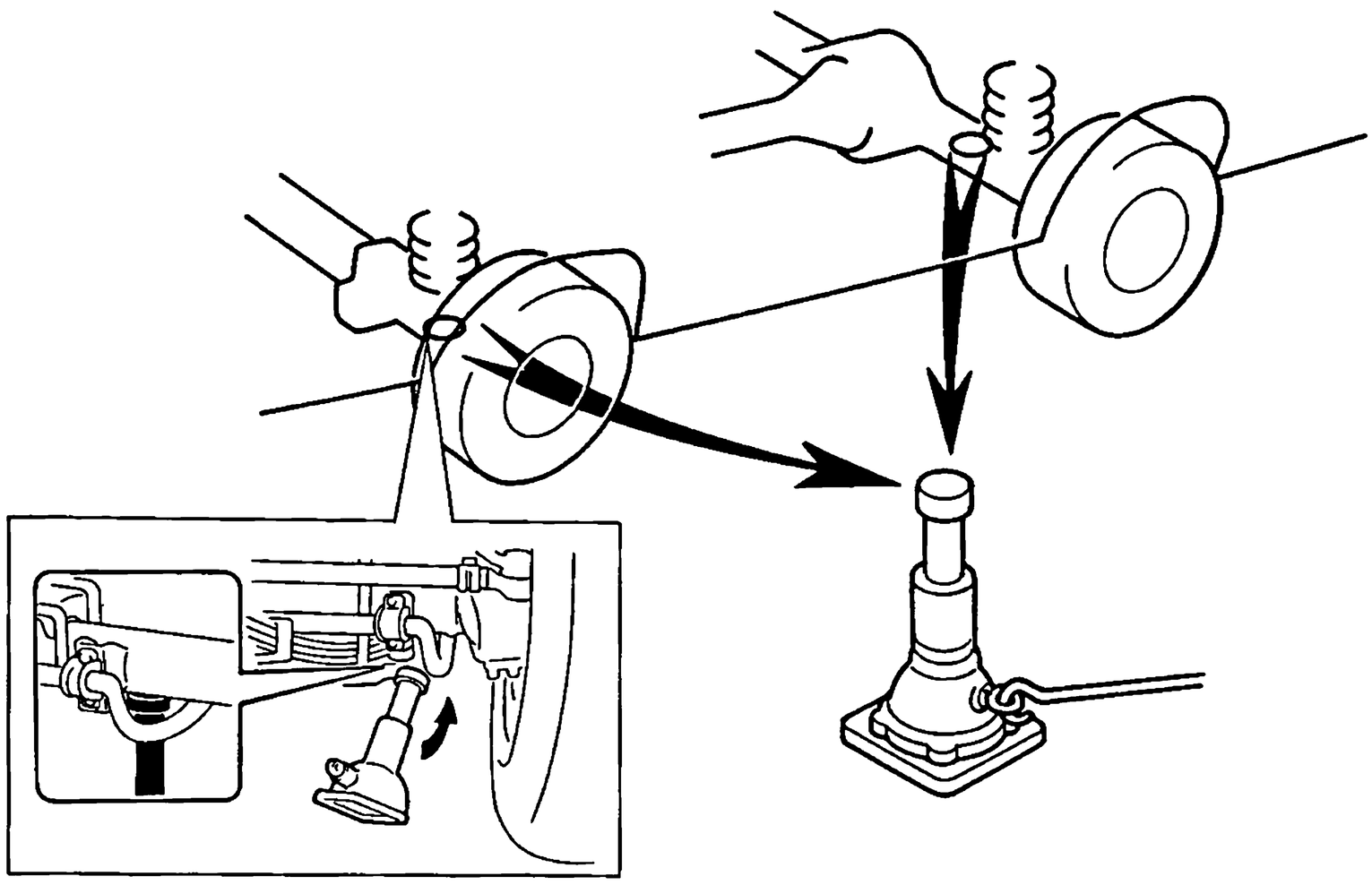
IN0040
IN0352

**Leaf Spring Type (PZJ, HZJ and FZJ series)**
**70 series (short) and 73 series (middle)**




**75 series (long)**



**JACK POSITION**

Front ..... Under the front differential
Rear ..... Under the rear differential

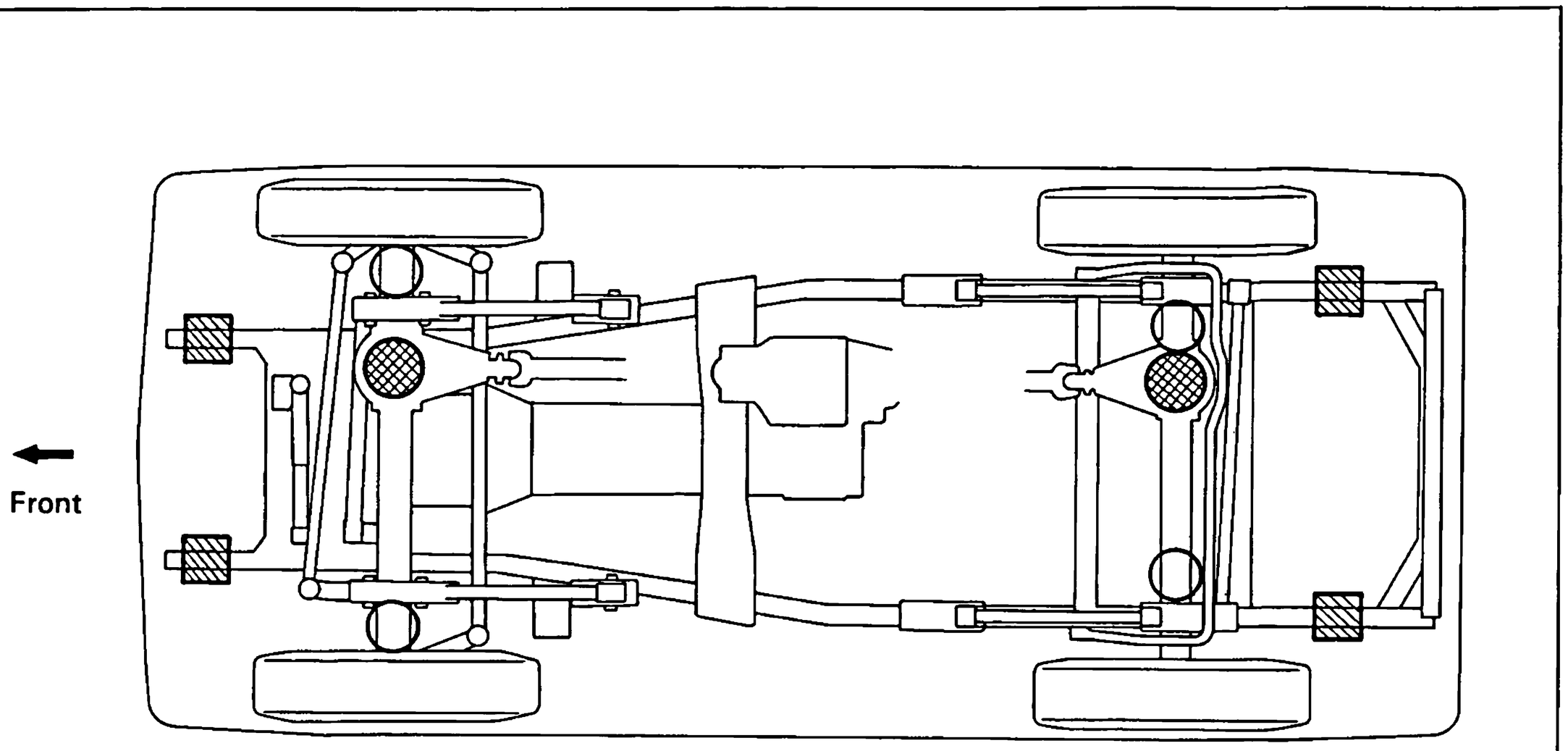
**SUPPORT POSITION**

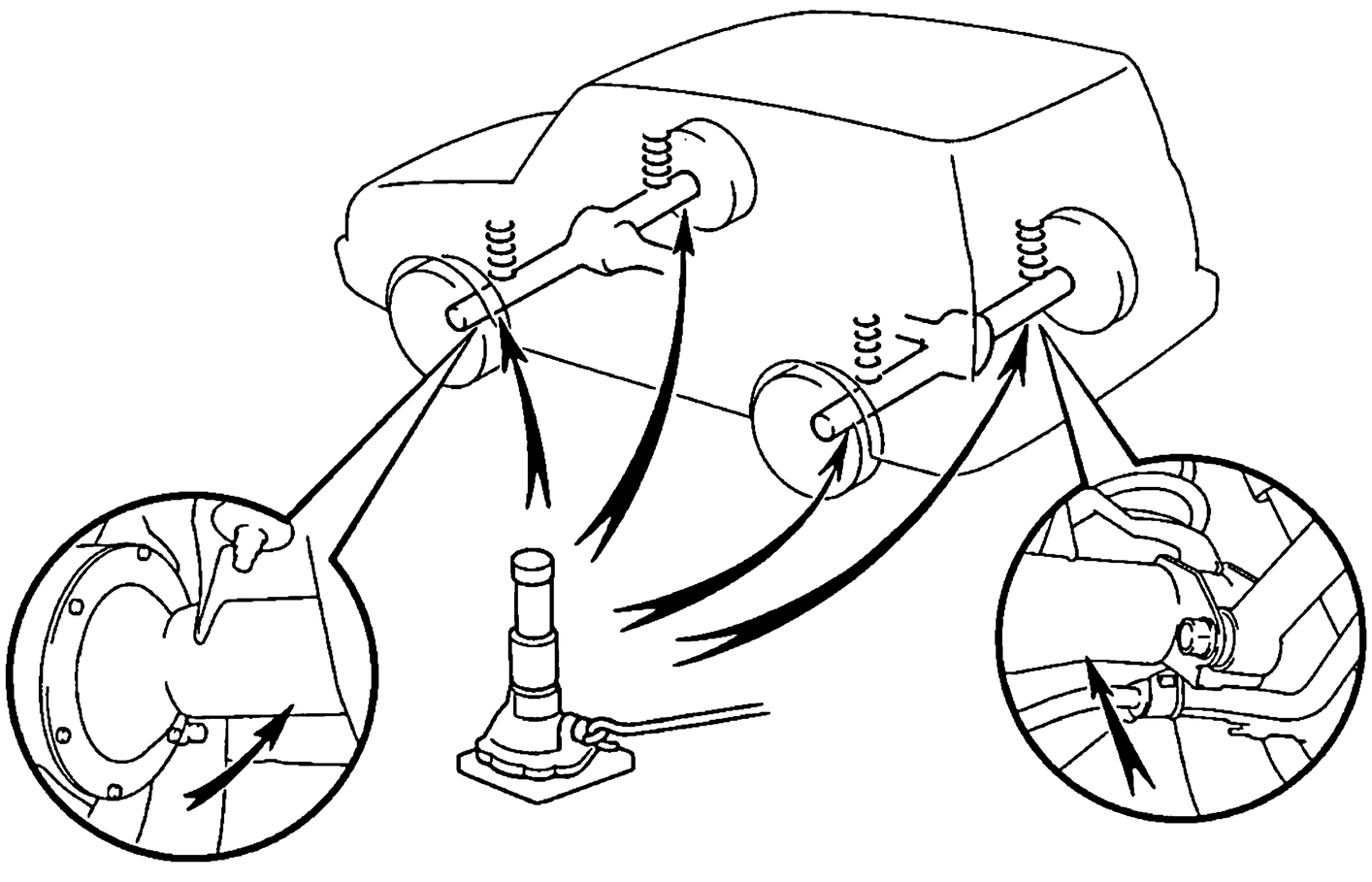
Safety stand .....

**SCREW TYPE JACK POSITION** .....

IN0043
IN0044
IN0352 IN0346

# VEHICLE LIFT AND SUPPORT LOCATIONS
## (Station Wagon)



**JACK POSITION** ——————————

Front ..... Under the front differential
Rear ..... Under the rear differential

**SCREW TYPE JACK POSITION** ——————

**SUPPORT POSITION**

Safety stand .....

IN0314
IN0342

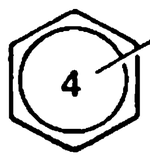
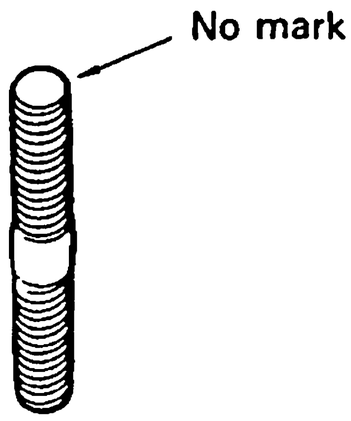
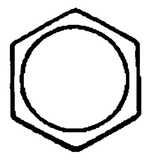
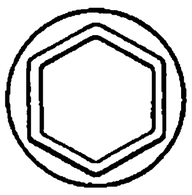
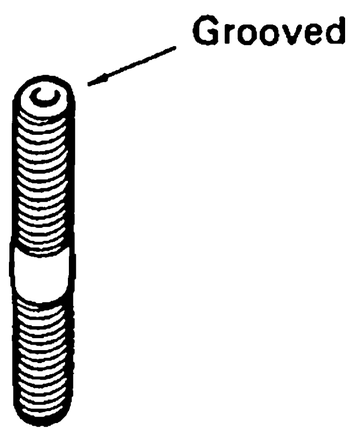
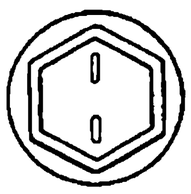
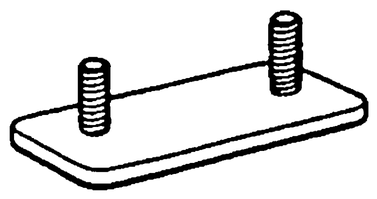
# ABBREVIATIONS USED IN THIS MANUAL

| | |
|---|---|
| ABS | Anti-Lock Brake System |
| A/C | Air Conditioner |
| A/T | Automatic Transmission |
| CB | Circuit Breaker |
| CCS | Cruise Control System |
| CD | Compact Disc |
| ECU | Electronic Control Unit |
| EFI | Electronic Fuel Injection |
| ELR | Emergency Locking Retractor |
| Ex. | Except |
| FIPG | Formed on Place Gasket |
| FL | Fusible Link |
| IG | Ignition |
| LED | Light Emitting Diode |
| LH | Left-Hand |
| LHD | Left-Hand Drive |
| LSD | Limited Slip Differential |
| M/T | Manual Transmission |
| MP | Multipurpose |
| PTO | Power Take-Off |
| RH | Right-Hand |
| RHD | Right-Hand Drive |
| SSM | Special Service Materials |
| SST | Special Service Tools |
| STD | Standard |
| SW | Switch |
| VSV | Vacuum Switching Valve |
| w/ | With |
| w/o | Without |
| 2WD | Two Wheel Drive Vehicles (4 × 2) |
| 4WD | Four Wheel Drive Vehicles (4 × 4) |

# STANDARD BOLT TORQUE SPECIFICATIONS

IN008-01

## HOW TO DETERMINE BOLT STRENGTH

| | Mark | Class | | Mark | Class |
|---|---|---|---|---|---|
| Hexagon head bolt |  | 4T<br>5T<br>6T<br>7T<br>8T<br>9T<br>10T<br>11T | Stud bolt |  | 4T |
| |  No mark | 4T | | | |
| Hexagon flange bolt w/ washer hexagon bolt |  No mark | 4T | |  | 6T |
| Hexagon head bolt |  Two protruding lines | 5T | | | |
| Hexagon flange bolt w/ washer hexagon bolt |  Two protruding lines | 6T | Welded bolt |  | 4T |
| Hexagon head bolt |  Three protruding lines | 7T | | | |
| Hexagon head bolt |  Four protruding lines | 8T | | | |

V00078

## SPECIFIED TORQUE FOR STANDARD BOLTS

| Class | Diameter mm | Pitch mm | Specified torque | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Hexagon head bolt | | | Hexagon flange bolt | | |
| | | | N·m | kgf·cm | ft·lbf | N·m | kgf·cm | ft·lbf |
| 4T | 6 | 1 | 5 | 55 | 48 in.·lbf | 6 | 60 | 52 in.·lbf |
| | 8 | 1.25 | 12.5 | 130 | 9 | 14 | 145 | 10 |
| | 10 | 1.25 | 26 | 260 | 19 | 29 | 290 | 21 |
| | 12 | 1.25 | 47 | 480 | 35 | 53 | 540 | 39 |
| | 14 | 1.5 | 74 | 760 | 55 | 84 | 850 | 61 |
| | 16 | 1.5 | 115 | 1,150 | 83 | – | – | – |
| 5T | 6 | 1 | 6.5 | 65 | 56 in.·lbf | 7.5 | 75 | 65 in.·lbf |
| | 8 | 1.25 | 15.5 | 160 | 12 | 17.5 | 175 | 13 |
| | 10 | 1.25 | 32 | 330 | 24 | 36 | 360 | 26 |
| | 12 | 1.25 | 59 | 600 | 43 | 65 | 670 | 48 |
| | 14 | 1.5 | 91 | 930 | 67 | 100 | 1,050 | 76 |
| | 16 | 1.5 | 140 | 1,400 | 101 | – | – | – |
| 6T | 6 | 1 | 8 | 80 | 69 in.·lbf | 9 | 90 | 78 in.·lbf |
| | 8 | 1.25 | 19 | 195 | 14 | 21 | 210 | 15 |
| | 10 | 1.25 | 39 | 400 | 29 | 44 | 440 | 32 |
| | 12 | 1.25 | 71 | 730 | 53 | 80 | 810 | 59 |
| | 14 | 1.5 | 110 | 1,100 | 80 | 125 | 1,250 | 90 |
| | 16 | 1.5 | 170 | 1,750 | 127 | – | – | – |
| 7T | 6 | 1 | 10.5 | 110 | 8 | 12 | 120 | 9 |
| | 8 | 1.25 | 25 | 260 | 19 | 28 | 290 | 21 |
| | 10 | 1.25 | 52 | 530 | 38 | 58 | 590 | 43 |
| | 12 | 1.25 | 95 | 970 | 70 | 105 | 1,050 | 76 |
| | 14 | 1.5 | 145 | 1,500 | 108 | 165 | 1,700 | 123 |
| | 16 | 1.5 | 230 | 2,300 | 166 | – | – | – |
| 8T | 8 | 1.25 | 29 | 300 | 22 | 33 | 330 | 24 |
| | 10 | 1.25 | 61 | 620 | 45 | 68 | 690 | 50 |
| | 12 | 1.25 | 110 | 1,100 | 80 | 120 | 1,250 | 90 |
| 9T | 8 | 1.25 | 34 | 340 | 25 | 37 | 380 | 27 |
| | 10 | 1.25 | 70 | 710 | 51 | 78 | 790 | 57 |
| | 12 | 1.25 | 125 | 1,300 | 94 | 140 | 1,450 | 105 |
| 10T | 8 | 1.25 | 38 | 390 | 28 | 42 | 430 | 31 |
| | 10 | 1.25 | 78 | 800 | 58 | 88 | 890 | 64 |
| | 12 | 1.25 | 140 | 1,450 | 105 | 155 | 1,600 | 116 |
| 11T | 8 | 1.25 | 42 | 430 | 31 | 47 | 480 | 35 |
| | 10 | 1.25 | 87 | 890 | 64 | 97 | 990 | 72 |
| | 12 | 1.25 | 155 | 1,600 | 116 | 175 | 1,800 | 130 |

# CLUTCH

**REFER TO FOLLOWING REPAIR MANUALS:**

| Manual Name | Pub. No. |
|---|---|
| • Land Cruiser (Station Wagon) Chassis and Body Repair Manual | RM184E |
| • Land Cruiser (Hardtop, Canvas Top and Station Wagon) Chassis and Body Repair Manual Supplement | RM290E |

CL

NOTE: The following pages contain only the points which differ from the above listed manuals.

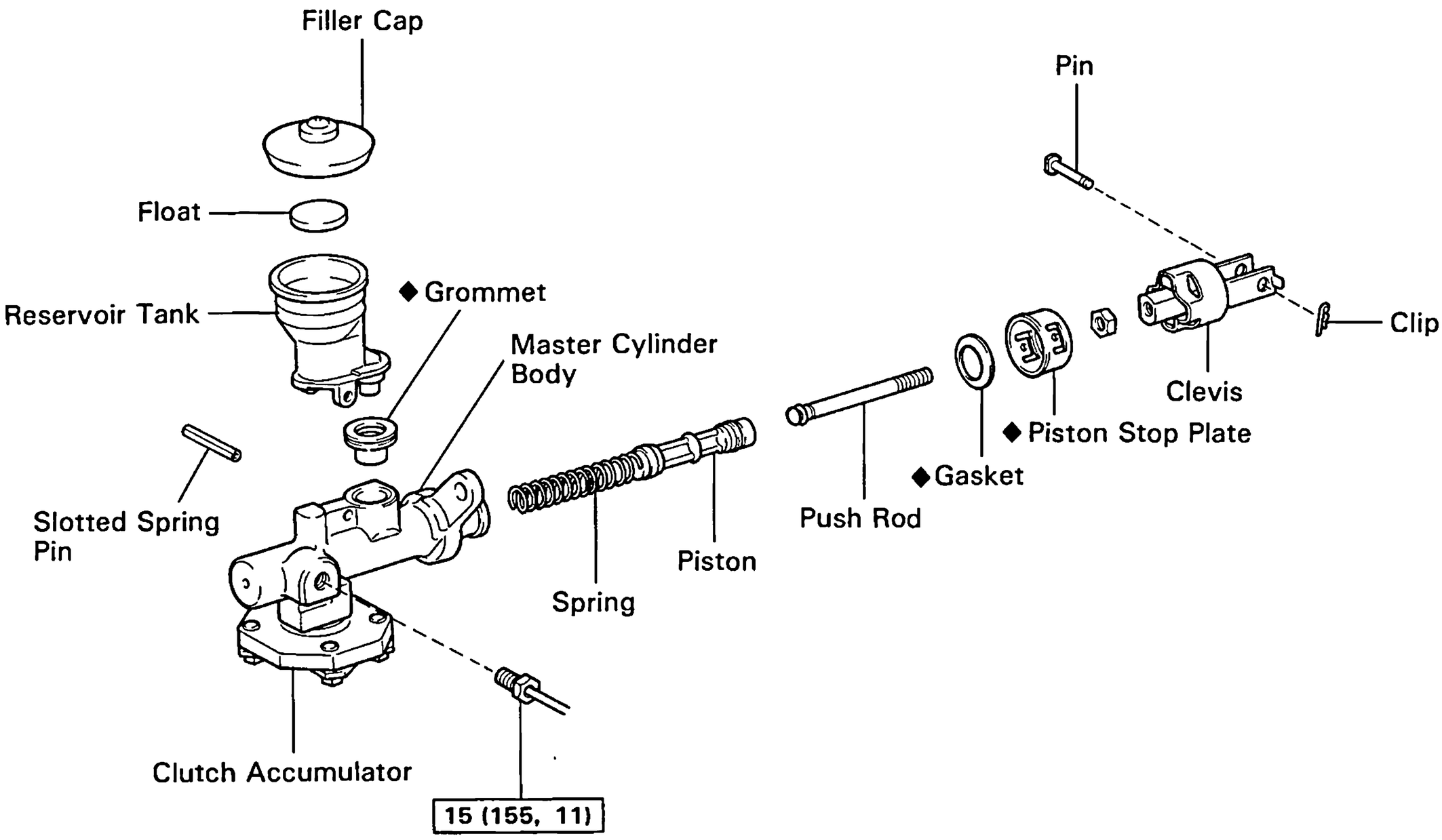
**(STATION WAGON)**

CLUTCH MASTER CYLINDER ..... CL-2

# CLUTCH MASTER CYLINDER

## COMPONENTS

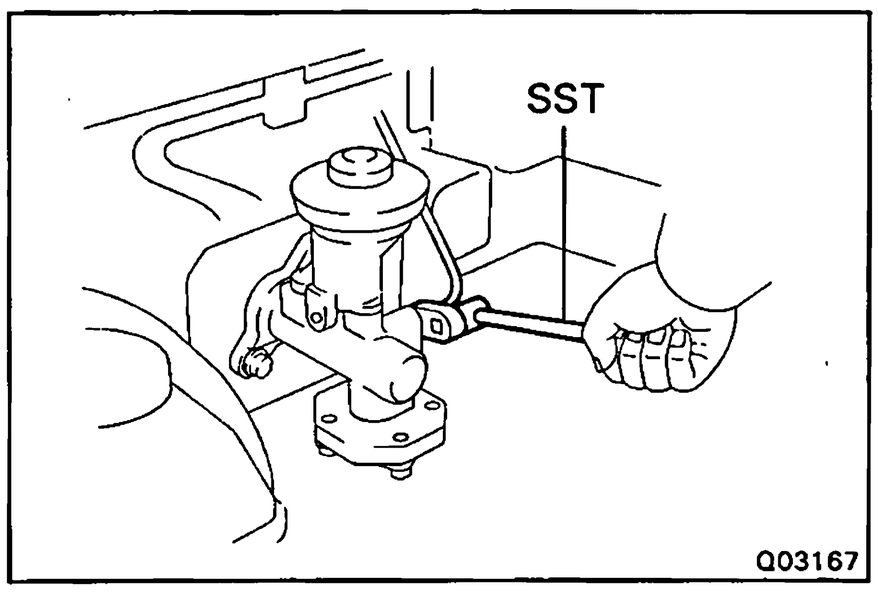
**1FZ–FE Engine**




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

Q03157




Q03167

## CLUTCH MASTER CYLINDER REMOVAL

### REMOVE MASTER CYLINDER

(a) Draw out fluid with syringe.

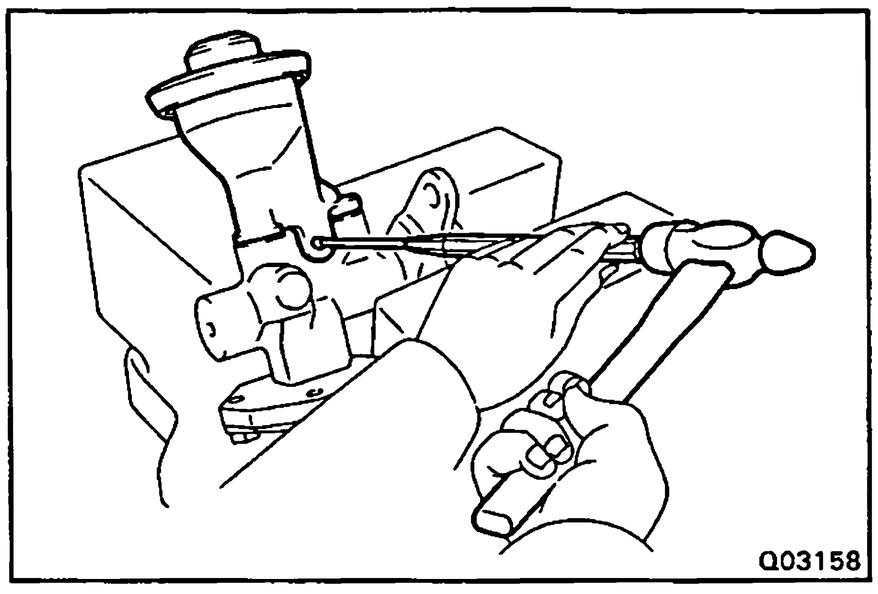
(b) Using SST, disconnect the clutch tube.
SST 09023-00100

(c) Remove the clip, clevis pin and return spring.

(d) Remove the nut from the room side.

(e) Remove the nut from the engine room side.

(f) Pull out the master cylinder.

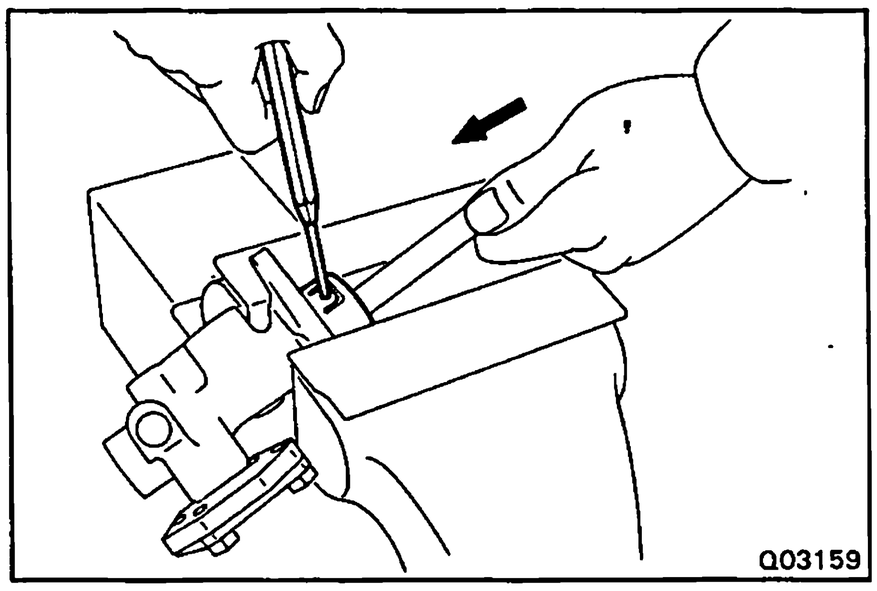



## MASTER CYLINDER DISASSEMBLY

**1. REMOVE RESERVOIR TANK**

(a) Using a pin punch and a hammer, drive out the slotted spring pin.

(b) Remove reservoir tank and grommet.




**2. REMOVE PUSH ROD**

(a) Using a pin punch, loosen the staked part of the plate.

(b) Remove the piston stop plate, gasket and the push rod.

**3. REMOVE PISTON**

## MASTER CYLINDER INSPECTION

HINT: Clean the disassembled parts with compressed air.

**1. INSPECT MASTER CYLINDER BORE FOR SCORING OR CORROSION**

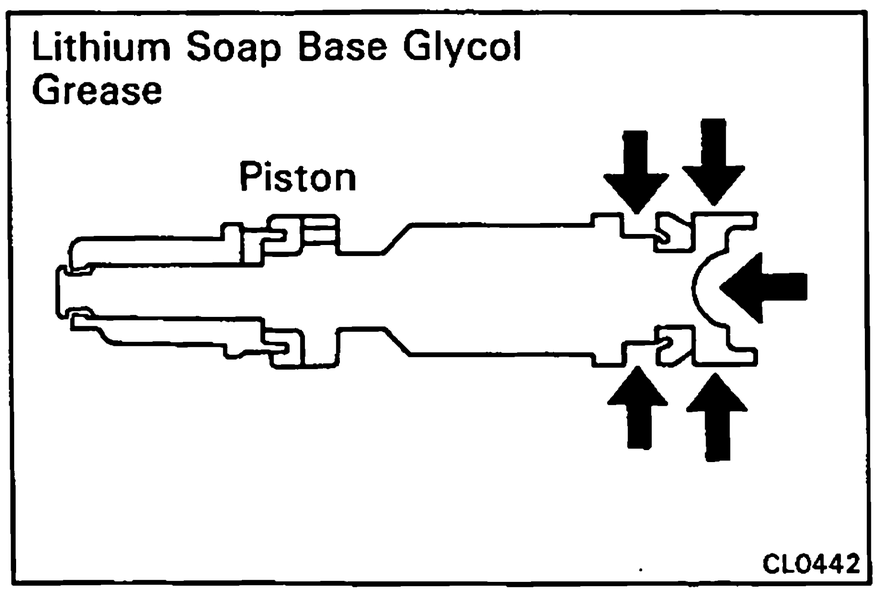
If a problem is found, clean or replace the cylinder.

**2. INSPECT PISTON AND CUPS FOR WEAR, SCORING, CRACKS OR SWELLING**

If either one requires replacement, use the parts from the cylinder kit.

**3. INSPECT PUSH ROD FOR WEAR OR DAMAGE**

If necessary, replace the push rod.

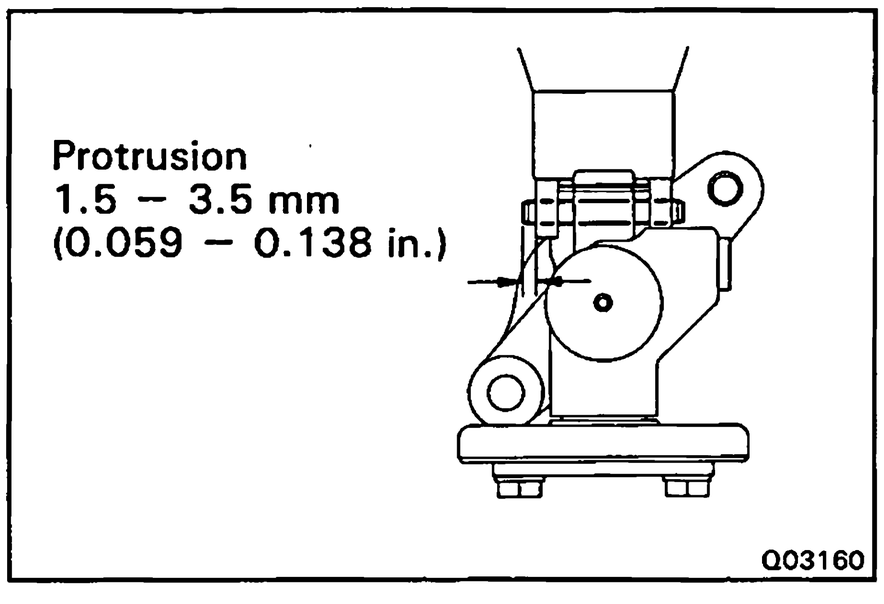



## MASTER CYLINDER ASSEMBLY

**1. COAT PARTS WITH LITHIUM SOAP BASE GLYCOL GREASE AS SHOWN**

**2. INSERT PISTON INTO CYLINDER**

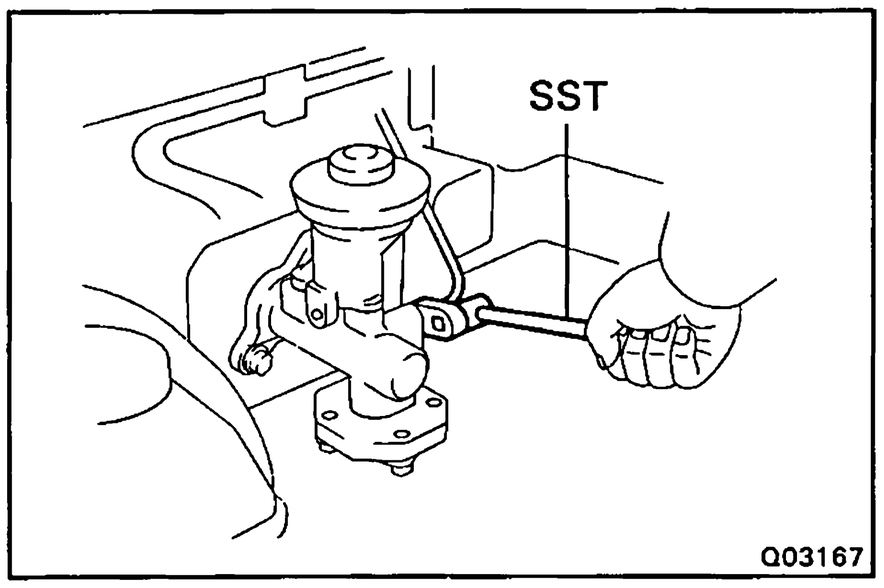
**3. INSTALL PUSH ROD ASSEMBLY WITH NEW STOP PLATE AND NEW GASKET**




**4. INSTALL RESERVOIR TANK**

(a) Install reservoir tank and new grommet.

(b) Using a pin punch and a hammer, drive in the slotted spring pin.




## MASTER CYLINDER INSTALLATION

**1. INSTALL MASTER CYLINDER**

Install the mounting nut, and torque them.

**Torque: 7.8 N·m (80 kgf·cm, 69 in.·lb)**

**2. CONNECT CLUTCH LINE UNION**

Using SST, connect the union.

SST 09023-00100

**3. CONNECT PUSH ROD AND INSTALL PIN**

Install the clip in the push rod pin.

**4. BLEED SYSTEM AND ADJUST CLUTCH PEDAL**

# MANUAL TRANSMISSION

## REFER TO FOLLOWING REPAIR MANUALS:

| Manual Name | Pub. No. |
|---|---|
| • Land Cruiser (Hardtop and Canvas Top) Chassis and Body Repair Manual | RM183E |
| • Land Cruiser (Station Wagon) Chassis and Body Repair Manual | RM184E |
| • Land Cruiser (Hardtop, Canvas Top and Station Wagon) Chassis and Body Repair Manual Supplement | RM290E |

NOTE: The following pages contain only the points which differ from the above listed manuals.

**(HARDTOP & CANVAS TOP)**
DESCRIPTION ..... MT-2
PREPARATION ..... MT-3
TRANSMISSION REMOVAL AND INSTALLATION ..... MT-4
OUTPUT SHAFT ..... MT-13
SERVICE SPECIFICATIONS ..... MT-24
**(STATION WAGON)**
DESCRIPTION ..... MT-26
PREPARATION ..... MT-27
OUTPUT SHAFT ..... MT-28
SERVICE SPECIFICATIONS ..... MT-40

MT

# DESCRIPTION

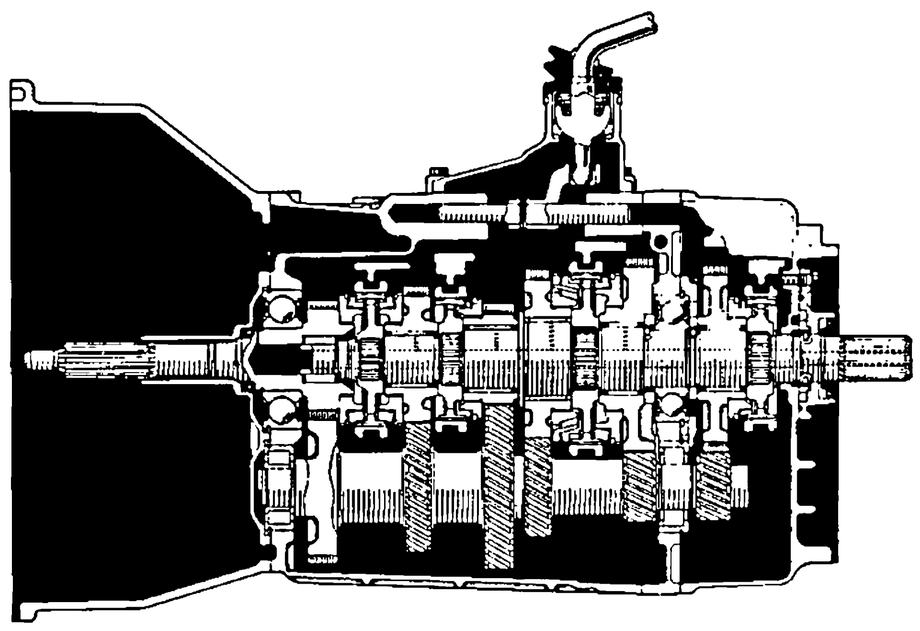
## PRECAUTIONS

When working with FIPG material, you must be observe the following.

- Using a razor blade and gasket scraper, remove all the old sealant (FIPG) material from the gasket surfaces.
- Throughly clean all components to remove all the loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply the sealant in approx. 1 mm (0.04 in.) bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the sealant (FIPG) material must be removed and reapplied.

## DESCRIPTION

- Transaxle type H150F and H151F are constant mesh synchronizers for forward gears, and a sliding mesh reverse gear.
- A triple - cone type synchromesh mechanism is used in the second gear to improve the shift feeling characteristics. This helps to reduce the shifting effort, provide smoothly shifting.
- The input shaft is composed of the 1st and 2nd speed gears and the reverse drive gear, and the output shaft is composed of the drive gear (for use with the ring gear).

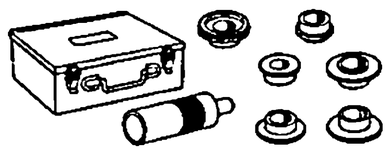
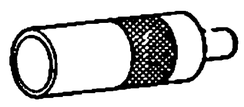
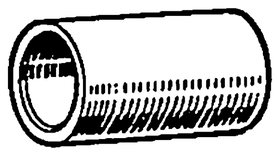
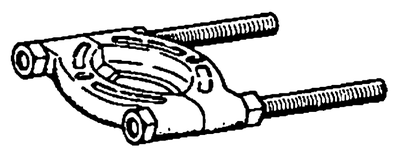


Q03143

| Type of Transmission | | H150F | H151F |
|---|---|---|---|
| Type of Engine | | 1FZ-F, 1FZ-FE | |
| Gear Ratio | 1st | 4.529 | 4.081 |
| | 2nd | 2.464 | 2.294 |
| | 3rd | 1.490 | ← |
| | 4th | 1.000 | ← |
| | 5th | 0.881 | ← |
| | Reverse | 4.313 | ← |
| Oil Capacity | | 2.7 liters (2.6 US qts, 3.1 Imp. qts) | |
| Oil Vicosity | | SAE 75W-90 | |
| Oil Grade | | API GL-4 or GL-5 | |

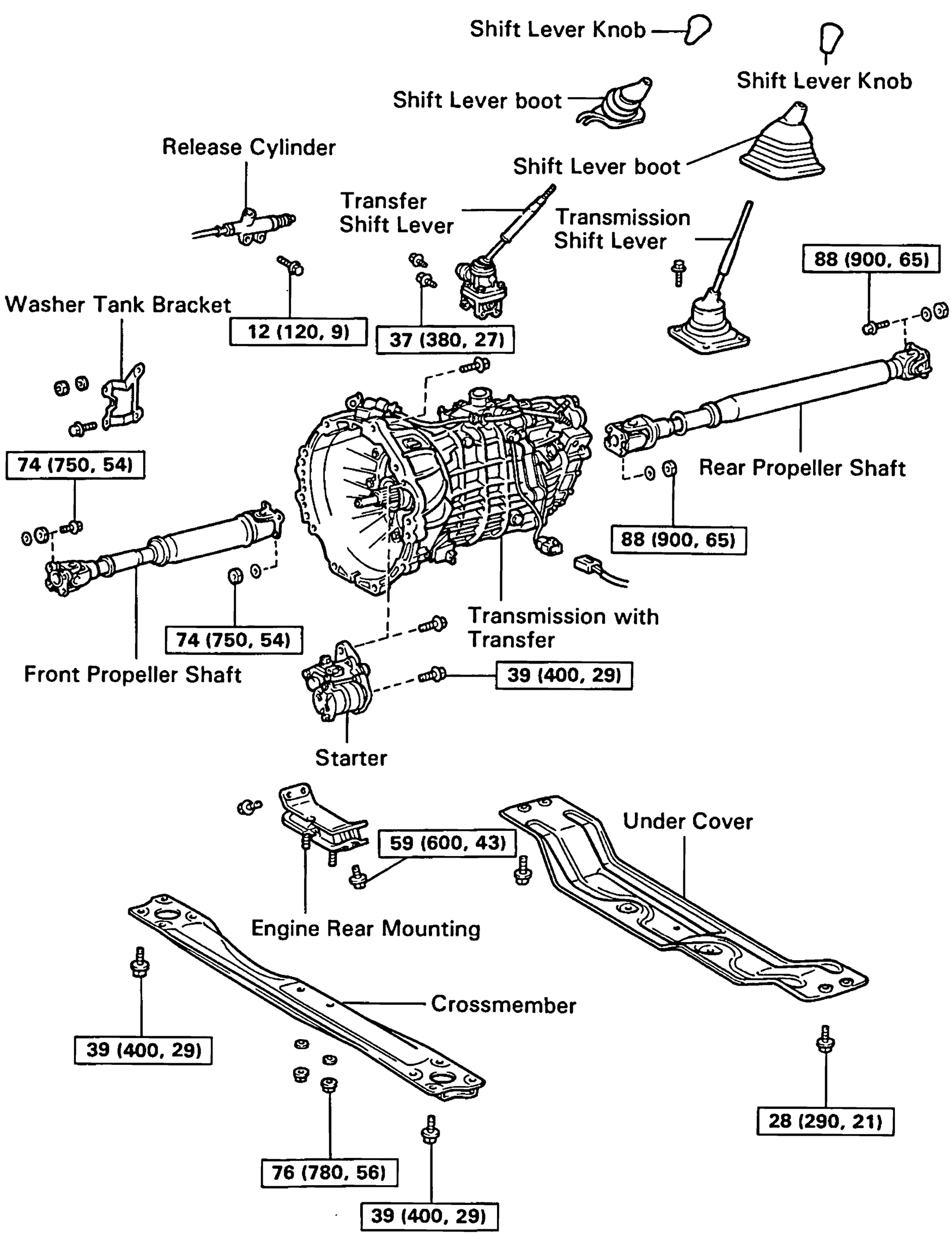
# PREPARATION

## SST (SPECIAL SERVICE TOOLS)

| | | | |
|---|---|---|---|
|  | **09316-60010** | Transmission & Transfer Bearing Replacer | |
|  | **(09316-00010)** | Replacer Pipe | |
|  | **09523-36010** | Rear Axle Hub Guide Tool | Output shaft rear ball bearing |
|  | **09555-55010** | Differential Drive Pinion Bearing Replacer | |
|  | **09950-00020** | Bearing Remover | |

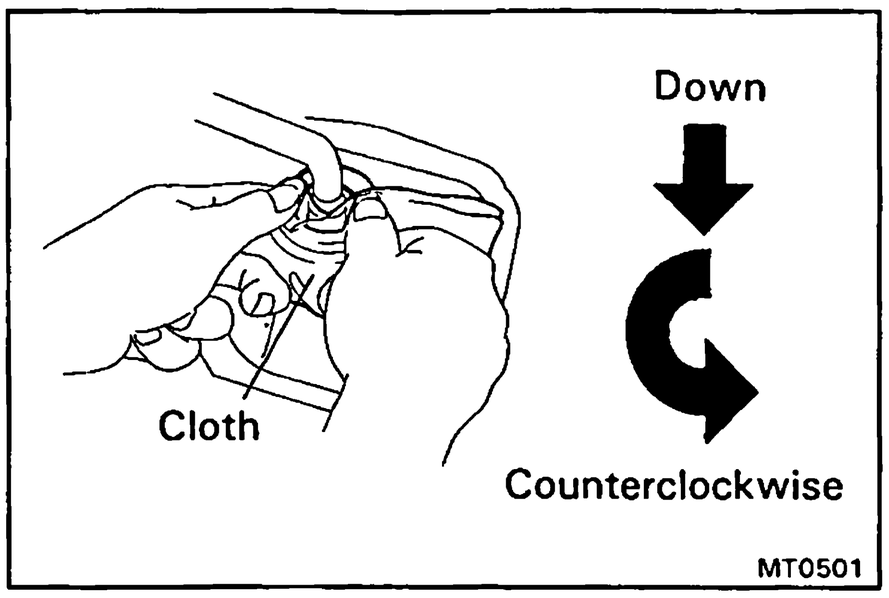
# TRANSMISSION REMOVAL AND INSTALLATION

## COMPONENTS




Q03129

N·m (kgf·cm, ft·lbf) : Specified torque




# TRANSMISSION REMOVAL

**1. DISCONNECT BATTERY CABLE FROM NEGATIVE TERMINAL**

**2. REMOVE TRANSMISSION SHIFT LEVER FROM INSIDE OF VEHICLE**

(a) Remove the transmission shift lever knob.

(b) Remove the four screws and remove the shift lever boot retainer.

(c) Pull up the shift lever boot.

(d) Cover the shift lever cap with cloth.

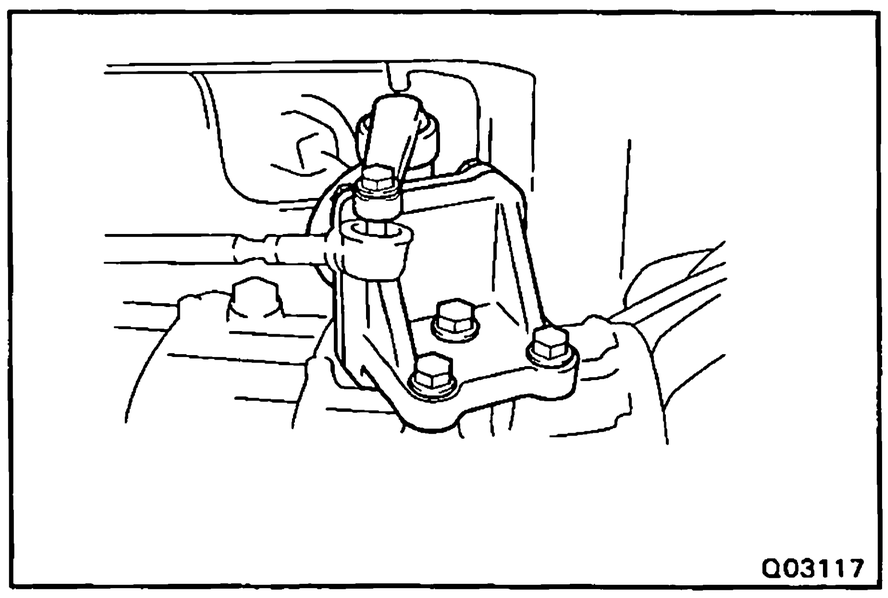
(e) Then, pressing down on the shift lever cap, rotate it countercrockwise to remove.

(f) Remove the shift lever.

**3. REMOVE TRANSFER SHIFT LEVER**

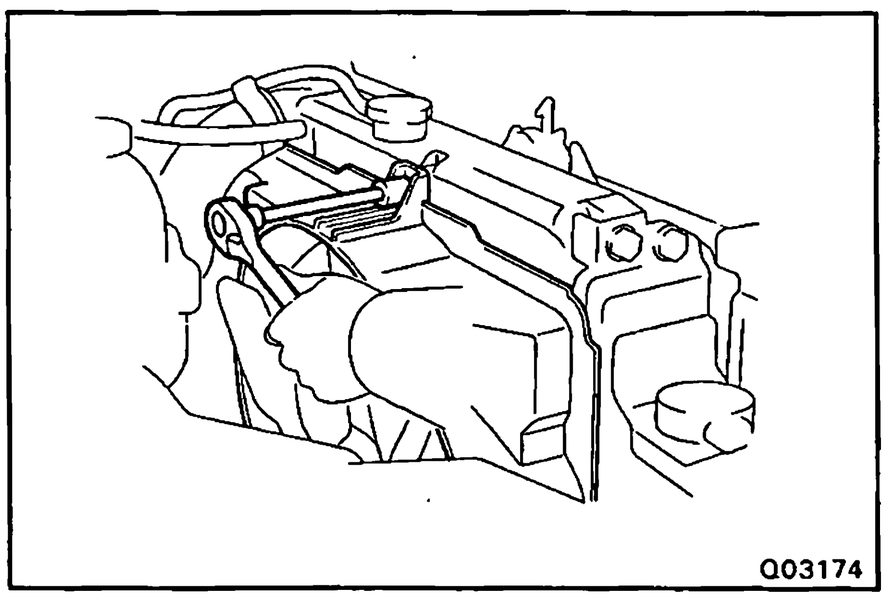
(a) Remove the transfer shift lever knob.

(b) Remove the four screws and remove the boot.




(c) Remove the nut and washer and the link.

(d) Remove the three bolts and the transfer shift lever.

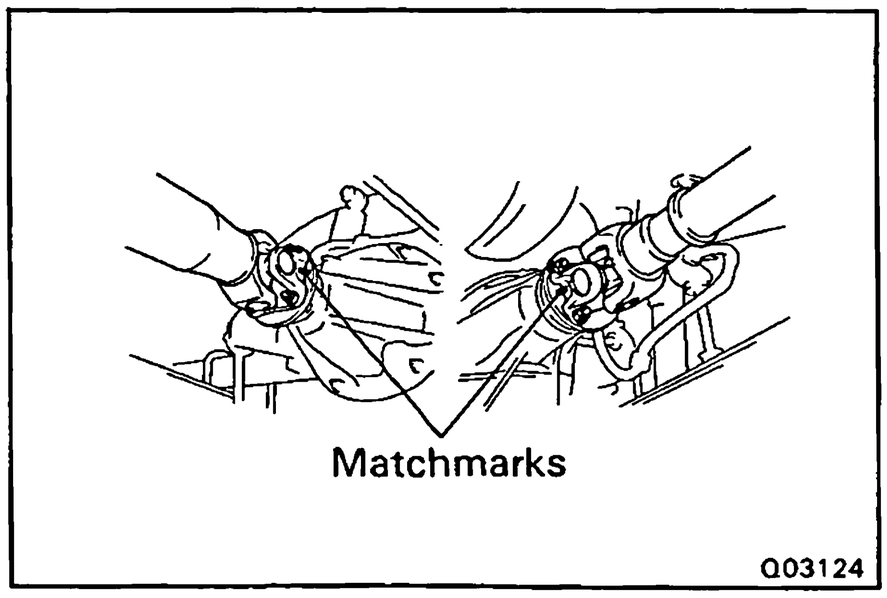



**4. LOOSEN FAN SHROUD OF COOLING FAN TO AVOID DAMAGE TO FAN**

**5. RAISE VEHICLE AND DRAIN TRANSMISSION OIL**

**NOTICE: Be sure the vehicle is securely supported.**

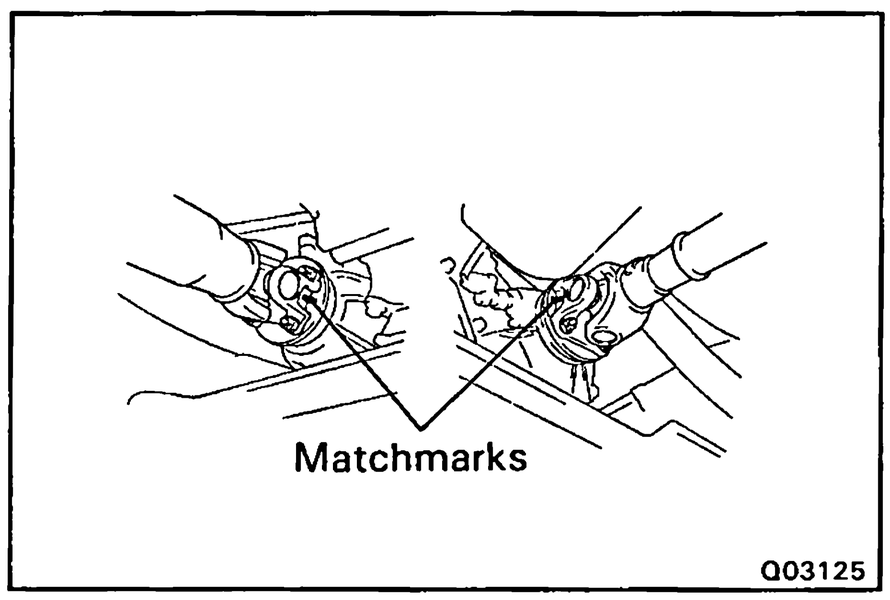
**6. REMOVE TRANSFER UNDER COVER**




**7. DISCONNECT FRONT AND REAR PROPELLER SHAFT FLANGES FROM COMPANION FLANGE ON DIFFERENTIAL**

(a) Put matchmarks on the flanges.

(b) Remove the four bolts and nuts.

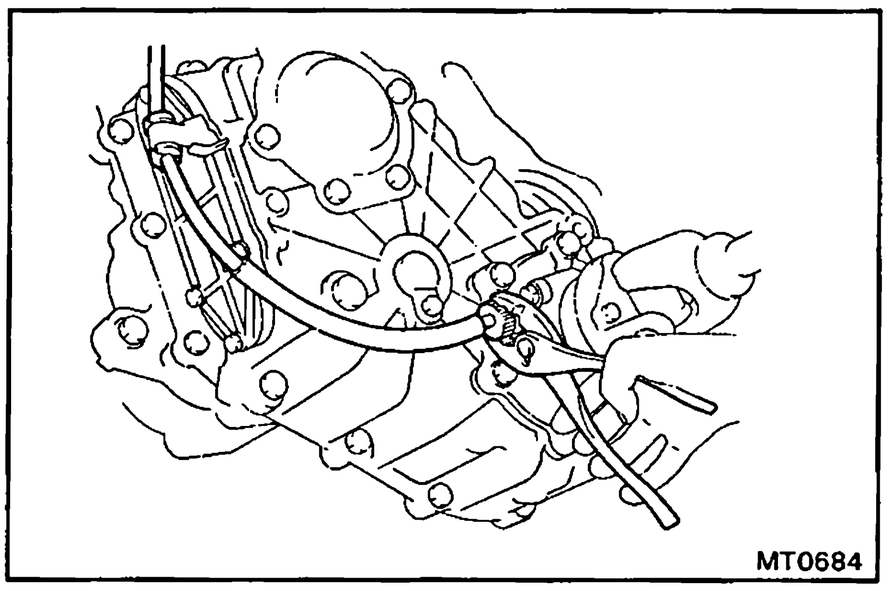



**8. DISCONNECT FRONT AND REAR PROPELLER SHAFT FLANGES FROM COMPANION FLANGE ON TRANSFER**

(a) Put matchmarks on the flange.

(b) Remove the four nuts.

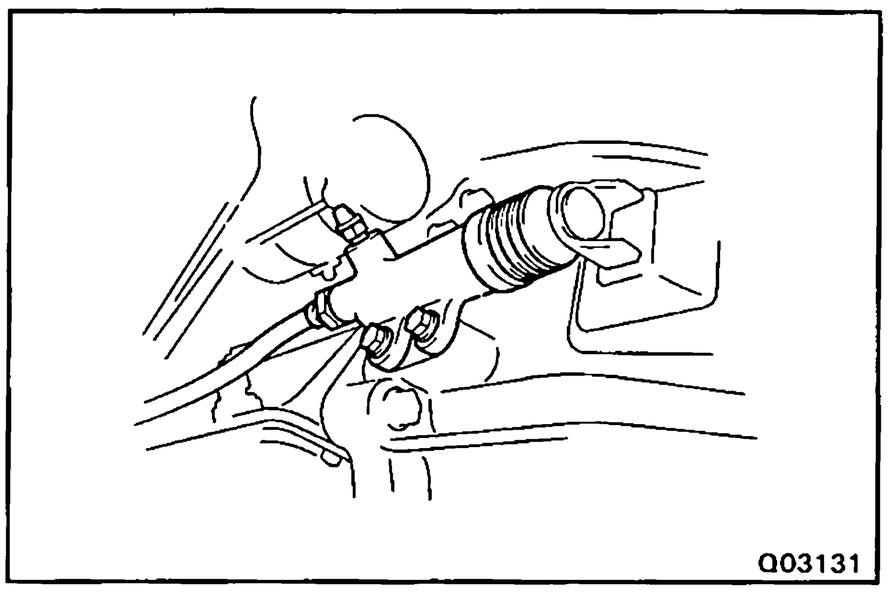
(c) Remove the propeller shaft.




**9. REMOVE SPEEDOMETER CABLE**

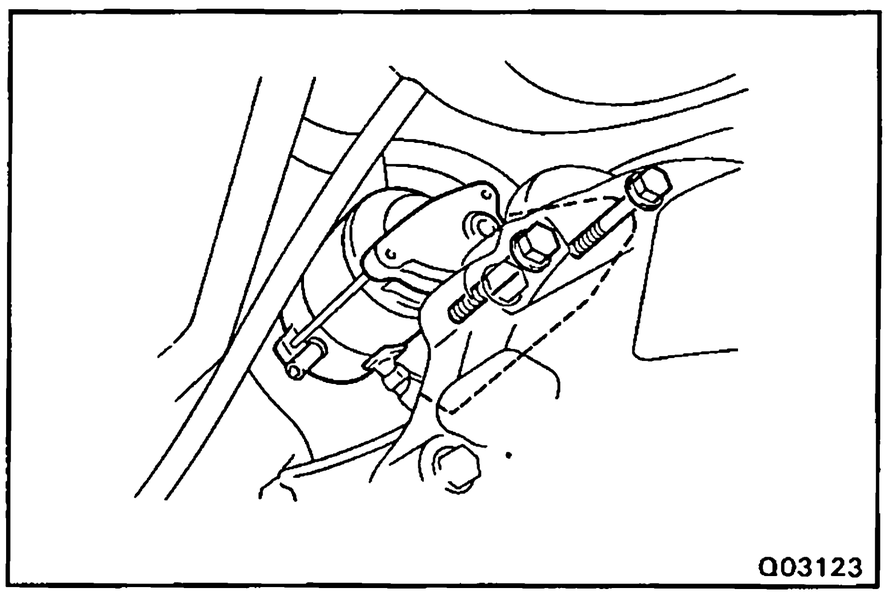
Using pliers, remove the speedometer cable.

**10. DISCONNECT BACK-UP LIGHT SWITCH CONNECTOR**




**11. REMOVE CLUTCH RELEASE CYLINDER**

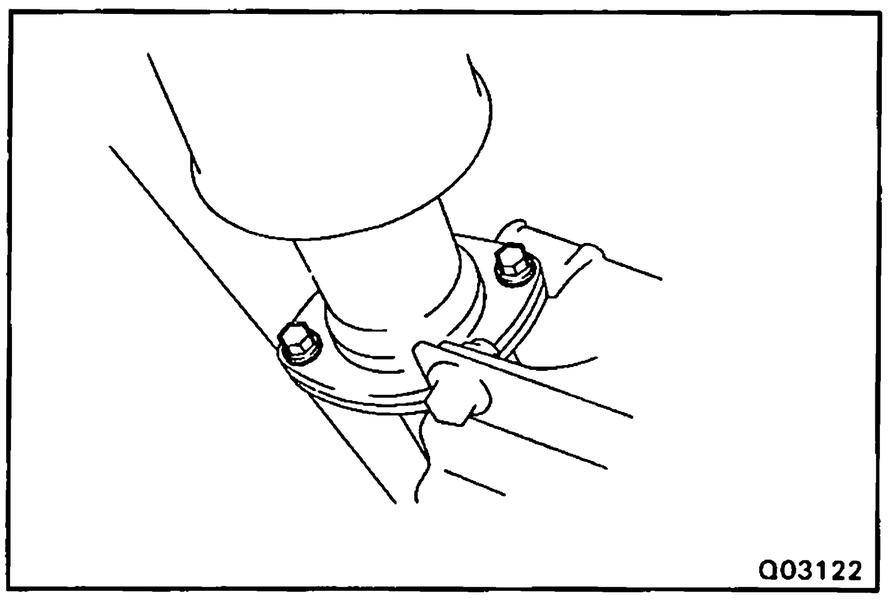
Remove the two bolts and release cylinder.




**12. REMOVE STARTER**

(a) Disconnect the connector and wire from the starter.

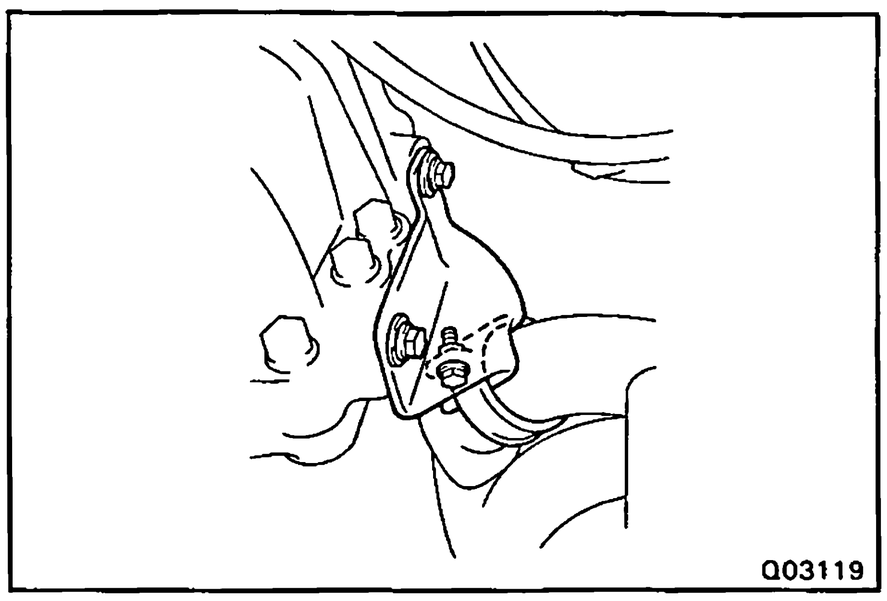
(b) Remove the two bolts and starter.




**13. REMOVE FRONT EXHAUST PIPE**

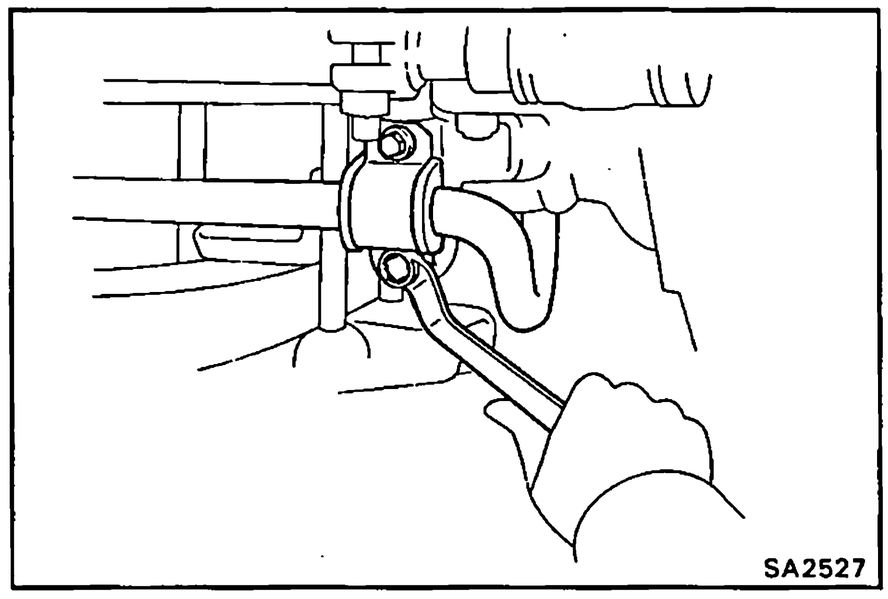
(a) Disconnect the oxygen sensor connector.

(b) Remove the two bolts, bracket and a gasket.


Q03119

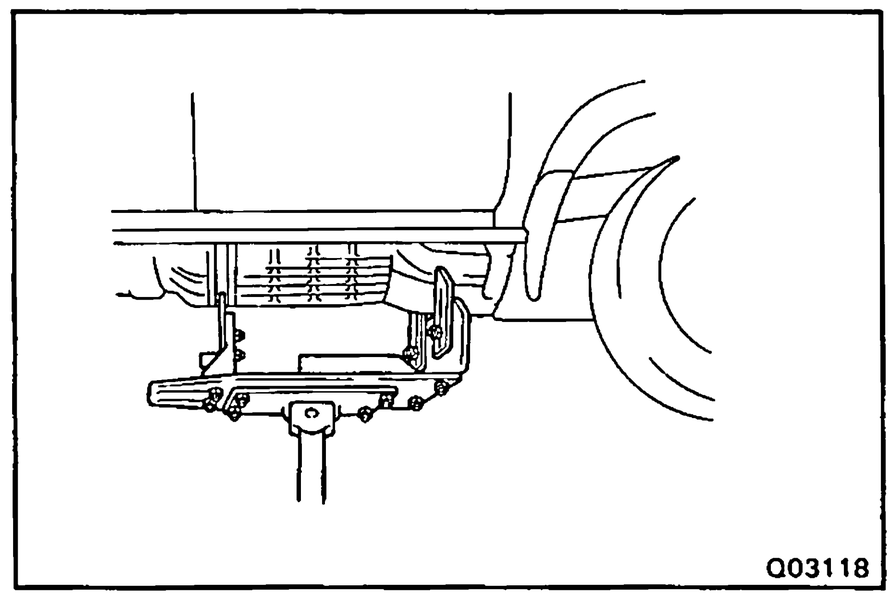
(c) Remove the exhaust pipe clamp from the bracket.

(d) Remove the two bolts and exhaust pipe bracket from the clutch housing.


SA2527

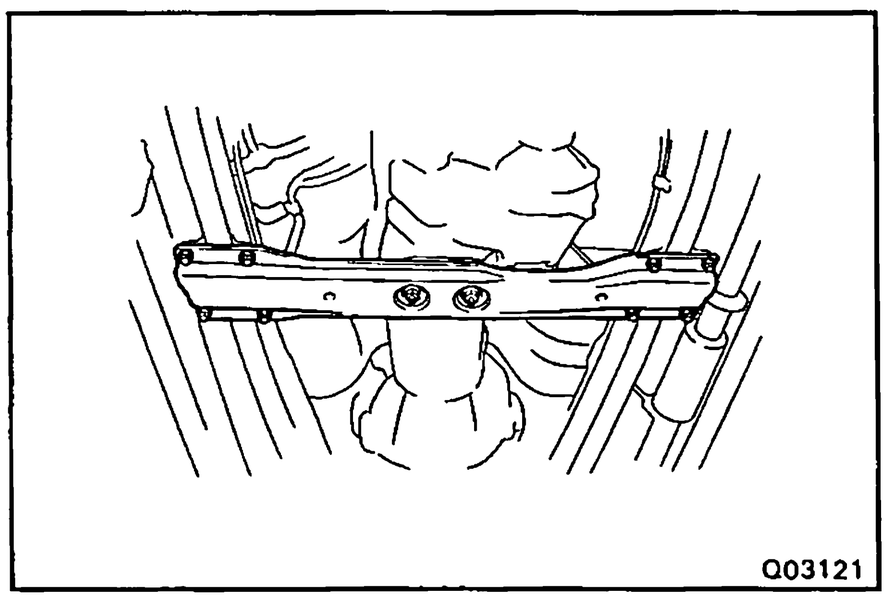
**14. REMOVE STABILIZER BRAKET SET BOLTS**

Remove four stabilizer bracket set bolts.


Q03118

**15. SUPPORT TRANSMISSION**

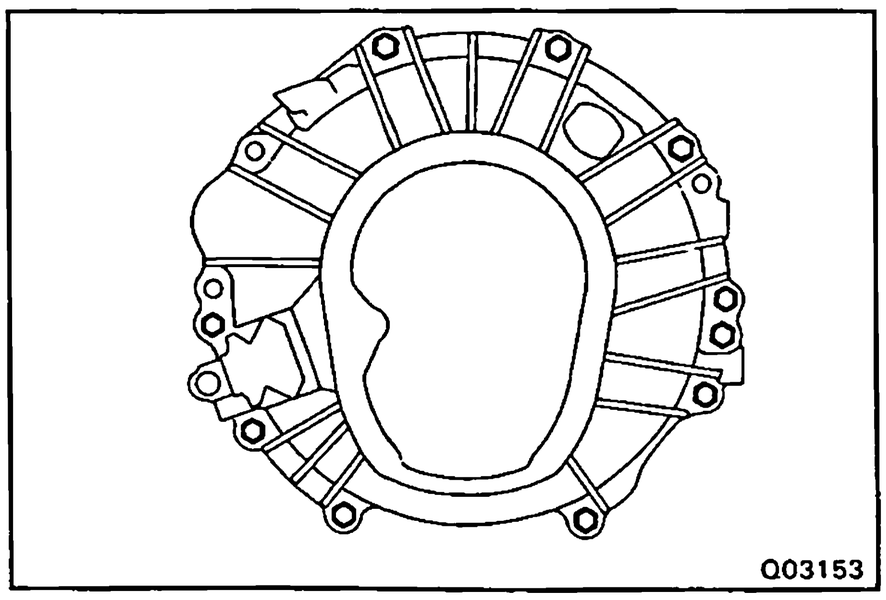
Remove the transmission enough to remove the weight from the rear support.


Q03121

**16. REMOVE CROSSMEMBER**

(a) Raise the transmission slightly with a jack.

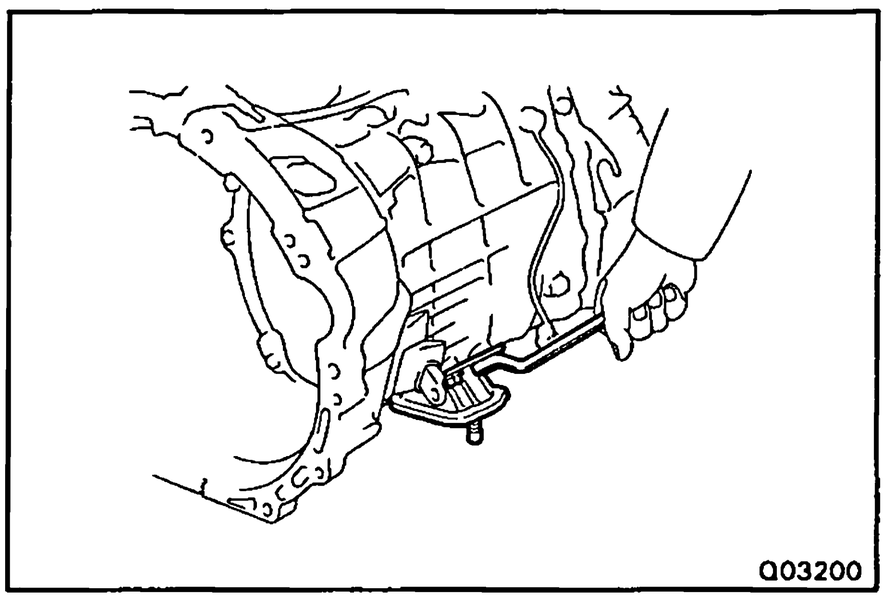
(b) Remove the eight bolts, two nuts and crossmember.


Q03153

**17. REMOVE TRANSMISSION**

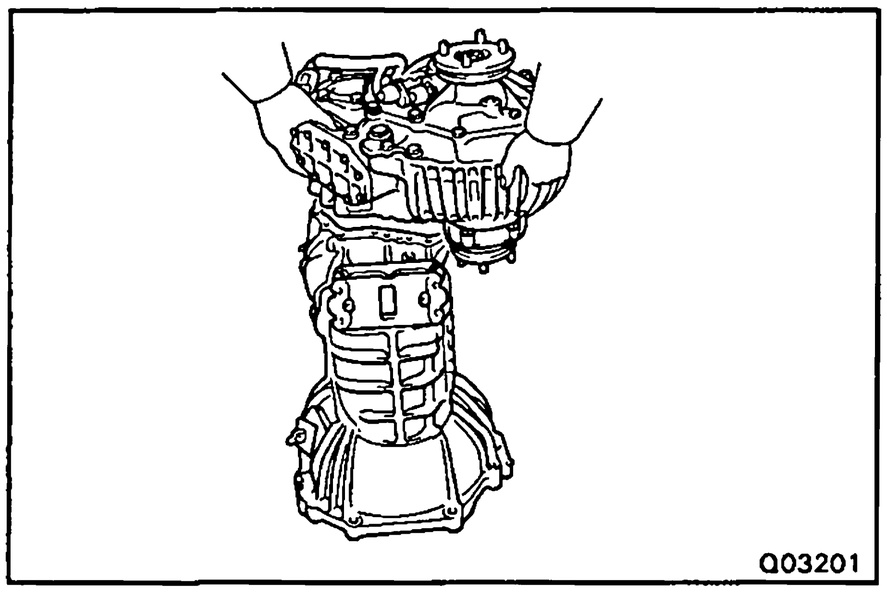
(a) Remove the transmission mounting bolts from the engine.

(b) Pull out the transmission down and toward the rear.


Q03200

### 18. REMOVE ENGINE REAR MOUNTING

Remove the four bolts and engine rear mounting from the transmission.

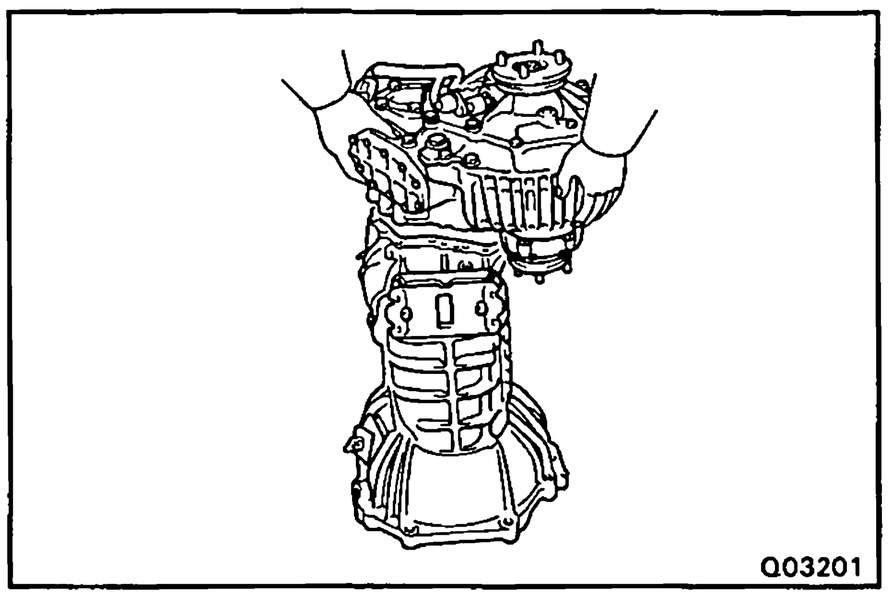

Q03201

### 19. REMOVE TRANSFER FROM TRANSMISSION

(a) Remove the transfer adaptor rear mounting bolts.

(b) Pull the transfer straight up and remove it from the transmission.

HINT: Take care not to damage the adaptor rear oil seal with the transfer input gear spline.


Q03201

## TRANSMISSION INSTALLATION (See page MT-4)

**1. INSTALL TRANSFER TO TRANSMISSION**

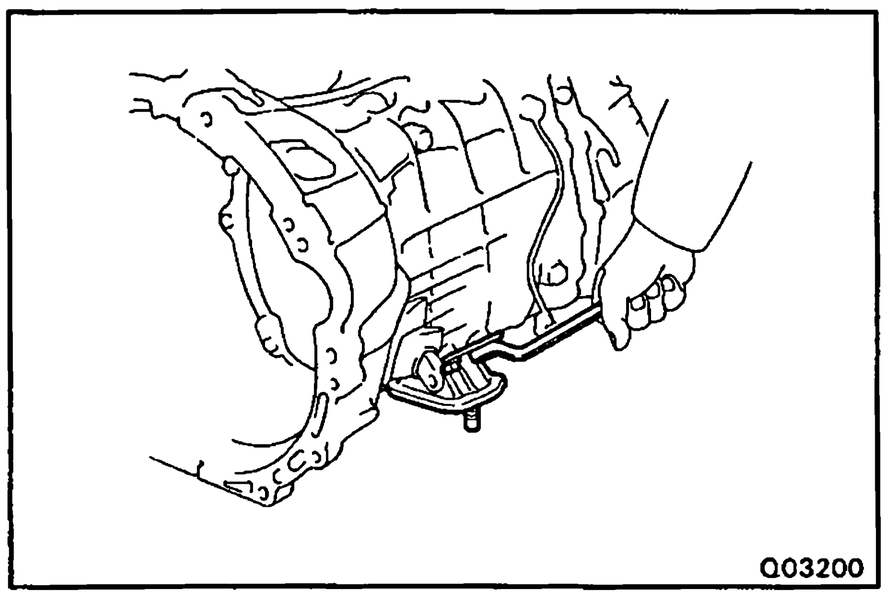
(a) Apply MP grease to the adaptor oil seal.

(b) Install the transfer to the transmission.

HINT: Take care not to damage the oil seal by the input gear spline when installing the transfer.

(c) Install and torque the bolts.

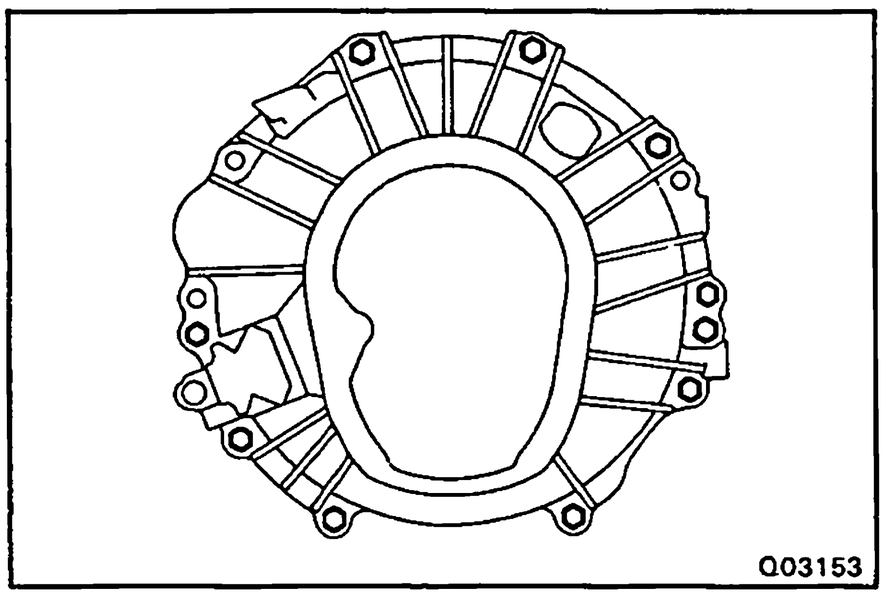
**Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)**


Q03200

**2. INSTALL ENGINE REAR MOUNTING**

Install the engine rear mounting and torque the four bolts.

**Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)**

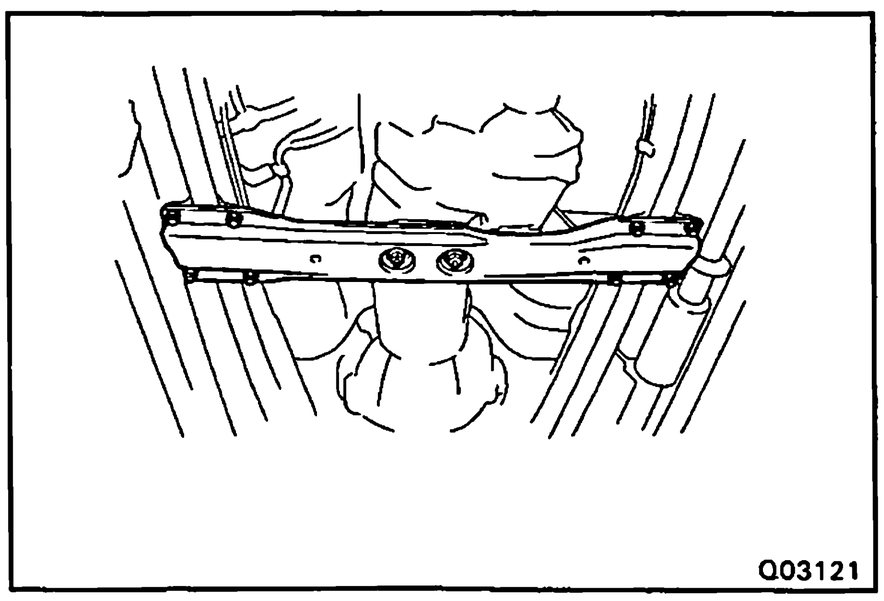

Q03153

**3. INSTALL TRANSMISSION TO ENGINE**

(a) Align the input shaft spline with the clutch disc and install the transmission to the engine.

(b) Install and torque the ten bolts.

**Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)**


Q03121

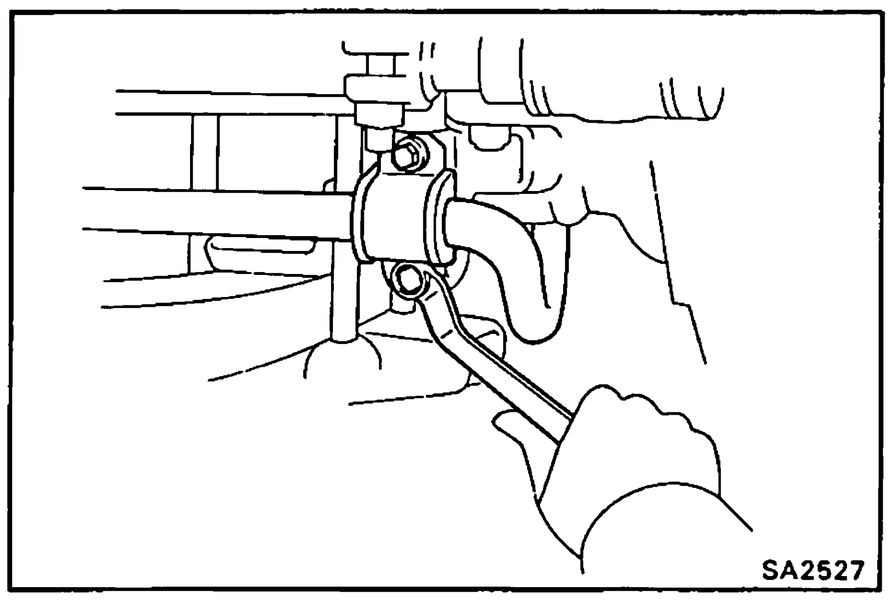
**4. INSTALL CROSSMEMBER**

(a) Raise the transmission slightly with a jack.

(b) Install the crossmember with eight bolts and two nuts.

**Torque: BOLT 39 N·m (400 kgf·cm, 29 ft·lbf)**
**NUT 76 N·m (780 kgf·cm, 56 ft·lbf)**

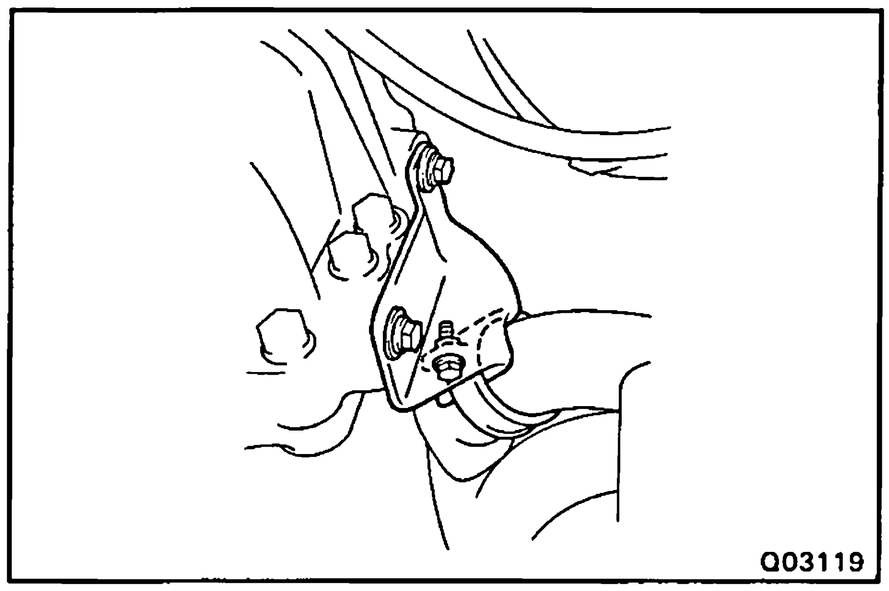
(c) Remove the jack.




**5. INSTALL STABILIZER BRACKET SET BOLTS**

Install the stabirizer bracket with four bolts.

**Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)**



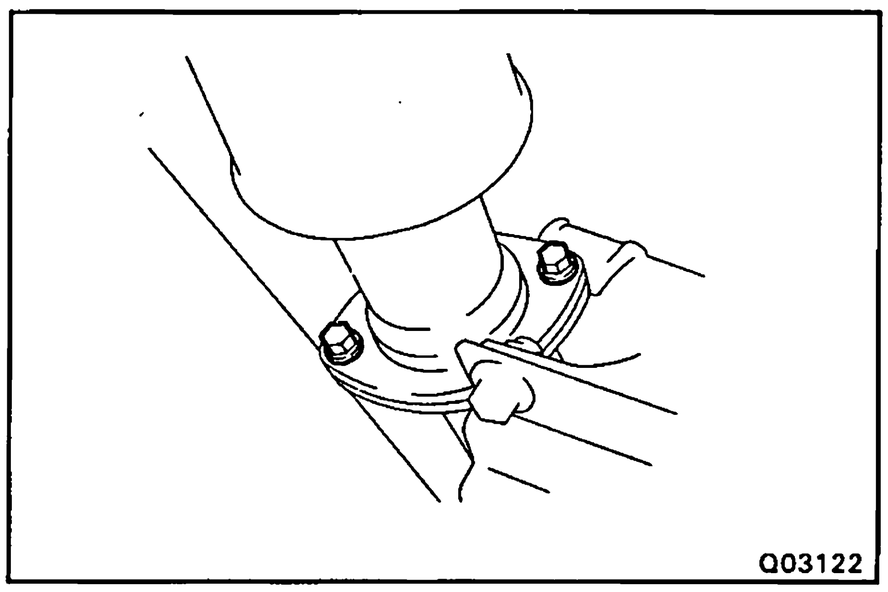

**6. INSTALL FRONT EXHAUST PIPE**

(a) Install the exhaust pipe bracket and two bolts to the clutch housing.

**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

(b) Install the exhaust pipe clamp.

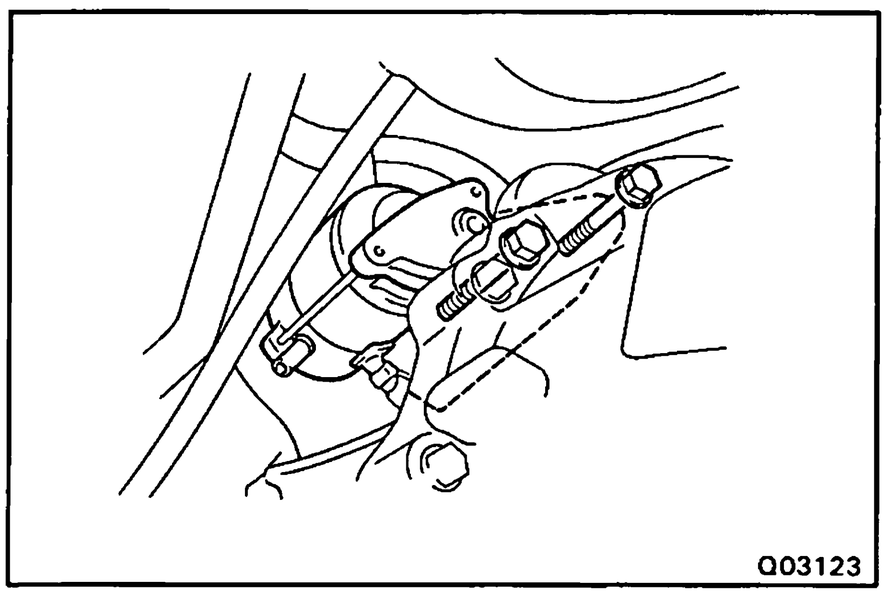
**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**




(c) Install a new gasket, bracket and torque the two bolts.

**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

(d) Connect the oxygen sensor connector.

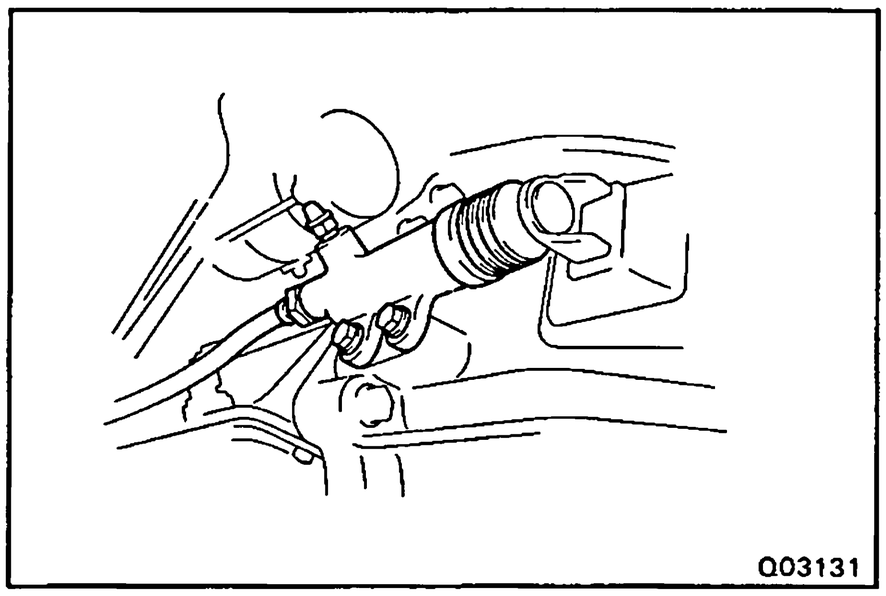



**7. INSTALL STARTER**

(a) Install the starter with two bolts.

**Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)**

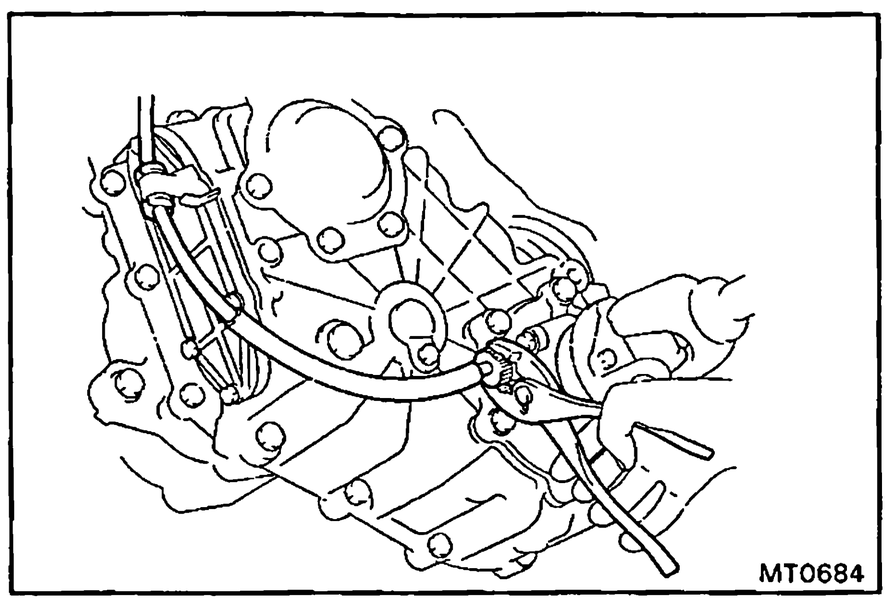
(b) Connect the connector and wire to the starter.




**8. INSTALL CLUTCH RELEASE CYLINDER**

Install the clutch release cylinder with two bolts.

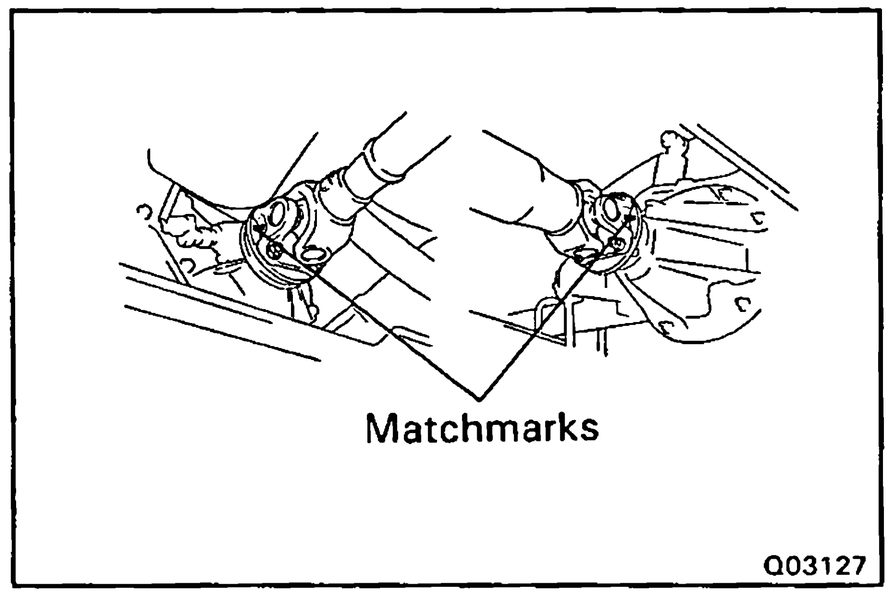
**Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)**


MT0684

**9. INSTALL SPEEDOMETER CABLE**

Using pliers, install the speedometer cable.

**10. CONNECT BACK-UP LIGHT SWITCH CONNECTOR**


Matchmarks
Q03127

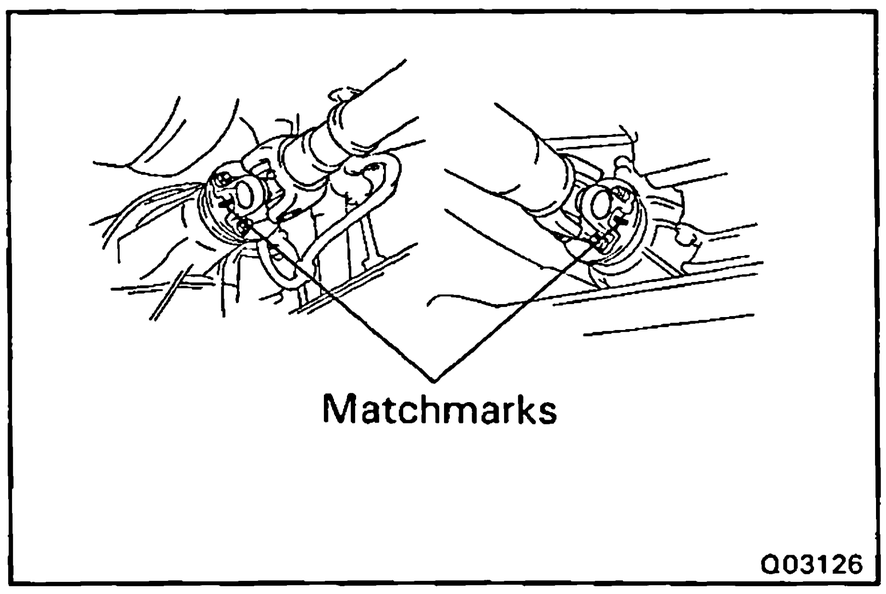
**11. CONNECT PROPELLER SHAFT FLANGE TO COMPANION FLANGE ON TRANSFER**

(a) Align the matchmarks on the flanges and connect the flanges with four nuts.

(b) Torque the nuts.

**Torque:**
**Front Propeller Shaft**
**74 N·m (750 kgf·cm, 54 ft·lb)**
**Rear Propeller Shaft**
**88 N·m (900 kgf·cm, 65 ft·lb)**

HINT: When installing the washers, put them properly in place.


Matchmarks
Q03126

**12. CONNECT PROPELLER SHAFT FLANGE ON DIFFERENTIAL**

(a) Align the matchmarks on the flanges and connect the flanges with four bolts and nuts.

(b) Torque the bolts and nuts.

**Torque:**
**Front Propeller Shaft**
**74 N·m (750 kgf·cm, 54 ft·lb)**
**Rear Propeller Shaft**
**88 N·m (900 kgf·cm, 65 ft·lb)**

HINT: When installing the washers, put them properly in place.

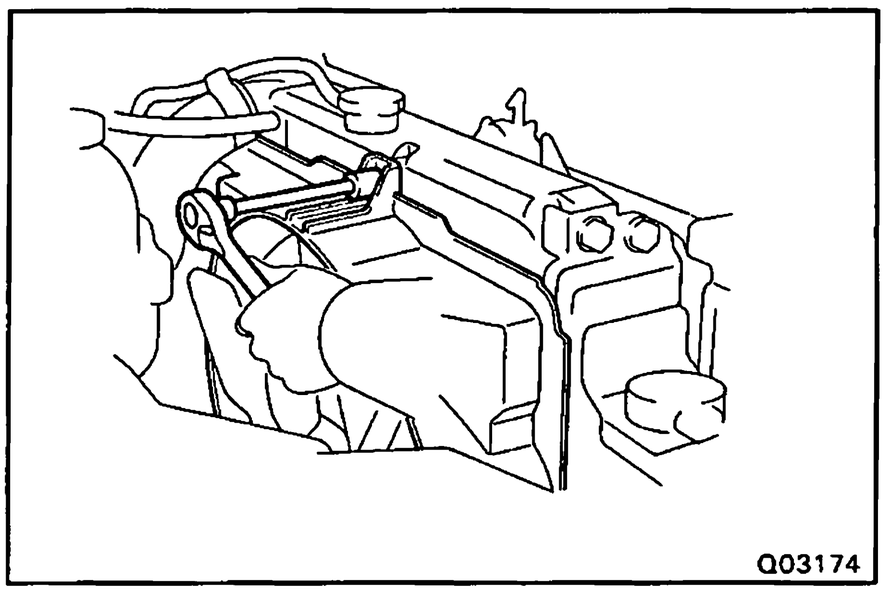
**13. INSTALL TRANSFER UNDER COVER**

**14. FILL TRANSMISSION WITH GEAR OIL**

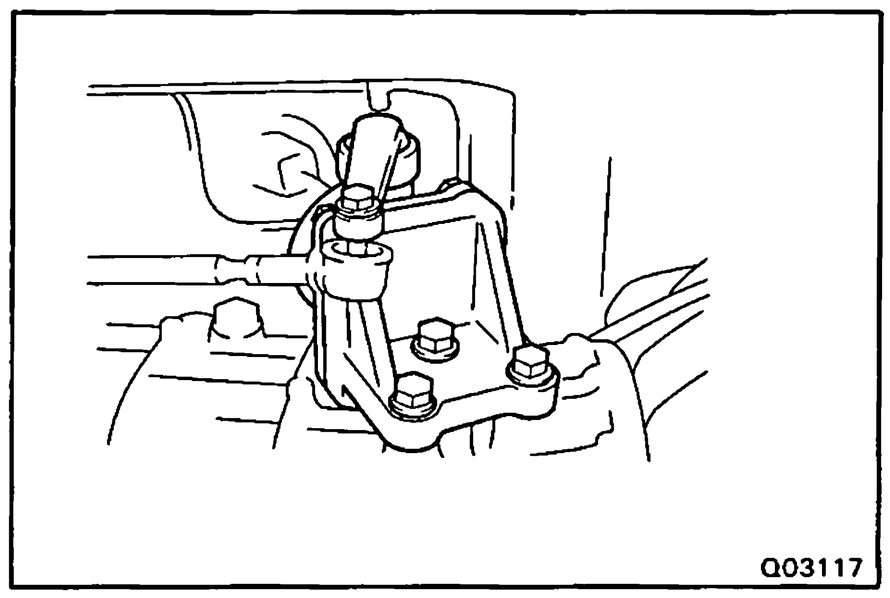
**Oil grade:**
**API GL — 4 or GL — 5**

**Viscosity:**
**SAE 75W — 90**

**Capacity:**
**2.7 liters (2.6 US qts, 3.1 Imp.qts)**

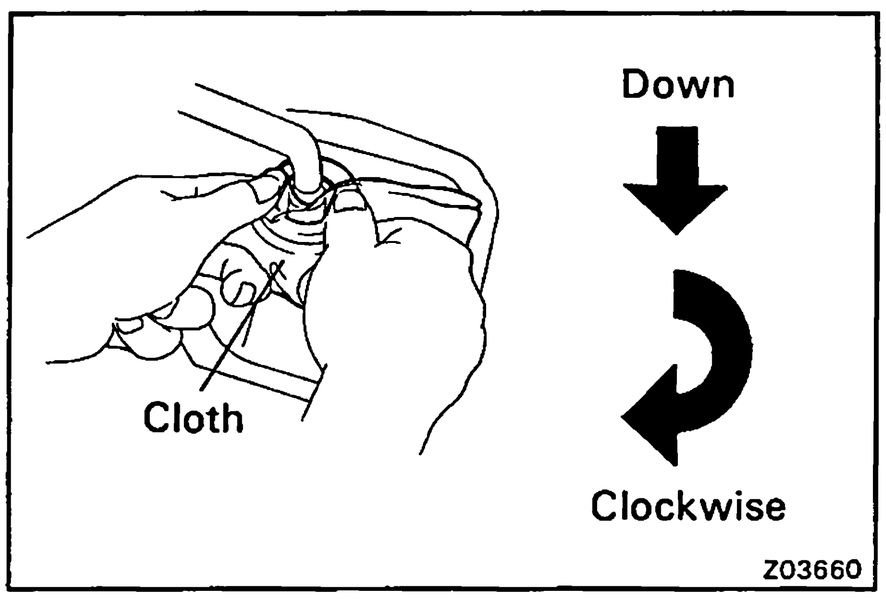

Q03174

**15. TIGHTEN FAN SHROUD**


Q03117

**16. INSTALL TRANSFER SHIFT LEVER**

(a) Install the link with the washer and nut.
(b) Install the transfer shift lever and the three bolts.
(c) Install the boot and four screws.
(d) Install the transfer shift lever knob.



Z03660

**17. INSTALL TRANSMISSION SHIFT LEVER**

(a) Apply MP grease to the transmission shift lever.
(b) Align the groove of the shift lever cap and the pin part of the case cover.
(c) Cover the shift lever cap with a cloth.
(d) Then, pressing down on the shift lever cap, rotate it clockwise to install.
(e) Install the shift lever boot.
(f) Install the transmission shift lever knob.

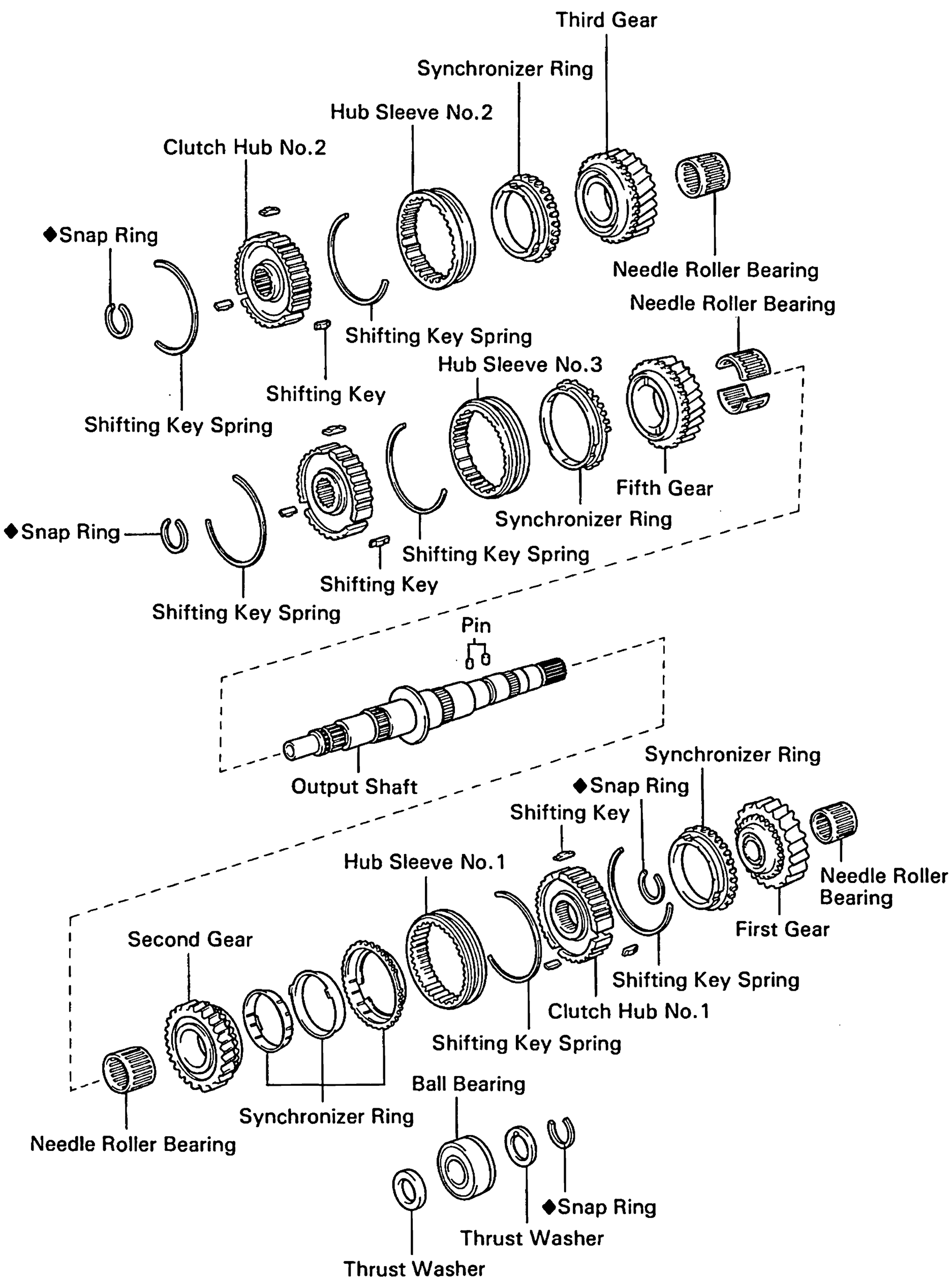
**18. INSTALL NEGATIVE BATTERY CABLE**

**19. PERFORM ROAD TEST**

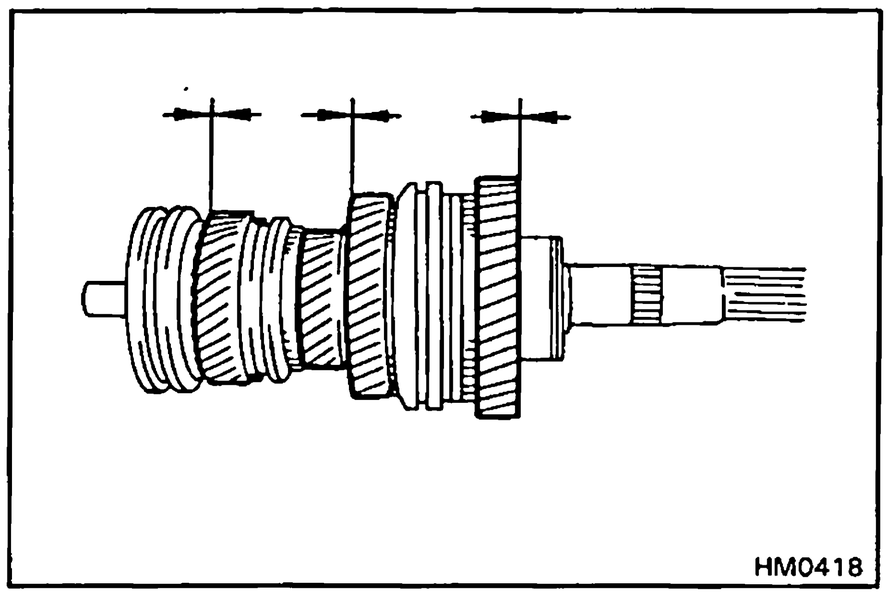
Check for abnormal noise and smooth shifting.

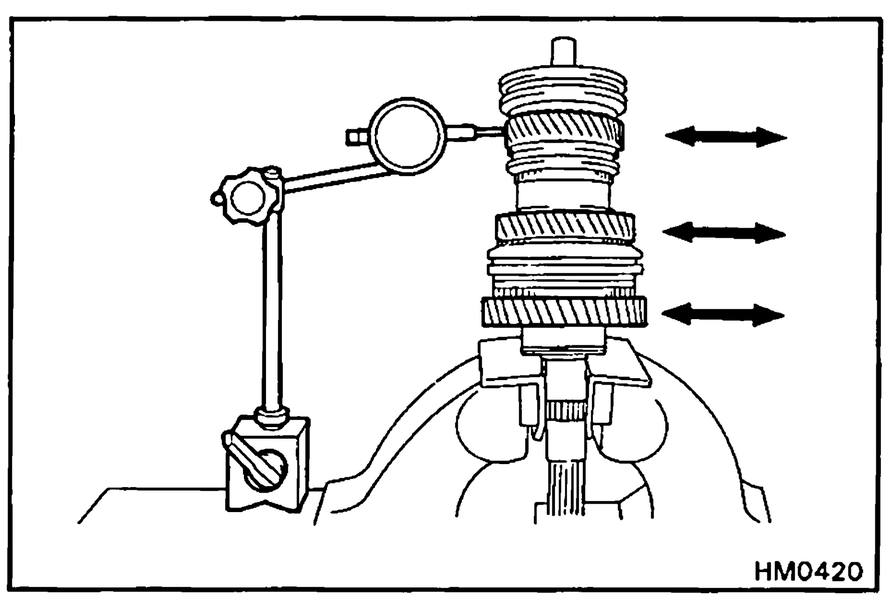
# OUTPUT SHAFT

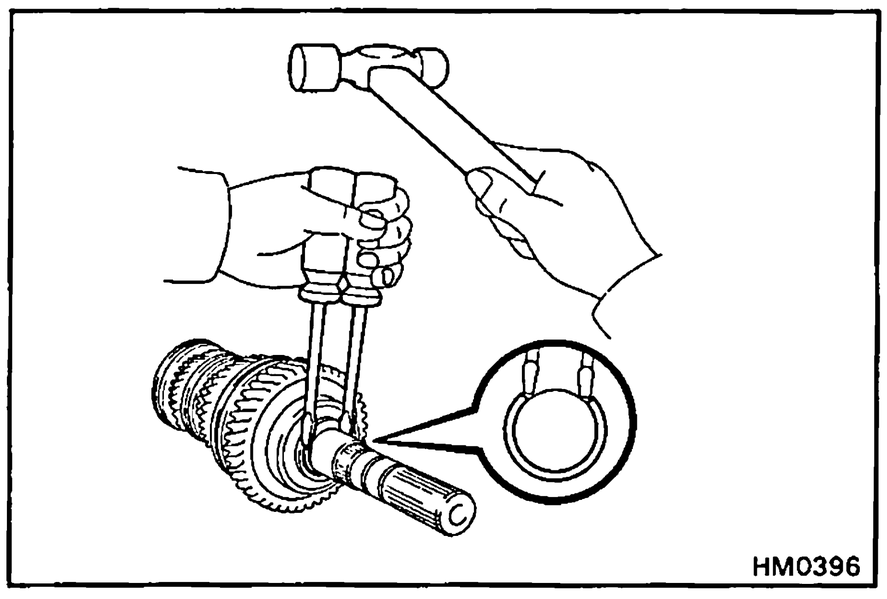
## COMPONENTS

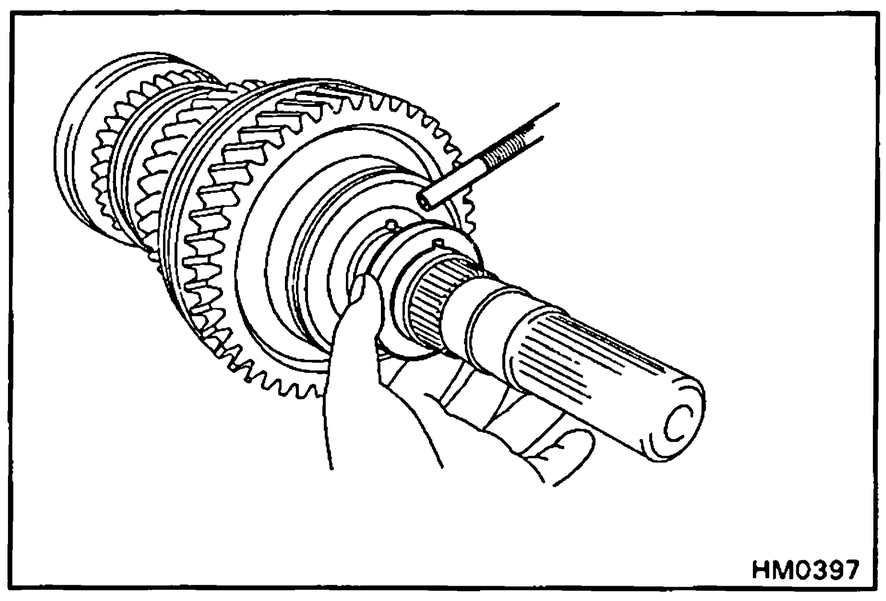


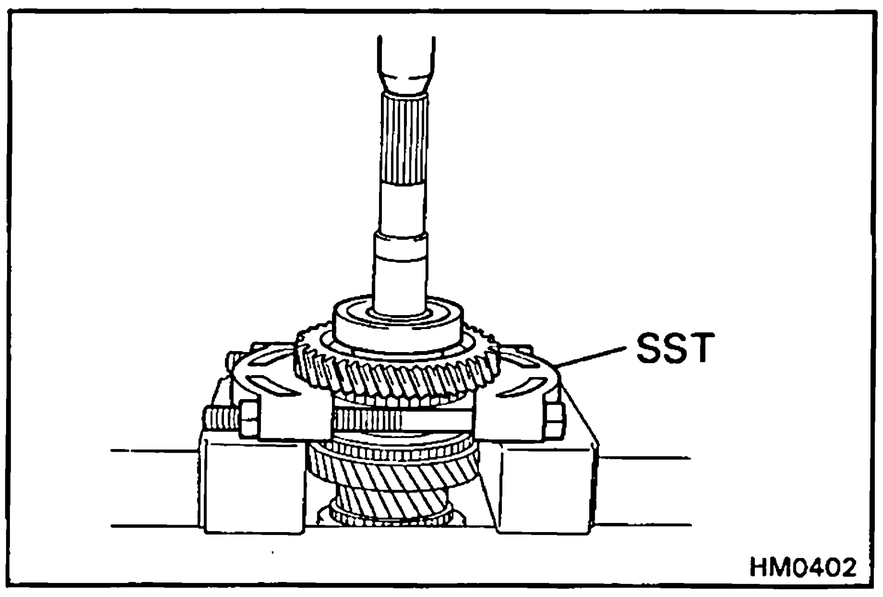

◆ Non-reusable part


HM0418


HM0420


HM0396


HM0397



HM0402

# OUTPUT SHAFT DISASSEMBLY

**1. INSPECT EACH GEAR THRUST CLEARANCE**

Measure the thrust clearance of each gear.

**Standard clearance:**

| | |
|---|---|
| **1st and 3rd gear** | **0.1 — 0.45 mm (0.0039 — 0.0177 in.)** |
| **2nd and 5th gear** | **0.1 — 0.35 mm (0.0039 — 0.0138 in.)** |

**Maximum clearnace:**

| | |
|---|---|
| **1st and 3rd gear** | **0.45 mm (0.0177 in.)** |
| **2nd and 5th gear** | **0.35 mm (0.0138 in.)** |

**2. INSPECT EACH GEAR OIL CLEARANCE**

Using a dial indicator, measure the oil clearance of each gear.

**Standard clearance:**

| | |
|---|---|
| **1st and 3rd gear** | **0.020 — 0.073 mm (0.0008 — 0.0029 in.)** |
| **2nd and 5th gear** | **0.015 — 0.068 mm (0.0006 — 0.0027 in.)** |

**Maximum clearance:**

| | |
|---|---|
| **1st and 3rd gear** | **0.073 mm (0.0029 in.)** |
| **2nd and 5th gear** | **0.068 mm (0.0027 in.)** |

**3. REMOVE BALL BEARING AND FIRST GEAR**

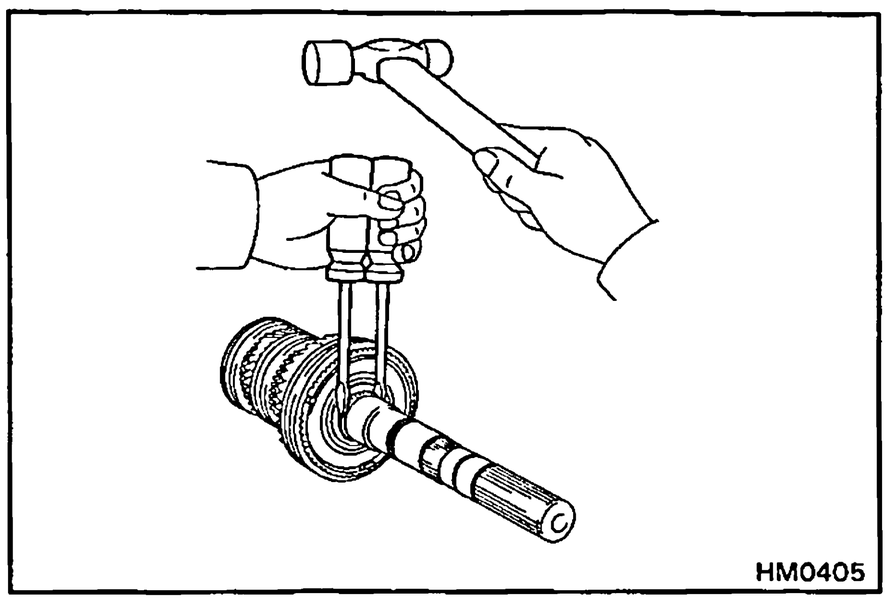
(a) Using two screwdrivers and a hammer, drive out the snap ring.

(b) Remove the thrust washer and pin.

(c) Using SST and a press, remove the ball bearing, thrust washer, first gear and synchronizer rings.

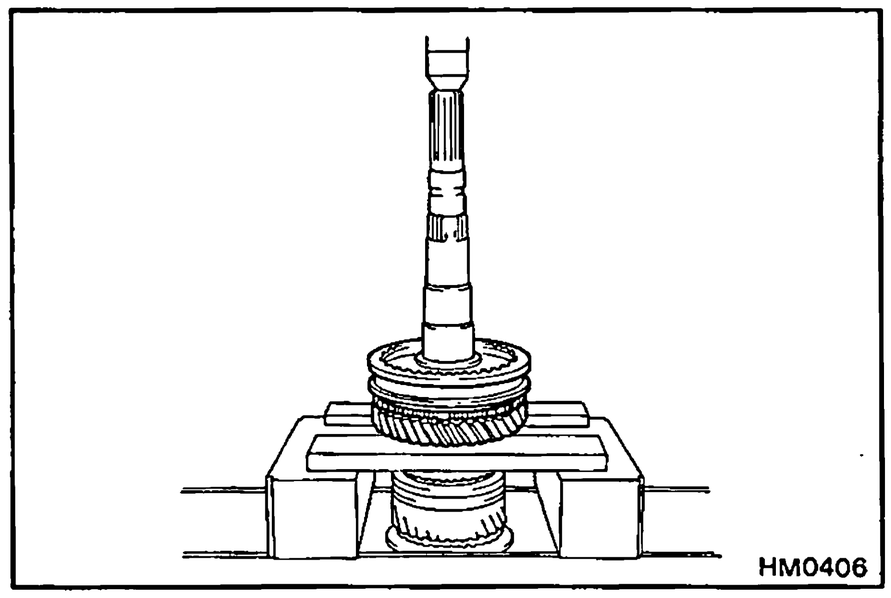
SST 09555-55010

(d) Remove the pin and needle roller bearing.


HM0405

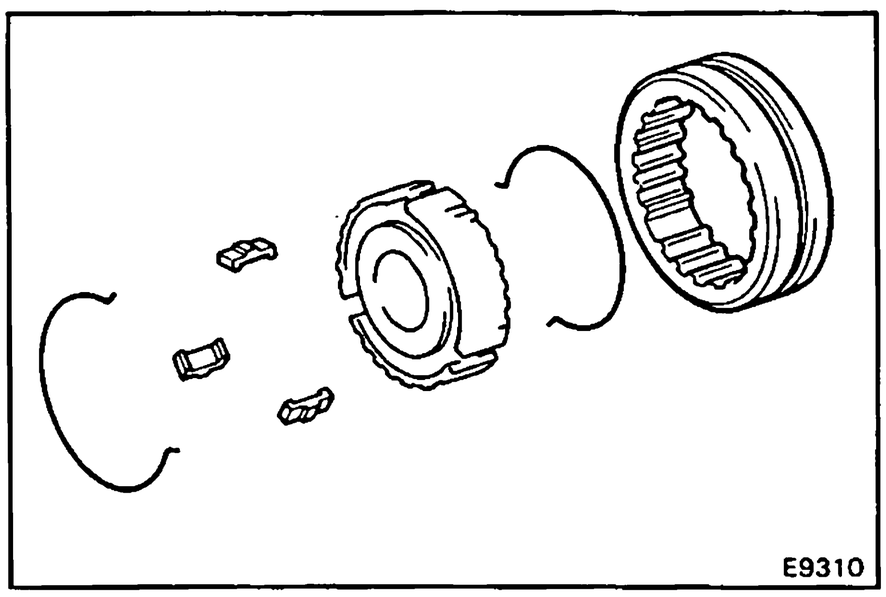
**4. REMOVE HUB SLEEVE NO.1 ASSEMBLY, SYNCHRONIZER RING, SECOND GEAR AND NEEDLE ROLLER BEARING**

(a) Using two screwdrivers and a hammer, drive out the snap ring.


HM0406

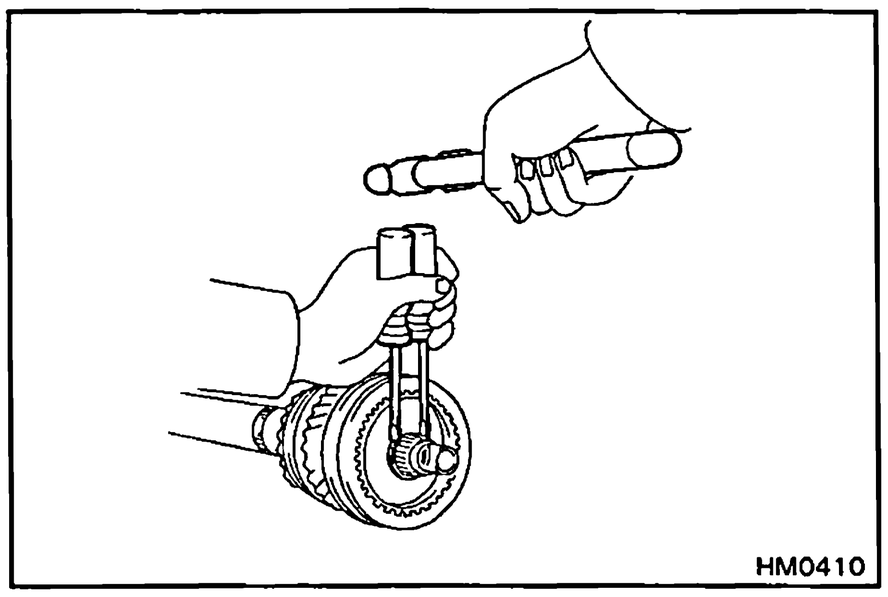
(b) Using a press, remove the hub sleeve No.1 assembly, synchronizer rings, and second gear.

(c) Remove the needle roller bearing.


E9310

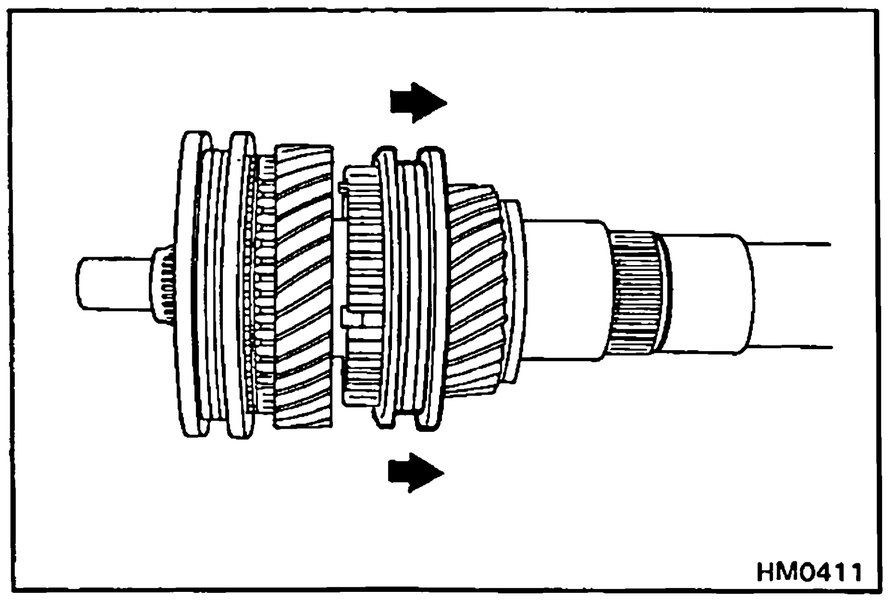
**5. REMOVE HUB SLEEVE NO.1, SHIFTING KEYS AND SPRING FROM CLUTCH HUB NO.1**

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.1.

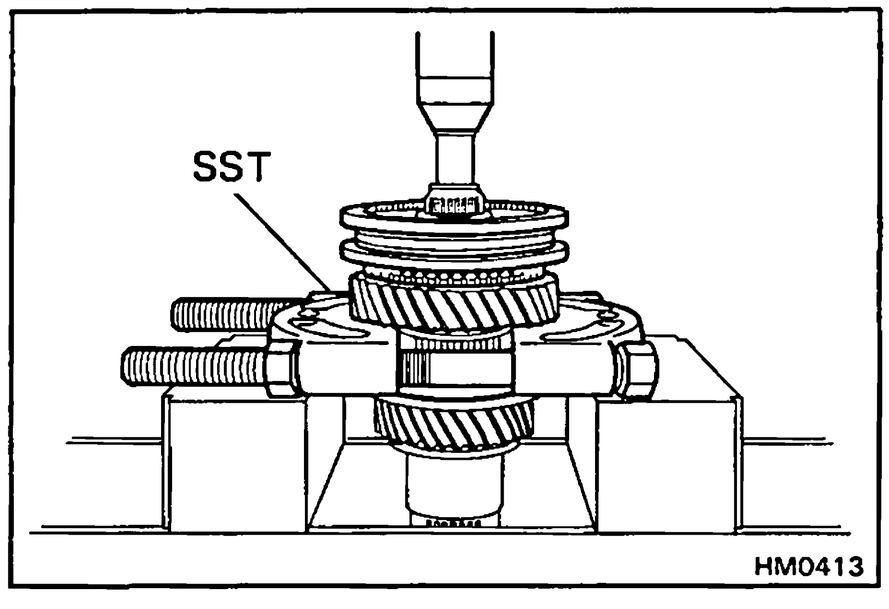

HM0410

**6. REMOVE HUB SLEEVE NO.2 ASSEMBLY, SYNCHRONIZER RINGS, THIRD GEAR AND NEEDLE ROLLER BEARING**

(a) Remove two screwdrivers and a hammer, drive out the snap ring.


HM0411

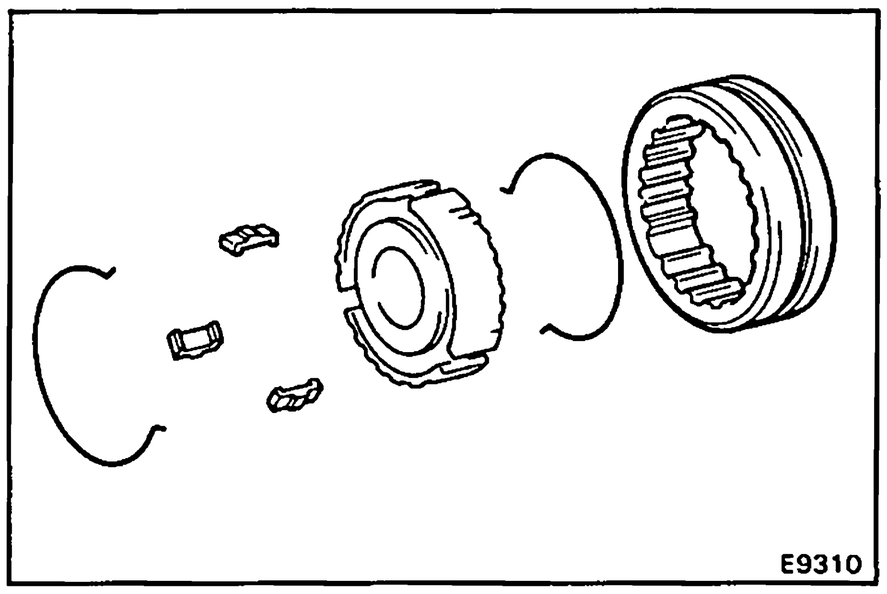
(b) Shift hub sleeve No.3 onto the fifth gear.




(c) Using SST and a press, remove the hub sleeve No.2 assembly, synchronizer ring and third gear.

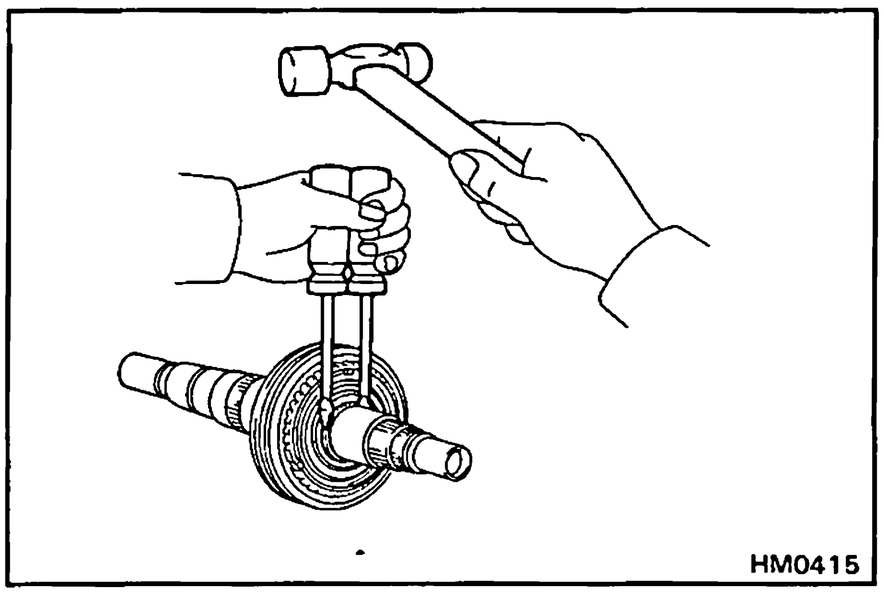
SST 09555-55010

(d) Remove the needle roller bearing.




**7. REMOVE HUB SLEEVE NO.2, SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.2**

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.2.




**8. REMOVE HUB SLEEVE NO.3 ASSEMBLY, SYNCHRONIZER RING, FIFTH GEAR AND NEEDLE ROLLER BEARING**

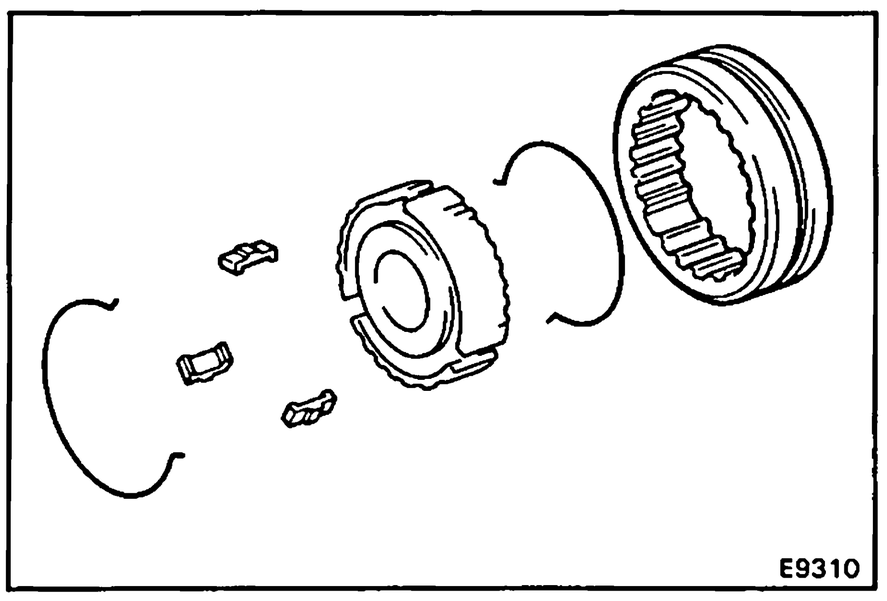
(a) Using two screwdriver, and a hammer, drive out the snap ring.




(b) Using SST and a press, remove the hub sleeve No.3 assembly and synchronizer ring.

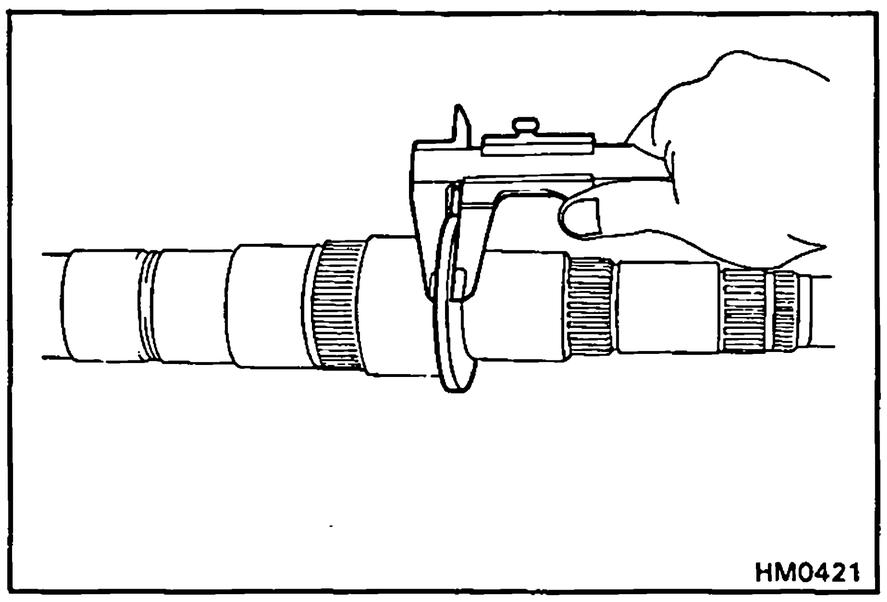
SST 09950-00020

(c) Remove the needle roller bearing.




**9. REMOVE HUB SLEEVE NO.3 SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.3**

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.3.


HM0421

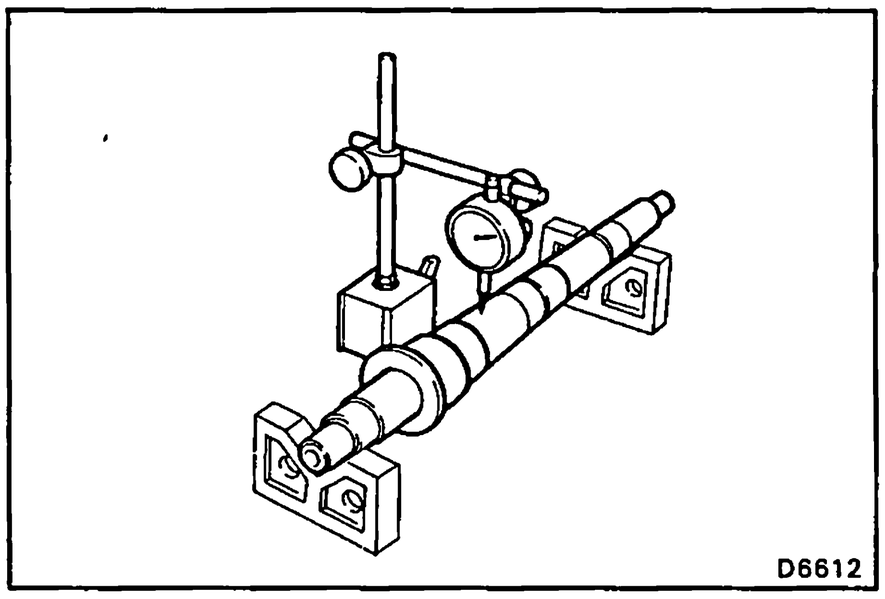
# OUTPUT SHAFT ASSEMBLY INSPECTION

### INSPECT OUTPUT SHAFT

(a) Using calipers, measure the output shaft flange thickness.

**Minimum thickness:**
**4.725 mm (0.1860 in.)**

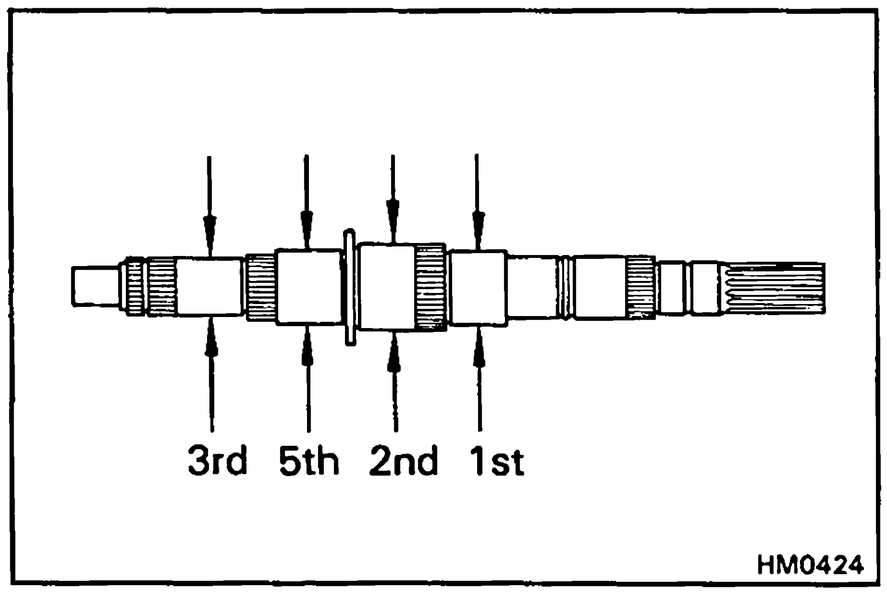
If the thickness is less than the minimum, replace the output shaft.


D6612

(b) Using a dial indicator, check the shaft runout.

**Maximum runout:**
**0.03 mm (0.0020 in.)**

If the run out exceeds the maximum, replace the output shaft.

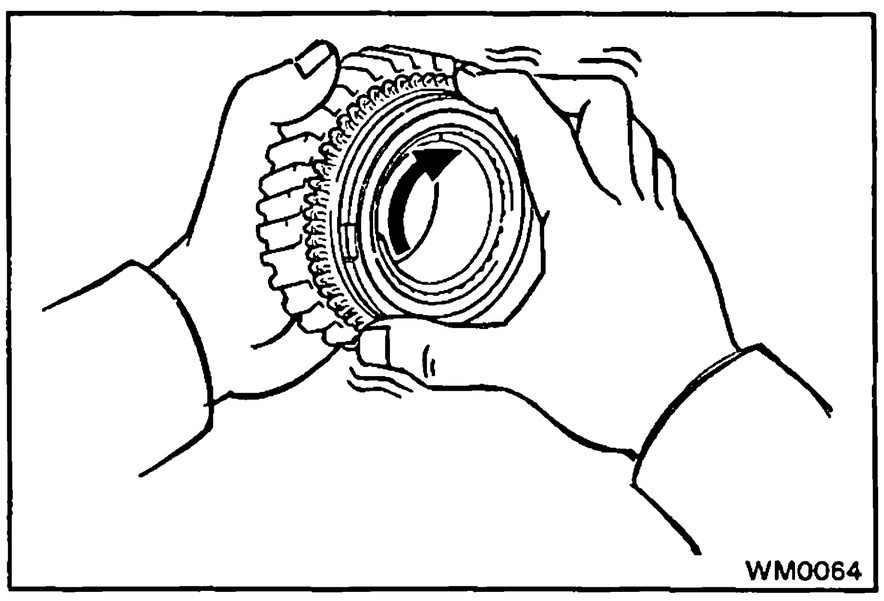


HM0424

(c) Using a micrometer, measure the outer diameter of the output shaft journal.

**Minimum outer diameter:**
**1st 49.979 mm (1.9677 in.)**
**2nd 57.984 mm (2.2828 in.)**
**3rd 37.979 mm (1.4952 in.)**
**5rh 45.984 mm (1.8104 in.)**

If the outer diameter is less than the minimum, replace the output shaft.


WM0064

# OUTPUT SHAFT COMPONENT PARTS INSPECTION

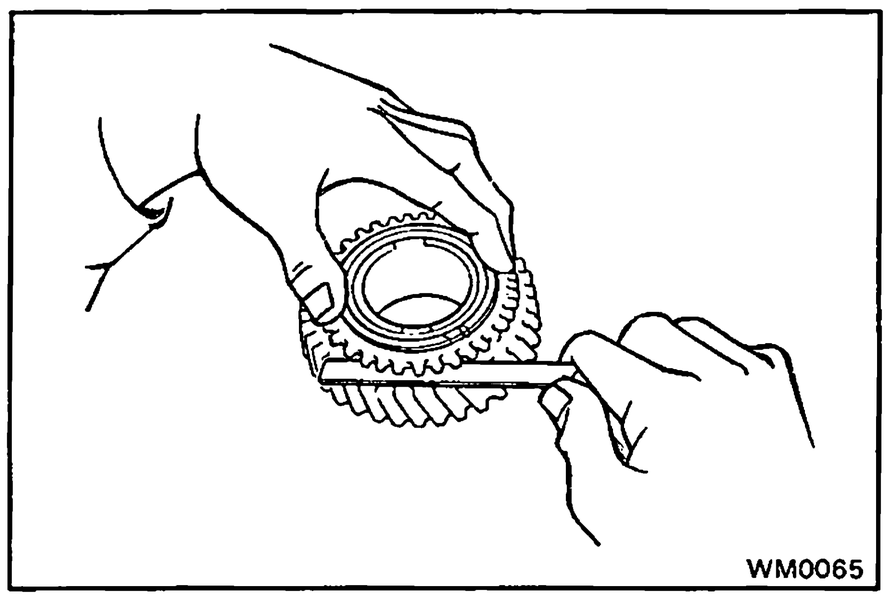
### 1. INSPECT SYNCHRONIZER RINGS FOR 1st AND 3rd GEAR

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, lightly rub the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

**NOTICE:**

- **Wash off completely the fine lapping compound after rubbing.**
- **Check again the braking effect of the synchronizer ring.**


WM0065

(c) Using a feeler gauge, measure the clearance between the synchronizer ring back and the gear spline end.

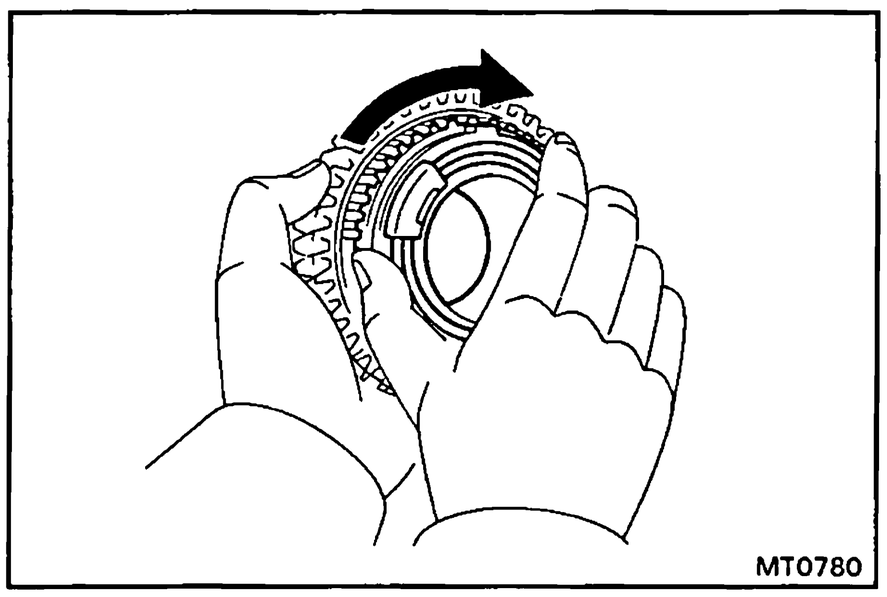
**Minimum clearance:**

**1st gear 1.1 mm (0.0433 in.)**
**3rd gear 0.8 mm (0.0315 in.)**

HINT:

- When replacing either a synchronizer ring or gear, apply a small amount of fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear together.
- When replacing both the synchronizer ring and gear, there is no need to apply any compound or to rub them together.

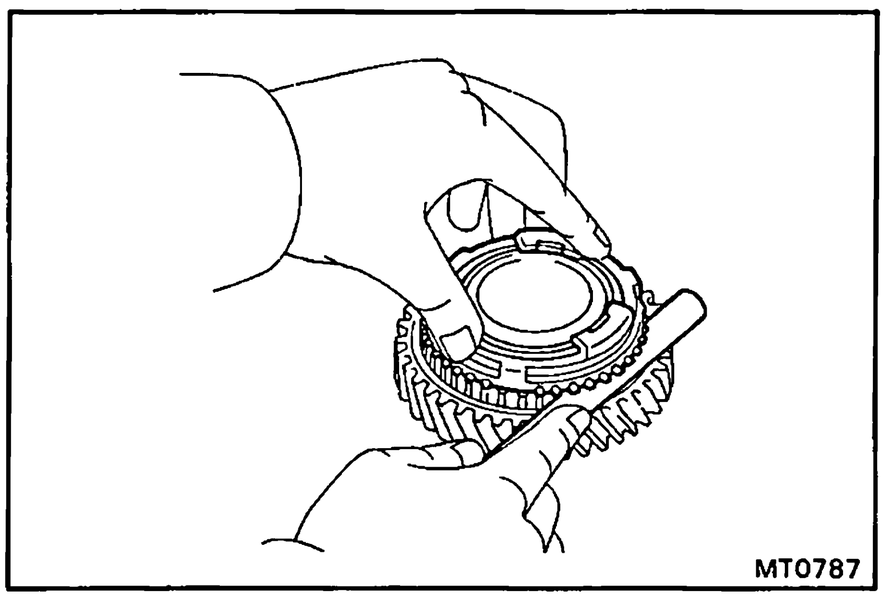
**NOTICE: Wash off completely the fine lapping compound after rubbing.**


MT0780

## 2. INSPECT SYNCHRONIZER RING FOR 2nd GEAR

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, replace the synchronizer ring.

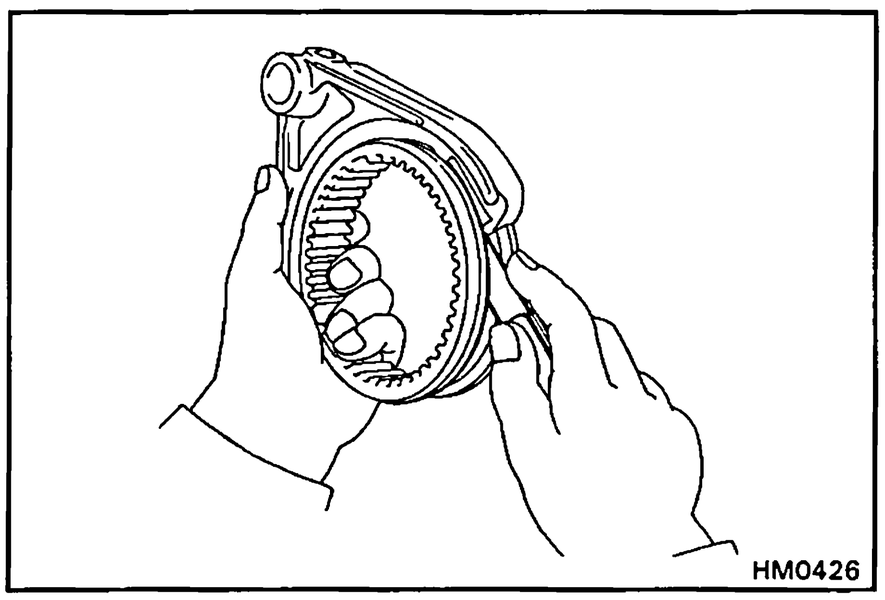

MT0787

(c) Measure the clearance between the synchronizer ring back and gear spline end.

**Minimum clearance:**

**0.85 mm (0.0335 in.)**

If the clearance is less than the limit, replace the synchronizer ring.


HM0426

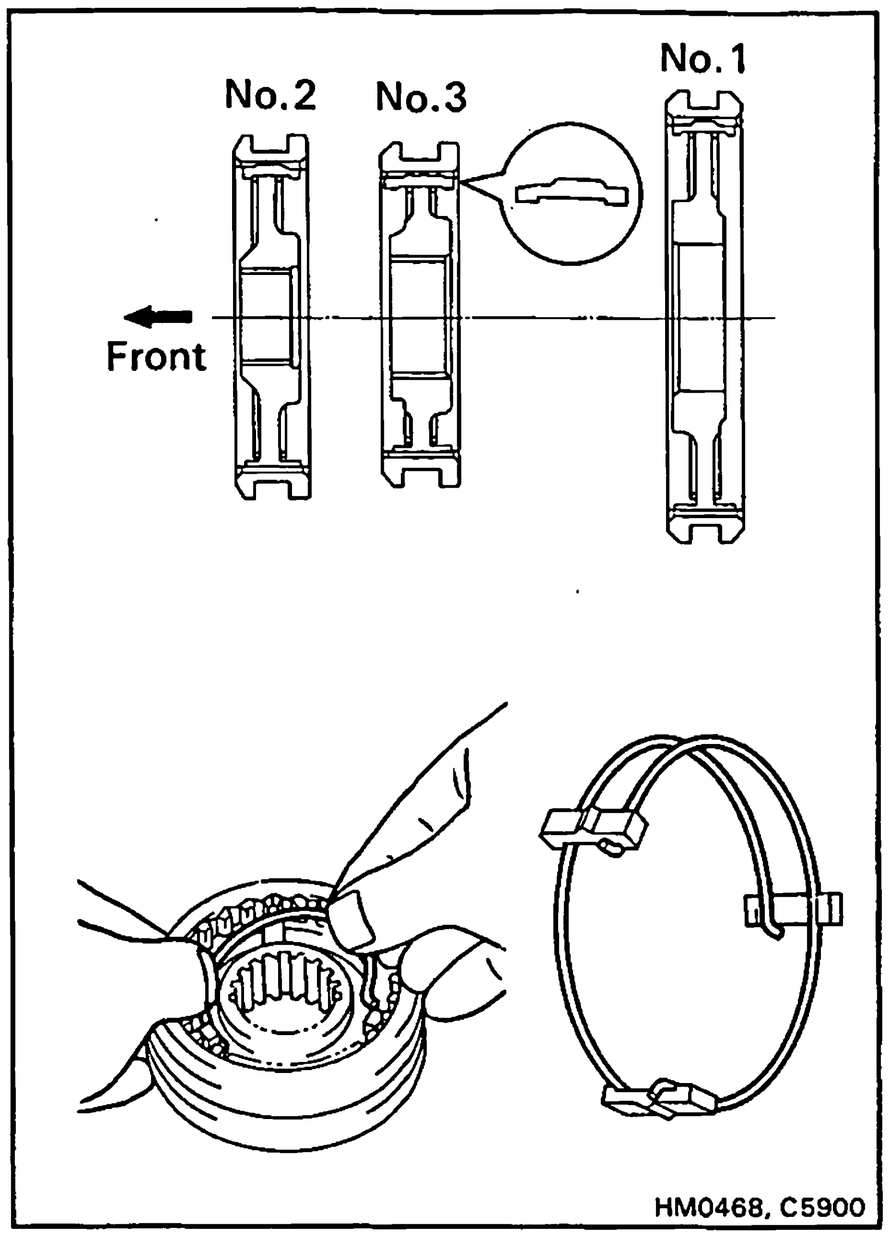
## 3. INSPECT CLEARNACE OF SHIFT FORKS AND HUB SLEEVES

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

**Maximum clearance:**

**0.35 mm (0.0138 in.)**

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.



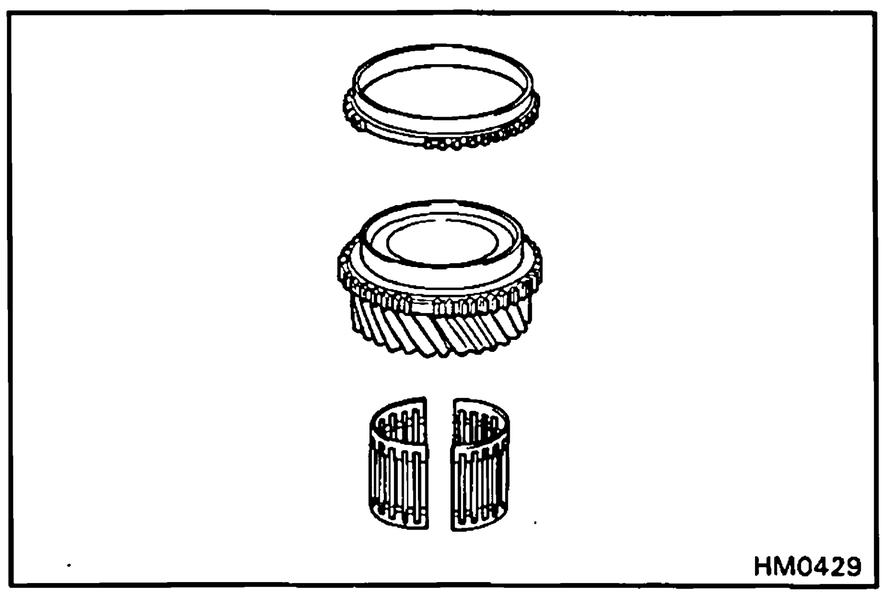

# OUTPUT SHAFT ASSEMBLY

**1. INSTALL CLUTCH HUB NO.1, NO.2 AND NO.3 INTO HUB SLEEVE**

(a) Install the clutch hub and shifting keys to the hub sleeve.

(b) Install the springs under the shifting keys.

**NOTICE: Install the key springs positioned so that their end gaps are not in line.**

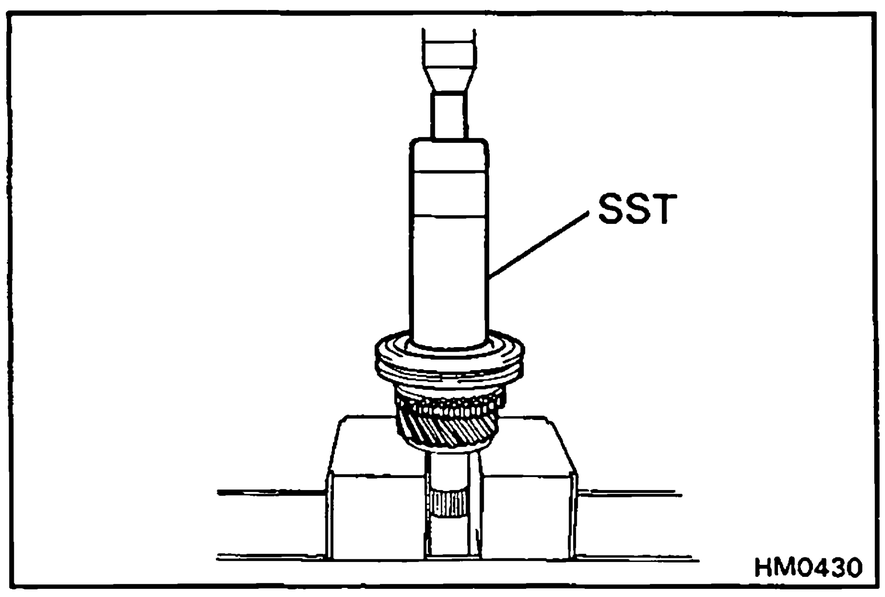



**2. INSTALL FIFTH GEAR AND HUB SLEEVE NO.3 ASSEMBLY ON OUTPUT SHAFT**

(a) Apply gear oil to the shaft and needle roller bearing.

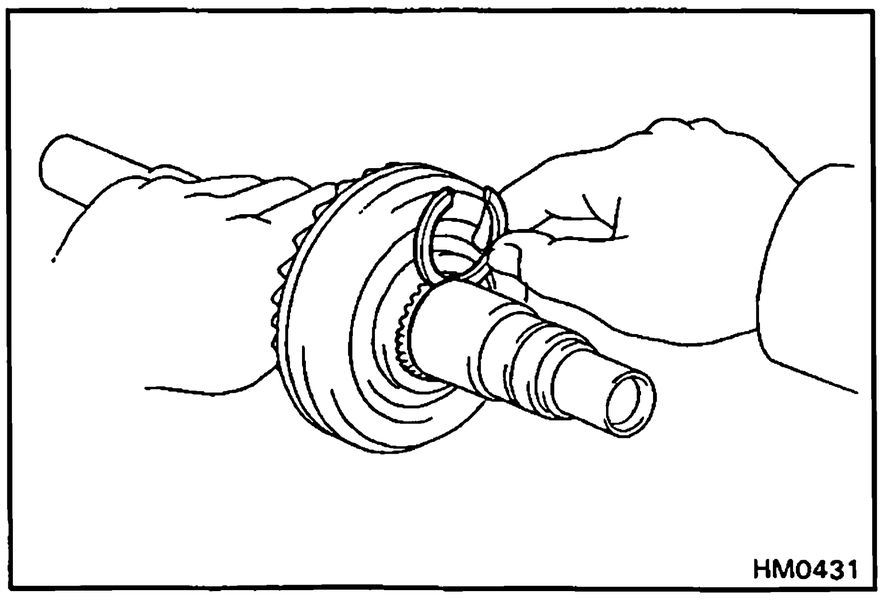
(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the fifth gear.




(d) Using SST and a press, install the fifth gear and hub sleeve No.3.

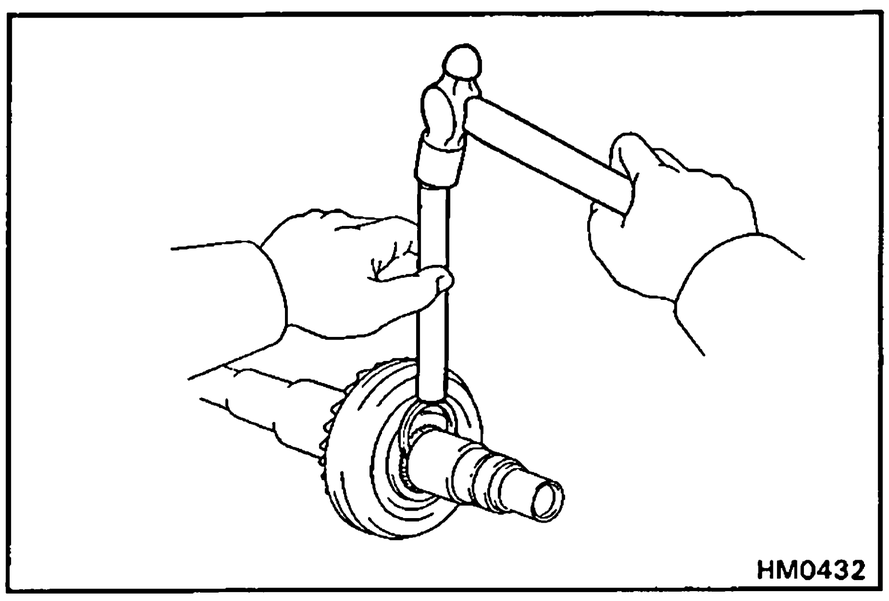
SST 09316-60010 (09316-00010)



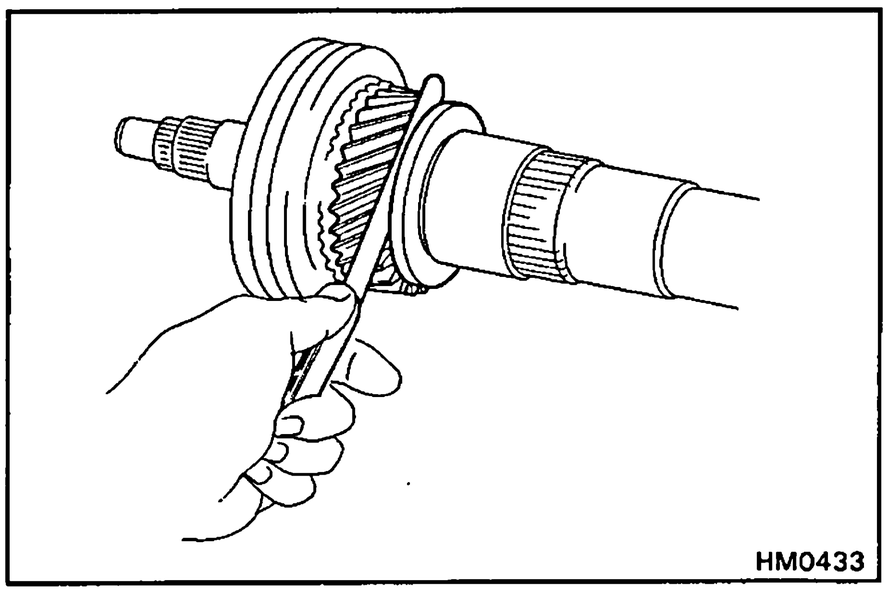

**3. INSTALL SNAP RING**

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.40 — 2.45 (0.0945 — 0.0965) |
| B | 2.45 — 2.50 (0.0965 — 0.0984) |
| C | 2.50 — 2.55 (0.0984 — 0.1004) |
| D | 2.55 — 2.60 (0.1004 — 0.1024) |
| E | 2.60 — 2.65 (0.1024 — 0.1044) |
| F | 2.65 — 2.70 (0.1044 — 0.1063) |


HM0432

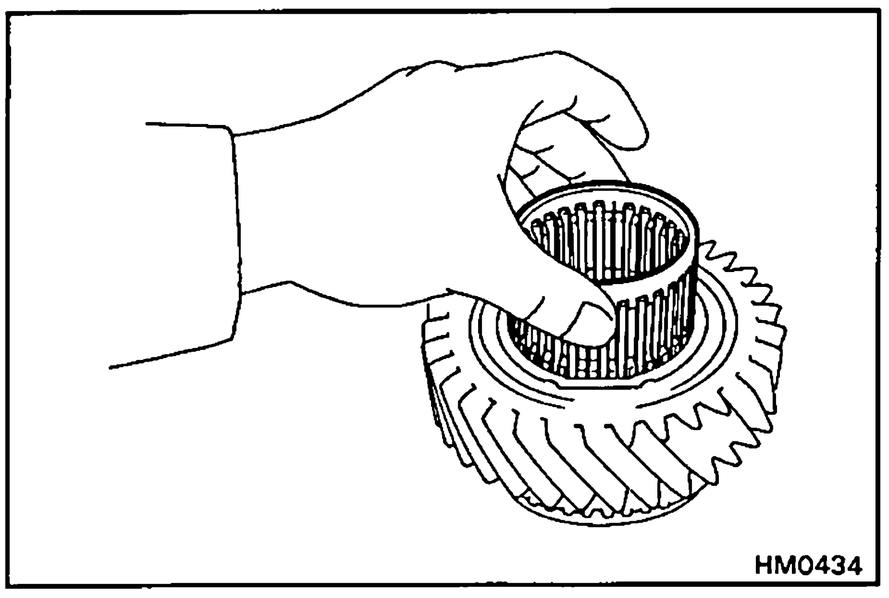
(b) Using a brass bar and hammer, drive in the snap ring.


HM0433

**4. INSPECT FIFTH GEAR THRUST CLEARANCE**

Using a feeler gauge, measure the fifth gear thrust clearance.

**Standard clearance:**
**0.1 — 0.35 mm (0.0039 — 0.0138 in.)**

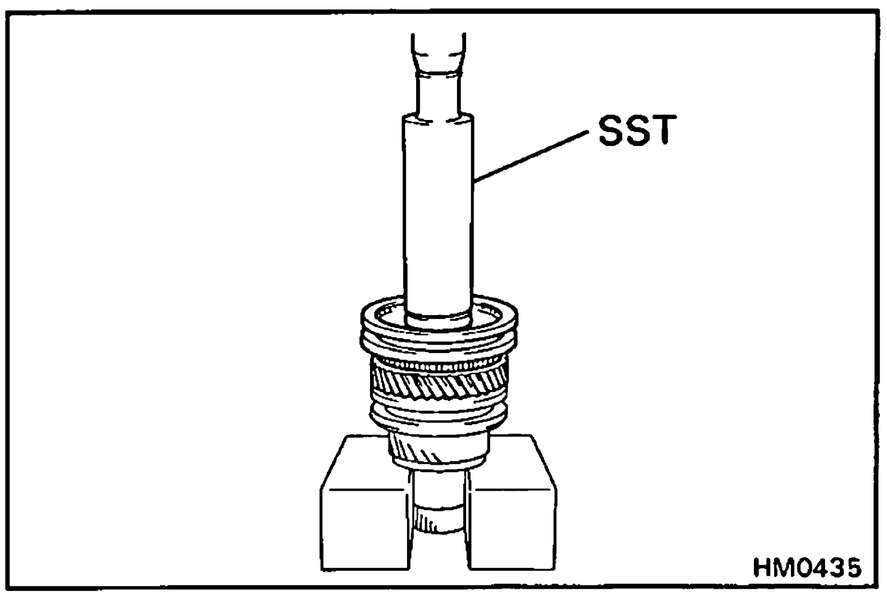

HM0434

**5. INSTALL THIRD GEAR AND HUB SLEEVE NO.2 ASSEMBLY**

(a) Apply gear oil to the shaft and needle roller bearing.

(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

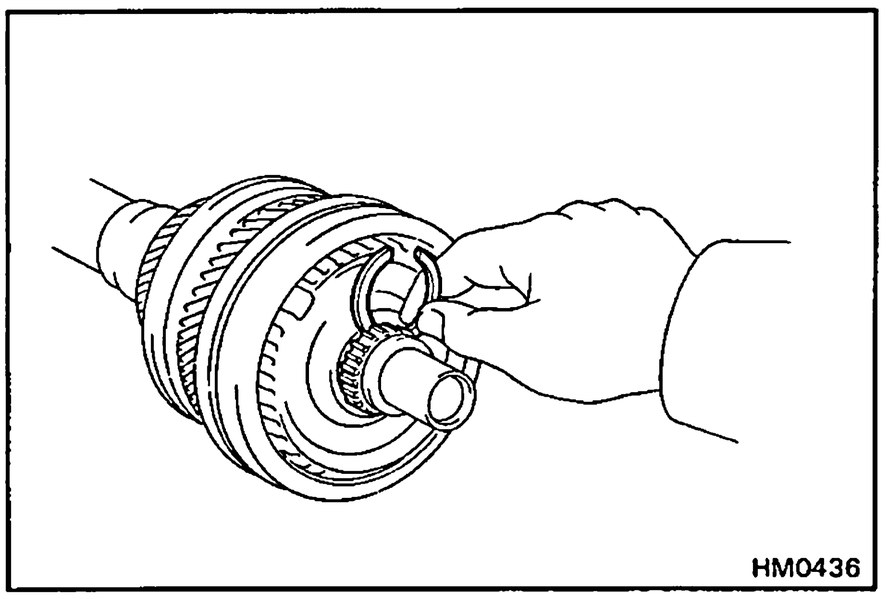
(c) Install the needle roller bearing in the third gear.



HM0435

(d) Using SST and a press, install the third gear and hub sleeve No.2.

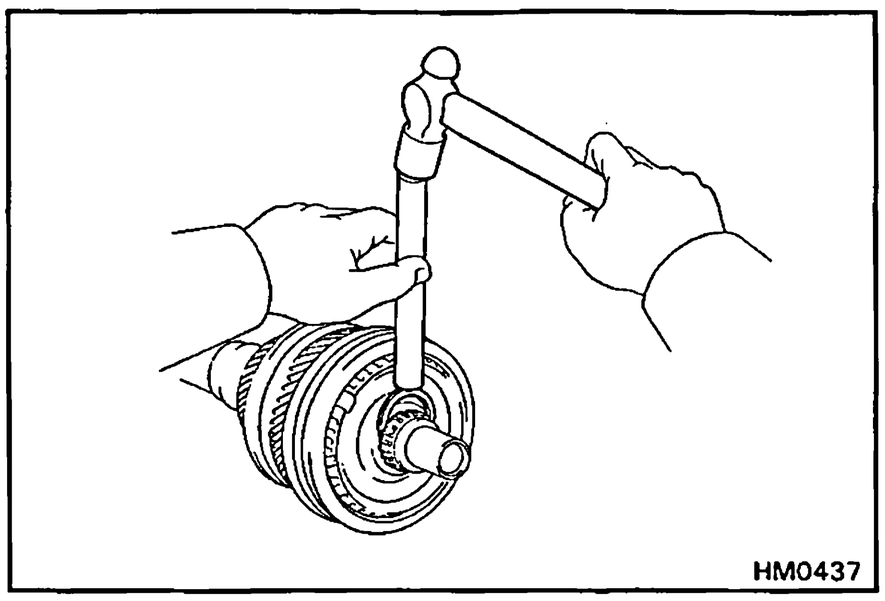
SST 09316-60010 (09316-00010)


HM0436

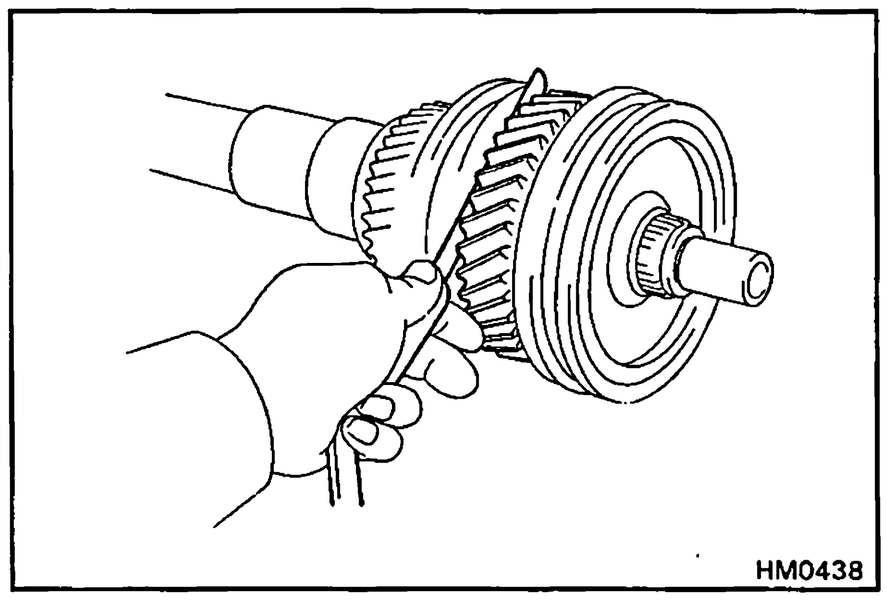
**6. INSTALL SNAP RING**

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| 4 | 1.90 — 1.95 (0.0748 — 0.0768) |
| 5 | 1.95 — 2.00 (0.0768 — 0.0787) |
| 6 | 2.00 — 2.05 (0.0787 — 0.0807) |
| 7 | 2.05 — 2.10 (0.0807 — 0.0827) |
| 8 | 2.10 — 2.15 (0.0827 — 0.0847) |
| 9 | 2.15 — 2.20 (0.0847 — 0.0866) |


HM0437

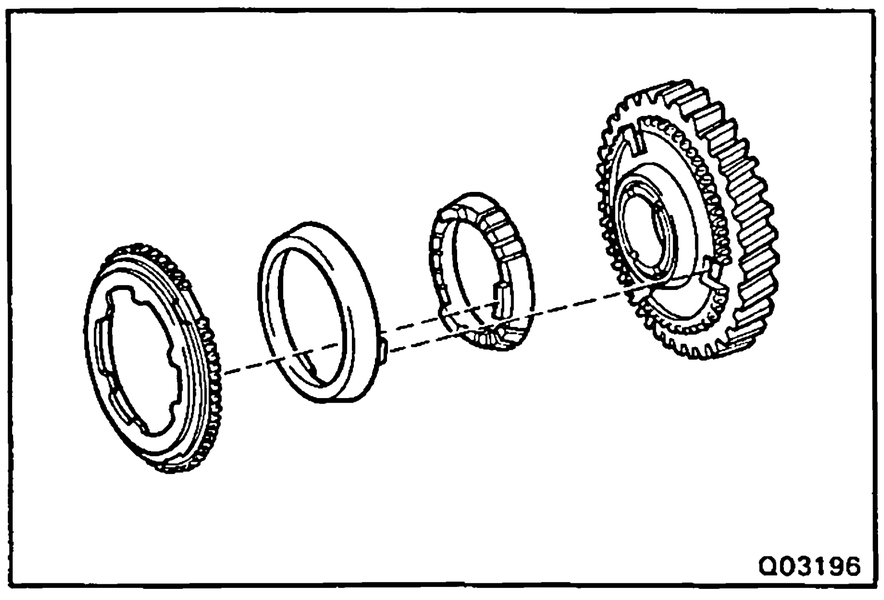
(b) Using a brass bar and hammer, drive in a new snap ring.


HM0438

**7. INSPECT THIRD GEAR THRUST CLEARANCE**

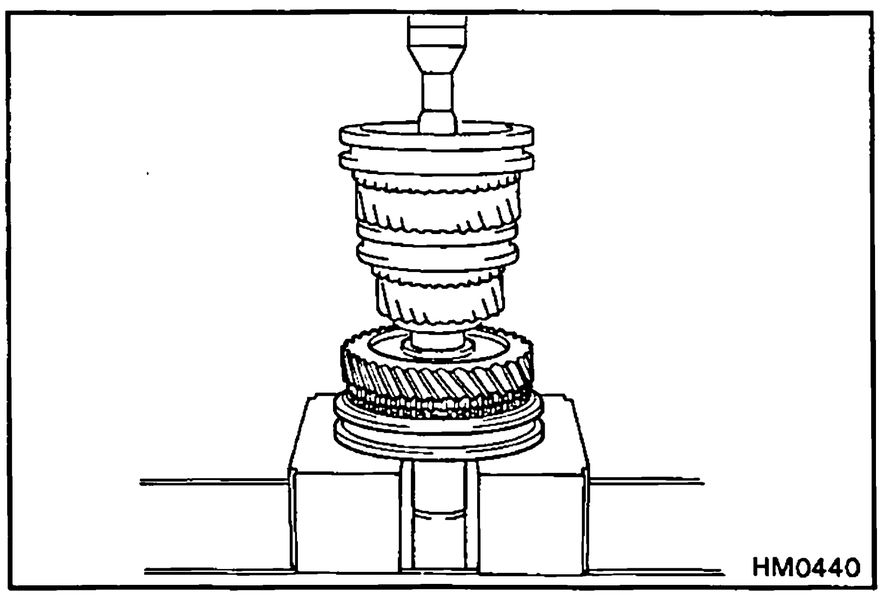
Using a feeler gauge, measure the third gear thrust clearance.

**Standard clearance:**
**0.1 — 0.45 mm (0.0039 — 0.0138 in.)**


Q03196

**8. INSTALL SECOND GEAR AND HUB SLEEVE NO.1 ASSEMBLY**

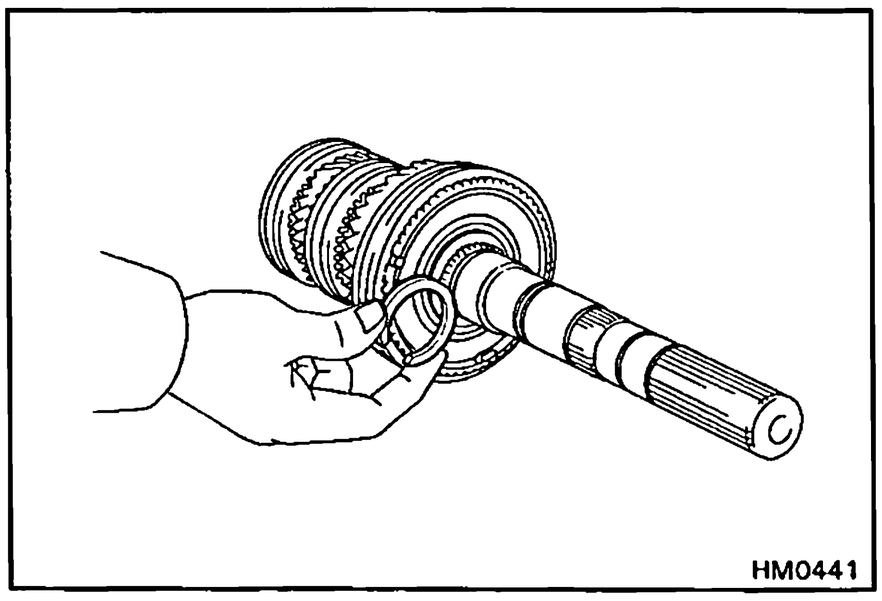
(a) Place the synchronizer rings on the 2nd gear.


HM0440

(b) Apply gear oil to the shaft and needle roller bearing.

(c) Install the needle roller bearing in the second gear.

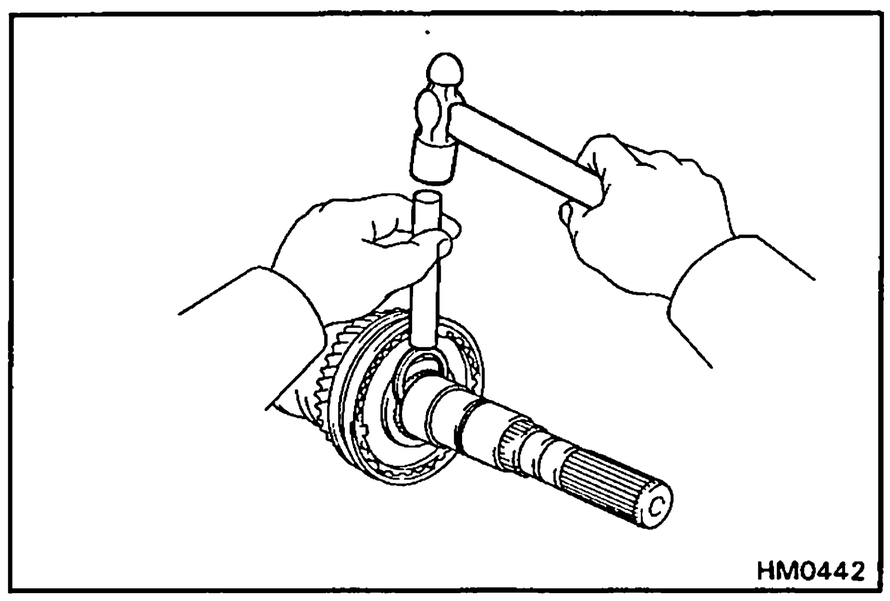
(d) Using a press, install the second gear and hub sleeve No.1 assembly.


HM0441

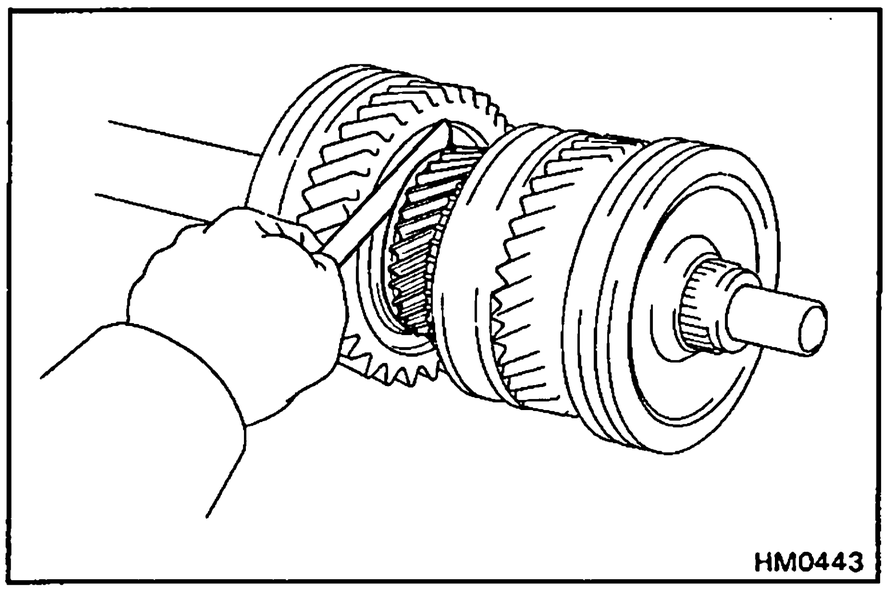
**9. INSTALL SNAP RING**

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.90 — 2.95 (0.1142 — 0.1162) |
| B | 2.95 — 3.00 (0.1162 — 0.1181) |
| C | 3.00 — 3.05 (0.1181 — 0.1201) |
| D | 3.05 — 3.10 (0.1201 — 0.1220) |
| E | 3.10 — 3.15 (0.1220 — 0.1240) |
| F | 3.15 — 3.20 (0.1240 — 0.1260) |


HM0442

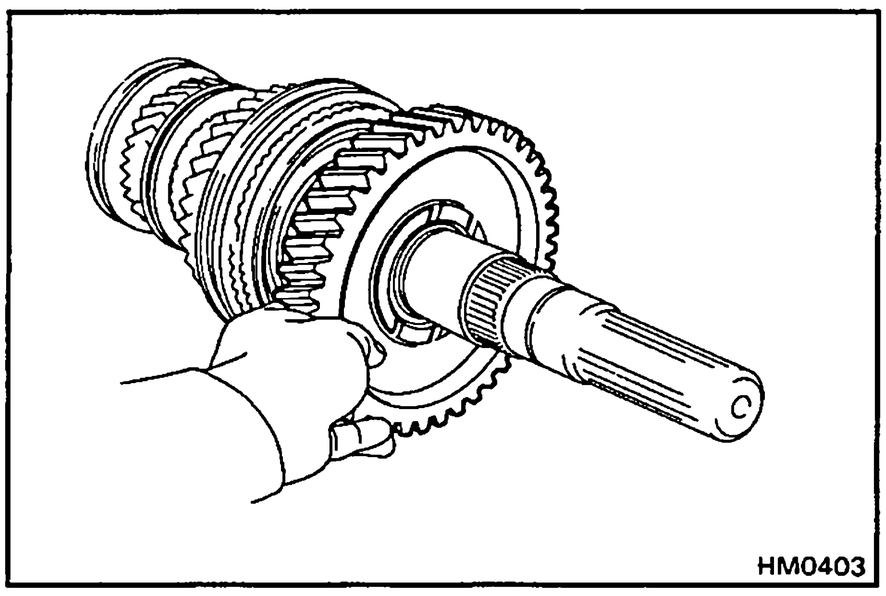
(b) Using a brass bar and hammer, drive in a new snap ring.


HM0443

**10. INSPECT SECOND GEAR THRUST CLEARANCE**

Using a feeler gauge, measure the second gear thrust clearance.

**Standard clearance:**
**0.1 — 0.35 mm (0.0039 — 0.0138 in.)**

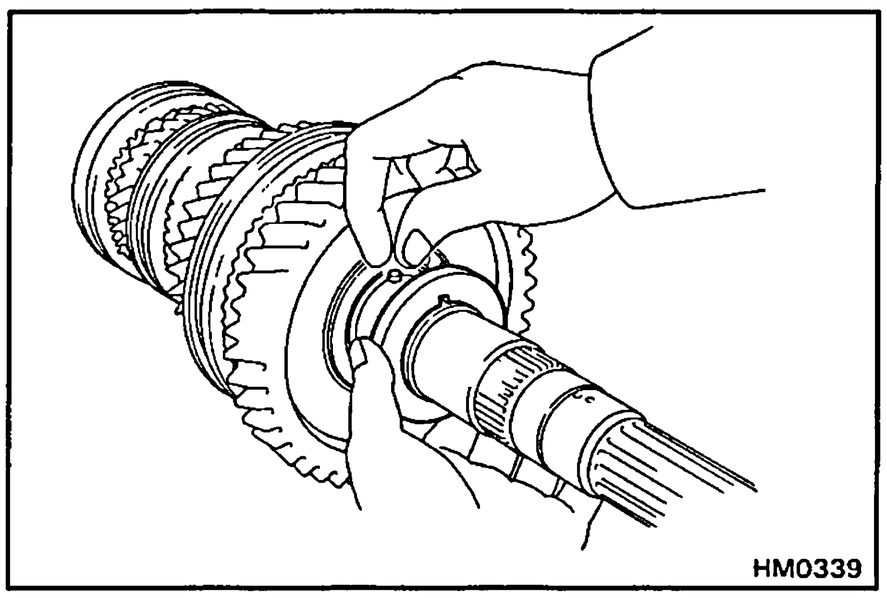

HM0403

**11. INSTALL FIRST GEAR**

(a) Apply gear oil to the shaft and needle roller bearing.

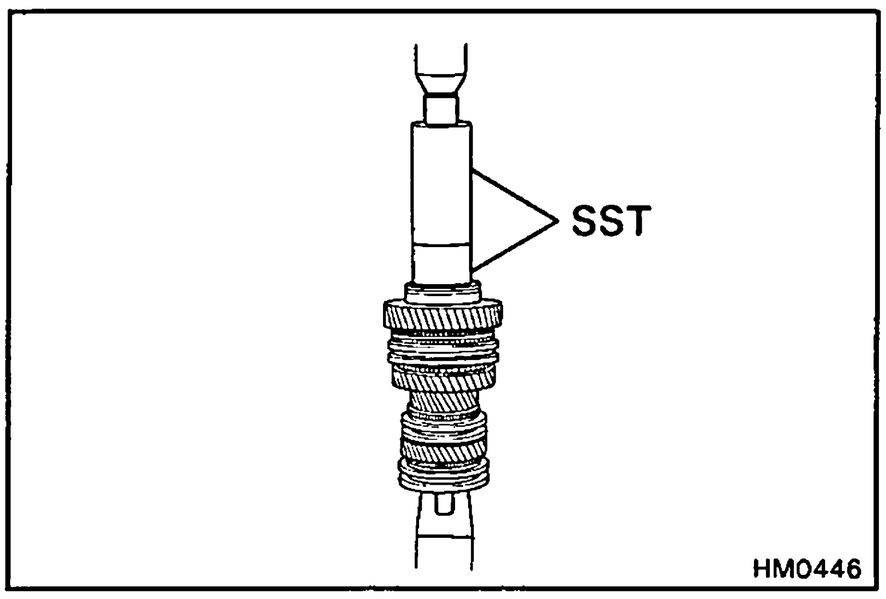
(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the first gear.


HM0339

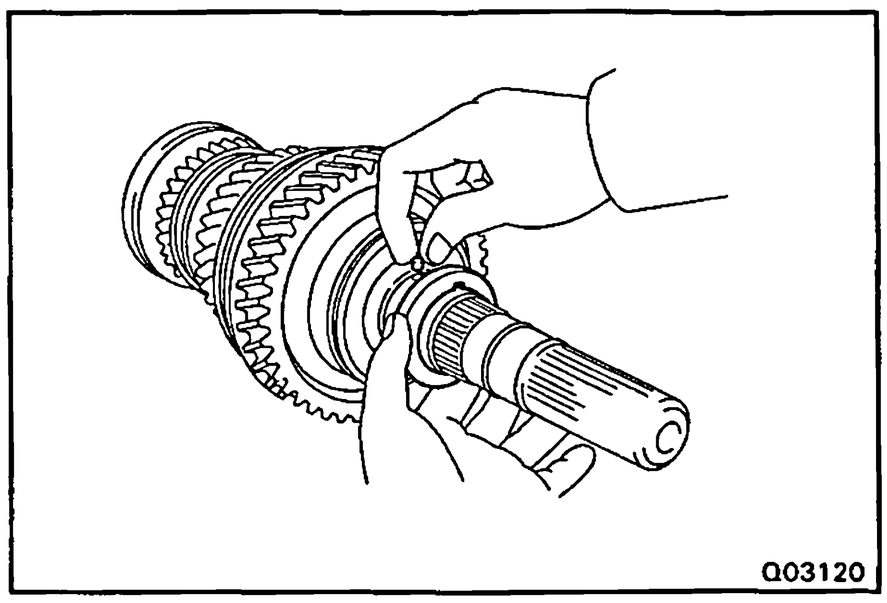
**12. INSTALL BALL BEARING**

(a) Install the pin and thrust washer.

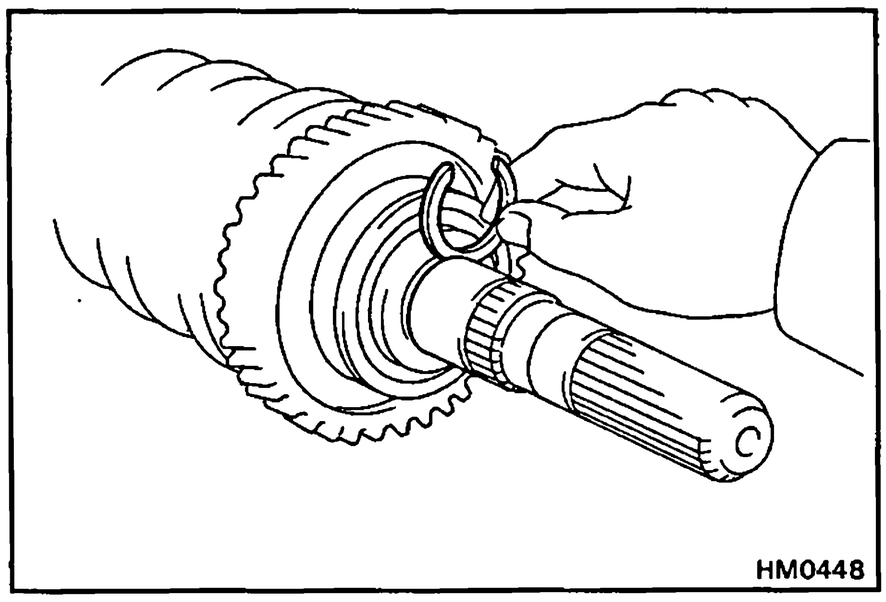


HM0446

(b) Using SST and a press, install the ball bearing.
SST 09316-60010 (09316-00010), 09523-36010


Q03120

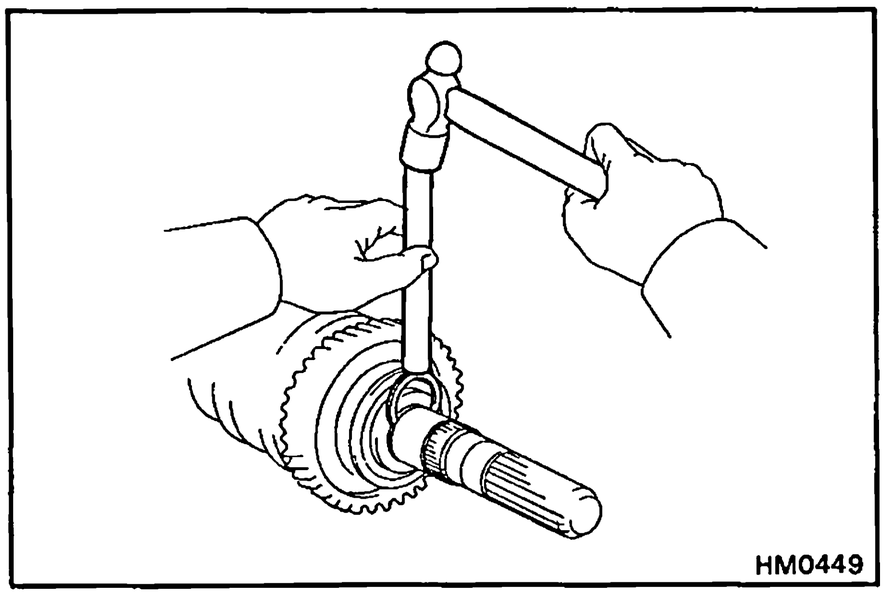
(c) Install the pin and thrust washer.


HM0448

## 13. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.40 — 2.45 (0.0945 — 0.0965) |
| B | 2.45 — 2.50 (0.0965 — 0.0984) |
| C | 2.50 — 2.55 (0.0984 — 0.1004) |
| D | 2.55 — 2.60 (0.1004 — 0.1024) |
| E | 2.60 — 2.65 (0.1024 — 0.1044) |
| F | 2.65 — 2.70 (0.1044 — 0.1063) |
| G | 2.70 — 2.75 (0.1063 — 0.1083) |
| H | 2.75 — 2.80 (0.1083 — 0.1102) |


HM0449

(b) Using a brass bar and a hammer, drive in a new snap ring.

# SERVICE SPECIFICATIONS

## SERVICE DATA

| | | | |
|---|---|---|---|
| Output shaft 1st gear journal diameter | | | |
| | Limit | 49.979 mm | 1.9177 in. |
| Output shaft 2nd gear journal diameter | | | |
| | Limit | 57.984 mm | 2.2828 in. |
| Output shaft 3rd gear journal diameter | | | |
| | Limit | 37.979 mm | 1.4952 in. |
| Output shaft 5th gear journal diameter | | | |
| | Limit | 45.984 mm | 1.8104 in. |
| Output shaft Frange thickness | | | |
| | Limit | 4.725 mm | 0.1860 in. |
| Output shaft Runout | | | |
| | Limit | 0.03 mm | 0.0012 in. |
| Gear thrust clearance 1st and 3rd | | | |
| | STD | 0.1 — 0.45 mm | 0.0039 — 0.0177 in. |
| Gear thrust clearance 2nd and 5th | | | |
| | STD | 0.1 — 0.35 mm | 0.0039 — 0.0138 in. |
| Gear oil clearance 1st and 3rd | | | |
| | STD | 0.020 — 0.073 mm | 0.0008 — 0.0029 in. |
| Gear oil clearance 2nd and 5th | | | |
| | STD | 0.015 — 0.068 mm | 0.0006 — 0.0027 in. |
| Synchronizer ring for 1st gear clearance | | | |
| | Limit | 1.1 mm | 0.04331 in. |
| Synchronizer ring for 2nd gear clearance | | | |
| | Limit | 0.85 mm | 0.0335 in. |
| Synchronizer ring for 3rd gear clearance | | | |
| | Limit | 0.8 mm | 0.0315 in. |
| Output shaft snap ring thickness | | | |
| No.3 Hub sleeve | Mark A | 2.40 — 2.45 mm | 0.0945 — 0.0965 in. |
| No.3 Hub sleeve | Mark B | 2.45 — 2.50 mm | 0.0965 — 0.0984 in. |
| No.3 Hub sleeve | Mark C | 2.50 — 2.55 mm | 0.0984 — 0.1004 in. |
| No.3 Hub sleeve | Mark D | 2.55 — 2.60 mm | 0.1004 — 0.1024 in. |
| No.3 Hub sleeve | Mark E | 2.60 — 2.65 mm | 0.1024 — 0.1044 in. |
| No.3 Hub sleeve | Mark F | 2.65 — 2.70 mm | 0.1044 — 0.1063 in. |
| No.2 Hub sleeve | Mark 4 | 1.90 — 1.95 mm | 0.0748 — 0.0768 in. |
| No.2 Hub sleeve | Mark 5 | 1.95 — 2.00 mm | 0.0768 — 0.0787 in. |
| No.2 Hub sleeve | Mark 6 | 2.00 — 2.05 mm | 0.0787 — 0.0807 in. |
| No.2 Hub sleeve | Mark 7 | 2.05 — 2.10 mm | 0.0807 — 0.0827 in. |
| No.2 Hub sleeve | Mark 8 | 2.10 — 2.15 mm | 0.0827 — 0.0847 in. |
| No.2 Hub sleeve | Mark 9 | 2.15 — 2.20 mm | 0.0847 — 0.0866 in. |
| No.1 Hub sleeve | Mark A | 2.90 — 2.95 mm | 0.1142 — 0.1162 in. |
| No.1 Hub sleeve | Mark B | 2.95 — 3.00 mm | 0.1162 — 0.1181 in. |
| No.1 Hub sleeve | Mark C | 3.00 — 3.05 mm | 0.1181 — 0.1201 in. |
| No.1 Hub sleeve | Mark D | 3.05 — 3.10 mm | 0.1201 — 0.1220 in. |
| No.1 Hub sleeve | Mark E | 3.10 — 3.15 mm | 0.1220 — 0.1240 in. |
| No.1 Hub sleeve | Mark F | 3.15 — 3.20 mm | 0.1240 — 0.1260 in. |
| Rear bearing | Mark A | 2.40 — 2.45 mm | 0.0945 — 0.0965 in. |
| Rear bearing | Mark B | 2.45 — 2.50 mm | 0.0965 — 0.0984 in. |
| Rear bearing | Mark C | 2.50 — 2.55 mm | 0.0984 — 0.1004 in. |
| Rear bearing | Mark D | 2.55 — 2.60 mm | 0.1004 — 0.1024 in. |
| Rear bearing | Mark E | 2.60 — 2.65 mm | 0.1024 — 0.1044 in. |
| Rear bearing | Mark F | 2.65 — 2.70 mm | 0.1044 — 0.1063 in. |
| Rear bearing | Mark G | 2.70 — 2.75 mm | 0.1063 — 0.1083 in. |
| Rear bearing | Mark H | 2.75 — 2.80 mm | 0.1083 — 0.1102 in. |

# TORQUE SPECIFICATIONS

| Part tightened | N·m | kgf·cm | ft·lbf |
|---|---|---|---|
| Transfer x Transmission | 69 | 700 | 51 |
| Engine rear mounting x Transfer adapter | 59 | 600 | 43 |
| Transmission x Engine | 72 | 730 | 53 |
| Crossmember x Body | 39 | 400 | 29 |
| Crossmember x Engine rest mounting | 76 | 780 | 56 |
| Stabirizer bracket x Axle housing | 28 | 290 | 21 |
| Exhaust pipe bracket x Clutch housing | 39 | 400 | 29 |
| Exhaust pipe clamp | 19 | 195 | 14 |
| Exhaust center pipe | 39 | 400 | 29 |
| Transmission x Starter | 39 | 400 | 29 |
| Clutch release cylinder set bolt | 12 | 120 | 9 |
| Shift lever control retainer x Transmission case | 17 | 170 | 12 |
| Front propeller shaft x Front differential | 74 | 750 | 54 |
| Front propeller shaft x Transfer | 74 | 750 | 54 |
| Rear propeller shaft x Rear differential | 88 | 900 | 65 |
| Rear propeller shaft x Transfer | 88 | 900 | 65 |

# DESCRIPTION

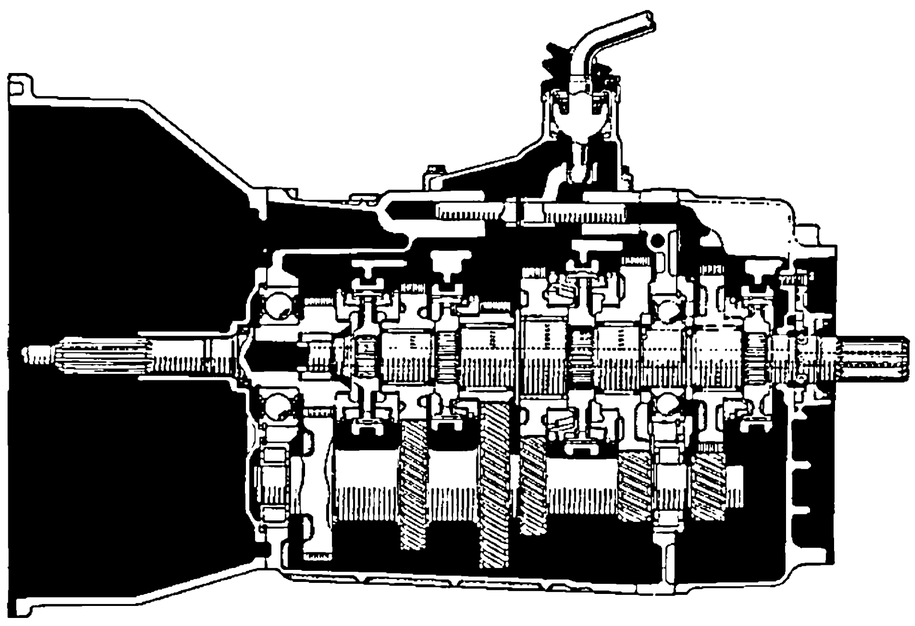
## PRECAUTIONS

When working with FIPG material, you must be observe the following.

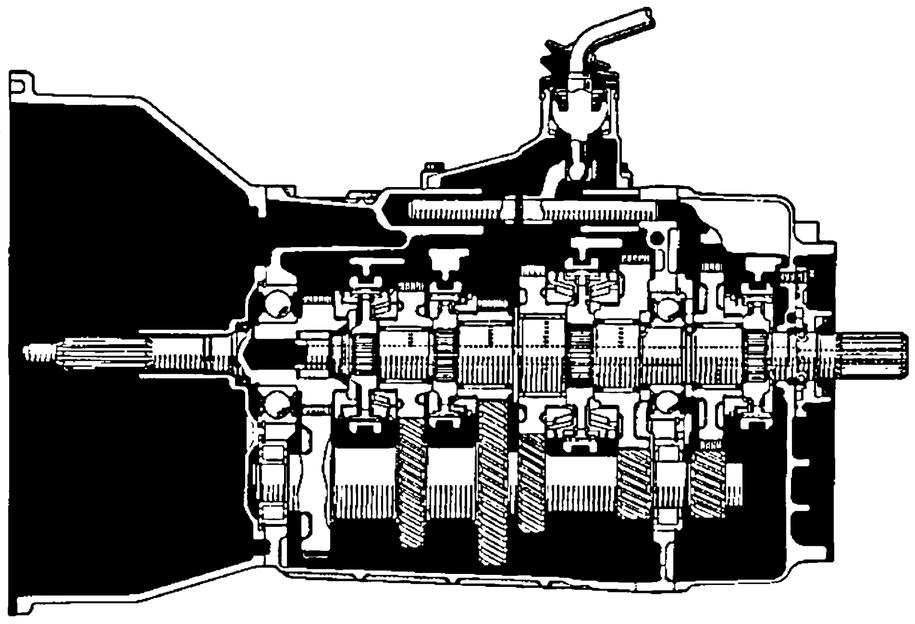
- Using a razor blade and gasket scraper, remove all the old sealant (FIPG) material from the gasket surfaces.
- Throughly clean all components to remove all the loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply the sealant in approx. 1 mm (0.04 in.) bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the sealant (FIPG) material must be removed and reapplied.

## DESCRIPTION

- Transaxle type H150F and H151F are constant mesh synchronizers for forward gears, and a sliding mesh reverse gear.
- (H150F) A triple-cone type synchromesh mechanism is used in the second gear to improve the shift feeling characteristics. This helps to reduce the shifting effort, provide smoothly shifting.
- (H151F) A triple-cone type synchromesh mechanism is used in the first, second and third gears to improve the shift feeling characteristics. This helps to reduce the shifting effort, provide smoothly shifting.
- The input shaft is composed of the 1st and 2nd speed gears and the reverse drive gear, and the output shaft is composed of the drive gear (for use with the ring gear).



Q03143

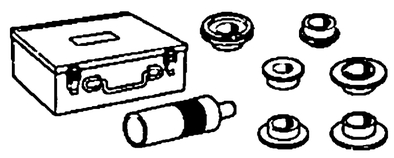
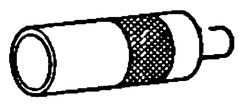
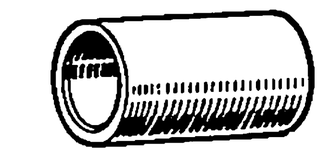
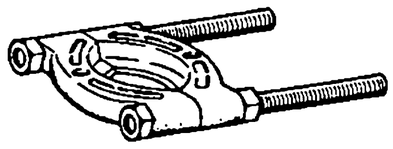


Q03145

| Type of Transmission | | H150F | H151F |
|---|---|---|---|
| Type of Engine | | 1HZ | 1HD-T, 1FZ-F, 1FZ-FE |
| Gear Ratio | 1st | 4.529 | 4.081 |
| | 2nd | 2.464 | 2.294 |
| | 3rd | 1.490 | ← |
| | 4th | 1.000 | ← |
| | 5th | 0.881 | ← |
| | Reverse | 4.313 | ← |
| Oil Capacity | | 2.7 liters (2.6 US qts, 3.1 Imp.qts) | |
| Oil Vicosity | | SAE75W — 90 | |
| Oil Grade | | API GL-4 or GL-5 | |

# PREPARATION

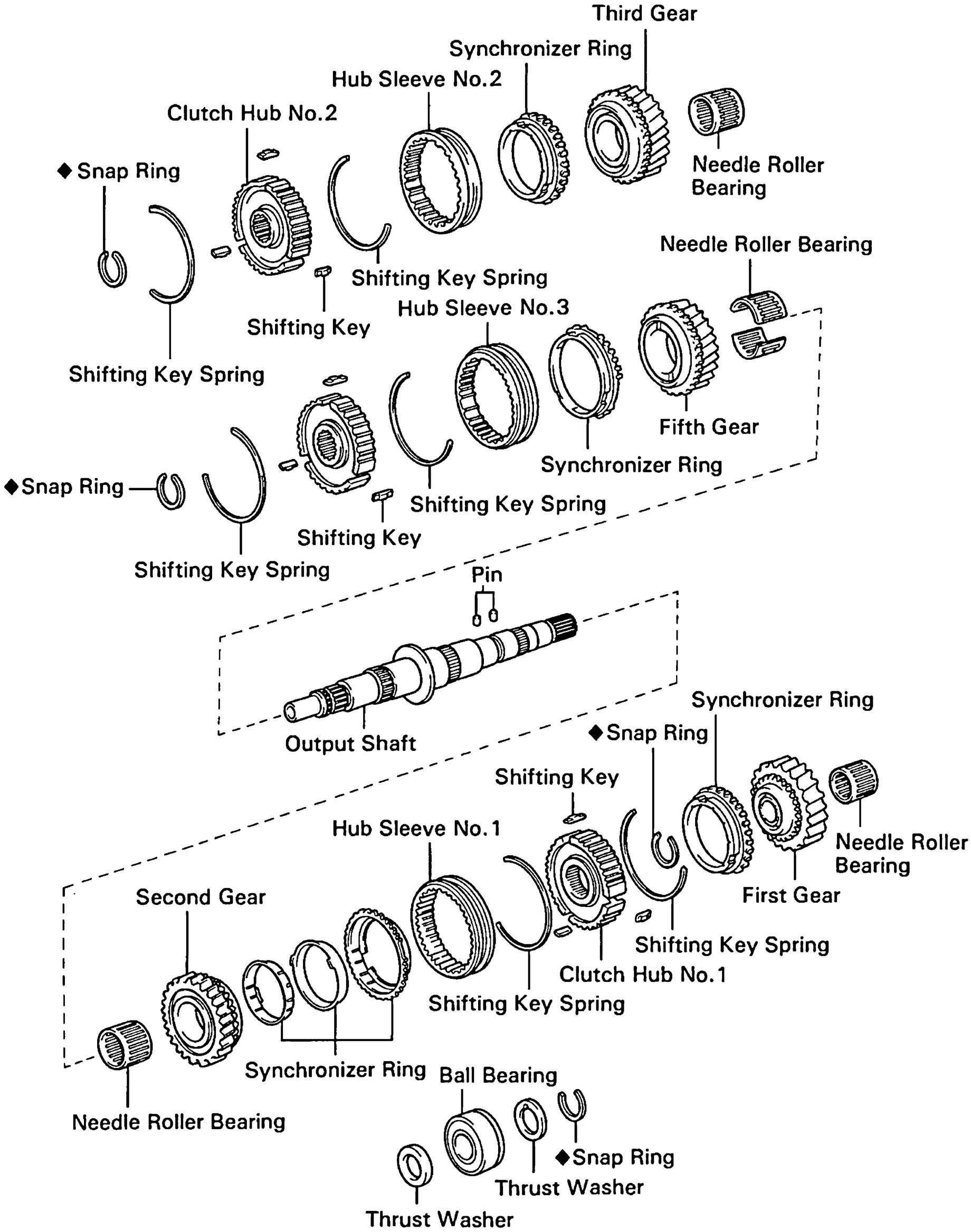
## SST (SPECIAL SERVICE TOOLS)

| | | | |
|---|---|---|---|
|  | 09316-60010 | Transmission & Transfer Bearing Replacer | |
|  | (09316-00010) | Replacer Pipe | |
|  | 09523-36010 | Rear Axle Hub Guide Tool | Output shaft rear ball bearing |
|  | 09555-55010 | Differential Drive Pinion Bearing Replacer | |
|  | 09950-00020 | Bearing Remover | |

# OUTPUT SHAFT

## COMPONENTS

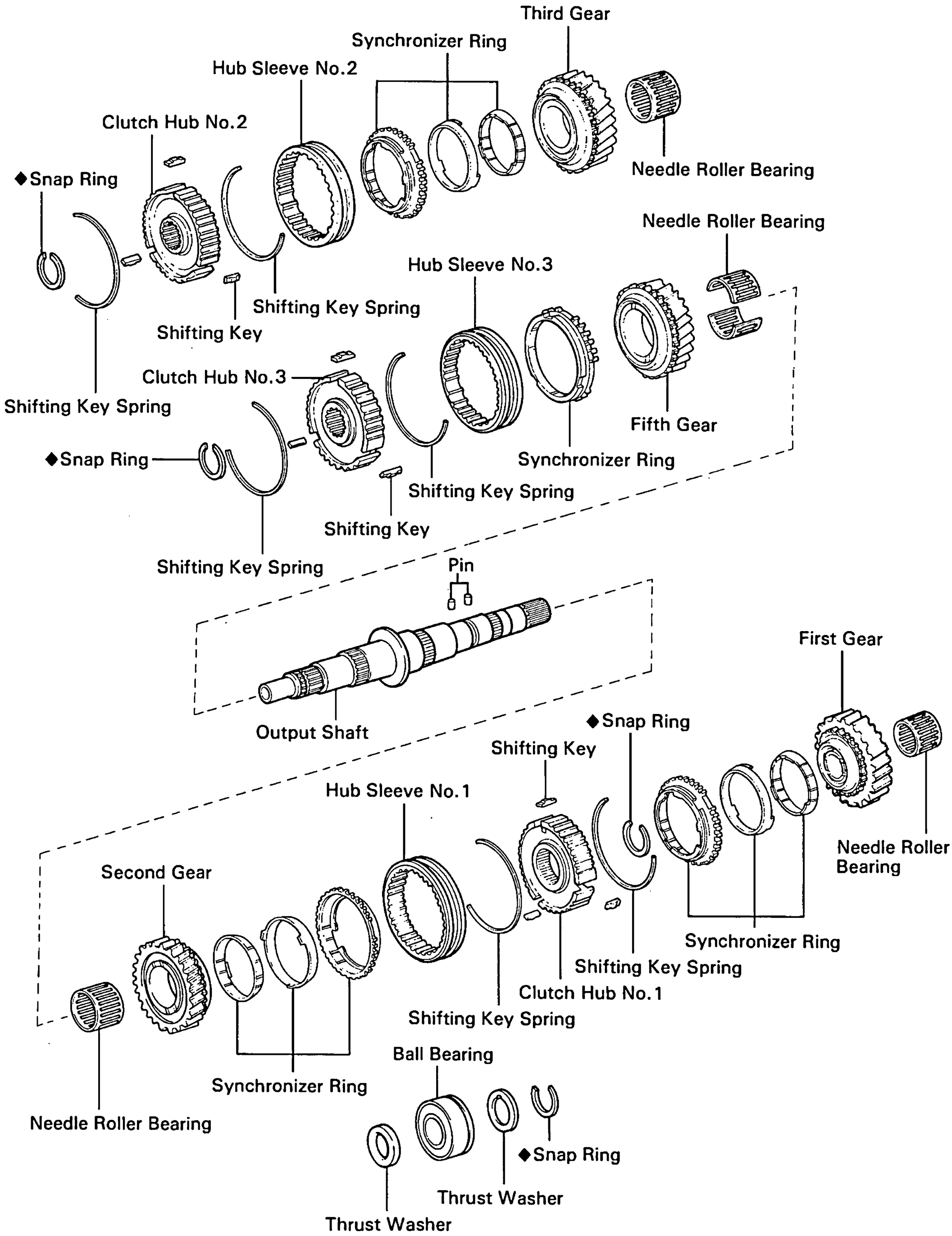
H150F




◆ Non-reusable part

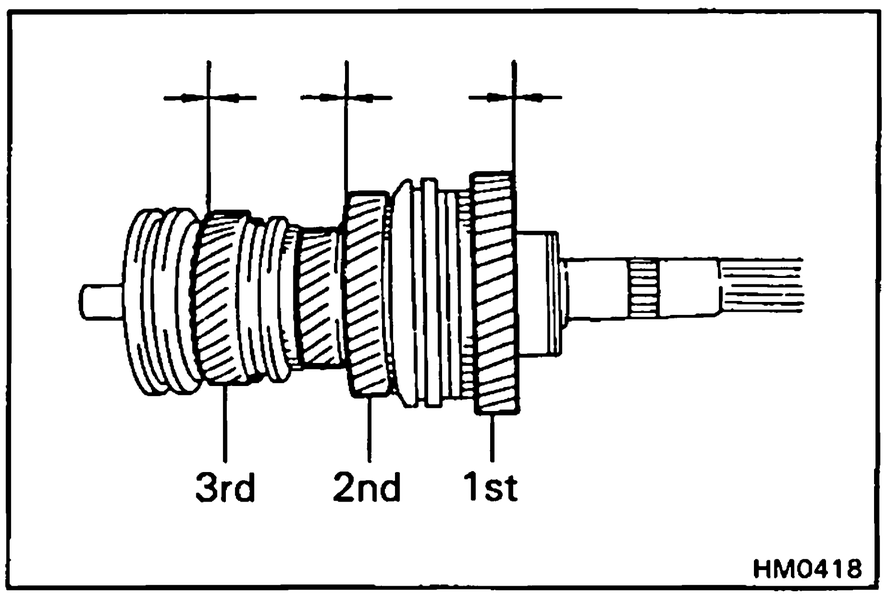
Q03128

**H151F**




◆ Non-reusable part

HM0527




# OUTPUT SHAFT DISASSEMBLY

## 1. INSPECT EACH GEAR THRUST CLEARANCE

Measure the thrust clearance of each gear.

**Standard clearance:**

| | |
|---|---|
| **1st and 3rd gear** | **0.1 — 0.45 mm (0.0039 — 0.0177 in.)** |
| **2nd and 5th gear** | **0.1 — 0.35 mm (0.0039 — 0.0138 in.)** |

**Maximum clearance:**

| | |
|---|---|
| **1st and 3rd gear** | **0.45 mm (0.0177 in.)** |
| **2nd and 5th gear** | **0.35 mm (0.0138 in.)** |

## 2. INSPECT EACH GEAR OIL CLEARANCE

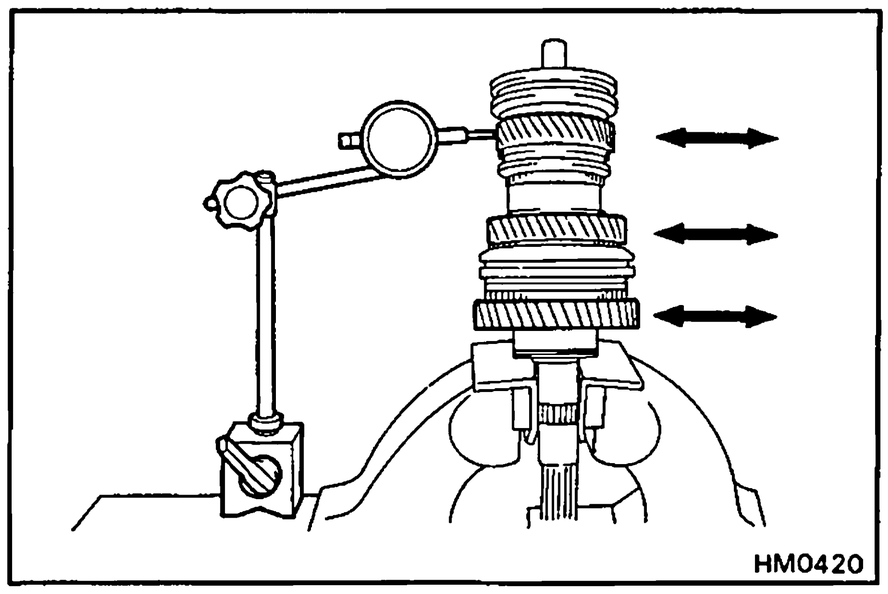
Using a dial indicator, measure the oil clearance of each gear.

**Standard clearance:**

| | |
|---|---|
| **1st and 3rd gear** | **0.020 — 0.073 mm (0.0008 — 0.0029 in.)** |
| **2nd and 5th gear** | **0.015 — 0.068 mm (0.0006 — 0.0027 in.)** |

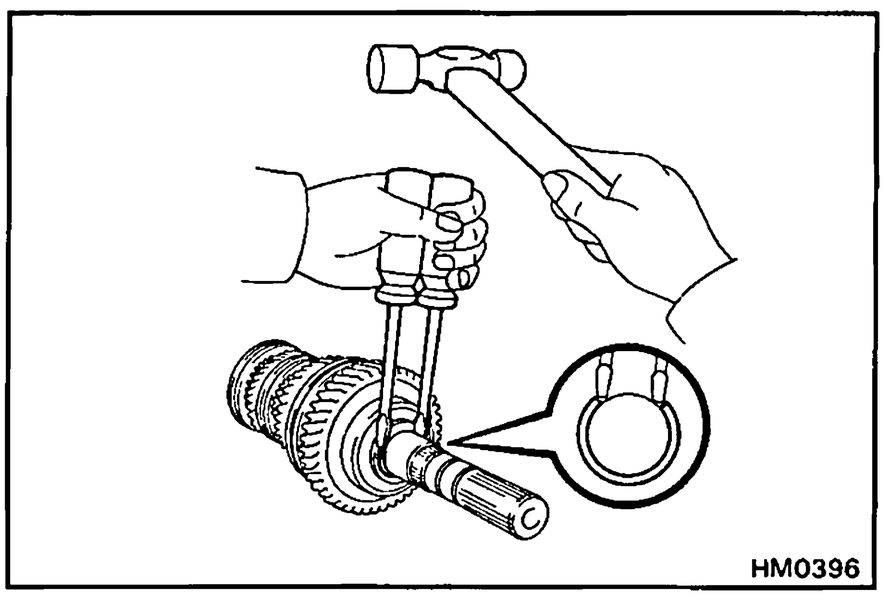
**Maximum clearance:**

| | |
|---|---|
| **1st and 3rd gear** | **0.073 mm (0.0029 in.)** |
| **2nd and 5th gear** | **0.068 mm (0.0027 in.)** |

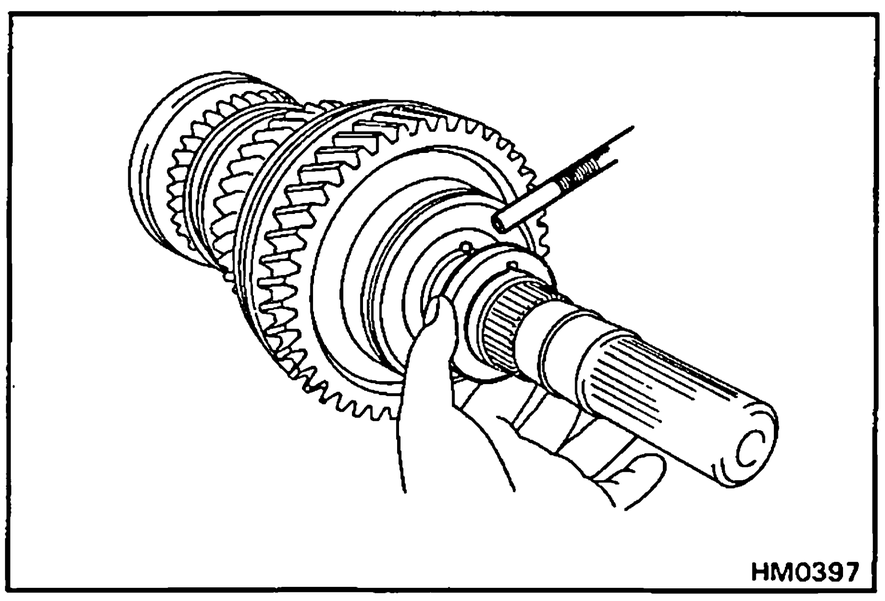


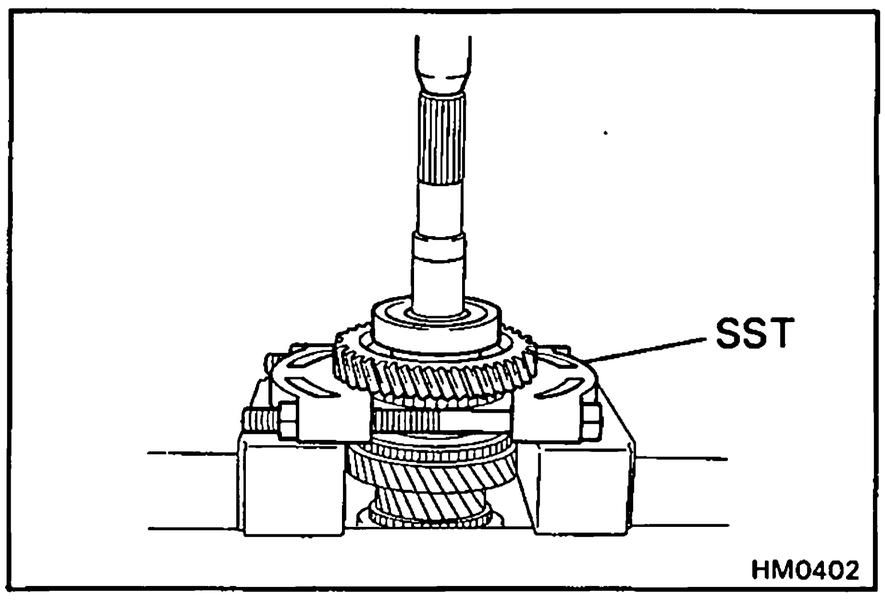

## 3. REMOVE BALL BEARING AND FIRST GEAR

(a) Using two screwdrivers and a hammer, drive out the snap ring.




(b) Remove the thrust washer and pin.



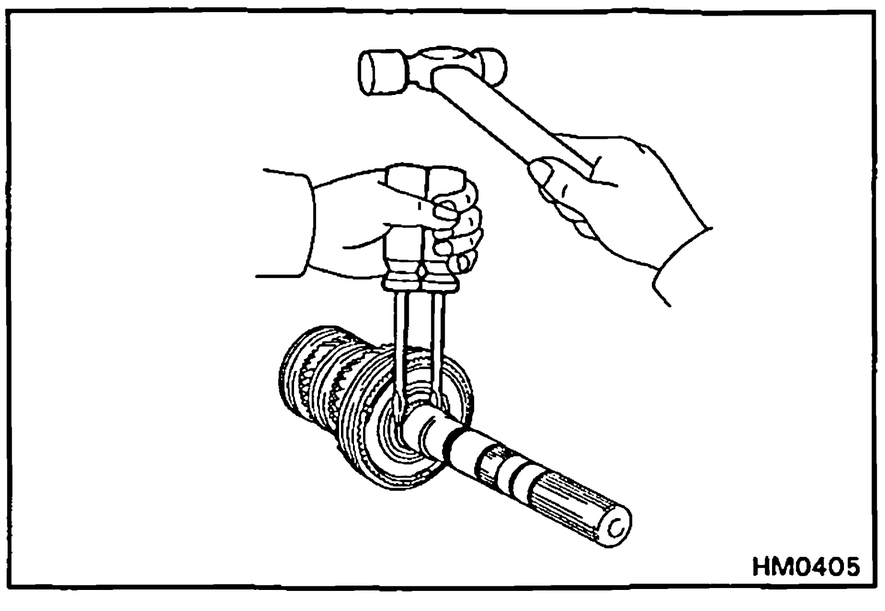

(c) Using SST and a press, remove the ball bearing, thrust washer, first gear and synchronizer ring.

H150F — Single Synchronizer ring

H151F — Triple Synchronizer rings

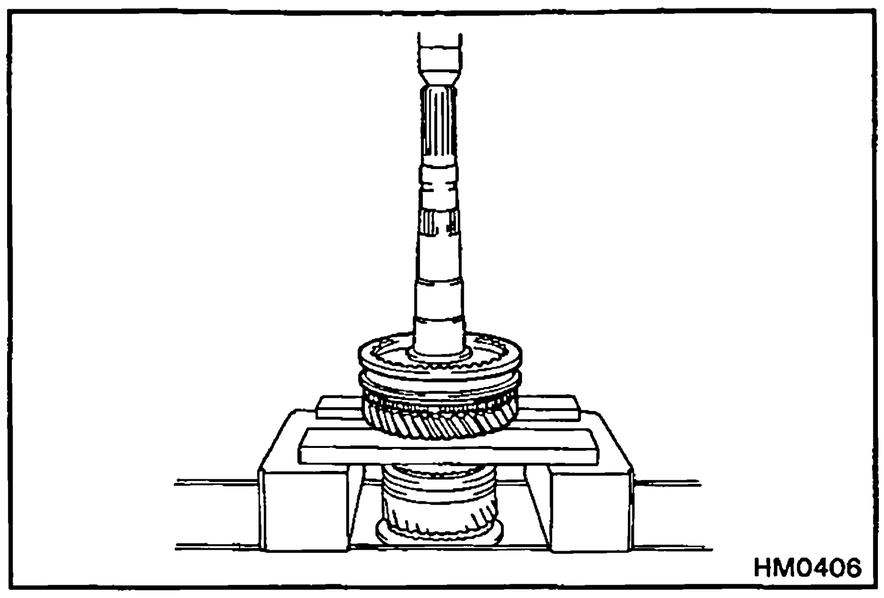
SST 09555-55010

(d) Remove the pin and needle roller bearing.


HM0405

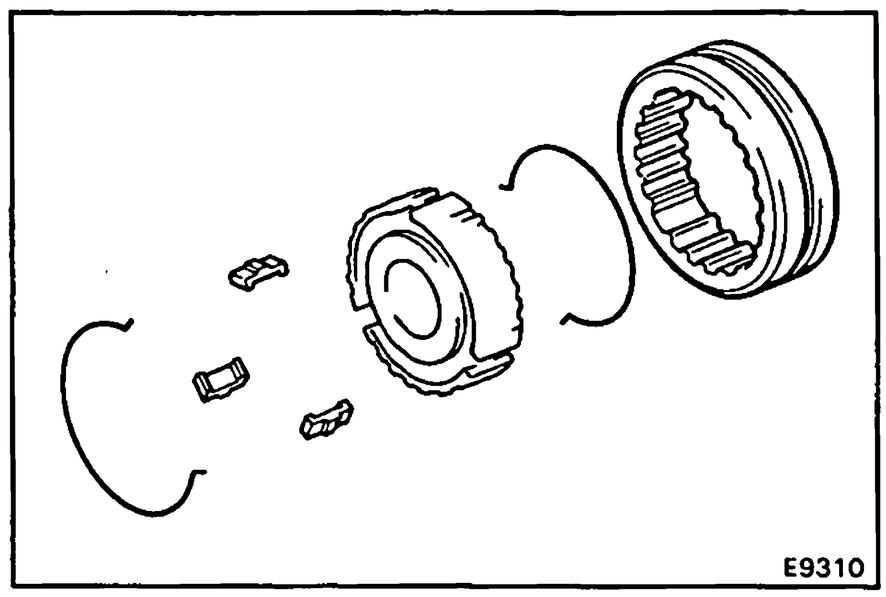
**4. REMOVE HUB SLEEVE NO.1 ASSEMBLY, SYNCHRONIZER RING, SECOND GEAR AND NEEDLE ROLLER BEARING**

(a) Using two screwdrivers and a hammer, drive out the snap ring.


HM0406

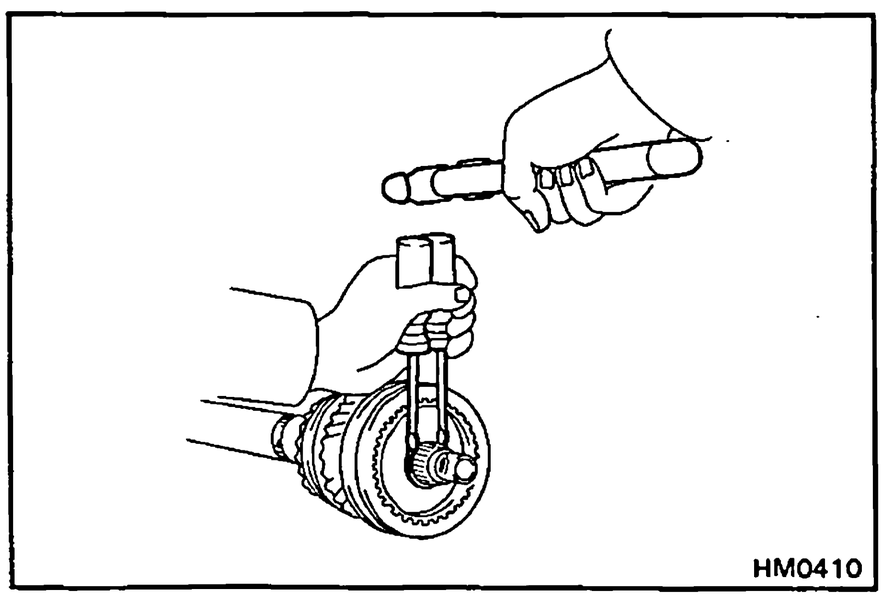
(b) Using a press, remove the hub sleeve No.1 assembly, synchronizer rings, and second gear.

(c) Remove the needle roller bearing.


E9310

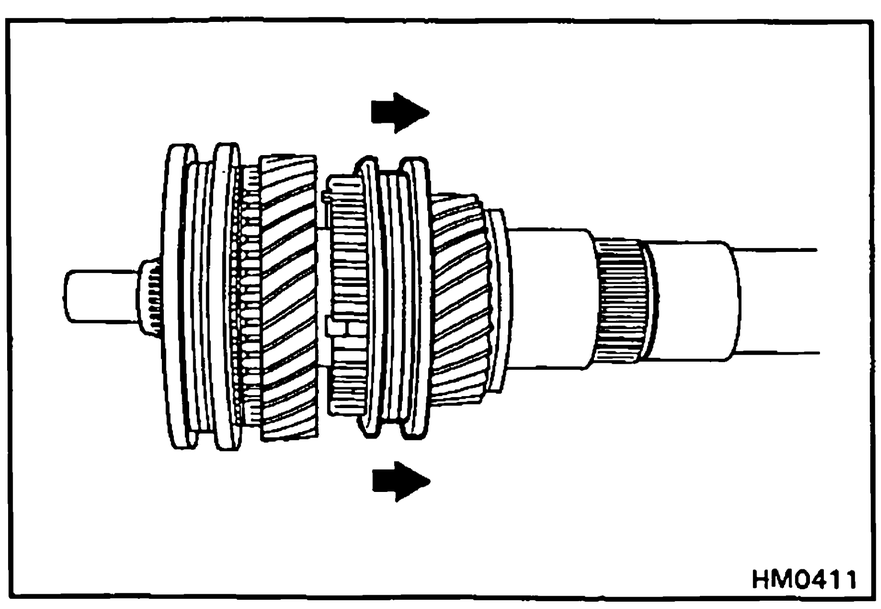
**5. REMOVE HUB SLEEVE NO.1, SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.1**

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.1.

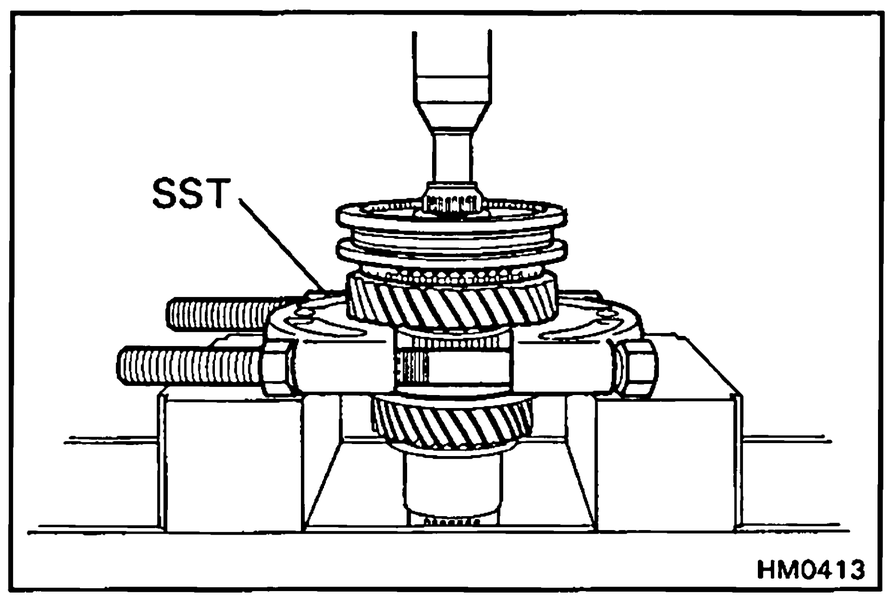

HM0410

**6. REMOVE HUB SLEEVE NO.2 ASSEMBLY, SYNCHRONIZER RING, THIRD GEAR AND NEEDLE ROLLER BEARING**

(a) Remove two screwdrivers and a hammer, drove out the snap ring.


HM0411

(b) Shift hub sleeve No.3 onto the fifth gear.



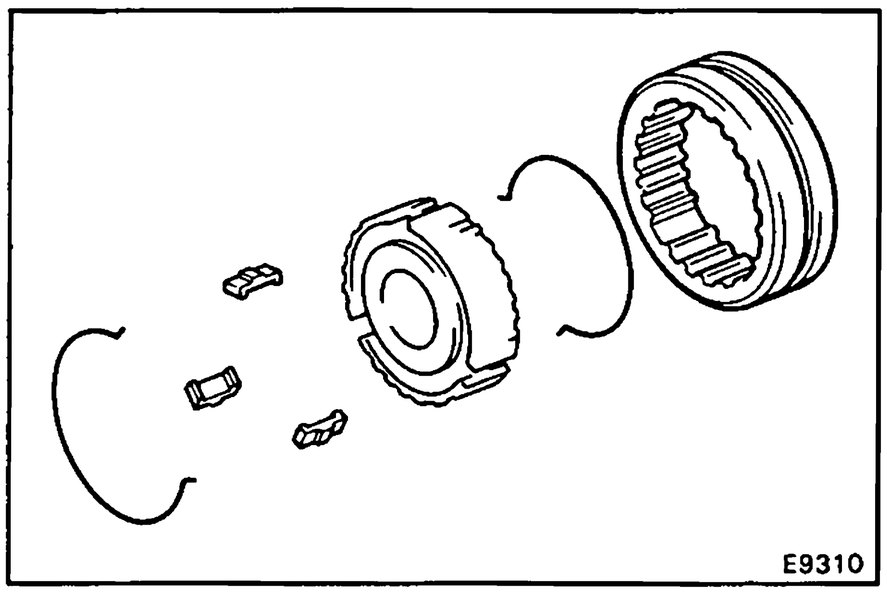

(c) Using SST and a press, remove the hub sleeve No.2 assembly, synchronizer ring and third gear.

H150F — Single Synchronizer ring

H151F — Triple Synchronizer rings

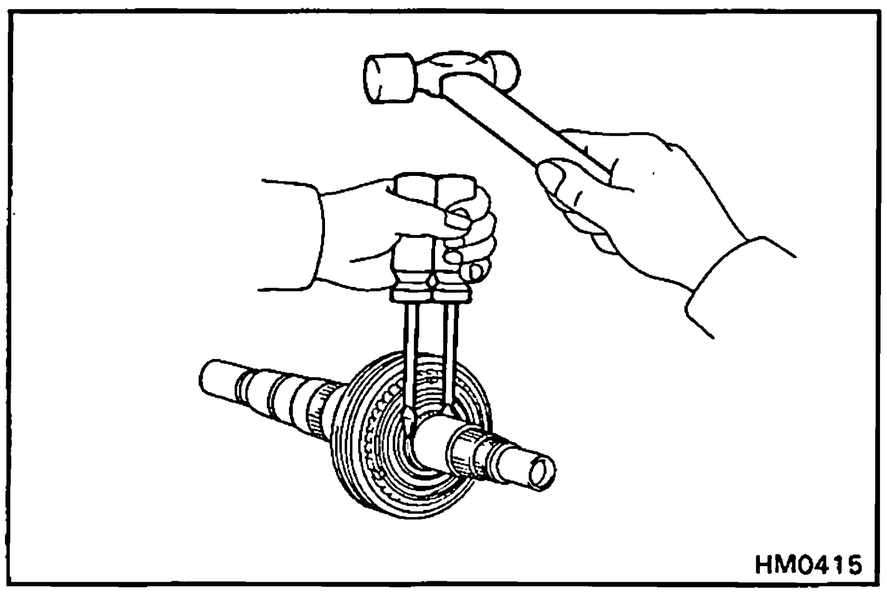
SST 09555-55010

(d) Remove the needle roller bearing.



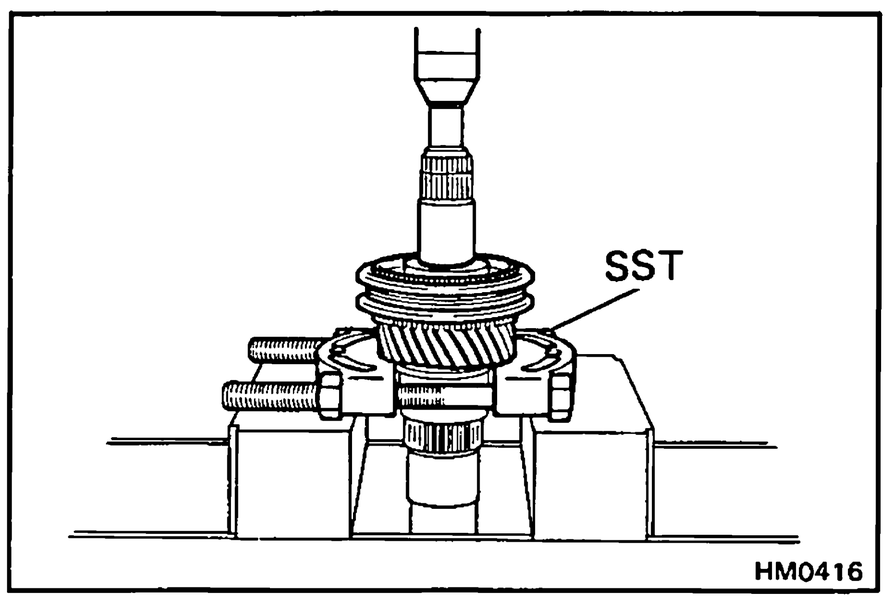

**7. REMOVE HUB SLEEVE NO.2, SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.2**

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.2.




**8. REMOVE HUB SLEEVE NO.3 ASSEMBLY, SYNCHRONIZER RING, FIFTH GEAR AND NEEDLE ROLLER BEARING**

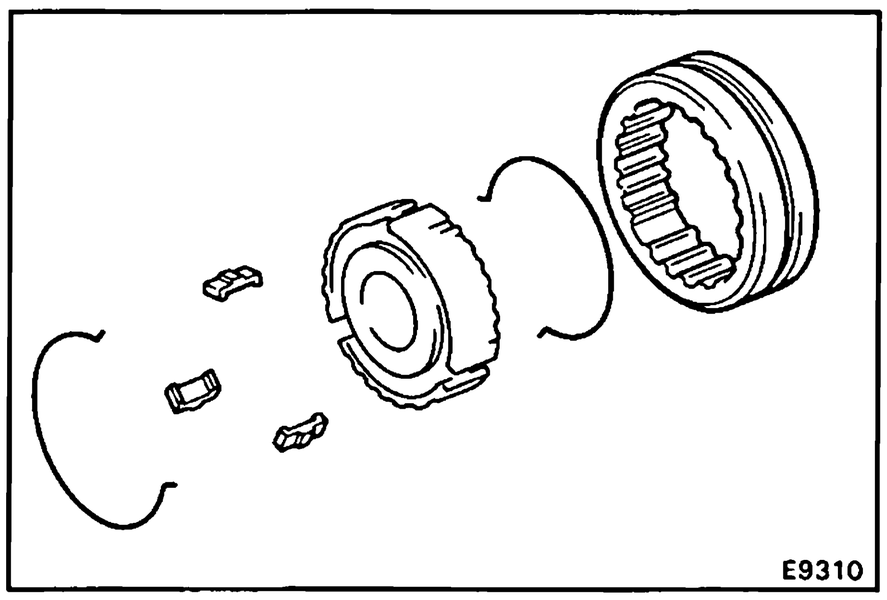
(a) Using two screwdriver, and a hammer, drive out the snap ring.




(b) Using SST and a press, remove the hub sleeve No.3 assembly and synchronizer ring.

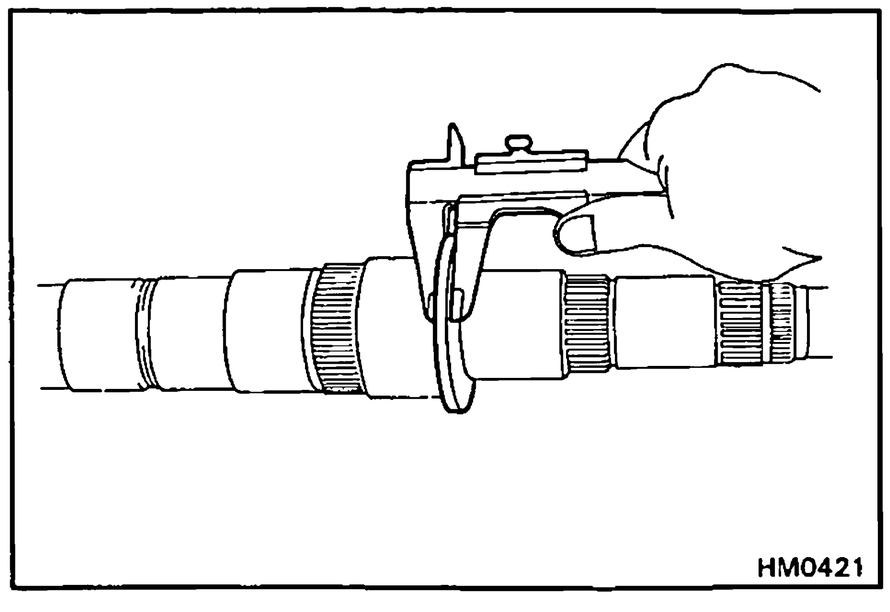
SST 09950-00020

(c) Remove the needle roller bearing.




**9. REMOVE HUB SLEEVE NO.3 SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.3**

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.3.


HM0421

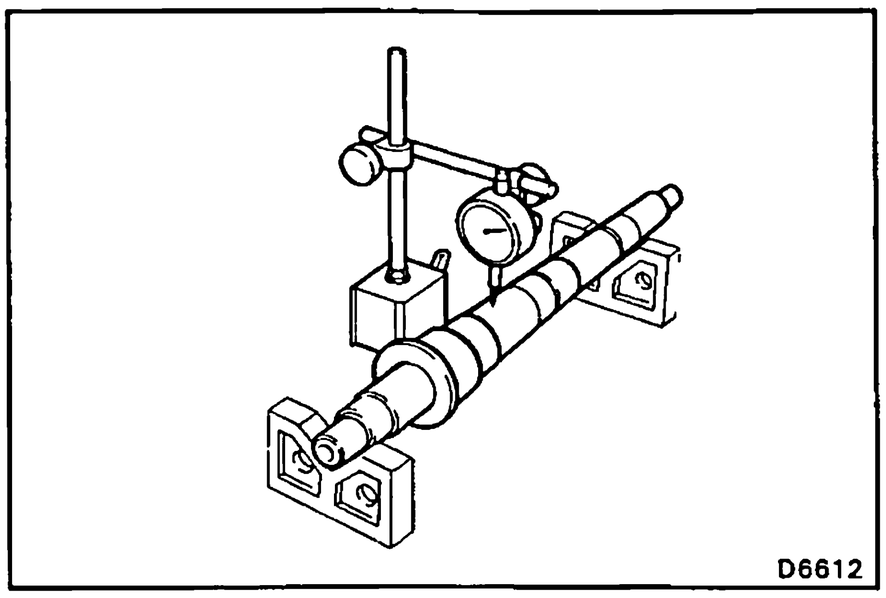
# OUTPUT SHAFT ASSEMBLY INSPECTION

## 1. INSPECT OUTPUT SHAFT

(a) Using calipers, measure the output shaft flange thickness.

**Minimum thickness:**
**4.725 mm (0.1860 in.)**

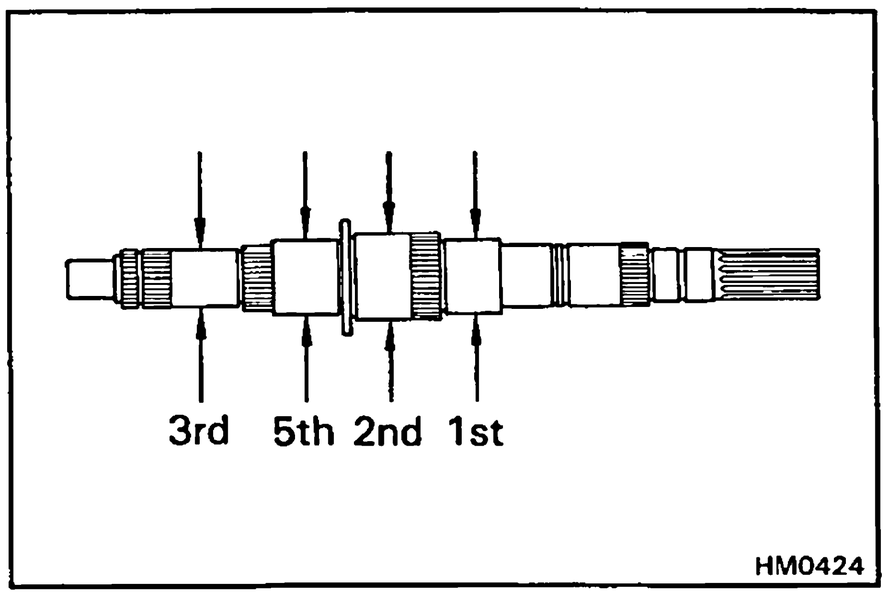
If the thickness is less than the minimum, replace the output shaft.


D6612

(b) Using a dial indicator, check the shaft runout.

**Maximum runout:**
**0.03 mm (0.0020 in.)**

If the runout exceeds the maximum, replace the output shaft.



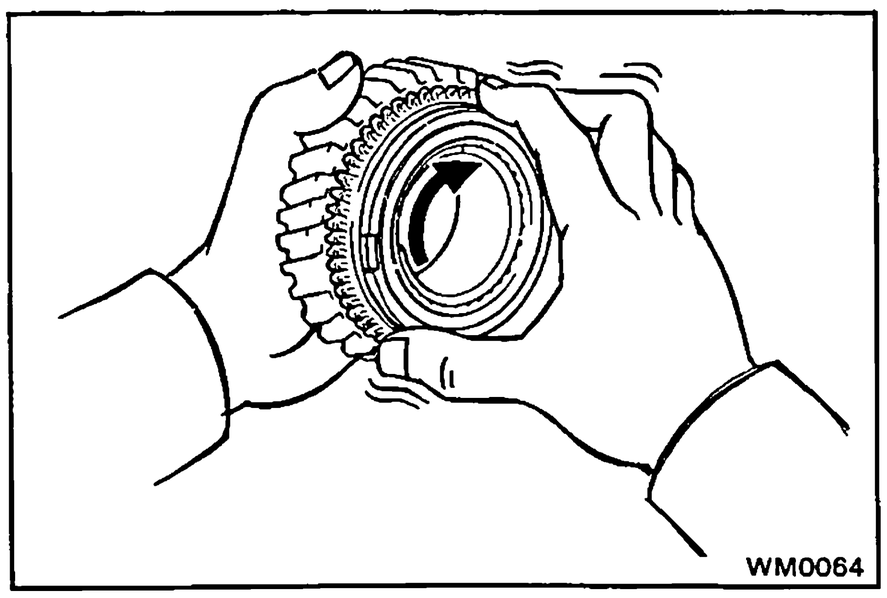
HM0424

(c) Using a micrometer, measure the outer diameter of the output shaft journal.

**Minimum outer diameter:**

| | |
|---|---|
| **1st** | **49.979 mm (1.9677 in.)** |
| **2nd** | **57.984 mm (2.2828 in.)** |
| **3rd** | **37.979 mm (1.4952 in.)** |
| **5th** | **45.984 mm (1.8104 in.)** |

If the outer diameter is less than the minimum, replace the output shaft.


WM0064

## 2. INSPECT SYNCHRONIZER RINGS

H150F — FOR FIRST, THIRD AND FIFTH GEARS

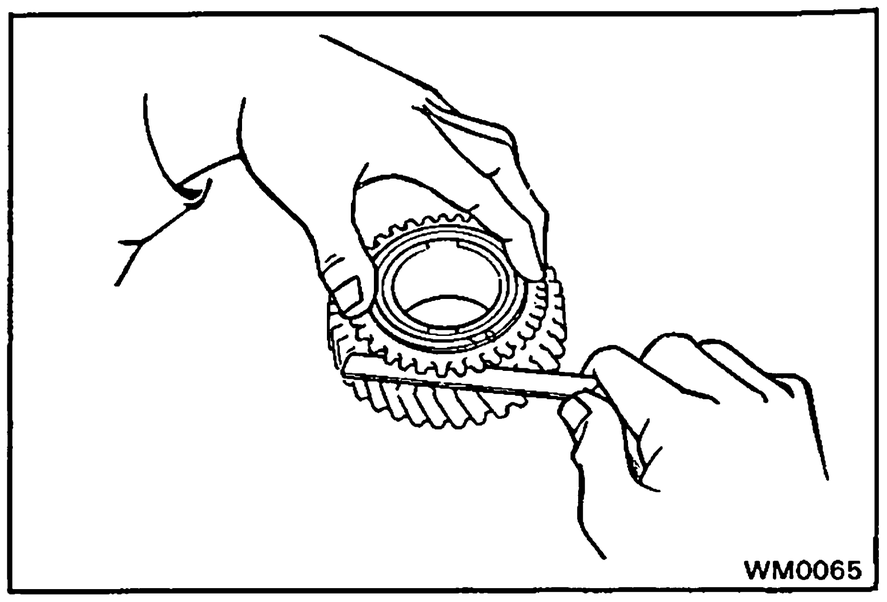
H151F — FOR FIFTH GEARS

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, lightly rub the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

**NOTICE:**

- **Wash off completely the fine lapping compound after rubbing.**
- **Check again the braking effect of the synchronizer ring.**


WM0065

(c) Using a feeler gauge, measure the clearance between the synchronizer ring back and the gear spline end.

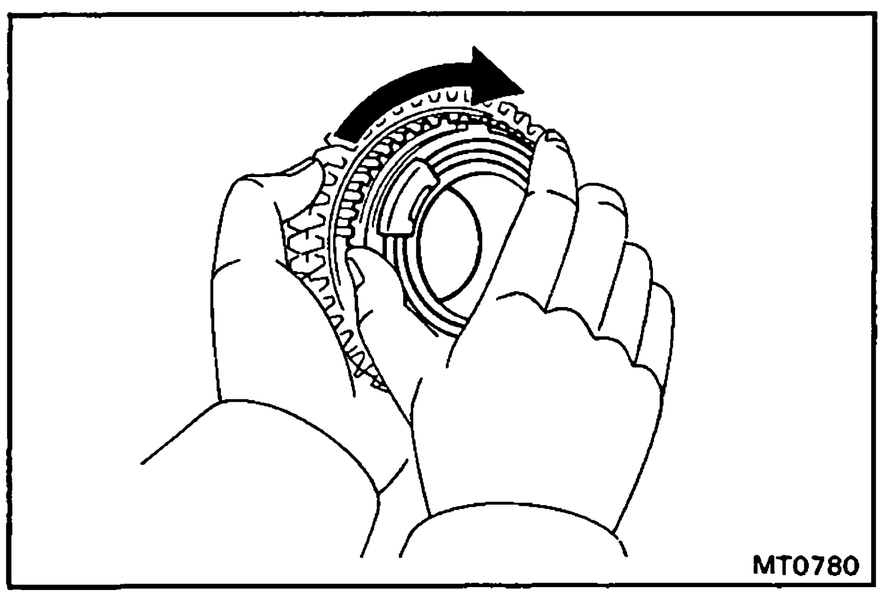
**Minimum clearance:**

| | |
|---|---|
| **1st gear** | **1.1 mm (0.0433 in.)** |
| **3rd and 5th gear** | **0.8 mm (0.0315 in.)** |

HINT:

- When replacing either a synchronizer ring or gear, apply a small amount of fine lapping compound between the synchronizer ring and gear cone.Lightly rub the synchronizer ring and gear together.
- When replacing both the synchronizer ring and gear, there is no need to apply any compound or to rub them together.

**NOTICE: Wash off completely the fine lapping compound after rubbing.**


MT0780

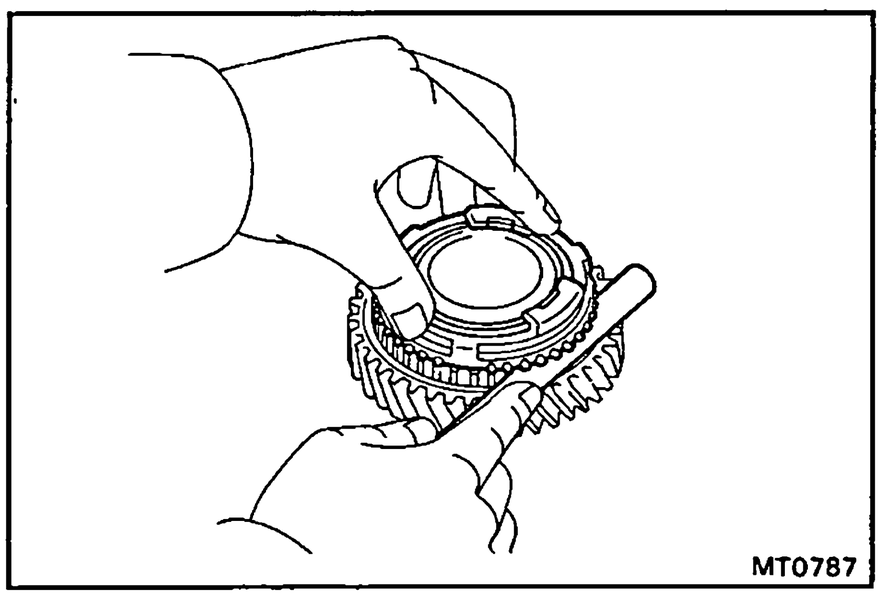
### 3. INSPECT SYNCHRONIZER RING

H150F – FOR SECOND GEARS

H151F – FOR FIRST SECOND AND THIRD GEARS

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, replace the synchronizer ring.

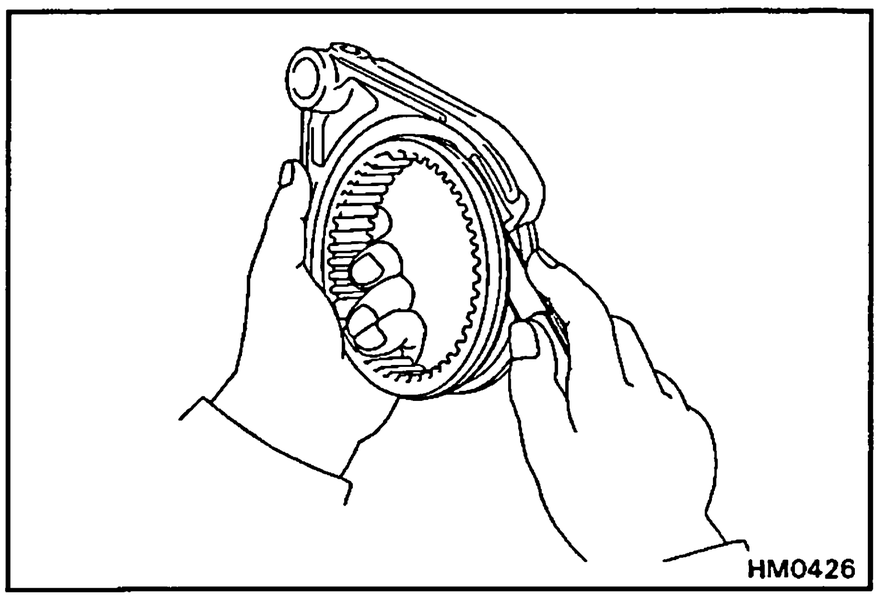

MT0787

(c) Measure the clearance between the synchronizer ring back and gear spline end.

**Minimum clearance:**

| | |
|---|---|
| **1st and 2nd gear** | **0.85 mm (0.0335 in.)** |
| **3rd gear** | **0.75 mm (0.0295 in.)** |

If the clearance is less than the limit, replace the synchronizer ring.


HM0426

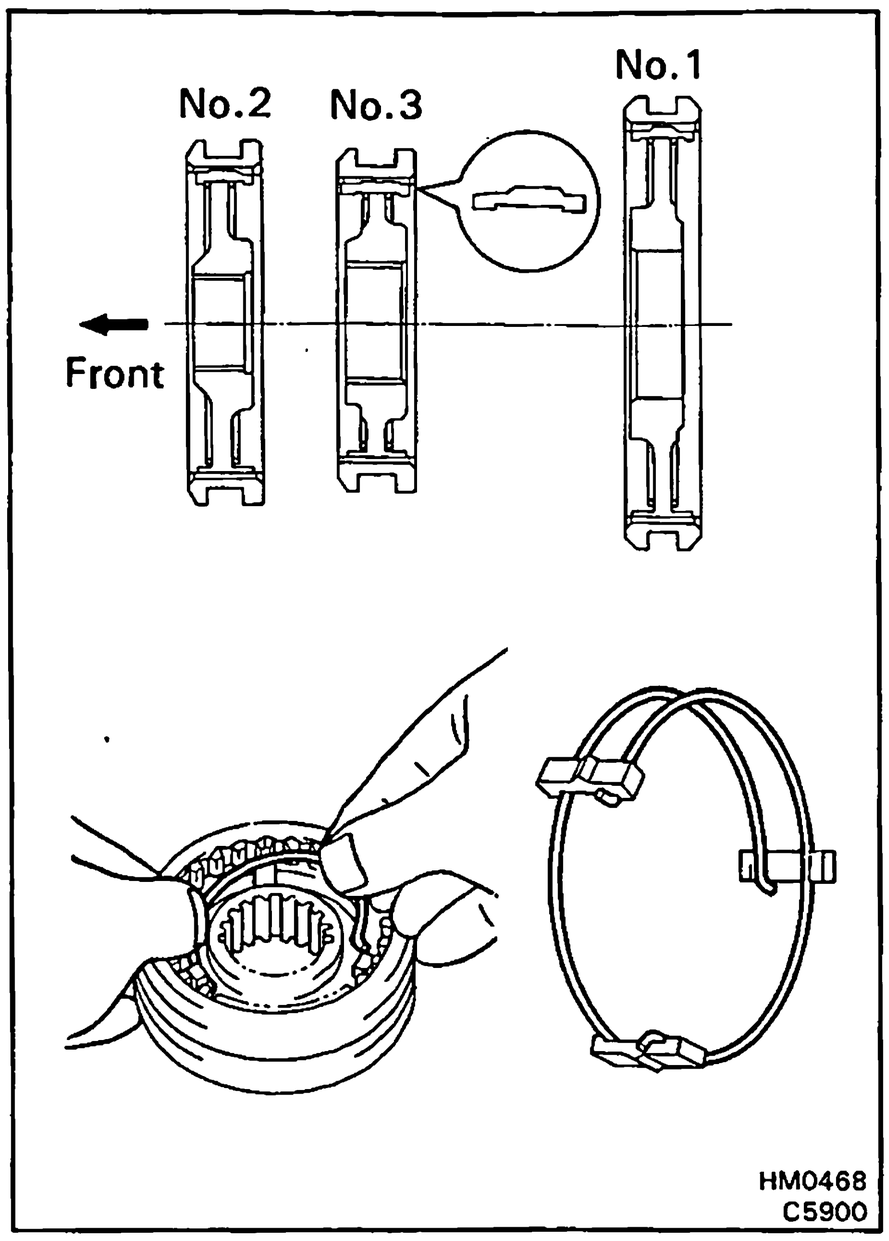
### 4. INSPECT CLEARANCE OF SHIFT FORKS AND HUB SLEEVES

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

**Maximum clearance:**

**0.35 mm (0.0138 in.)**

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.



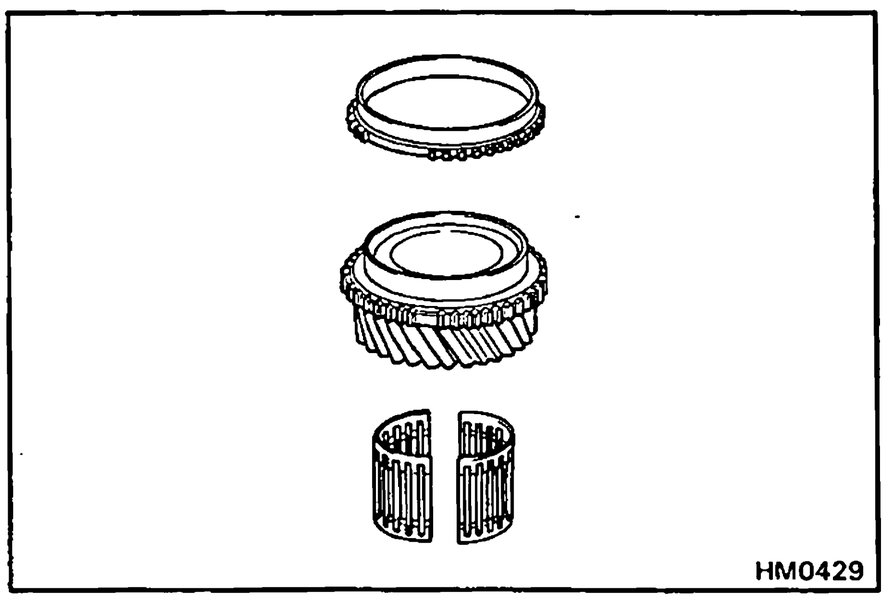

# OUTPUT SHAFT ASSEMBLY

**1. INSTALL CLUTCH HUB NO.1, NO.2 AND NO.3 INTO HUB SLEEVE**

(a) Install the clutch hub and shifting keys to the hub sleeve.

(b) Install the springs under the shifting keys.

**NOTICE: Install the key springs positioned so that their end gaps are not in line.**

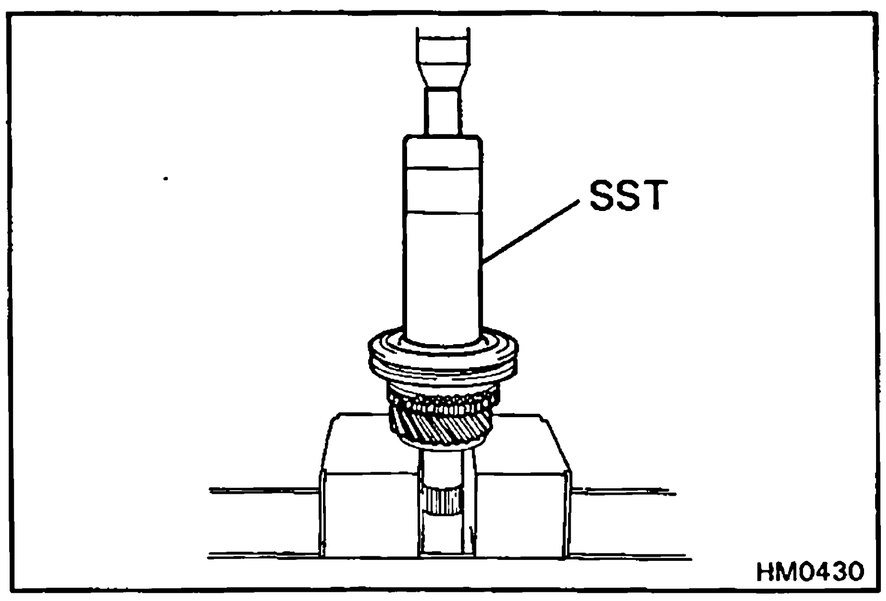



**2. INSTALL FIFTH GEAR AND HUB SLEEVE NO.3 ASSEMBLY ON OUTPUT SHAFT**

(a) Apply gear oil to the shaft and needle roller bearing.

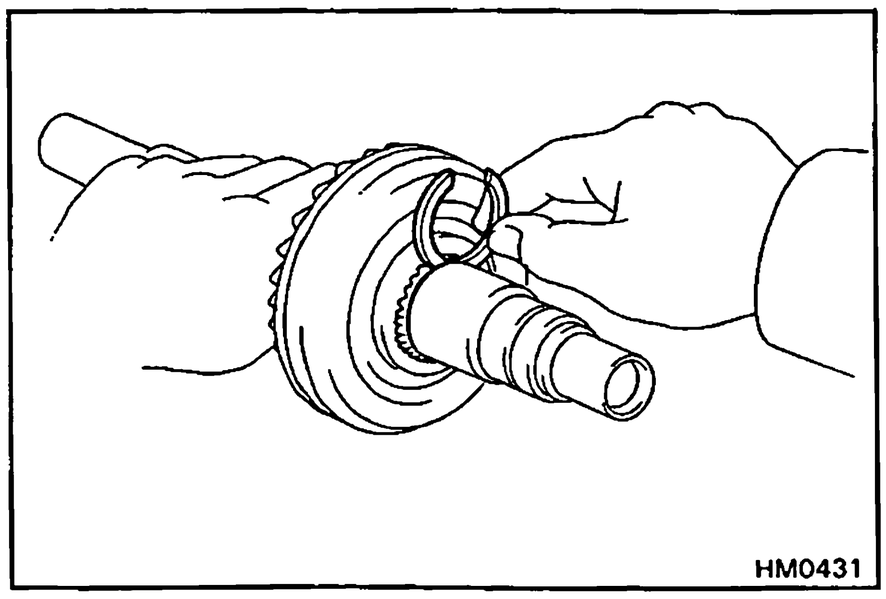
(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the fifth gear.




(d) Using SST and a press, install the fifth gear and hub sleeve No.3.

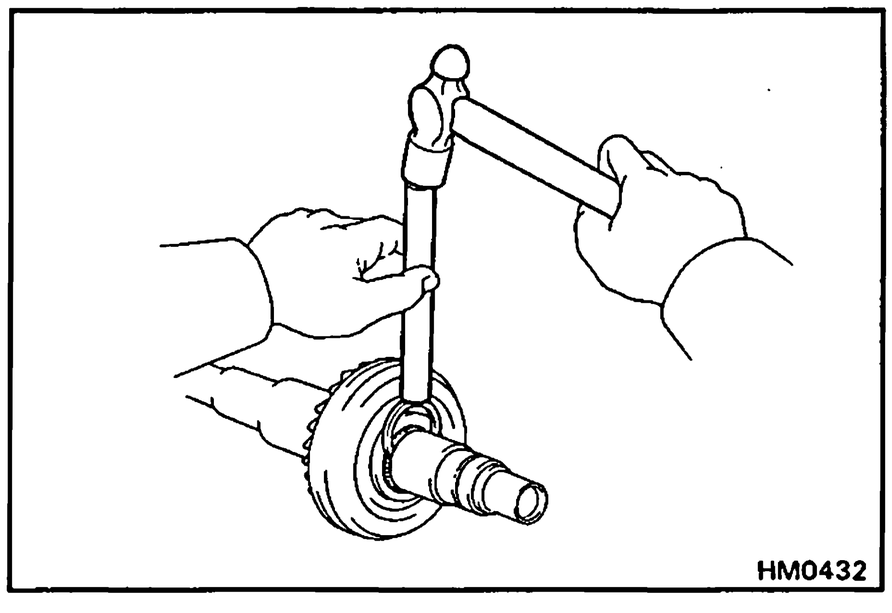
SST 09316-60010 (09316-00010)



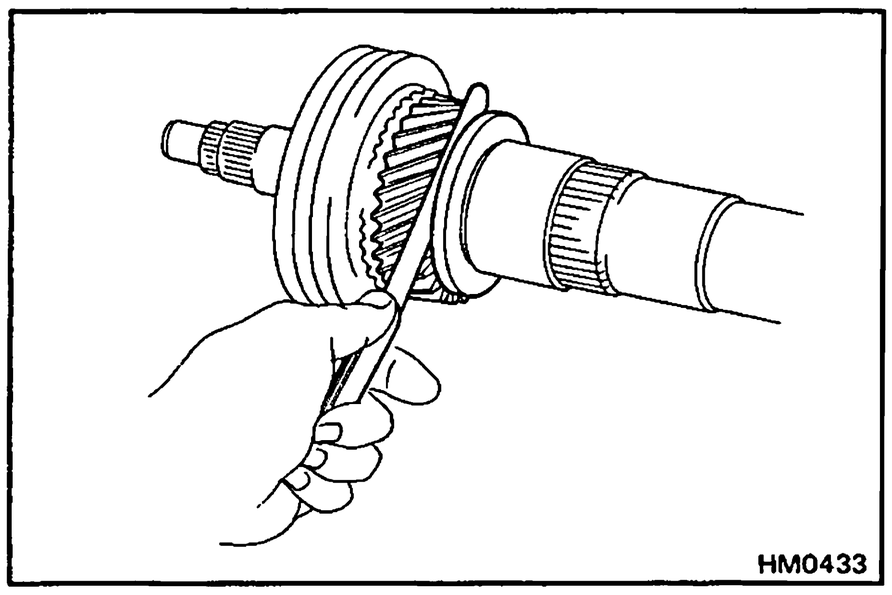

**3. INSTALL SNAP RING**

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.40 — 2.45 (0.0945 — 0.0965) |
| B | 2.45 — 2.50 (0.0965 — 0.0984) |
| C | 2.50 — 2.55 (0.0984 — 0.1004) |
| D | 2.55 — 2.60 (0.1004 — 0.1024) |
| E | 2.60 — 2.65 (0.1024 — 0.1044) |
| F | 2.65 — 2.70 (0.1044 — 0.1063) |



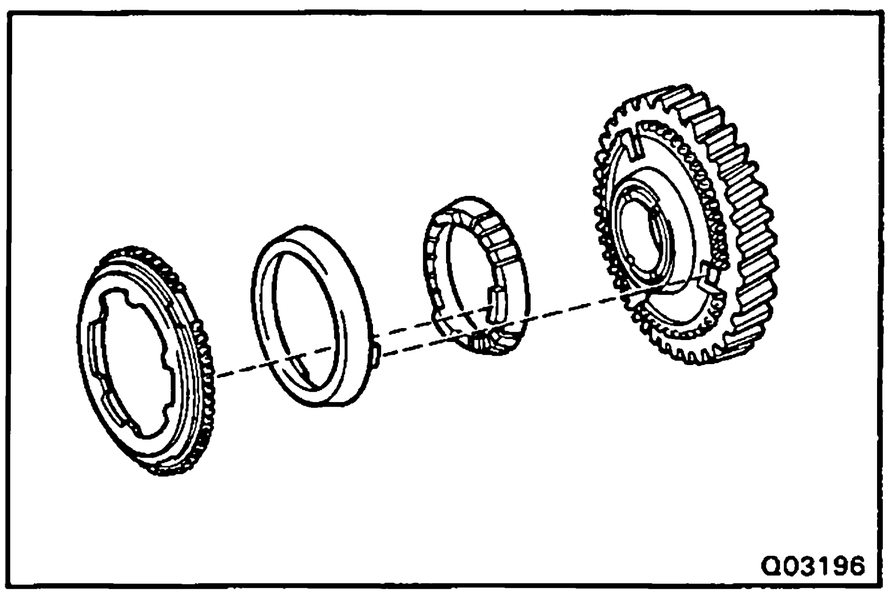

(b) Using a brass bar and hammer, drive in the snap ring.




**4. INSPECT FIFTH GEAR THRUST CLEARANCE**

Using a feeler gauge, measure the fifth gear thrust clearance.

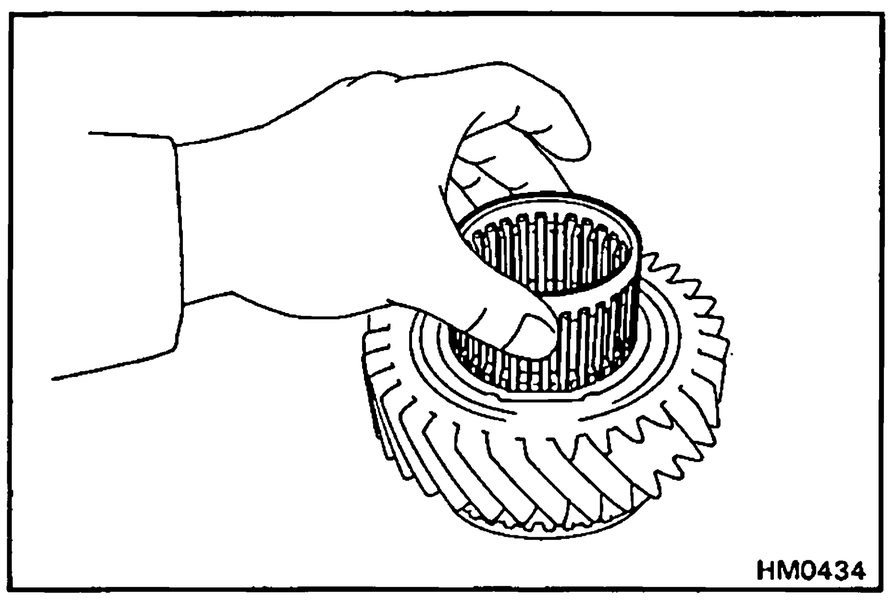
**Standard clearance:**
**0.1 — 0.35 mm (0.0039 — 0.0138 in.)**




**5. INSTALL THIRD GEAR AND HUB SLEEVE NO.2 ASSEMBLY**

(H151F)

(a) Place the synchronizer rings on the 3rd gear.

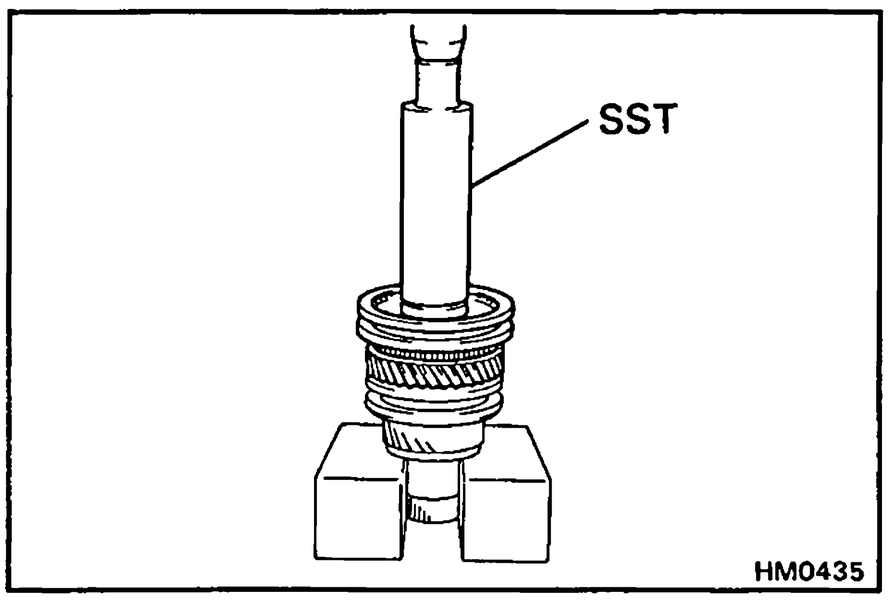



(b) Apply gear oil to the shaft and needle roller bearing.

(H150F)

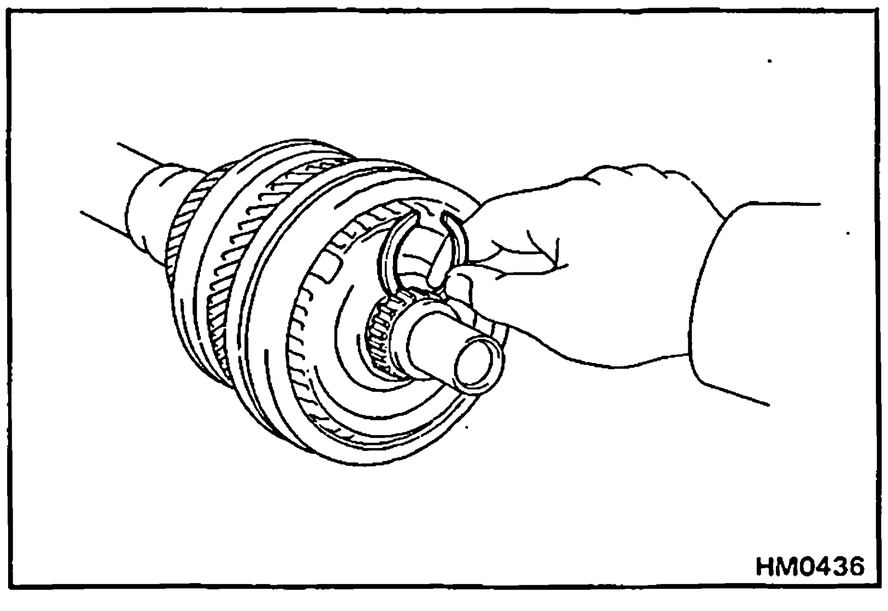
(c) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(d) Install the needle roller bearing in the third gear.




(e) Using SST and a press, install the third gear and hub sleeve No.2.

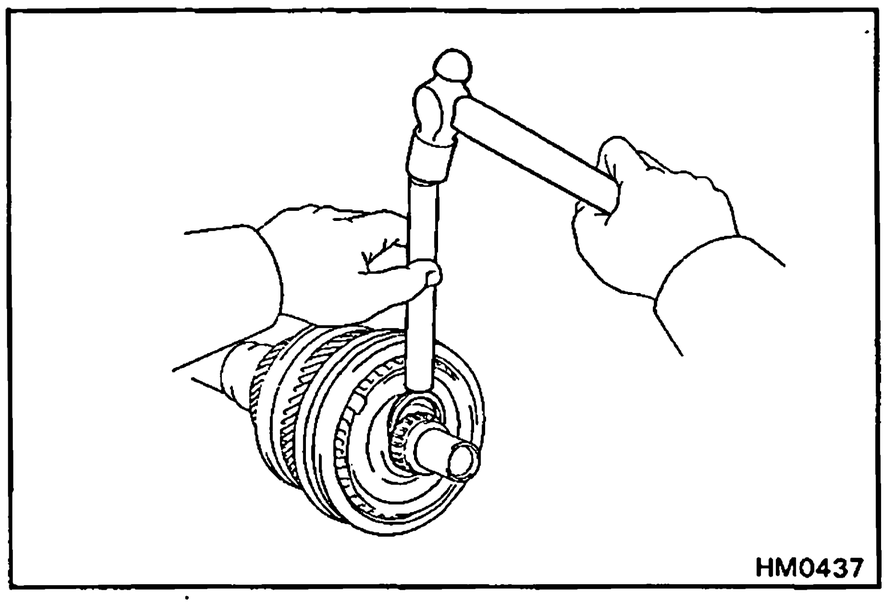
SST 09316-60010 (09316-00010)


HM0436

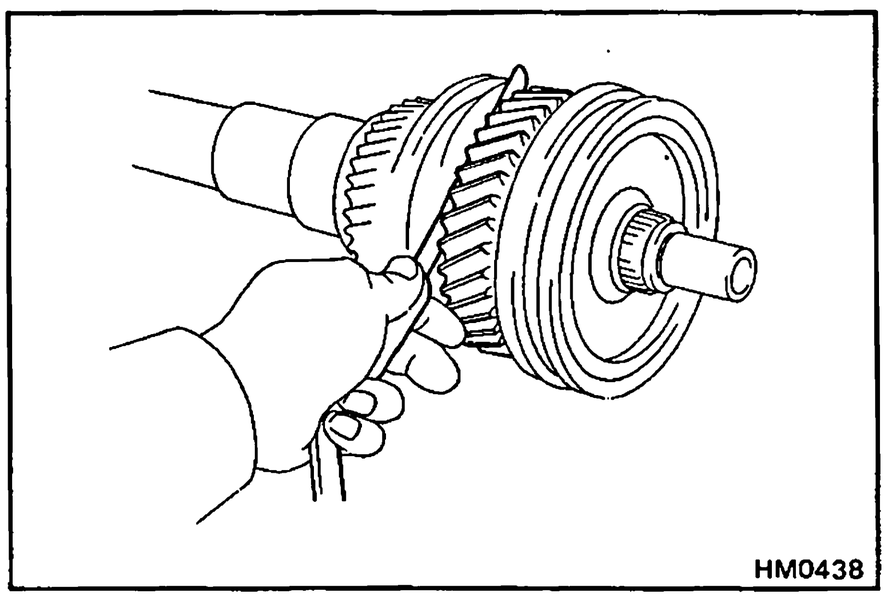
## 6. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| 4 | 1.90 — 1.95 (0.0748 — 0.0768) |
| 5 | 1.95 — 2.00 (0.0768 — 0.0787) |
| 6 | 2.00 — 2.05 (0.0787 — 0.0807) |
| 7 | 2.05 — 2.10 (0.0807 — 0.0827) |
| 8 | 2.10 — 2.15 (0.0827 — 0.0847) |
| 9 | 2.15 — 2.20 (0.0847 — 0.0866) |


HM0437

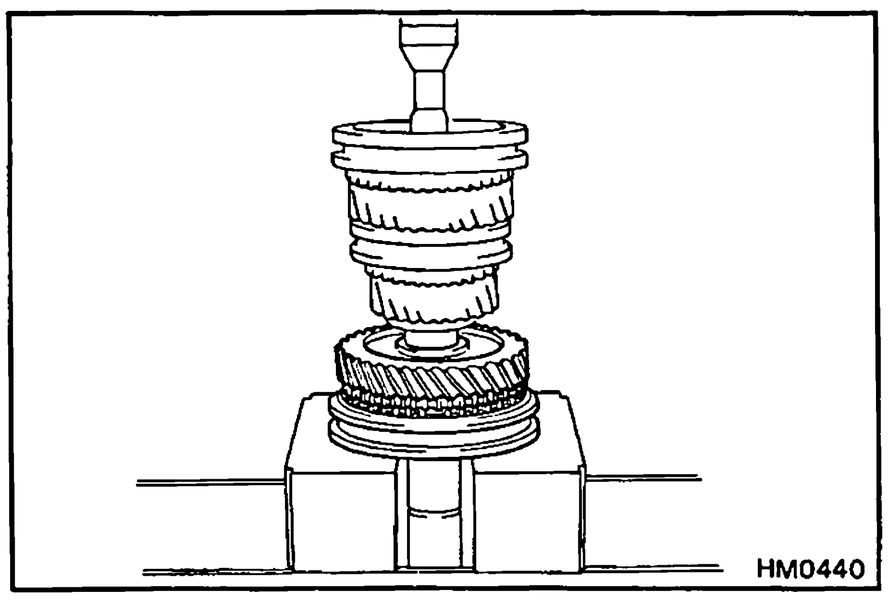
(b) Using a brass bar and a hammer, drive in a new snap ring.


HM0438

## 7. MEASURE THIRD GEAR THRUST CLEARANCE

Using a feeler gauge, measure the third gear thrust clearance.

**Standard clearance:**
**0.1 — 0.45 mm (0.0039 — 0.0138 in.)**


HM0440

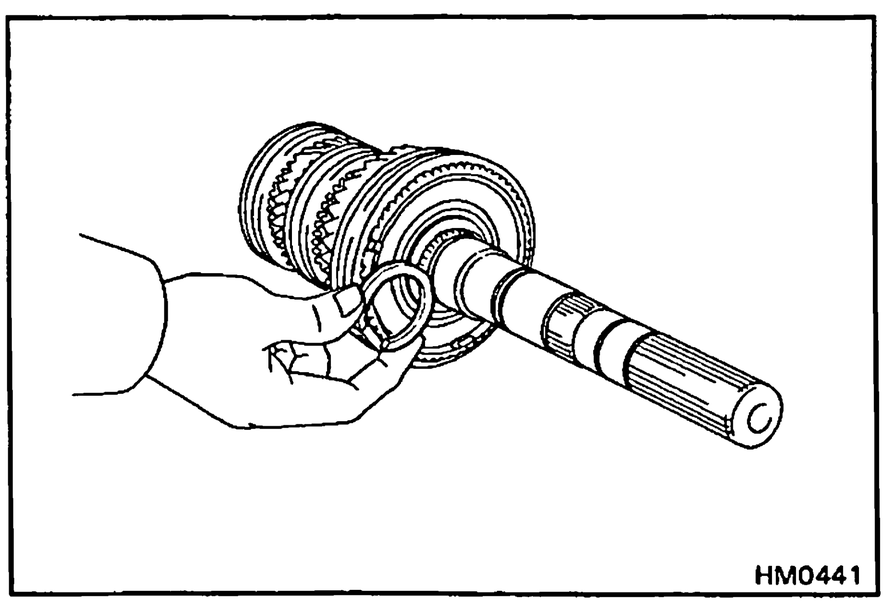
## 8. INSTALL SECOND GEAR AND HUB SLEEVE NO.1 ASSEMBLY

(a) Apply gear oil to the shaft and needle roller bearing.

(b) Place the synchronizer rings on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the second gear.

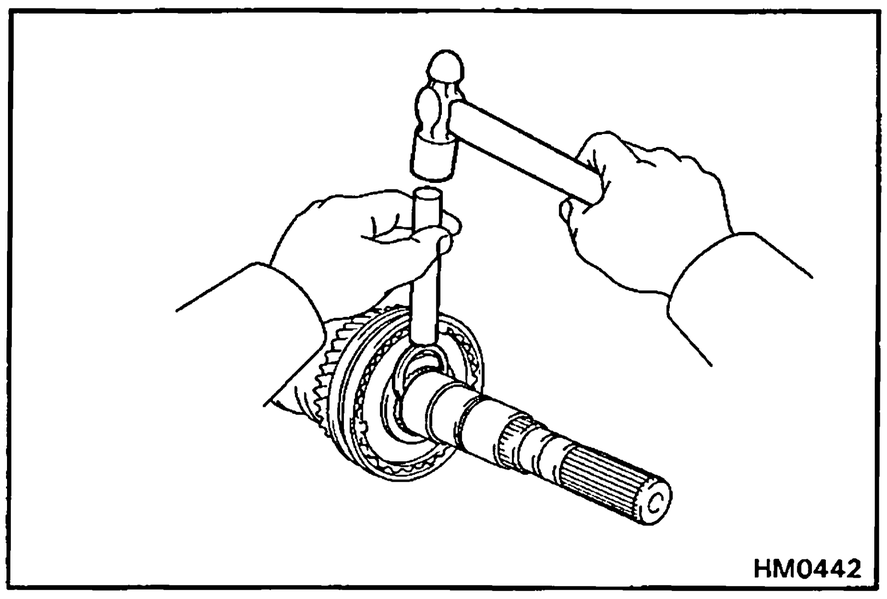
(d) Using a press, install the second gear and hub sleeve No.1 assembly.


HM0441

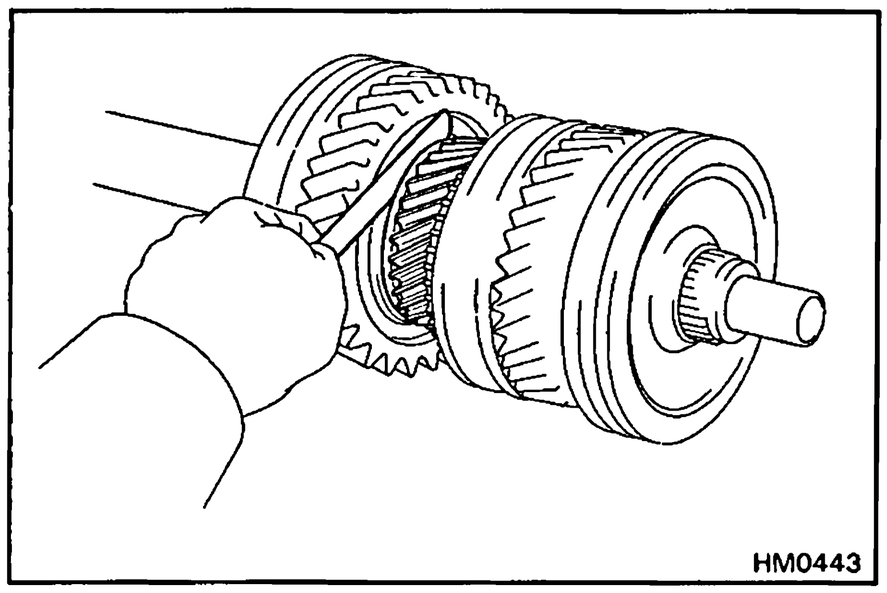
## 9. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.90 — 2.95 (0.1142 — 0.1162) |
| B | 2.95 — 3.00 (0.1162 — 0.1181) |
| C | 3.00 — 3.05 (0.1181 — 0.1201) |
| D | 3.05 — 3.10 (0.1201 — 0.1220) |
| E | 3.10 — 3.15 (0.1220 — 0.1240) |
| F | 3.15 — 3.20 (0.1240 — 0.1260) |


HM0442

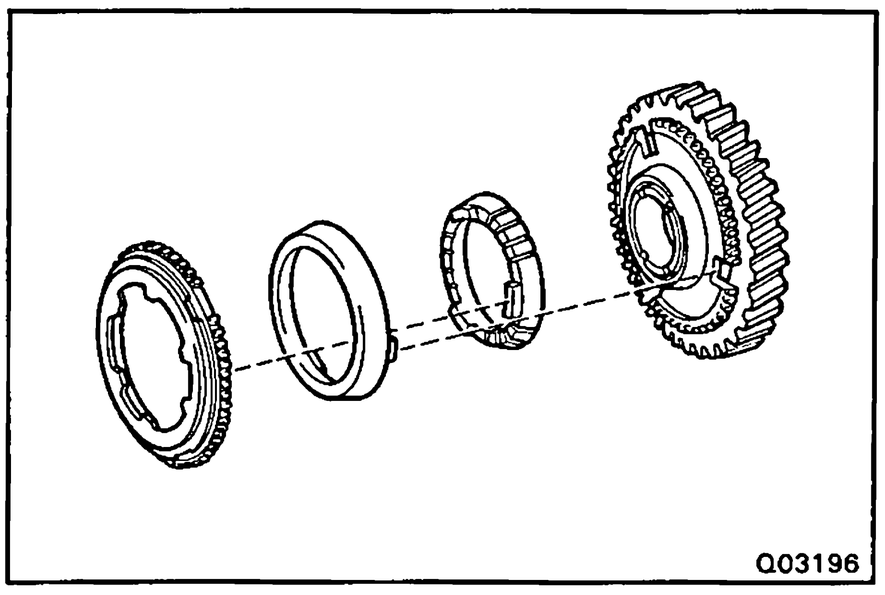
(b) Using a brass bar and a hammer, drive in a new snap ring.


HM0443

**10. INSPECT SECOND GEAR THRUST CLEARANCE**

Using a feeler gauge, measure the second gear thrust clearance.

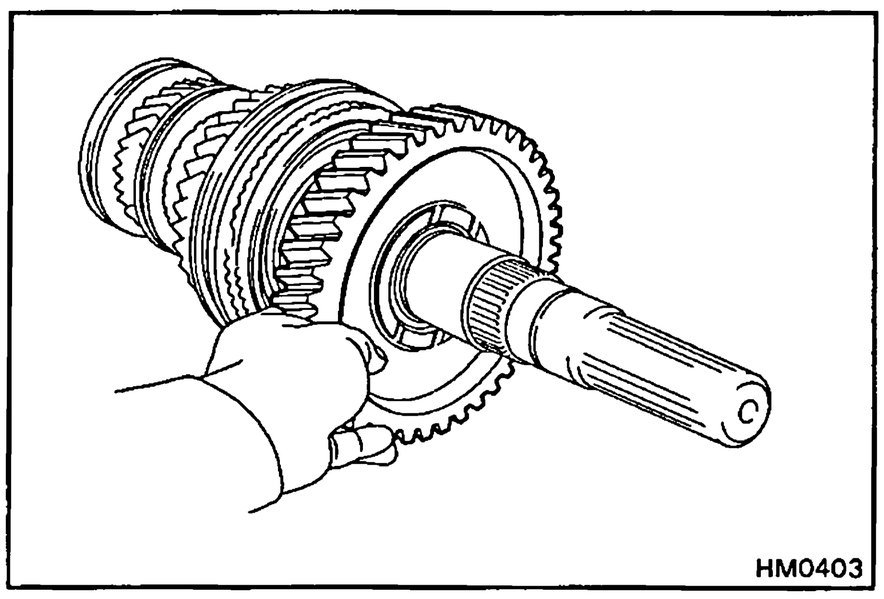
**Standard clearance:**
**0.1 — 0.35 mm (0.0039 — 0.0138 in.)**


Q03196

**11. INSTALL FIRST GEAR**

(H151F)

(a) Place the synchronizer rings on the 1st gear.

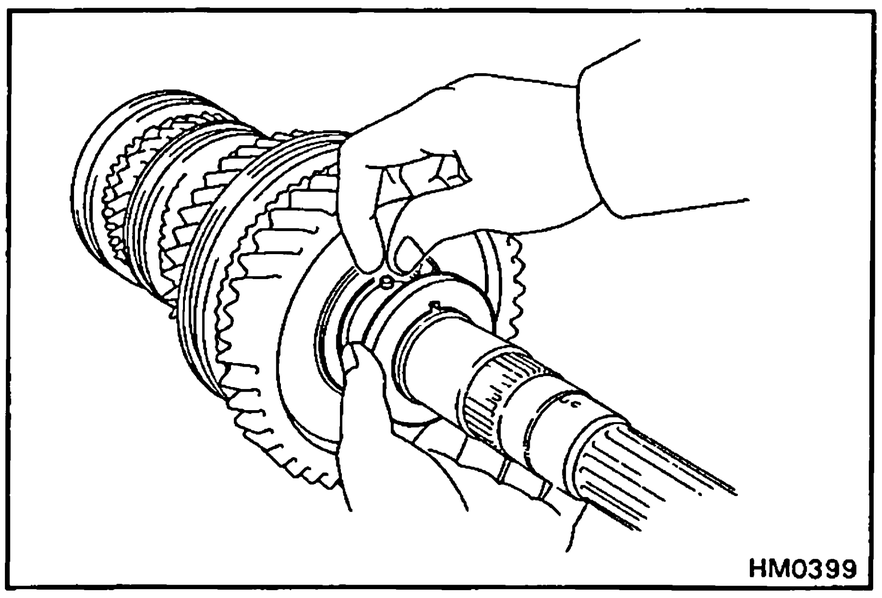

HM0403

(b) Apply gear oil to the shaft and needle roller bearing.

(H150F)

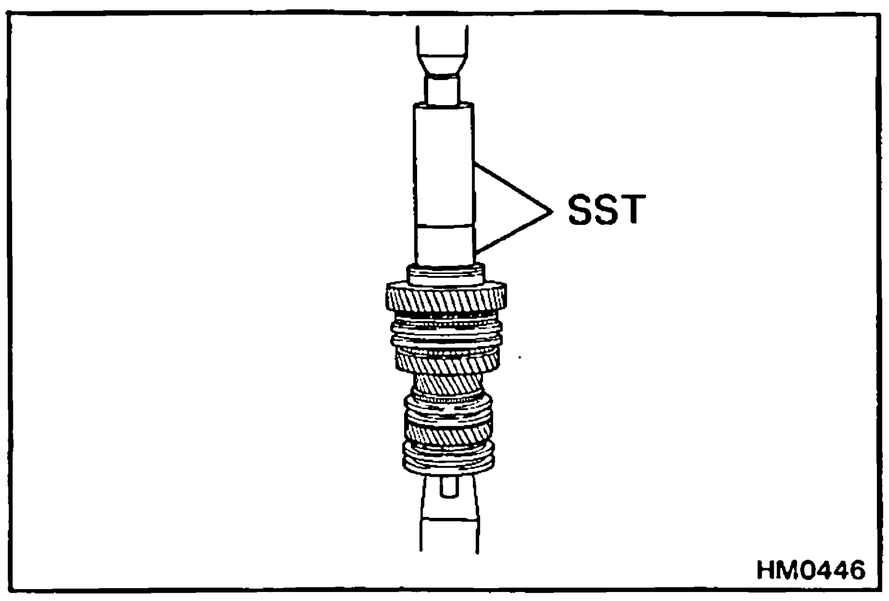
(c) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(d) Install the needle roller bearing in the first gear.

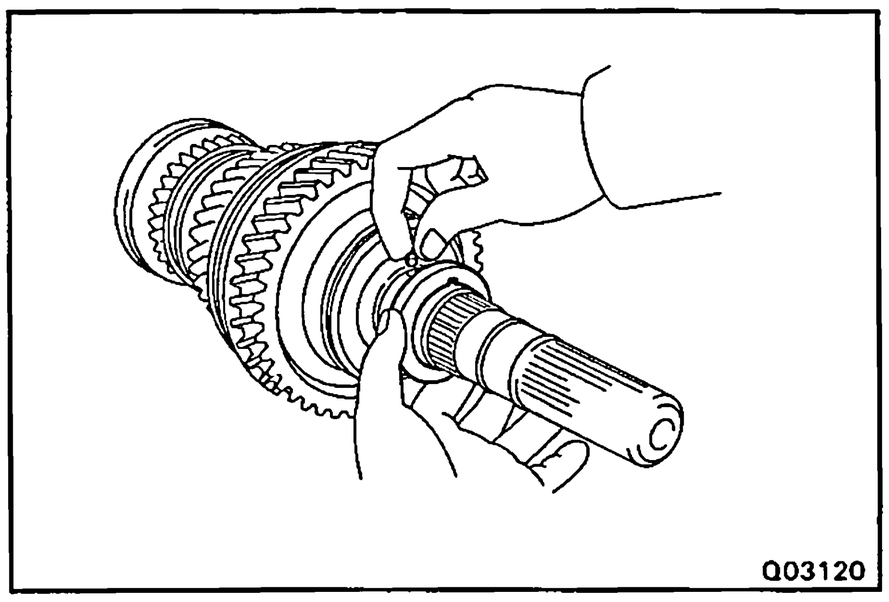

HM0399

**12. INSTALL BALL BEARING**

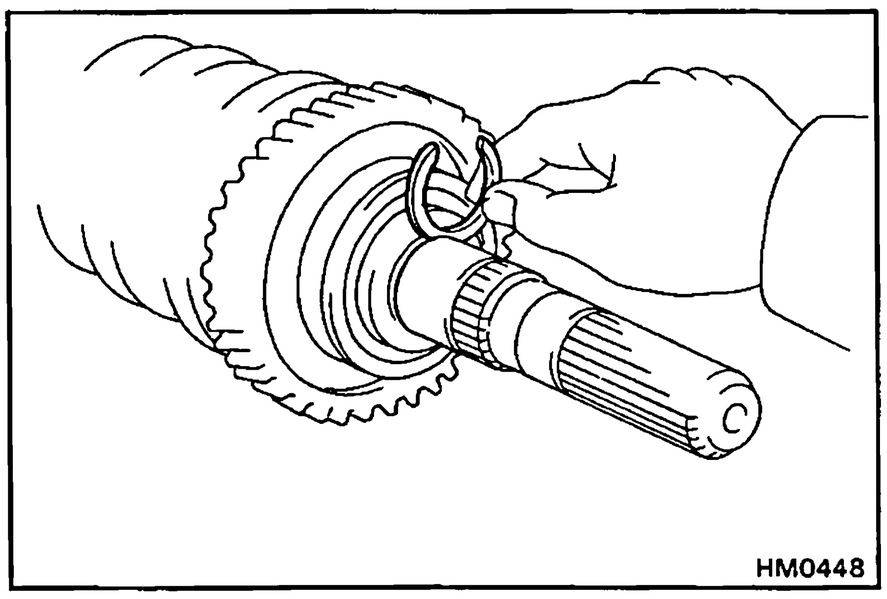
(a) Install the pin and thrust washer.




(b) Using SST and a press, install the ball bearing.
SST 09316-60010 (09316-00010), 09523-36010



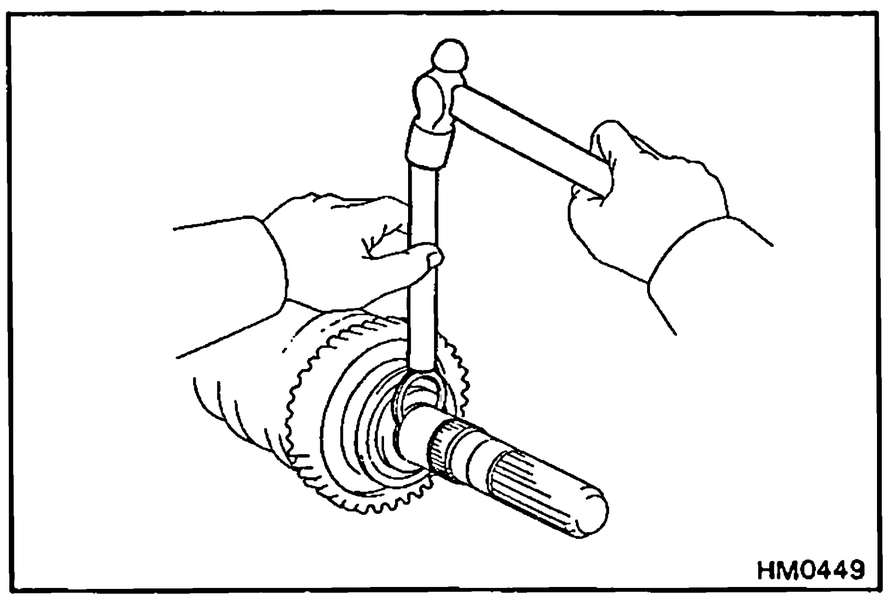

(c) Install the pin and thrust washer.




## 13. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.40 — 2.45 (0.0945 — 0.0965) |
| B | 2.45 — 2.50 (0.0965 — 0.0984) |
| C | 2.50 — 2.55 (0.0984 — 0.1004) |
| D | 2.55 — 2.60 (0.1004 — 0.1024) |
| E | 2.60 — 2.65 (0.1024 — 0.1044) |
| F | 2.65 — 2.70 (0.1044 — 0.1063) |
| G | 2.70 — 2.75 (0.1063 — 0.1083) |
| H | 2.75 — 2.80 (0.1083 — 0.1102) |




(b) Using a brass bar and a hammer, drive in a new snap ring.

# SERVICE SPECIFICATIONS

## SERVICE DATA

| | | | |
|---|---|---|---|
| Output shaft 1st gear journal diameter | Limit | 49.979 mm | 1.9677 in. |
| Output shaft 2nd gear journal diameter | Limit | 57.984 mm | 2.2828 in. |
| Output shaft 3rd gear journal diameter | Limit | 37.979 mm | 1.4952 in. |
| Output shaft 5th gear journal diameter | Limit | 45.984 mm | 1.8104 in. |
| Output shaft Frange thickness | Limit | 4.725 mm | 0.1860 in. |
| Output shaft Runout | Limit | 0.05 mm | 0.0020 in. |
| Gear thrust clearance 1st and 3rd | STD | 0.1 — 0.45 mm | 0.0039 — 0.0177 in. |
| Gear thrust clearance 2nd and 5th | STD | 0.1 — 0.35 mm | 0.0039 — 0.0138 in. |
| Gear oil clearance 1st and 3rd | STD | 0.020 — 0.073 mm | 0.0008 — 0.0029 in. |
| Gear oil clearance 2nd and 5th | STD | 0.015 — 0.068 mm | 0.0006 — 0.0027 in. |
| Synchronizer ring for 1st gear clearance | | | |
| (H150F) | | | |
| | Limit | 1.1 mm | 0.0433 in. |
| Synchronizer ring for 2nd gear clearance | | | |
| (H150F) | | | |
| | Limit | 0.85 mm | 0.0335 in. |
| Synchronizer ring for 3rd gear clearance | | | |
| (H150F) | | | |
| | Limit | 0.8 mm | 0.0315 in. |
| Synchronizer ring for 1st and 2nd gear clearance | | | |
| (H151F) | | | |
| | Limit | 0.85 mm | 0.0335 in. |
| Synchronizer ring for 3rd gear clearance | | | |
| (H151F) | | | |
| | Limit | 0.75 mm | 0.0295 in. |
| Output shaft snap ring thickness | | | |
| No.3 Hub sleeve | Mark A | 2.40 — 2.45 mm | 0.0945 — 0.0965 in. |
| No.3 Hub sleeve | Mark B | 2.45 — 2.50 mm | 0.0965 — 0.0984 in. |
| No.3 Hub sleeve | Mark C | 2.50 — 2.55 mm | 0.0984 — 0.1004 in. |
| No.3 Hub sleeve | Mark D | 2.55 — 2.60 mm | 0.1004 — 0.1024 in. |
| No.3 Hub sleeve | Mark E | 2.60 — 2.65 mm | 0.1024 — 0.1044 in. |
| No.3 Hub sleeve | Mark F | 2.65 — 2.70 mm | 0.1044 — 0.1063 in. |
| No.2 Hub sleeve | Mark 4 | 1.90 — 1.95 mm | 0.0748 — 0.0768 in. |
| No.2 Hub sleeve | Mark 5 | 1.95 — 2.00 mm | 0.0768 — 0.0787 in. |
| No.2 Hub sleeve | Mark 6 | 2.00 — 2.05 mm | 0.0787 — 0.0807 in. |
| No.2 Hub sleeve | Mark 7 | 2.05 — 2.10 mm | 0.0807 — 0.0827 in. |
| No.2 Hub sleeve | Mark 8 | 2.10 — 2.15 mm | 0.0827 — 0.0847 in. |
| No.2 Hub sleeve | Mark 9 | 2.15 — 2.20 mm | 0.0847 — 0.0866 in. |
| No.1 Hub sleeve | Mark A | 2.90 — 2.95 mm | 0.1142 — 0.1162 in. |
| No.1 Hub sleeve | Mark B | 2.95 — 3.00 mm | 0.1162 — 0.1181 in. |
| No.1 Hub sleeve | Mark C | 3.00 — 3.05 mm | 0.1181 — 0.1201 in. |
| No.1 Hub sleeve | Mark D | 3.05 — 3.10 mm | 0.1201 — 0.1220 in. |
| No.1 Hub sleeve | Mark E | 3.10 — 3.15 mm | 0.1220 — 0.1240 in. |
| No.1 Hub sleeve | Mark F | 3.15 — 3.20 mm | 0.1240 — 0.1260 in. |

| | | | |
|---|---|---|---|
| Output shaft snap ring thickness | | | |
| Rear bearing | Mark A | 2.40 — 2.45 mm | 0.0945 — 0.0965 in. |
| Rear bearing | Mark B | 2.45 — 2.50 mm | 0.0965 — 0.0984 in. |
| Rear bearing | Mark C | 2.50 — 2.55 mm | 0.0984 — 0.1004 in. |
| Rear bearing | Mark D | 2.55 — 2.60 mm | 0.1004 — 0.1024 in. |
| Rear bearing | Mark E | 2.60 — 2.65 mm | 0.1024 — 0.1044 in. |
| Rear bearing | Mark F | 2.65 — 2.70 mm | 0.1044 — 0.1063 in. |
| Rear bearing | Mark G | 2.70 — 2.75 mm | 0.1063 — 0.1083 in. |
| Rear bearing | Mark H | 2.75 — 2.80 mm | 0.1083 — 0.1102 in. |

# AUTOMATIC TRANSMISSION

**REFER TO LAND CRUISER (STATION WAGON) REPAIR MANUAL FOR CHASSIS AND BODY (Pub. No. RM184E)**

NOTE: The following pages contain only the points which differ from the above listed manual.

AT

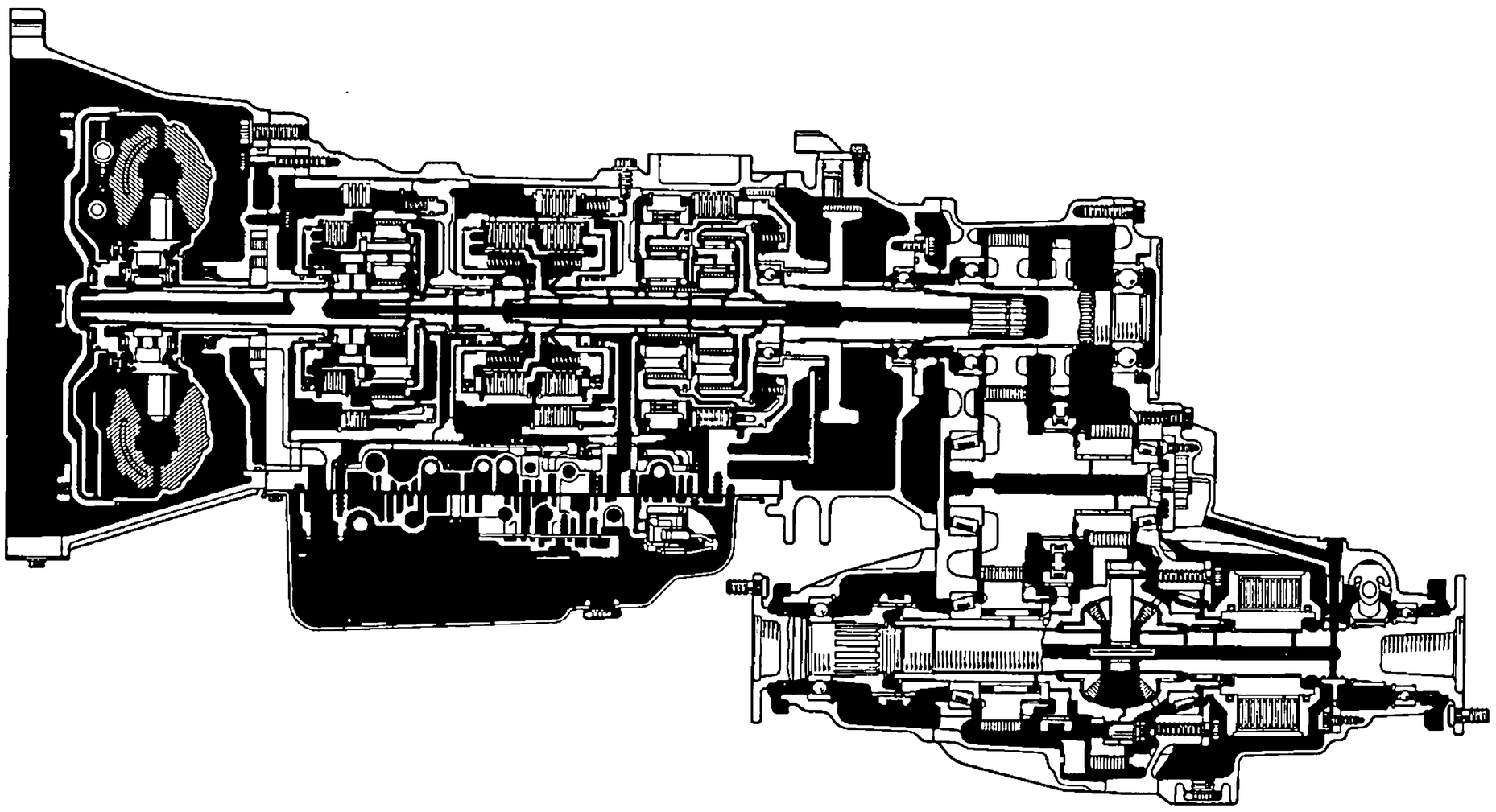
**(STATION WAGON)**


DESCRIPTION ..... AT-2
OPERATION ..... AT-4
PREPARATION ..... AT-12
TROUBLESHOOTING ..... AT-14
VALVE BODY ..... AT-58
THROTTLE CABLE ..... AT-63
ASSEMBLY REMOVAL AND INSTALLATION ..... AT-66
SERVICE SPECIFICATIONS ..... AT-86

# DESCRIPTION

## GENERAL DESCRIPTION

The A442F automatic transmission is a four-speed automatic transmission with a four-speed transfer, developed with the aim of producing an easy-driving 4WD vehicle. A lock-up mechanism is built into the torque converter.
The A442F transmission is mainly composed of the torque converter, the overdrive (hereafter called O/D) planetary gear unit, 3-speed planetary gear unit, 4-speed transfer, hydraulic control system and an electronic control system.



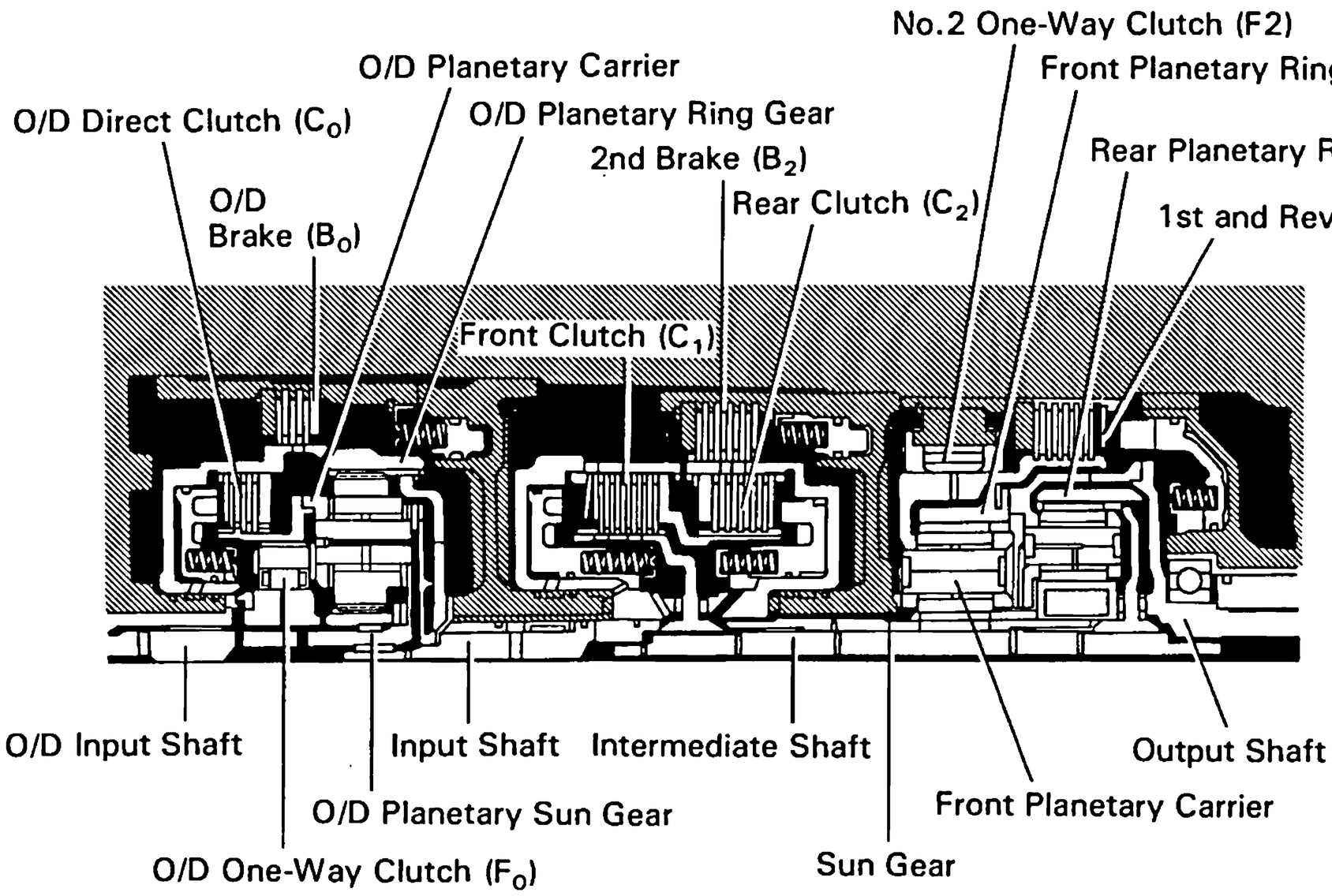
Q02509

# GENERAL SPECIFICATIONS

| | | | |
|---|---|---|---|
| Type of Transmission | | A442F | ← |
| Type of Engine | | 1FZ-FE | 1HD-T |
| Torque Converter Stall Torque Ratio | | 1.8 : 1 | 2.0 : 1 |
| Lock-up Mechanism | | Equipped | ← |
| Gear Ratio | 1st Gear | 2.950 | ← |
| | 2nd Gear | 1.530 | ← |
| | 3rd Gear | 1.000 | ← |
| | O/D Gear | 0.765 | ← |
| | Reverse Gear | 2.678 | ← |
| Number of Discs and Plates | (Disc and Plate) | | |
| | Front Clutch ($C_1$) | 6/6 | 7/7 |
| | Rear Clutch ($C_2$) | 5/5 | ← |
| | O/D Direct Clutch ($C_0$) | 3/3 | ← |
| | 2nd Brake ($B_1$) | 5/5 | ← |
| | 1st and Reverse Brake ($B_2$) | 6/6 | ← |
| | O/D Brake ($B_0$) | 3/3 | ← |
| ATF Type | | ATF DEXRON® II | ← |
| Capacity (US pts, Imp. qts) | Total | | |
| | w/ Oil Cooler | 15.4 (16.3, 13.6) | ← |
| | w/o Oil Cooler | 15.0 (15.9, 13.2) | ← |
| | Drain & Refill | 6.0 (6.3, 5.3) | ← |

# OPERATION

## OPERATION




Q03056

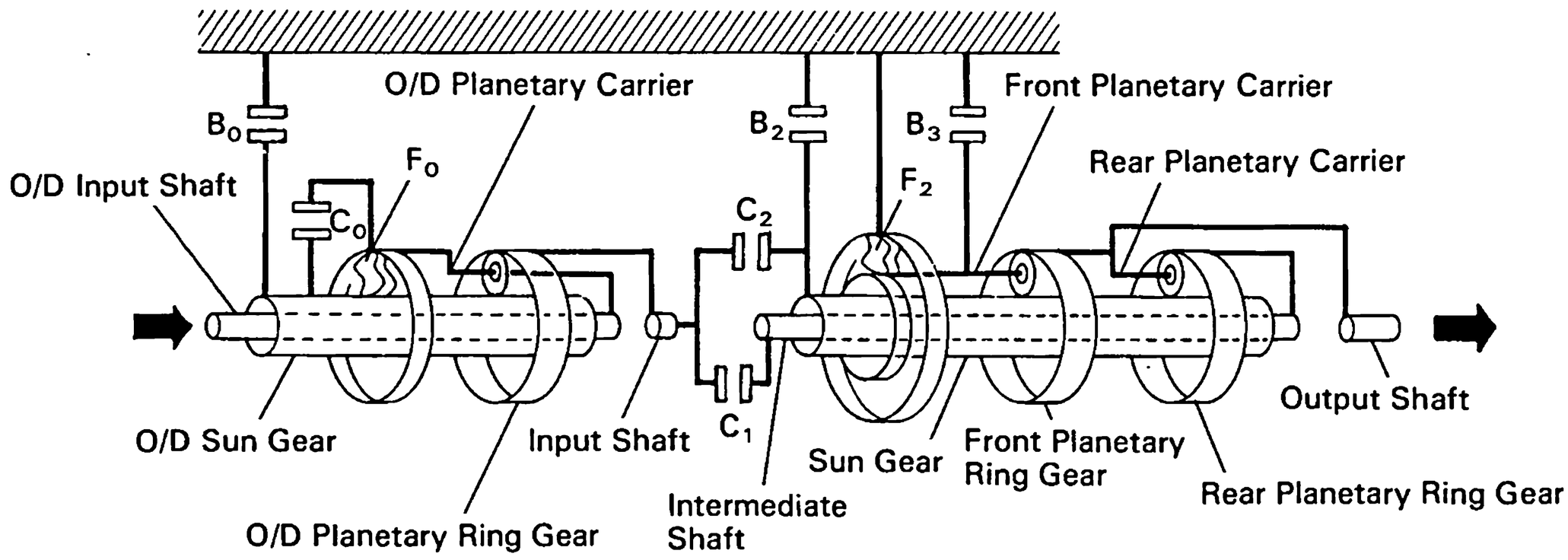
○....Operating

| Shift lever position | Gear position | $C_0$ | $C_1$ | $C_2$ | $B_0$ | $B_2$ | $B_3$ | $F_0$ | $F_2$ |
|---|---|---|---|---|---|---|---|---|---|
| P | Parking | ○ | | | | | | ○ | |
| R | Reverse | ○ | | ○ | | | ○ | ○ | |
| N | Neutral | ○ | | | | | | ○ | |
| D | 1st | ○ | ○ | | | | | ○ | ○ |
| | 2nd | | ○ | | | ○ | | ○ | |
| | 3rd | ○ | ○ | ○ | | | | ○ | |
| | O/D | | ○ | ○ | ○ | | | | |
| 2 | 2nd | ○ | ○ | | | ○ | | ○ | |
| L | 1st | ○ | ○ | | | | ○ | ○ | ○ |

V01579

## 1. FUNCTION OF COMPONENTS

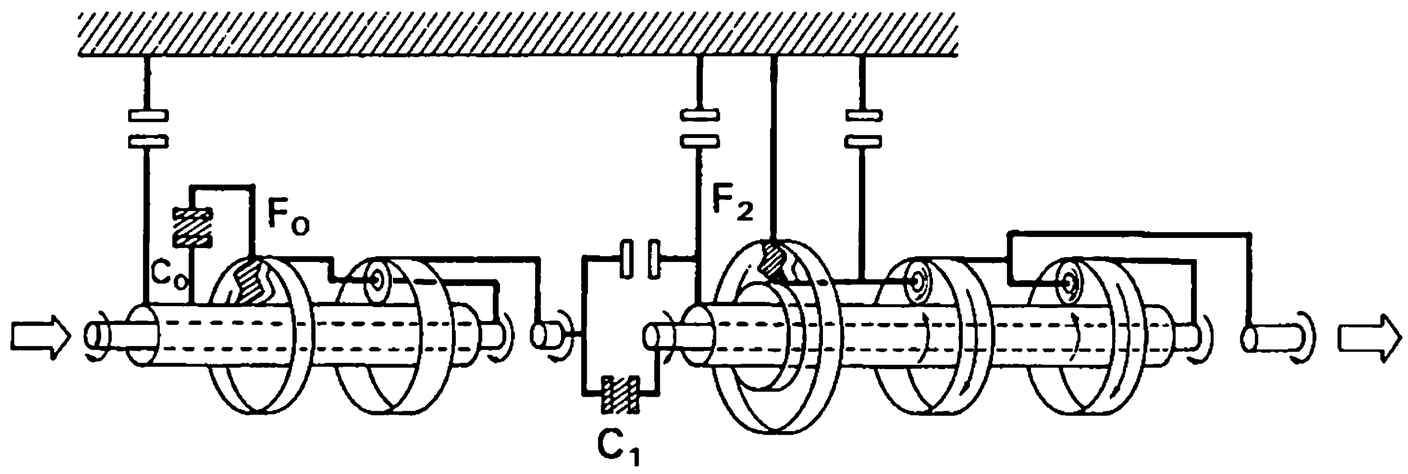
| COMPONENT | FUNCTION |
|---|---|
| O/D Direct Clutch ($C_0$) | Connects overdrive sun gear and overdrive carrier |
| O/D Brake ($B_0$) | Prevents overdrive sun gear from turning either clockwise or counterclockwise |
| O/D One-Way Clutch ($F_0$) | When transmission is being driven by engine, connects overdrive sun gear and overdrive carrier |
| Front Clutch ($C_1$) | Connects input shaft and intermediate shaft |
| Rear Clutch ($C_2$) | Connects input shaft and front & rear planetary sun gear |
| 2nd Brake ($B_1$) | Prevents front & rear planetary sun gear from turning either clockwise or counter-clockwise |
| 1st & Reverse Brake ($B_2$) | Prevents front planetary carrier from turning either clockwise or counterclockwise |
| No.2 One-Way Clutch ($F_2$) | Prevents front planetary carrier from turning counterclockwise |




AT3917

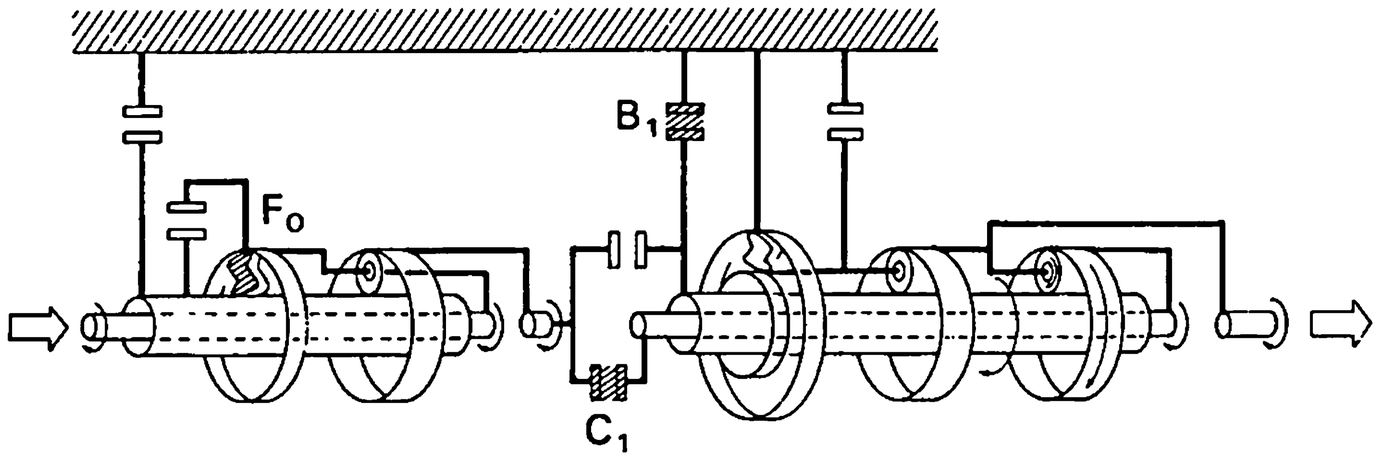
The conditions of operation for each gear position are shown on the following illustration:

**D Range 1st Gear**



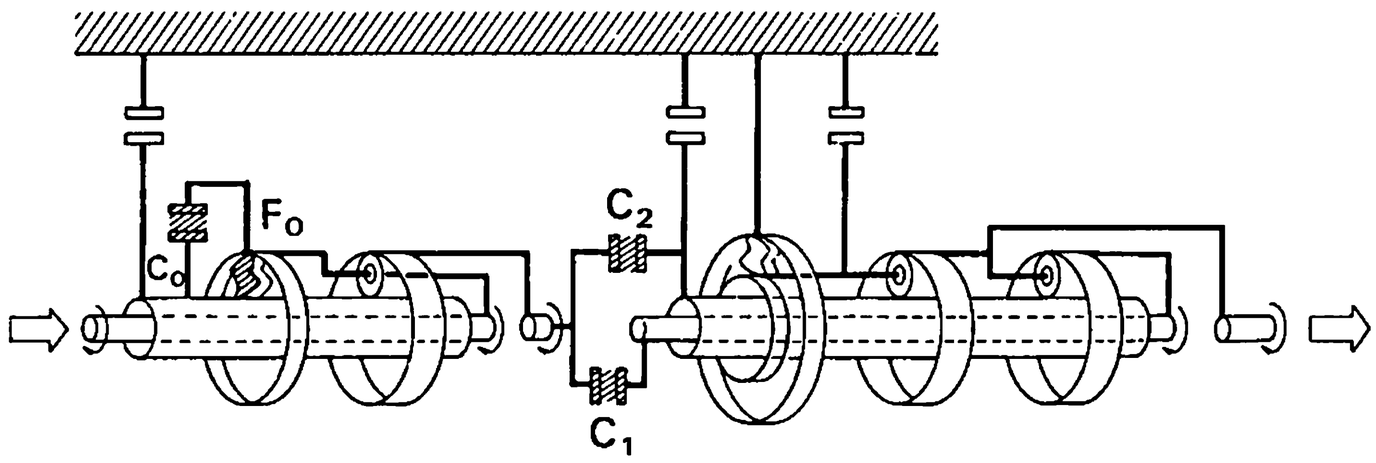

AT5949

**D Range 2nd Gear**



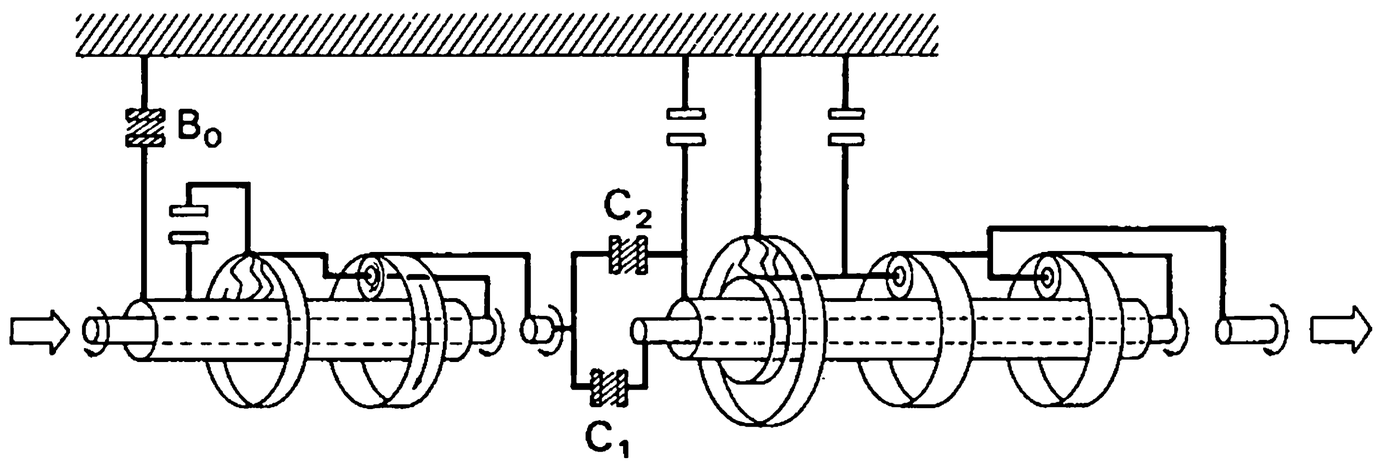

AT5950

**D Range 3rd Gear**



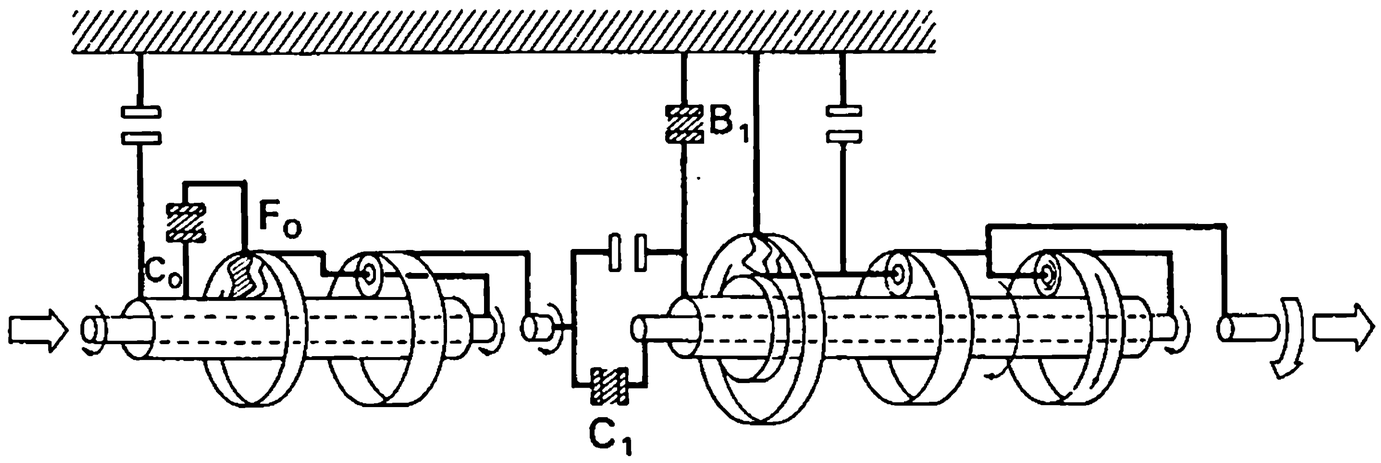

AT5951

**D Range O/D**



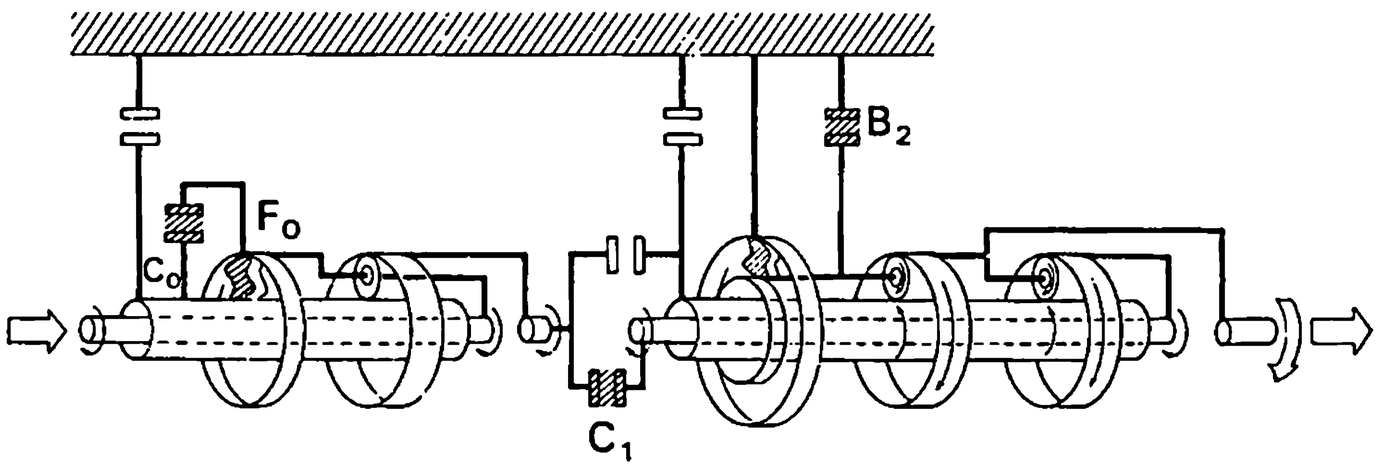

AT5952

**2 Range 2nd Gear**



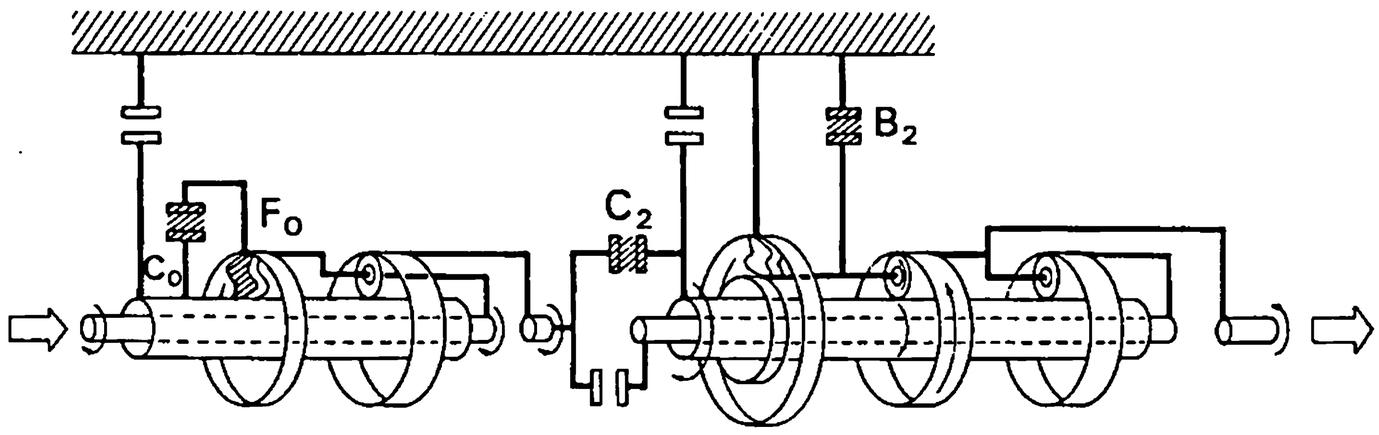

AT5953

**L Range 1st Gear**




AT5954

**R Range Reverse Gear**




AT5955

## 2. HYDRAULIC CONTROL SYSTEM

The hydraulic control system is composed of the oil pump, the valve body, the solenoid valves, the accumulators, the clutches and brakes, as well as the fluid passages which connect all of these components.

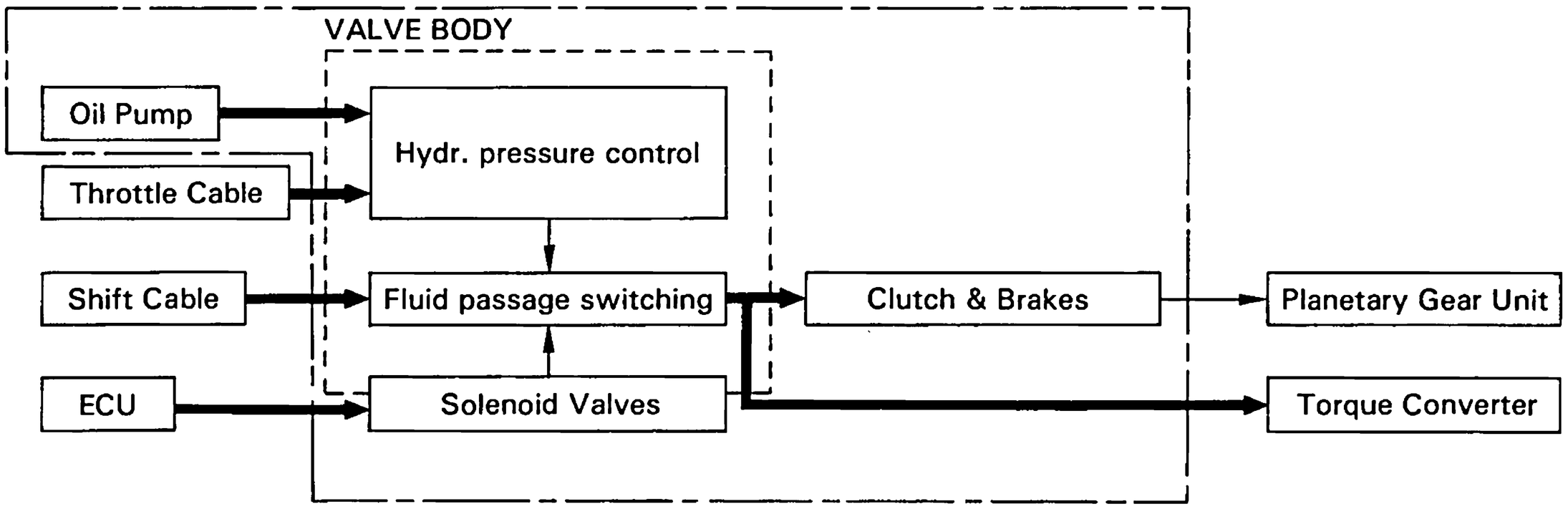
Based on the hydraulic pressure created by the oil pump, the hydraulic control system governs the hydraulic pressure acting on the torque converter, clutches and brakes in accordance with the vehicle driving condition.

There are four solenoid valves on the valve body.

These solenoid valves are turned on and off by signals from ECU to operate the shift valves.
These shift valves then switch the fluid passages so that fluid goes to the torque converter and planetary gear units.

(Except for the solenoid valves, the hydraulic control system of the electronically controlled transmission (hereafter called ECT) is basically the same as that of the fully hydraulic controlled automatic transmission.)

**HYDRAULIC CONTROL SYSTEM**



## 3. ELECTRONIC CONTROL SYSTEM

The electronic control system for the A442F automatic transmission provide extremely precise control of the gear shift timing and lock-up timing in response to driving conditions as sensed by various sensors located throughout the vehicle and in response to the engine's running condition.

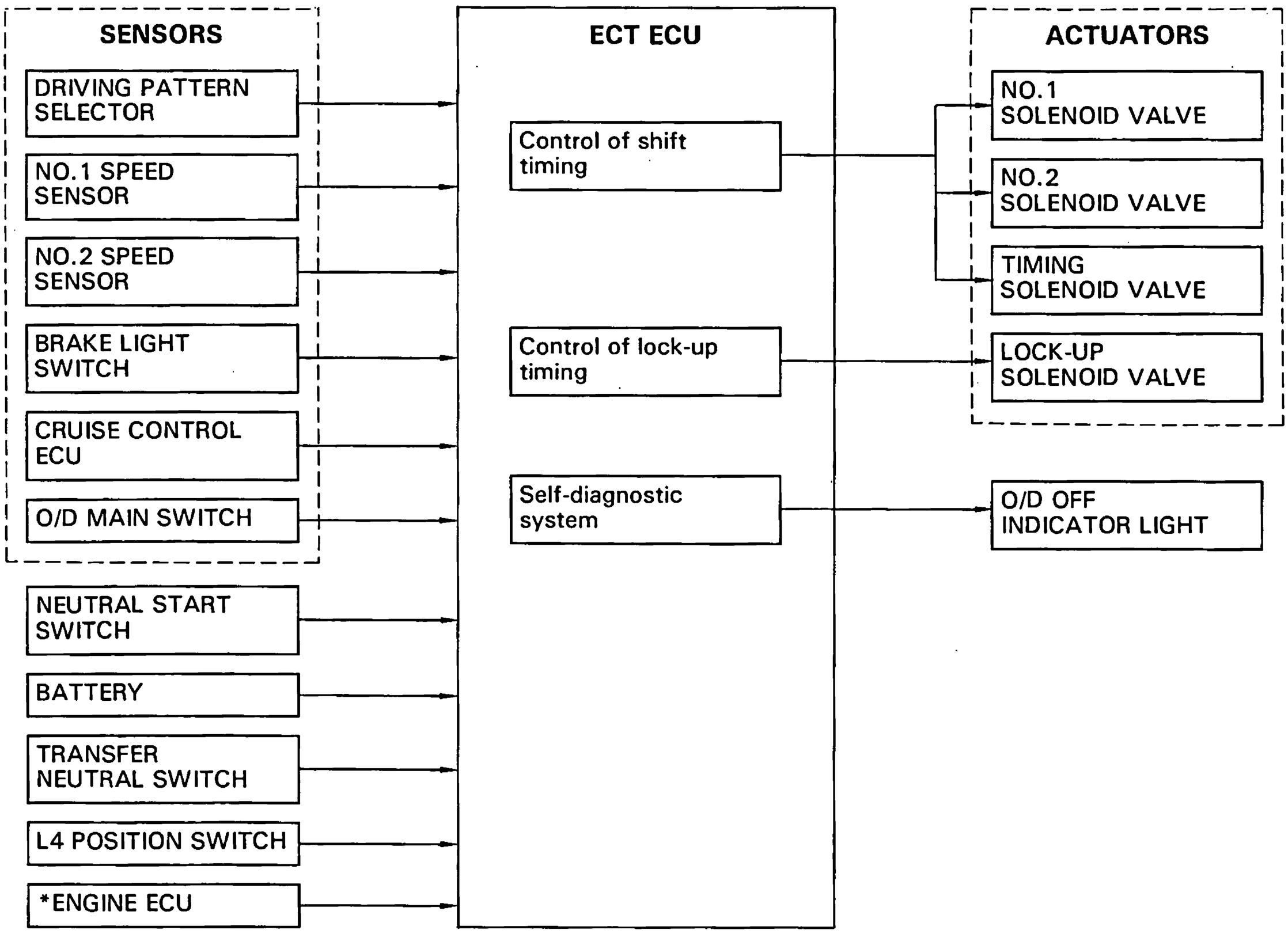
At the same time, the ECT ECU control reduces vehicle squat when the vehicle starts out and gear shift shock.

The electronic control system for controlling the shift timing and the operation of the lock-up clutch is composed of the following three parts:

(a) Sensors: These sense the vehicle speed and throttle position and send this data to the ECT ECU in the form of electronic signals.

(b) ECT ECU: This determines the shift and lock-up timing based upon the signals from the sensors.

(c) Actuators: Solenoid valves divert hydraulic pressure from one circuit of the hydraulic control unit to another thus controlling shifting and lock-up timing.




*: 1FZ-FE engine only

## 4. FUNCTION OF TCM

### • Control of Shift Timing

The ECU has programmed into its memory the optimum shift pattern for each shift lever position (D, 2, L ranges) and driving mode (Normal or Power).

Based on the appropriate shift pattern, the ECU turns No.1, No.2 and timing solenoid valves on or off in accordance with the vehicle speed signal from the speed sensor and the throttle opening signal from the throttle position sensor. In this manner, the ECU operates each shift valve, opening or closing the fluid passages to the clutches and brakes to permit up-shift or down-shift of the transmission.

HINT: The electronic control system provides shift timing and lock-up control only while the vehicle is traveling forward. In REVERSE, and NEUTRAL, the transmission is mechanically, not electronically controlled.

### • Control of Overdrive

Driving in overdrive is possible if the O/D main switch is on and the shift lever is in the D range. However, when the vehicle is being driven using the cruise control system (CCS), if the actual vehicle speed drops to about 4 km/h (2 mph) below the set speed while the vehicle is running in overdrive, the CCS ECU sends a signal to the ECT ECU to release the overdrive and prevent the transmission from shifting back into overdrive until the actual vehicle speed reaches the speed set in the CCS memory.

On this model, if the coolant temperature falls below 55°C (131°F), the engine ECU sends a signal to the ECT ECU, preventing the transmission from up-shifting into overdrive.

### • Control of Lock-Up System

The ECT ECU has programmed in its memory a lock-up clutch operation pattern for each driving mode (Normal or Power). Based on this lock-up pattern, the ECU turns lock-up solenoid valve on or off in accordance with the vehicle speed signals received from the speed sensor and the throttle opening signals from the the throttle position sensor.

Depending on whether lock-up solenoid valve is on or off, the lock-up relay valve performs changeover of the fluid passages for the converter pressure acting on the torque converter to engage or disengage the lock-up clutch.

(Mandatory Cancellation of Lock-Up System)

If any of the following conditions exist, the ECU turns off lock-up solenoid valve to disengage the lock-up clutch.

(1) The brake light switch comes on (during braking).

(2) The IDL points of the throttle position sensor close (throttle valve fully closed.).

(3) The vehicle speed drops 4 km/h (2 mph) or more below the set speed while the cruise control system is operating.

(4) The coolant temperature falls below 70°C (158°F).

The purpose of (1) and (2) above is to prevent the engine from stalling if the rear wheels lock up.

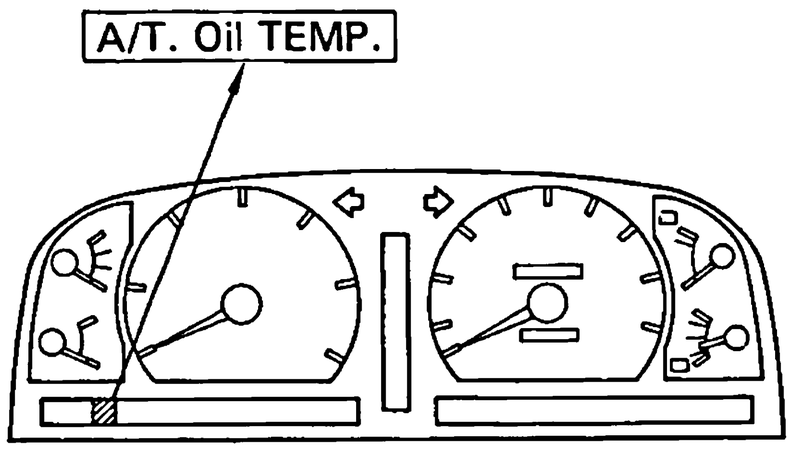
The purpose of (3) is to cause the torque converter operate to obtain torque multiplication.

The purpose of (4) is both to improve general driveability, and to speed up transmission warm-up.

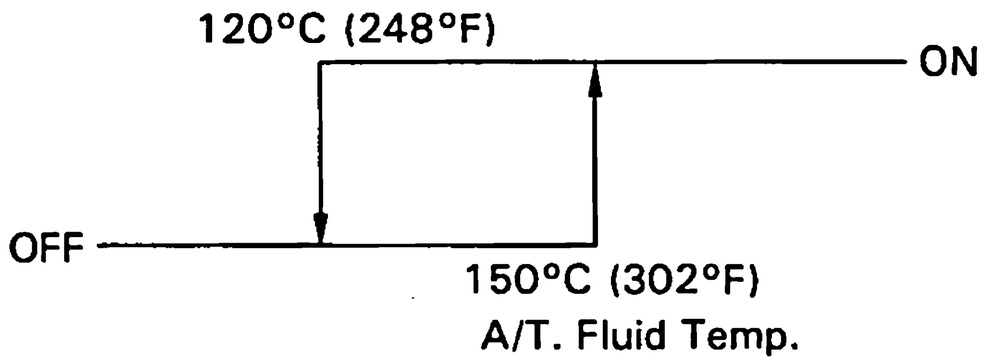
Also, while the lock-up system is in operation, the ECU will temporarily turn it off during up-shift or down-shift in order to decrease shifting shock.

## 5. A/T. FLUID TEMPERATURE WARNING SYSTEM

The ECT ECU detects the A/T fluid temperature by means of a fluid temperature sensor fitted to the union. The A/T fluid may become extremely when the vehicle is under and extreme load, as when driving on sand or climbing uphill. Should the fluid temperature increase above 150°C (302°F), the ECT ECU lights the warning light located in the combination meter. The light goes off when temperature falls below 120°C (248°F).



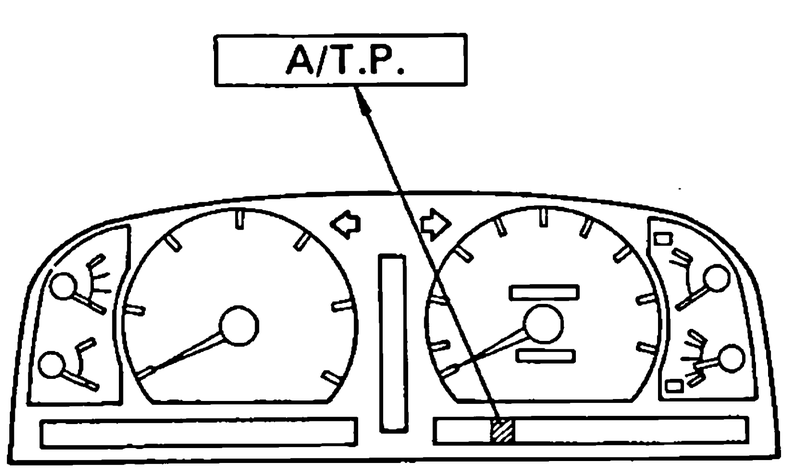

AT6023



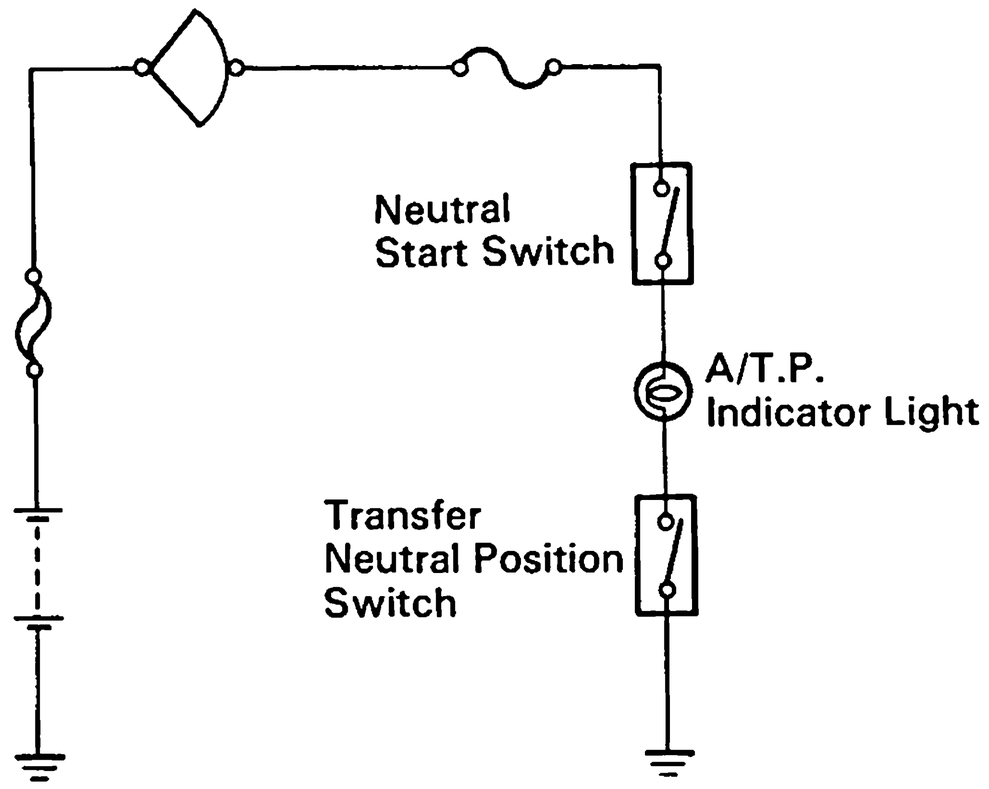

V01585

## 6. A/T. P. (Automatic Transmission Parking) INDICATOR

The propeller shaft and wheels are free even when the transmission shift lever is set to "P" as long as the transfer shift lever is in "neutral" position. The A/T.P. indicator lights up to warn the driver that the propeller shaft and wheels are not locked. If the A/T.P. indicator light goes on, the transfer shift lever should be shifted to out of "N" position.



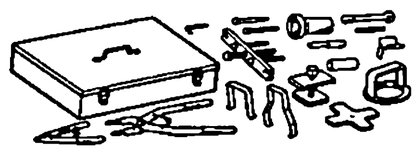
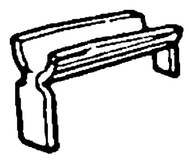
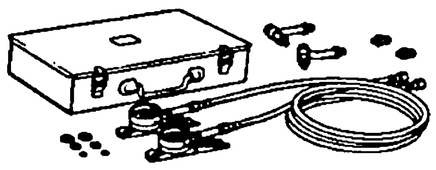

AT6024




AT3920

# PREPARATION

## SST (SPECIAL SERVICE TOOLS)

| | | | |
|---|---|---|---|
|  | 09032-00100 | Oil Pan Seal Cutter | |
|  | 09350-30020 | TOYOTA Automatic Transmission Tool Set | |
|  | (09351-32010) | One-way Clutch Test Tool | |
|  | (09351-32020) | Stator Stopper | |
|  | 09843-18020 | Diagnosis Check Wiring | |
|  | 09992-00094 | Automatic Transmission Oil Pressure Gauge Set | |

## EQUIPMENT

| | |
|---|---|
| Ohmmeter | |
| Voltmeter | |
| Torque wrench | |
| Dial indicator with magneticbase | Check drive plate runout. |
| Vernier calipers | Check torque converter installation. |
| Straight edge | Check torque converter installation. |

## LUBRICANT

| Item | Capacity | Classification |
|---|---|---|
| Automatic transmission fluid | | |
| Dry fill | | |
| w/ Oil cooler | 15.4 liter (16.3 US qts, 13.6 Imp.qts) | ATF DEXRON® II |
| w/o Oil cooler | 15.0 liter (15.9 US qts, 13.2 Imp.qts) | |
| Drain and refill | 6.0 liters (6.3 US qts, 5.3 Imp.qts) | |

## SSM (SPECIAL SERVICE MATERIALS)

| | | |
|---|---|---|
| 08826-00090 | Seal Packing 1281,<br>Three bond 1281 or equivalent | Oil pan |

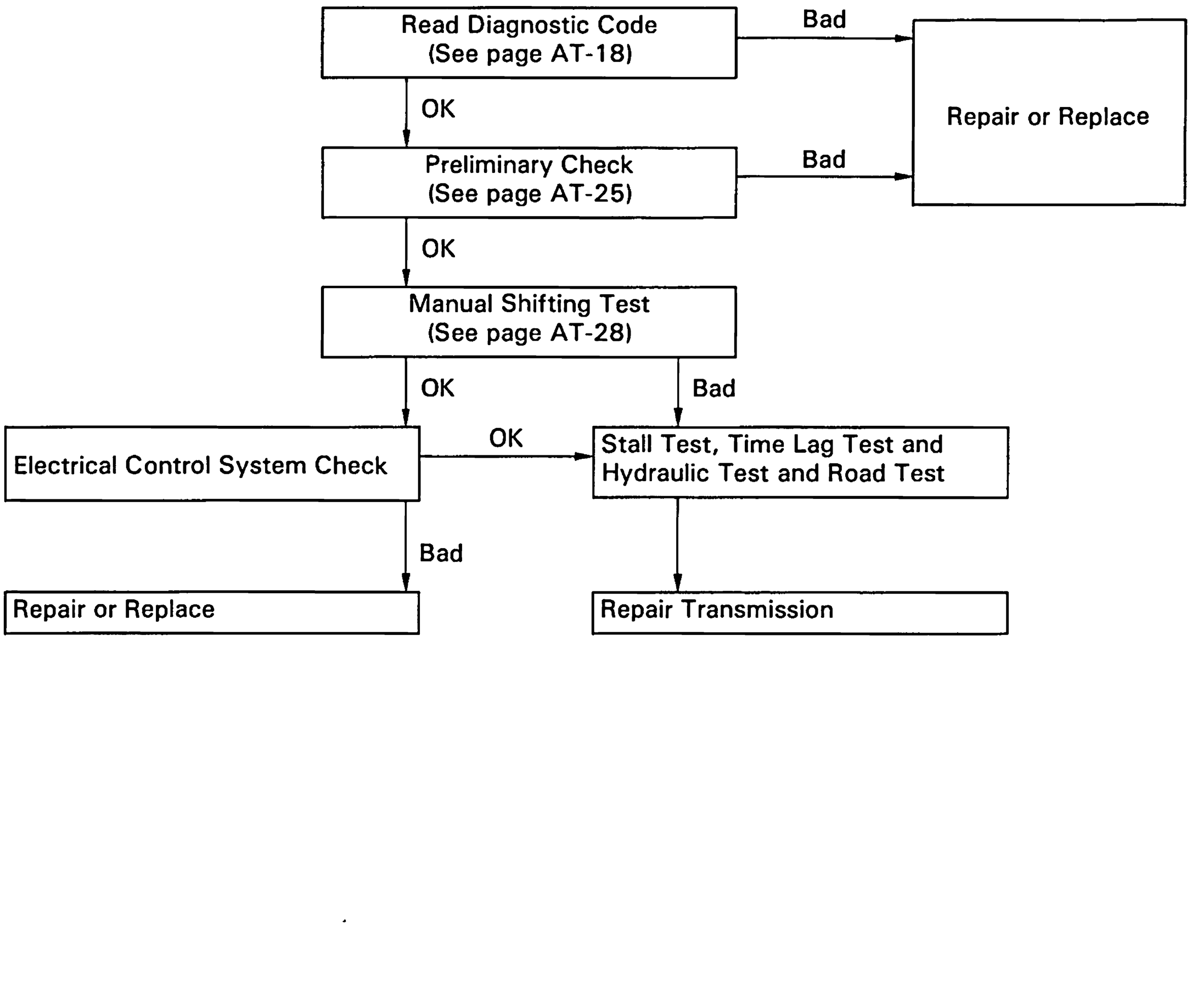
# TROUBLESHOOTING

Trouble occurring in the ECT can stem from one of three sources: the engine, the ECT electronic control unit or the transmission itself. Before troubleshooting, determine in which these three sources the problem lies, and begin troubleshooting with the simplest operation, gradually working up in order or difficulty.

## BASIC TROUBLESHOOTING

Before troubleshooting an ECT, first determine whether the problem is electrical or mechanical. To do this, just refer to the basic troubleshooting flow-chart provided below.

If the cause is already known, using the basic troubleshooting chart below a long with the general troubleshooting chart on the following pages should speed the procedure.

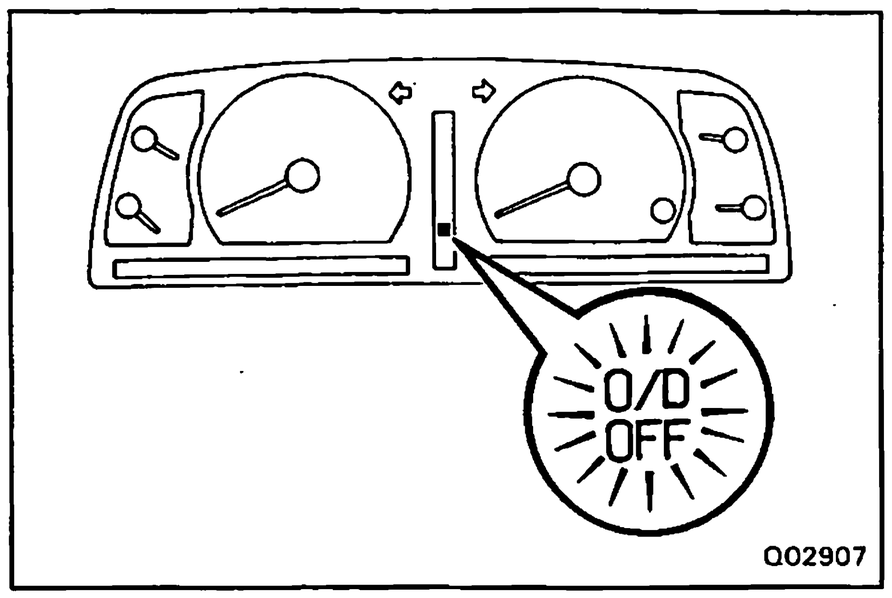


**NOTICE: Refer to A442F Automatic Transmission Repair Manual (Pub. No. RM314E) when ★ mark appears in the column for page numbers.**

| Problem | Possible cause | Remedy | Page |
|---|---|---|---|
| Fluid discolored or smells burnt | Fluid contaminated | Replace fluid | AT-25 |
| | Torque converter faulty | Replace torque converter | AT-76 |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| Vehicle does not move in any forward range or reverse | Manual linkage out of adjustment | Adjust linkage | AT-26 |
| | Valve body or primary regulator faulty | Inspect valve body | ★ |
| | Parking lock pawl faulty | Inspect parking lock pawl | ★ |
| | Torque converter faulty | Replace torque converter | AT-76 |
| | Converter drive plate broken | Replace drive plate | AT-76 |
| | Oil pump intake screen blocked | Clean screen | ★ |
| | Transmission faulty | Disassemble and inspect transmssion | ★ |
| Shift lever position incorrect | Manual linkage out of adjustment | Adjust linkage | AT-26 |
| | Manual valve and lever faulty | Inspect valve body | ★ |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| Harsh engagement into any drive position | Throttle cable out of adjustment | Adjust throttle cable | AT-26 |
| | Valve body or primary regulator faulty | Inspect valve body | ★ |
| | Accumulator pistons faulty | Inspect accumulator pistons | ★ |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| Delayed 1 — 2, 2 — 3 or 3 — O/D up-shift, or down-shift from O/D — 3 or 3 — 2 and shifts back to O/D or 3 | Electronic control faulty | Inspect electronic control | AT-29 |
| | Valve body faulty | Inspect valve body | ★ |
| | Solenoid valve faulty | Inspect solenoid valve | AT-40 |
| Slips on 1 — 2, 2 — 3 or 3 — O/D up-shift, or shps or shudders on acceleration | Manual linkage out of adjustment | Adjust linkage | AT-26 |
| | Throttle cable out of adjustment | Adjust throttle cable | AT-26 |
| | Valve body faulty | Inspect valve body | ★ |
| | Solenoid valve faulty | Inspect solenoid valve | AT-40 |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| Drag, binding or tie-up on 1 — 2, 2 — 3 or 3 — O/D up-shift | Manual linkage out of adjustment | Adjust linkage | AT-26 |
| | Valve body faulty | Inspect valve body | ★ |
| | Transmission faulty | Disassemble and inspect transmission | ★ |

**NOTICE: Refer to A442F Automatic Transmission Repair Manual (Pub. No. RM314E) when ★ mark appears in the column for page numbers.**

| Problem | Possible cause | Remedy | Page |
|---|---|---|---|
| No lock-up in 3rd or O/D | Electronic control faulty | Inspect electronic control | AT-29 |
| | Valve body faulty | Inspect valve body | ★ |
| | Solenoid valve faulty | Inspect solenoid valve | AT-40 |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| Harsh down-shift | Throttle cable out of adjustment | Adjust throttle cable | AT-26 |
| | Throttle cable and cam faulty | Inspect throttle cable and cam | AT-26 |
| | Accumulator pistons faulty | Inspect accumulator pistons | ★ |
| | Valve body faulty | Inspect valve body | ★ |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| No down-shift when coasting | Valve body faulty | Inspect valve body | ★ |
| | Solenoid valve faulty | Inspect solenoid valve | AT-40 |
| | Electronic control faulty | Inspect electronic control | AT-29 |
| Down-shift occurs too quickly or too late while coasting | Throttle cable faulty | Inspect throttle cable | AT-26 |
| | Valve body faulty | Inspect valve body | ★ |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| | Solenoid valve faulty | Inspect solenoid valve | AT-40 |
| | Electronic control faulty | Inspect electronic control | AT-29 |
| No O/D — 3, 3 — 2 or 2 — 1 kick-down | Solenoid valve faulty | Inspect solenoid valve | AT-40 |
| | Electronic control faulty | Inspect eletronic control | AT-29 |
| | Valve body faulty | Inspect valve body | ★ |
| No engine braking 2 or L range | Solenoid valve faulty | Inspect solenoid valve | AT-40 |
| | Electronic control faulty | Inspect electronic control | AT-29 |
| | Valve body faulty | Inspect valve body | ★ |
| | Transmission faulty | Disassemble and inspect transmission | ★ |
| Vehicle does not hold in P | Manual linkage out of adjustment | Adjust linkage | AT-26 |
| | Parking lock pawl cam and spring faulty | Inspect cam and spring | AT-26 |




# DIAGNOSIS SYSTEM

## DESCRIPTION

1. A self-diagnosis function is built into the electrical control system. Warning is indicated by the overdrive OFF indicator light.

   HINT: Warning and diagnostic codes can be read only when the overdrive switch is ON. If OFF, the overdrive OFF light is lit continuously and will not blink.

(a) If a malfunction occurs within the speed sensors (No.1 or 2), throttle sensor or engine speed signal, the overdrive OFF indicator light will blink to warn the driver.

However, there will be no warning of a malfunction with lock-up solenoid.

(b) The diagnostic code can be read by the number of blinks of the overdrive OFF indicator light when terminals $T_T$ and $E_1$ are connected. (See page AT-20)

(c) The throttle position sensor or brake signal are not indicated, but inspection can be made by checking the voltage at terminal $T_T$ of the check connector.

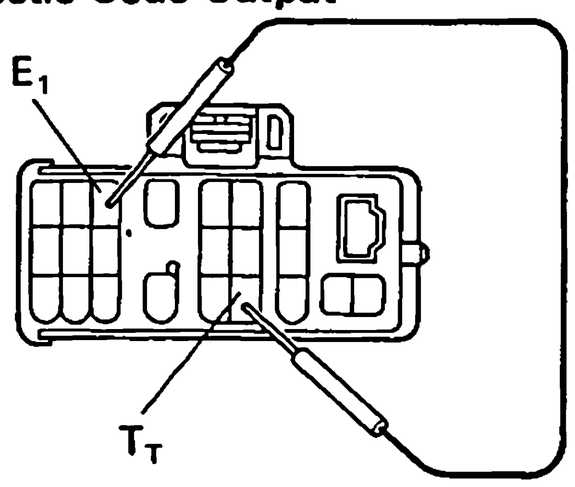
(d) The signals to each gear can be checked by measuring the voltage at terminal $T_T$ of the check connector while driving.

2. The diagnostic code is retained in memory by the ECT ECU and due to back-up voltage, is not canceled out when the engine is turned off. Consequently, after repair, it is necessary to turn the ignition switch off and remove the DOME fuse (10 A) or disconnect the ECT ECU connector to cancel out the diagnostic code. (See page AT-20)

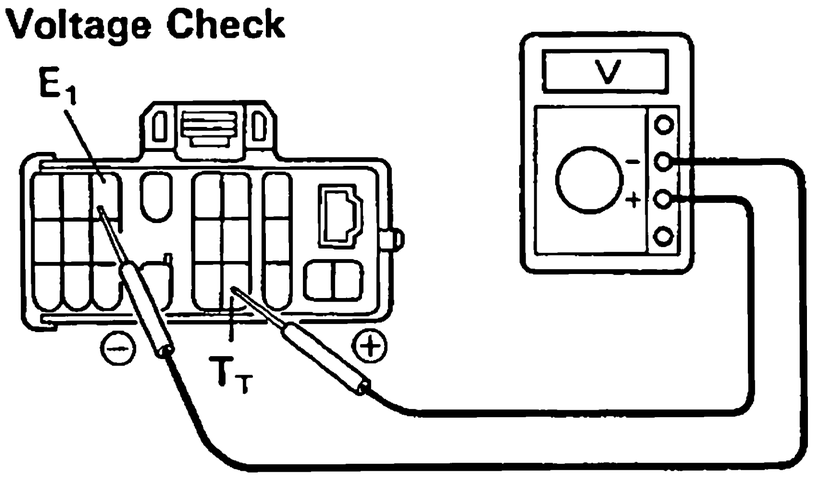
HINT:

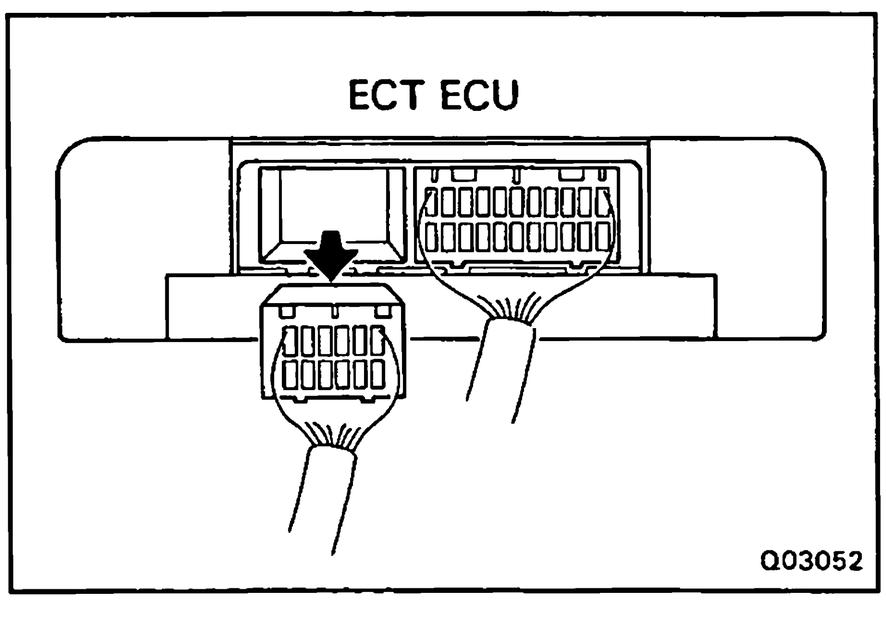
- Low battery voltage will cause faulty operation of the diagnosis system. Therefore, always check the battery first.
- Use a voltmeter and ohmmeter that have an impedance of at least 10 kΩ/V.

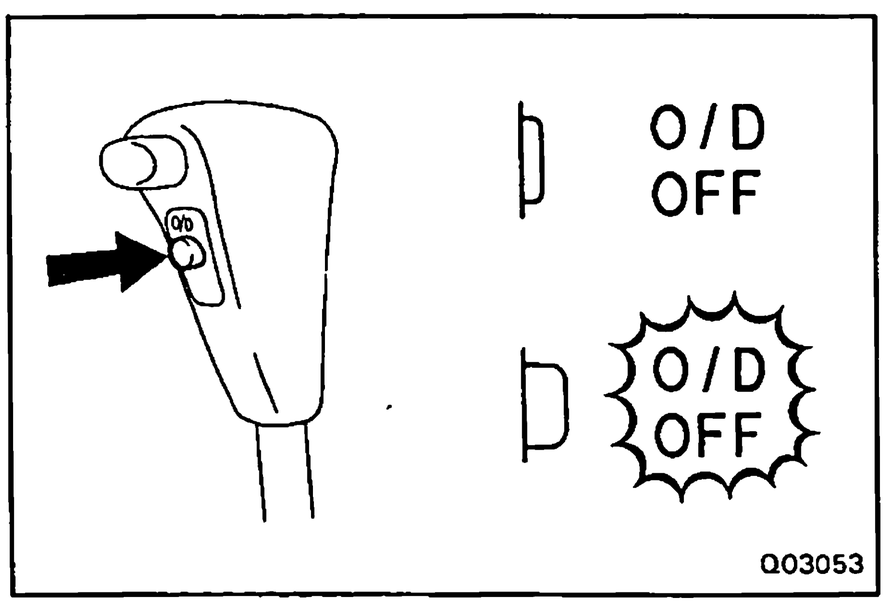
**Diagnostic Code Output**




**Voltage Check**



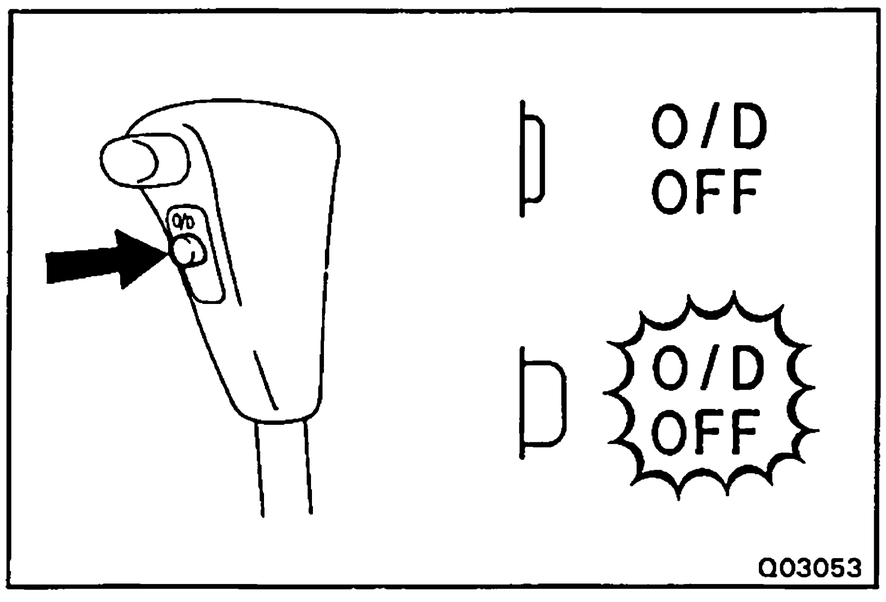




# CHECK "O/D OFF" INDICATOR LIGHT

1. Turn the ignition switch ON.
2. The "O/D OFF" light will come on when the O/D switch is placed at OFF.
3. When the O/D switch is set to ON, the "O/D OFF" light should go out.

   If the "O/D OFF" light flashes when the O/D switch is set to ON, the electronic control system is faulty.

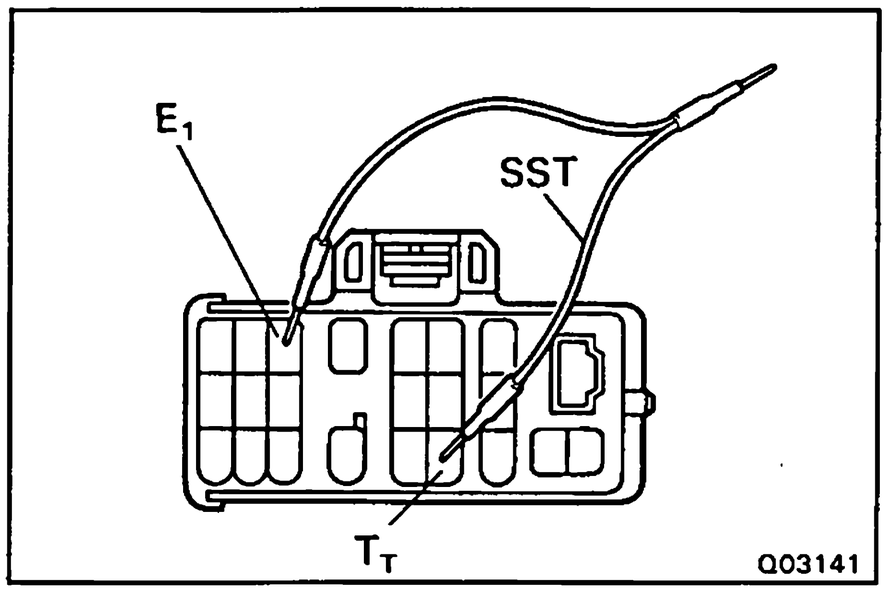



# READ DIAGNOSTIC CODE

**1. TURN IGNITION SWITCH AND O/D SWITCH TO ON**

Do not start the engine.

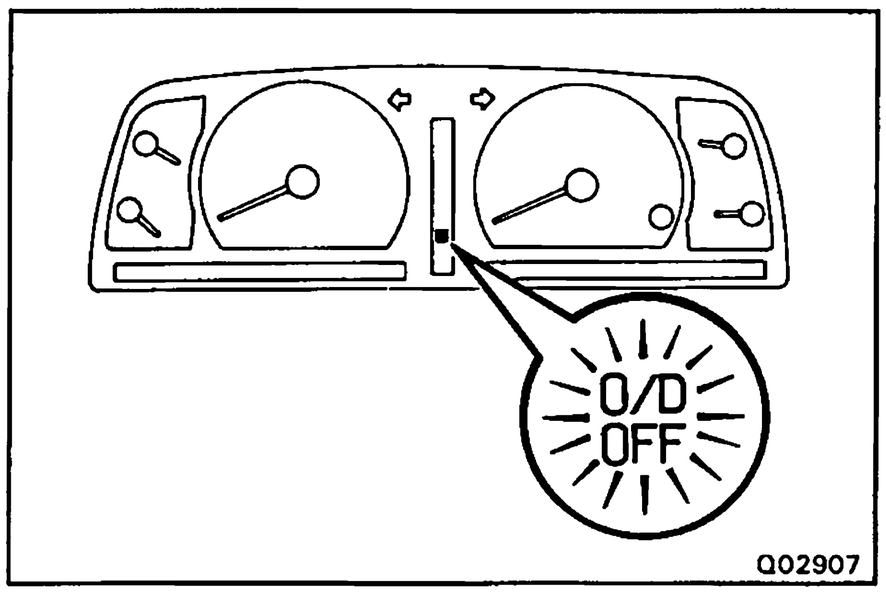
HINT: Warning and diagnostic codes can be read only when the overdrive switch is ON. If OFF, the overdrive OFF light willl light continuously and will not blink.




**2. CONNECT $T_T$ AND $E_1$ TERMINALS OF CHECK CONNECTOR**

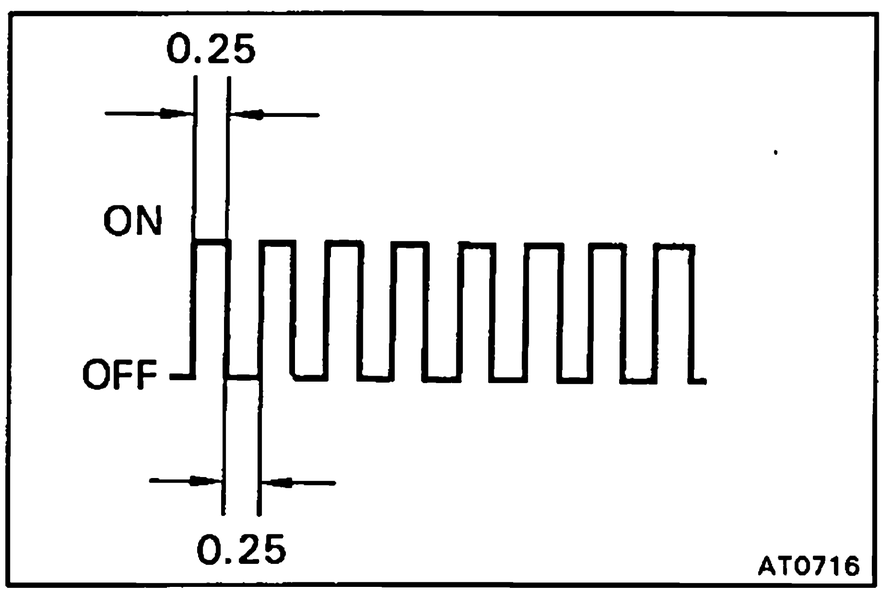
Using SST, connect terminals $T_T$ and $E_1$ of the check connector.

SST 09843-18020




**3. READ DIAGNOSTIC CODE**

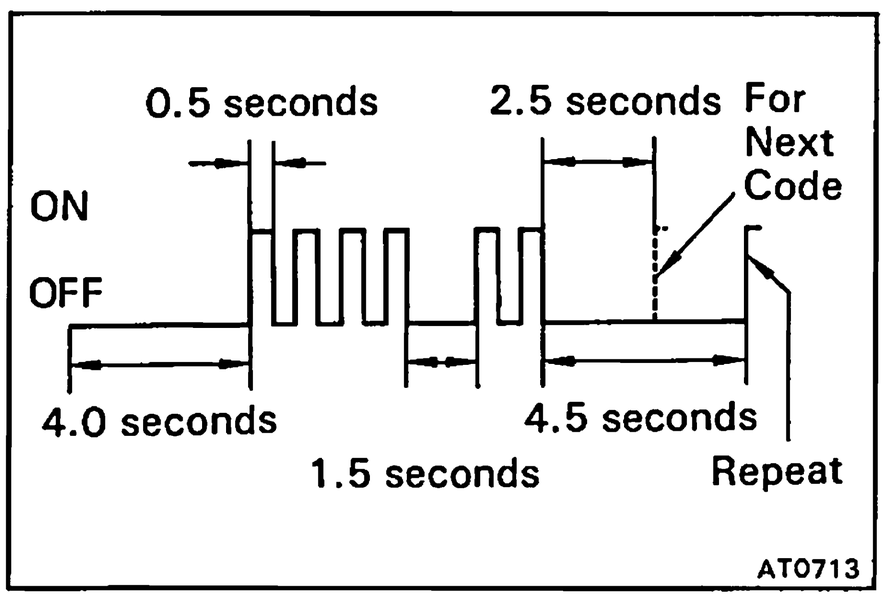
Read the diagnostic code as indicated by the number of times the O/D OFF light flashes.




**(Diagnostic Code Indication)**

- If the system is operating normally, the light will flash 2 times par second.
- In the event of a malfunction, the light will flash 1 time par second. The number of blinks will equal the first number and, after 1.5 seconds pause, the second number of the two digit diagnostic code. If there are two or more codes, there will be a 2.5 seconds pause between each.

HINT: In the event of several trouble codes occurring simultaneously, indication will began from the smaller value and continue to the larger.




**4. REMOVE SST**

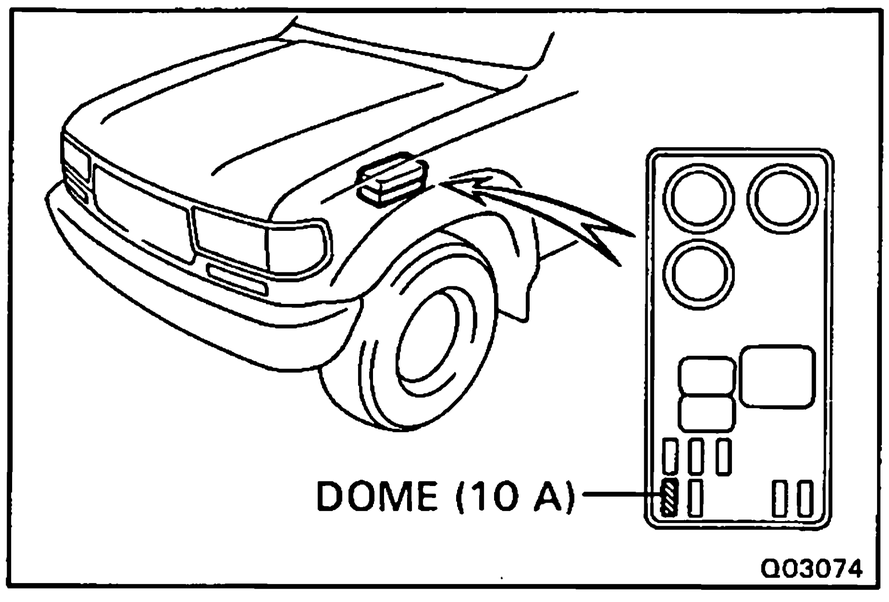
# DIAGNOSTIC CODES

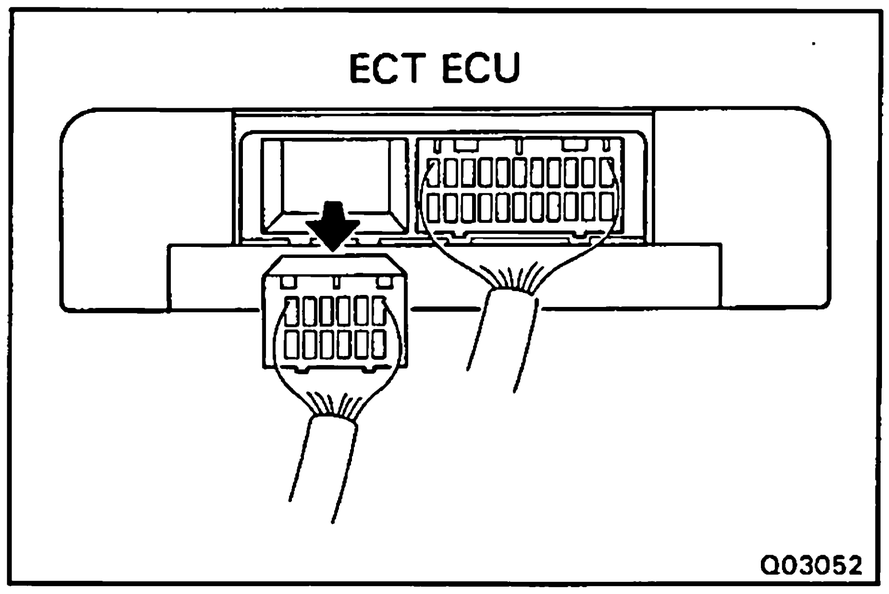
| Code No. | Light Pattern | Diagnosis System |
|---|---|---|
| — |  | Normal |
| 41 |  | Severed throttle position sensor or short circuit— severed wire harness or short circuit |
| 42 |  | Defective No. 1 speed sensor (in combination meter)— severed wire harness or short circuit |
| 61 |  | Defective No. 2 speed sensor (in ATM)— severed wire harness or short circuit |
| 62 |  | Severed No. 1 solenoid or short circuit— severed wire harness or short circuit |
| 63 |  | Severed No. 2 solenoid or short circuit— severed wire harness or short circuit |
| 64 |  | Severed lock-up solenoid or short circuit— severed wire harness or short circuit |
| 65 |  | Severed timing solenoid or short circuit— severed wire harness or short circuit |
| 86 |  | Severed engine speed sensor or short circuit— severed wire harness or short circuit |
| *88 |  | Severed engine ECU and ECT ECU or short circuit— severed wire harness or short circuit |

*: 1FZ-FE engine only

Q03076

HINT: If codes 62, 63, 64, or 65 appear, there is an electrical malfunction in the solenoid. Causes due to mechanical failure, such as a stuck valve, will not appear.




# CANCEL OUT DIAGNOSTIC CODE

1. After repair of the trouble area, the diagnostic code retained in memory by the ECT ECU must be canceled by removing the DOME fuse (10 A) for 10 seconds or more, depending on ambient temperature (the lower the temperature, the longer the fuse must be left out) with the ignition switch OFF.

   HINT:
   - Cancellation can be also done by removing the battery negative (—) terminal, but in this case other memory systems will be also canceled out.
   - The diagnostic code can be also canceled out by disconnecting the ECT ECU connector.
   - If the diagnostic trouble is not canceled out, it will be retained by the ECT ECU and appear along with a new code in event of future trouble.

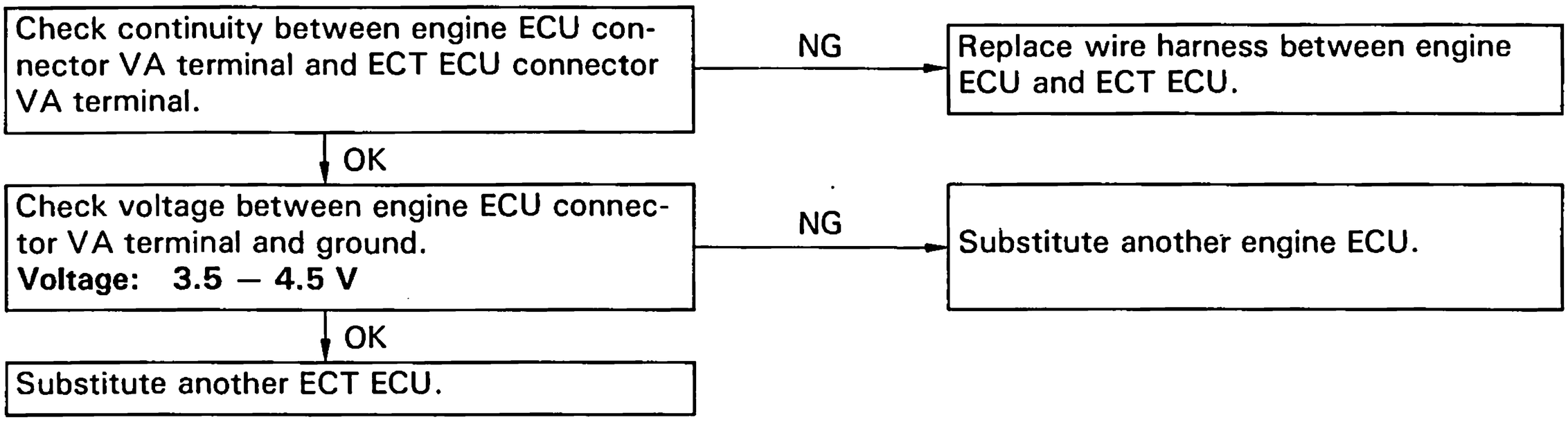
2. After cancellation, perform a road test to confirm that a "normal code" is now read on the O/D OFF light.

# TROUBLESHOOTING FLOW-CHART

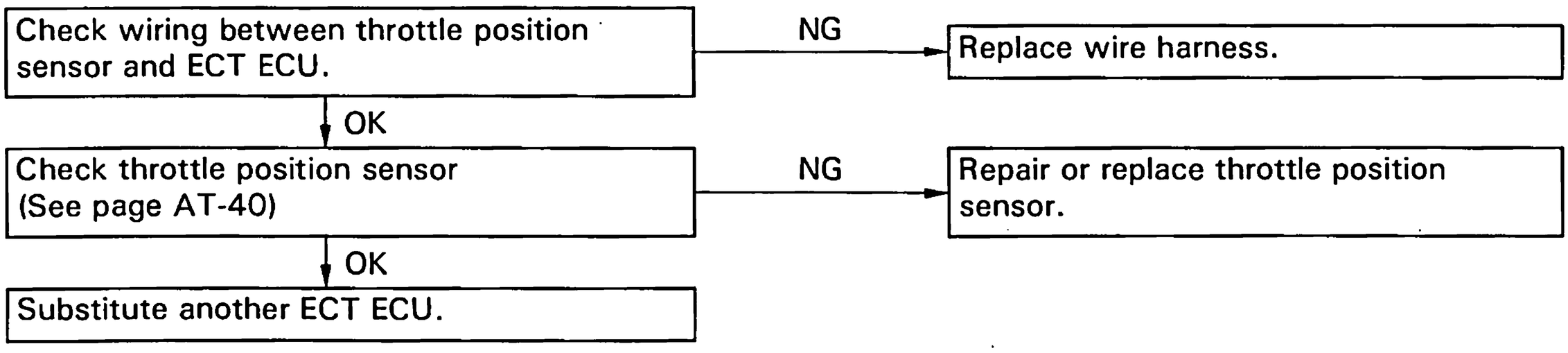
HINT:

- If diagnostic code Nos.41, 42, 61, 62, 63, 64, 65, 86, 88 (1FZ-FE engine only) and are output, the overdrive OFF indicator light will begin to blink immediately to warn the driver. However, an impact or shock may cause the blinking to stop; but the code will still be retained in the ECT ECU memory until canceled out.
- There is no warning for diagnostic code No.64 and 65.
- In the event of a simultaneous malfunction of both No.1 and No.2 speed sensors, no diagnostic code will appear and the fail-safe system will not function. However, when driving in the D range, the transmission will not up-shift from first gear, regardless of the vehicle speed.

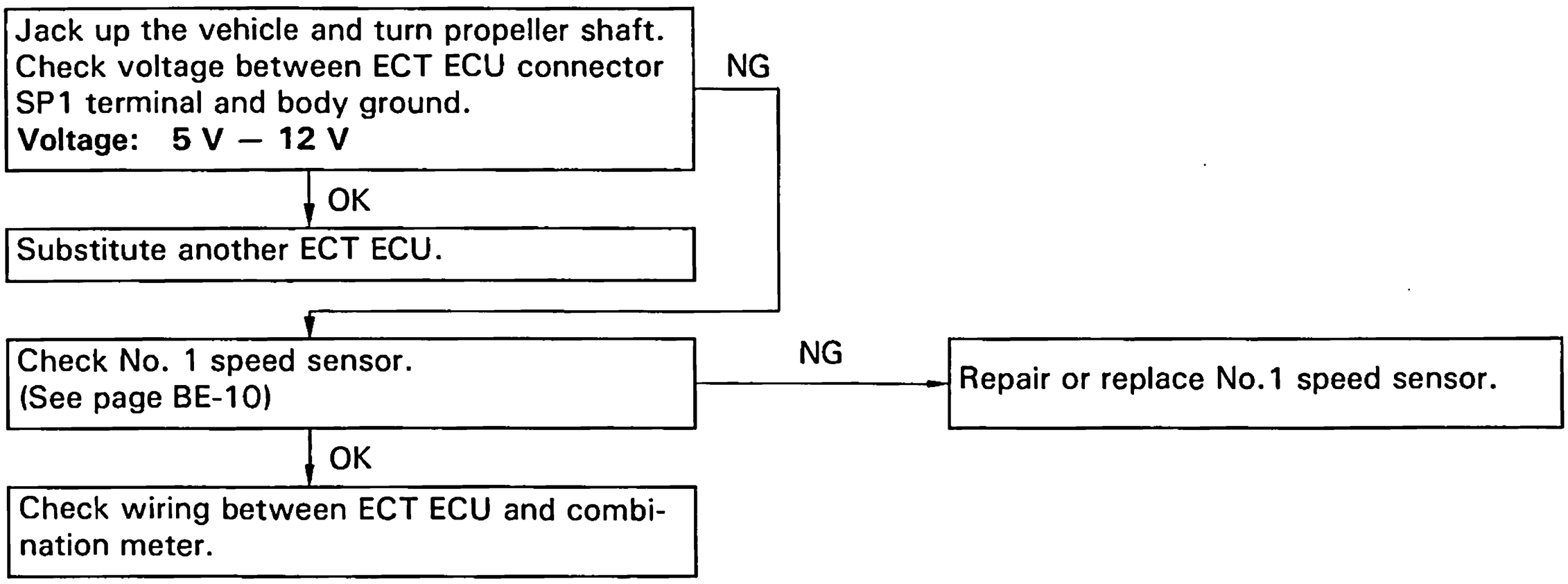
**Diagnostic Code 41 (Throttle position sensor circuitry) (1FZ-FE engine)**




**Diagnostic trouble Code 41 (Throttle position sensor circuitry) (1HD-T engine)**




**Diagnostic Code 42 (No. 1 speed sensor circuitry)**



**Diagnostic Code 61 (No.2 speed sensor circuitry)**

Check resistance between ECT ECU connector $SP_2^+$ terminal and $SP_2^-$ terminal.
**Resistance: 620 ± 80 Ω**

NG

OK

Substitute another ECT ECU.

Check No.2 speed sensor.
(See page AT-40)

NG → Repair or replace No.2 speed sensor.

OK

Check wiring between ECT ECU and No.2 speed sensor.

**Diagnostic Code 62 (No.1 solenoid valve circuitry)**

Check resistance of No.1 solenoid valve at ECT ECU connector. (See apge AT-39)

NG

OK

Substitute another ECT ECU.

Remove oil pan and check resistance of No.1 solenoid valve connector and body ground.
**Resistance: 11 — 15 Ω**

NG → Replace No.1 solenoid valve.

OK

Check wiring between No.1 solenoid valve and ECT ECU.

**Diagnostic Code 63 (No. 2 solenoid valve circuitry)**

Check resistance of No.2 solenoid valve at ECT ECU connector. (See page AT-39)

NG

OK

Substitute another ECT ECU.

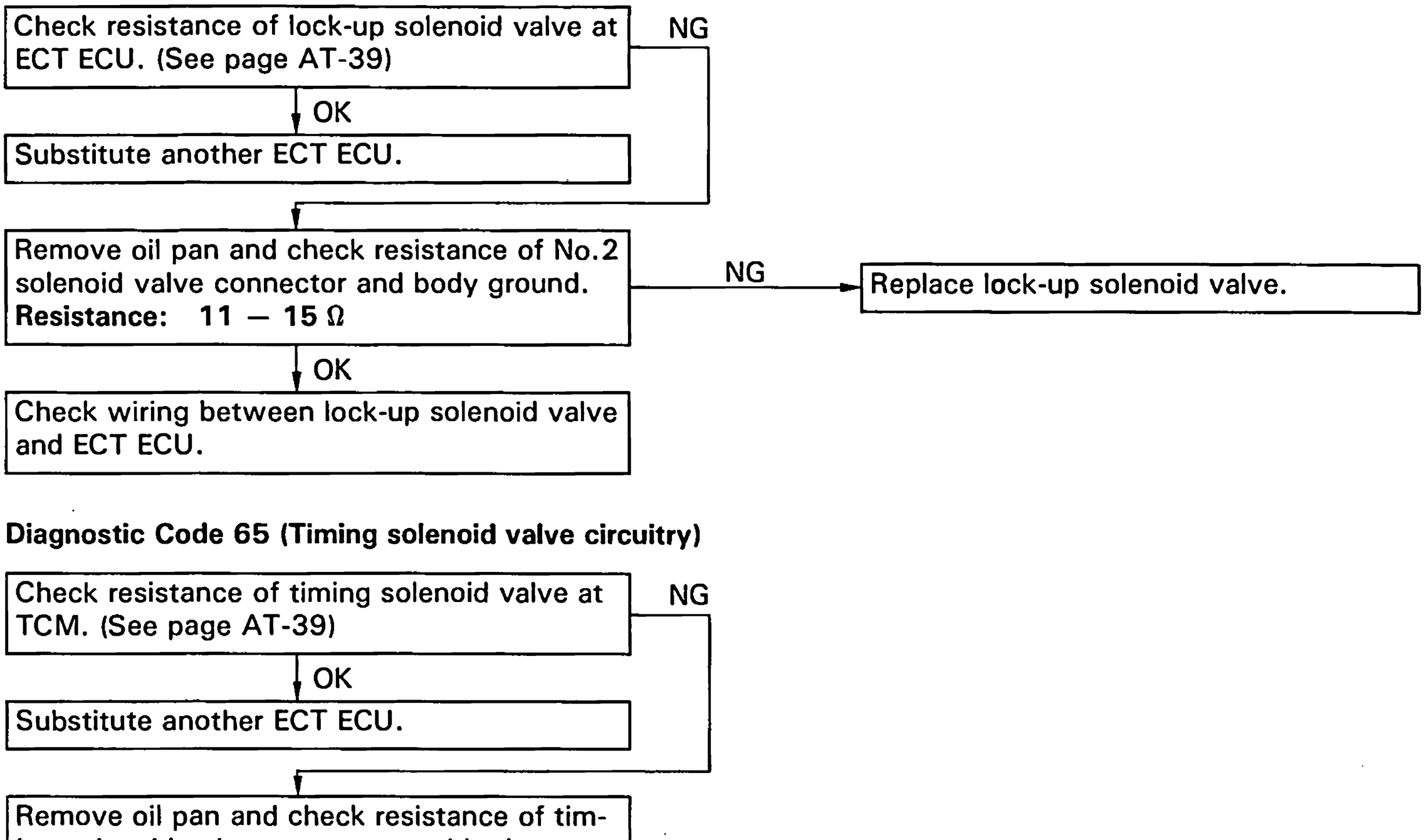
Remove oil pan and check resistance of No.2 solenoid valve connector and body ground.
**Resistance: 11 — 15 Ω**

NG → Replace No.2 solenoid valve.

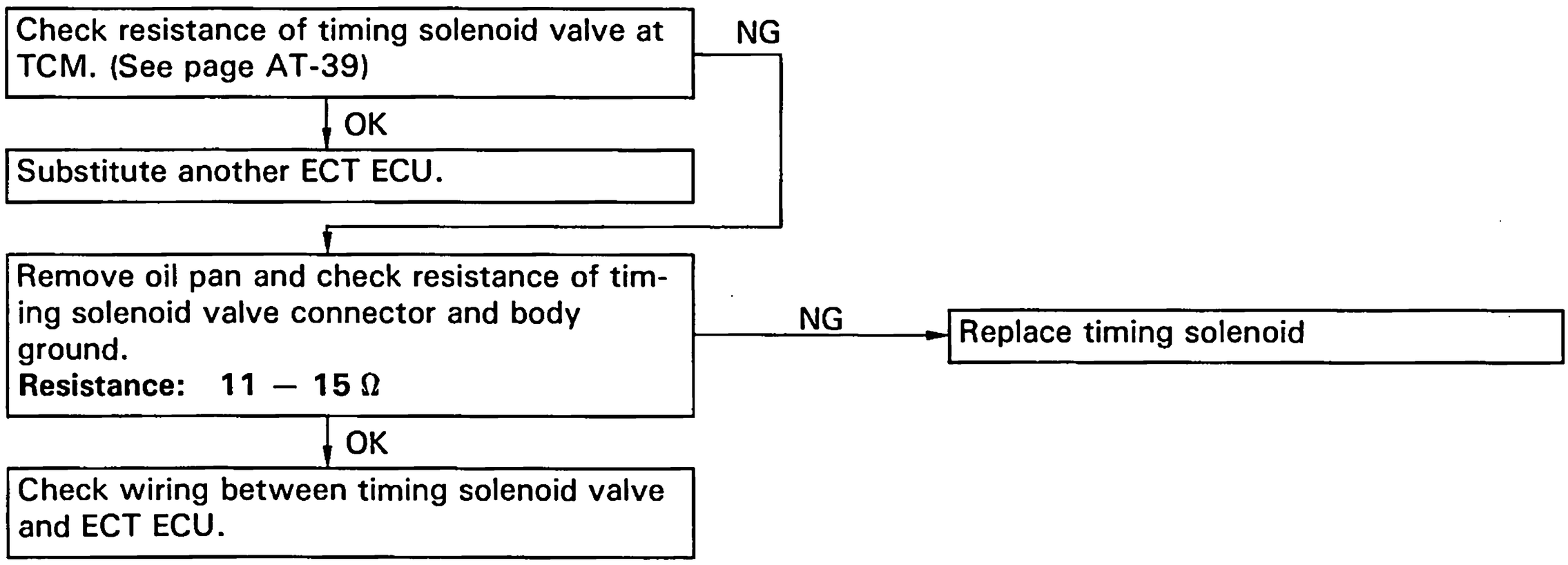
OK

Check wiring between No.2 solenoid valve and ECT ECU.

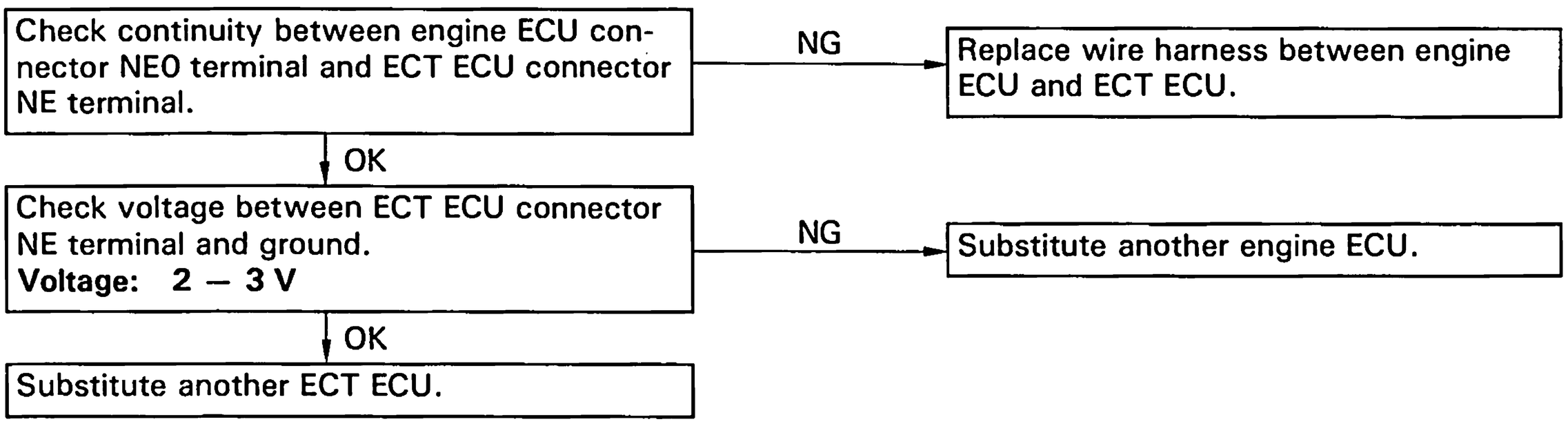
**Diagnostic Code 64 (Lock-up solenoid valve circuitry)**



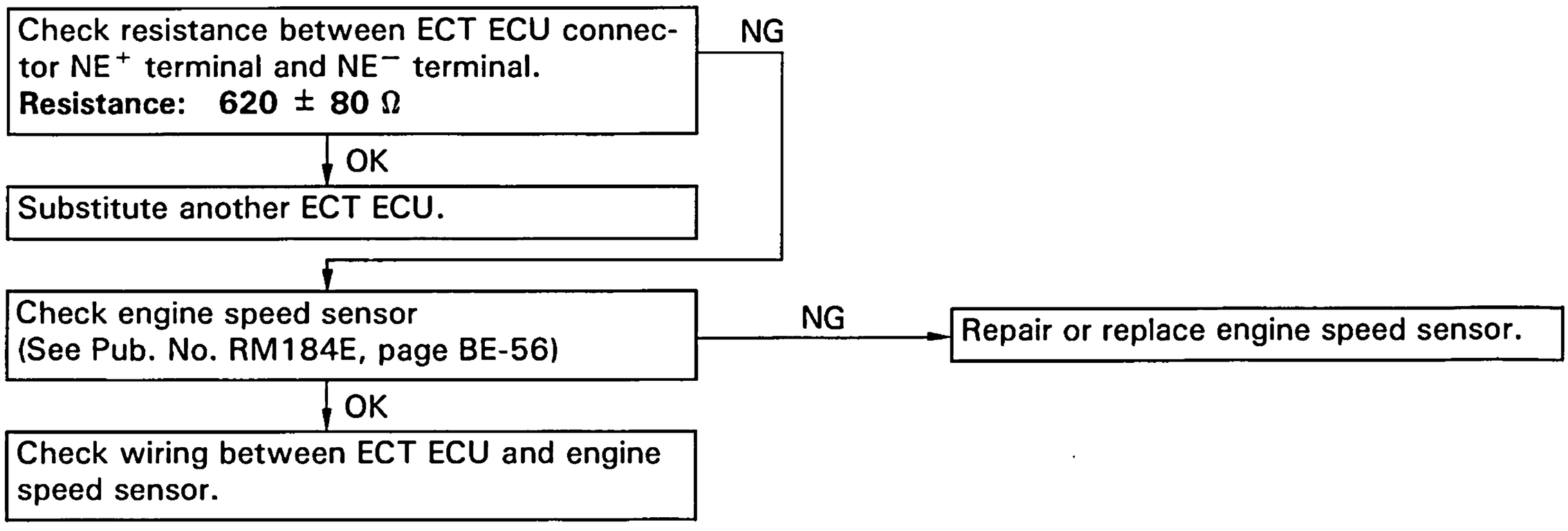

**Diagnostic Code 65 (Timing solenoid valve circuitry)**




**Diagnostic Code 86 (Engine speed sensor circuitry) (1FZ-FE engine)**

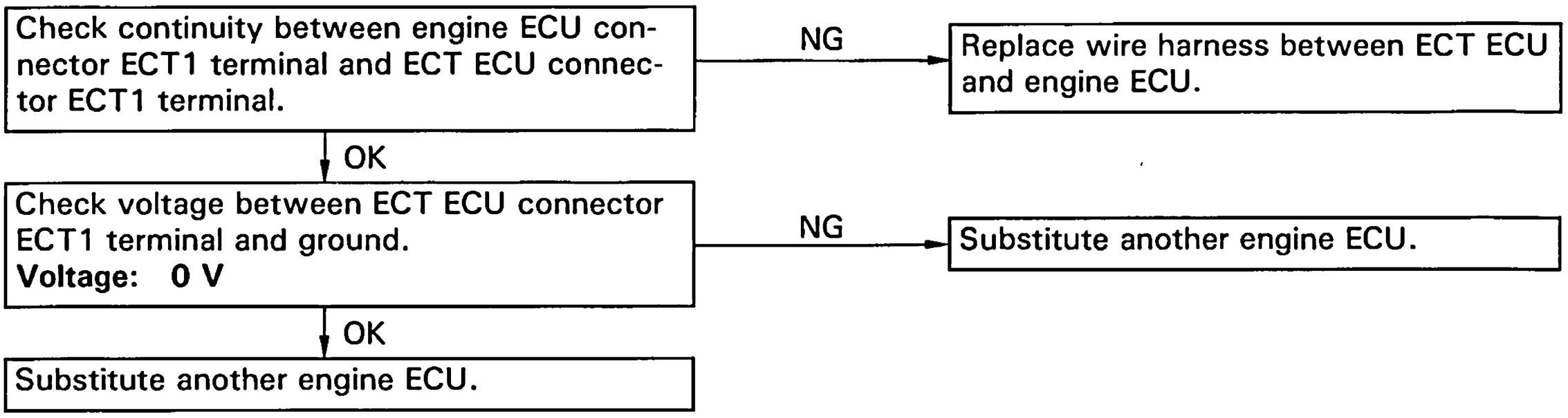


**Diagnostic Code 86 (Engine speed sensor circuitry) (1HD-T engine)**

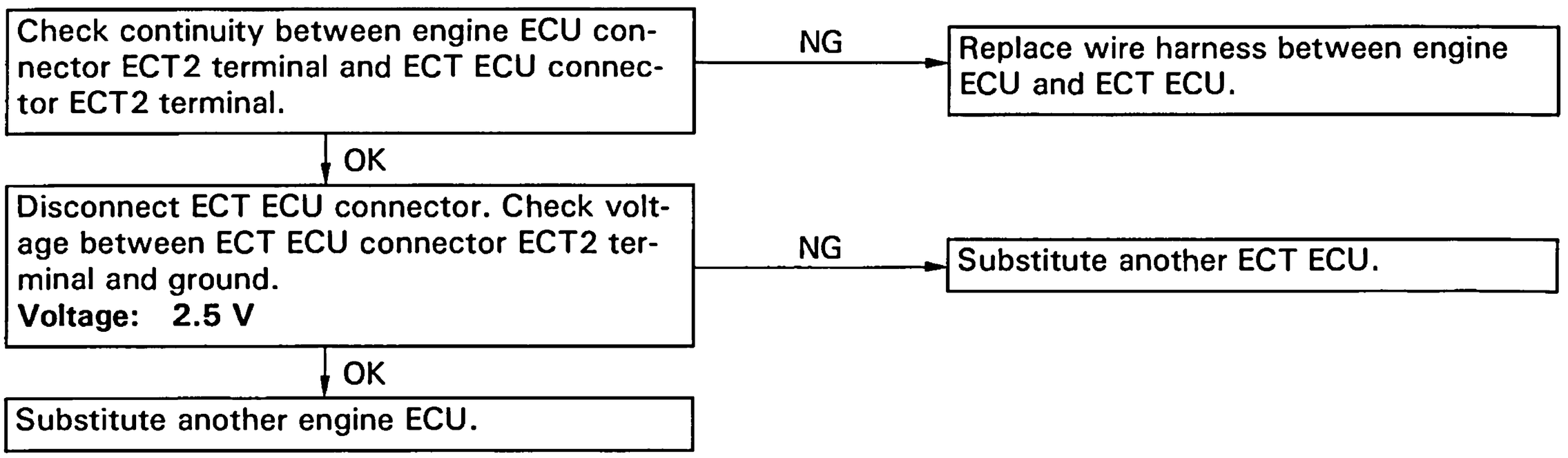



**(1FZ-FE engine only)**
**Diagnostic Code 88 (Timing retard demand signal and fail safe signal circuitry)**

(Timing retard demand signal)




(Fail safe singal)



# PRELIMINARY CHECK

## 1. CHECK FLUID LEVEL

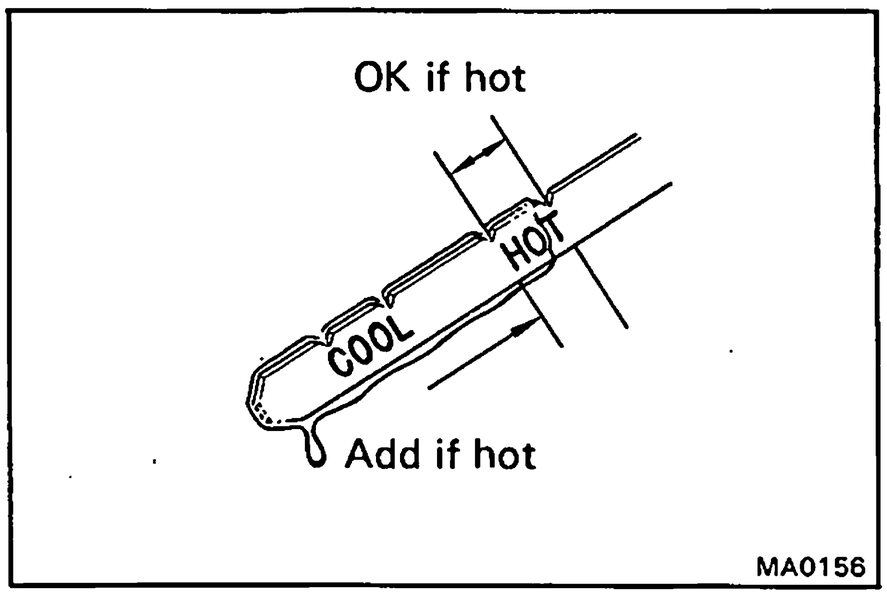
HINT:

- The vehicle must have driven so that the engine and transmission are at normal operating temperature.

(Fluid temperature: 70 — 80°C or 158 — 176°F)

- Only use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.

(a) Park the vehicle on a level surface, set the parking brake.




(b) With the engine idling, shift the shift lever into all positions from P to L range and return to P range.

(c) Pull out the transmission dipstick and wipe it clean.

(d) Push it back fully into the tube.

(e) Pull it out and check that the fluid level is on the HOT range.

If the level is at the low side, add fluid.

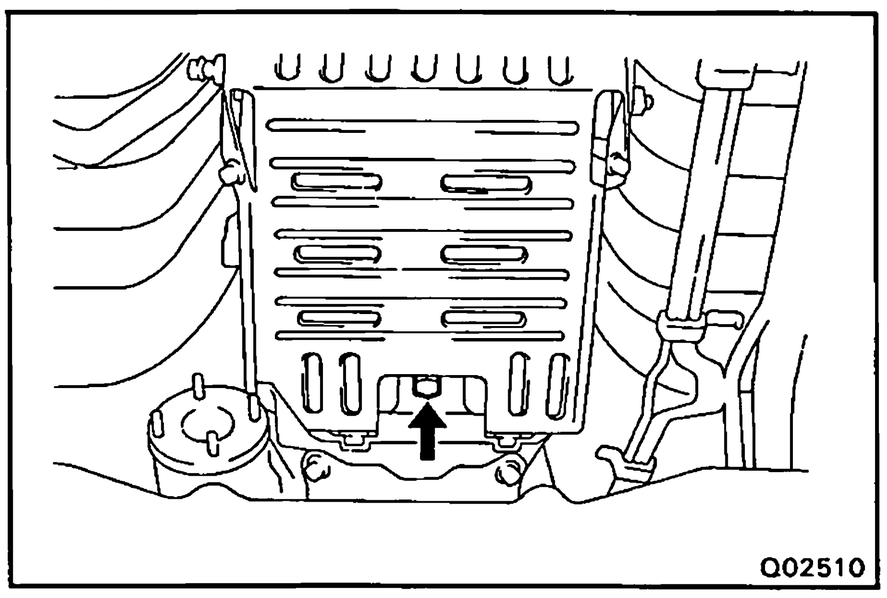
**Fluid type:**

**ATF DEXRON® II**

**NOTICE: Do not overfill.**

## 2. CHECK FLUID CONDITION

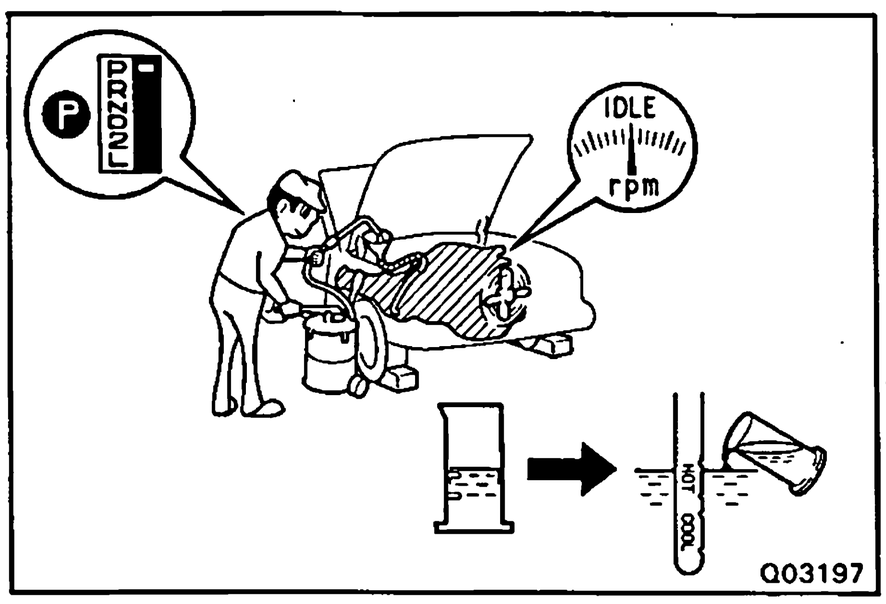
If the fluid smells burnt or is black, replace it in the following procedure.




(a) Remove the drain plug and drain the fluid.

(b) Reinstall the drain plug securely.

**Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)**




(c) With the engine OFF, add new fluid through the oil filler tube.

**Fluid type:**

**ATF DEXRON® II**

**Capacity:**

**Total**

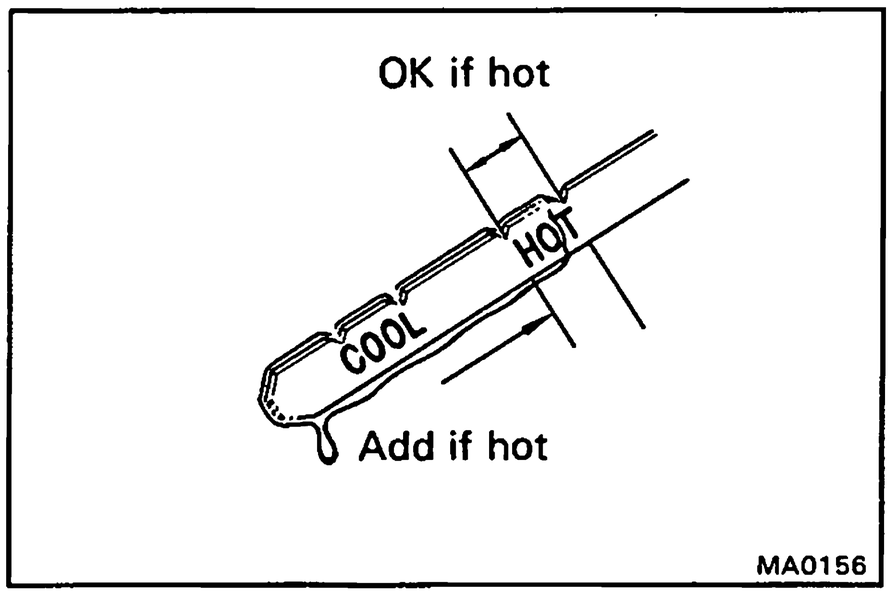
**(w/o Oil cooler)**
**15.4 litters (16.3 US qts, 13.6 Imp.qts)**
**(w/o Oil cooler)**
**15.0 liters (15.9 US qts, 13.2 Imp.qts)**

**Drain and refill**

**6.0 litters (6.3 US qts, 5.3 Imp.qts)**

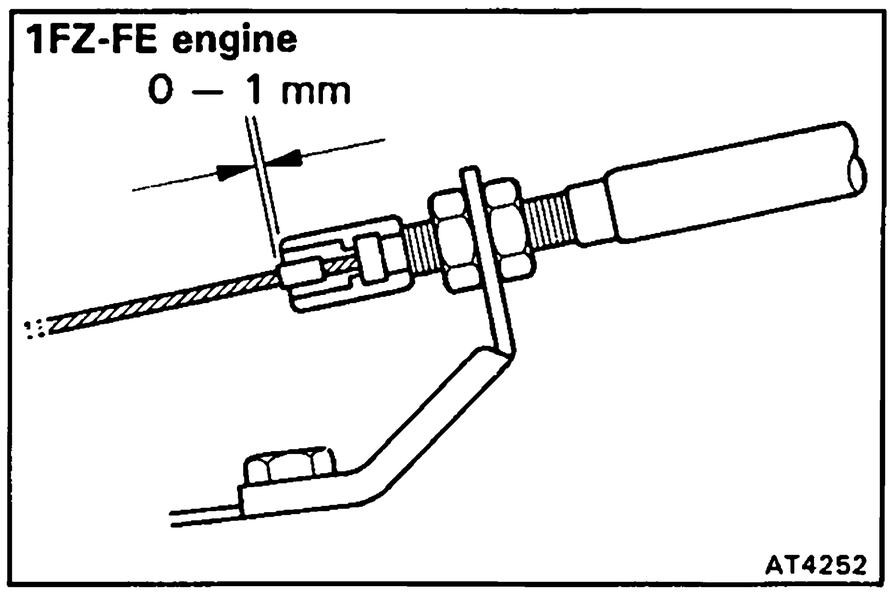
(d) Start the engine and shift the shift lever into all positions from P to L range and then shift into P range.

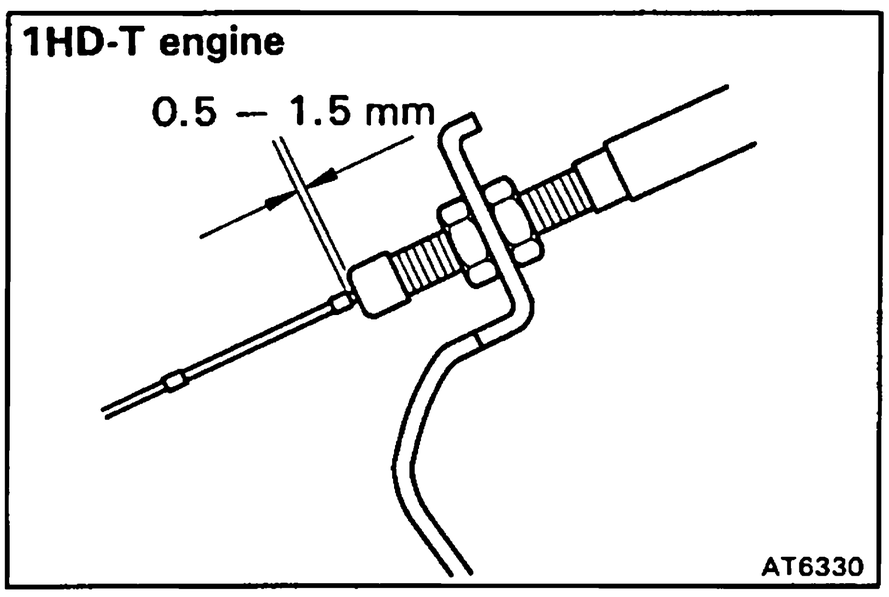
(e) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.




(f) Check the fluid level with the normal operating temperature (70 — 80°C or 158 — 176°F) and add as necessary.

**NOTICE: Do not overfill.**




### 3. INSPECT THROTTLE CABLE

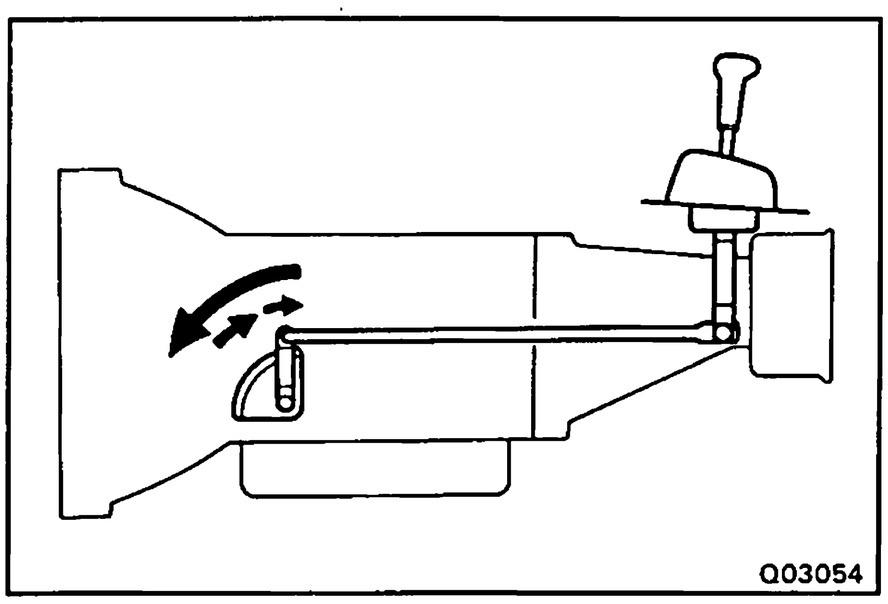
(a) Check that the throttle cable is installed correctly and not bent.

(b) With the throttle valve fully closed, measure the distance between the end of the boot and stopper on the cable.

**Standard distance:**

**(1FZ-FE engine) 0 — 1 mm (0 — 0.04 in.)**
**(1HD-T engine) 0.5 — 1.5 mm (0.020 — 0.059 in.)**

If the distance is not standard, adjust the cable by the adjusting nuts.




### 4. INSPECT TRANSMISSION SHIFT LEVER RANGE

When shifting the shift lever from the N range to other ranges, check that the lever can be shifted smoothly and accurately to each range and that the position indicator correctly indicates the position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

(a) Loosen the nut on the control rod.

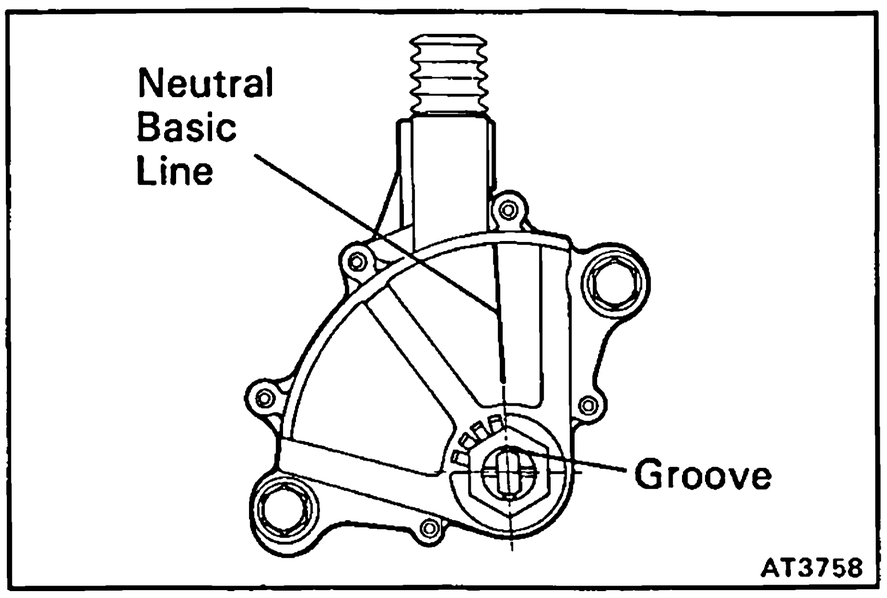
(b) Push the control shaft lever fully toward the rear of the vehicle.

(c) Return the control shaft lever two notches to N range.

(d) Set the shift lever to N range.

(e) While holding the shift lever lightly toward the R range side, tighten the control rod nut.

(f) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D range and reverse when shifting it to the R range.




**5. INSPECT NEUTRAL START SWTICH**

Check that the engine can be started with the shift lever only in the N or P range, but not in other ranges.

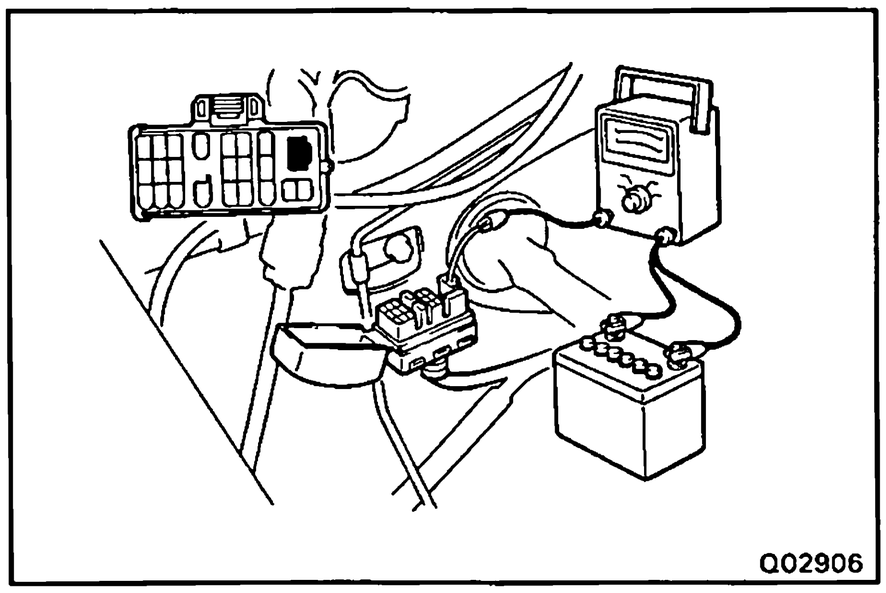
If not as started above, carry out the following adjustment procedures.

(a) Loosen the neutral start switch bolts and set the shift lever to the N range.

(b) Align the groove and neutral basic line.

(c) Hold in position and tighten the bolts.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

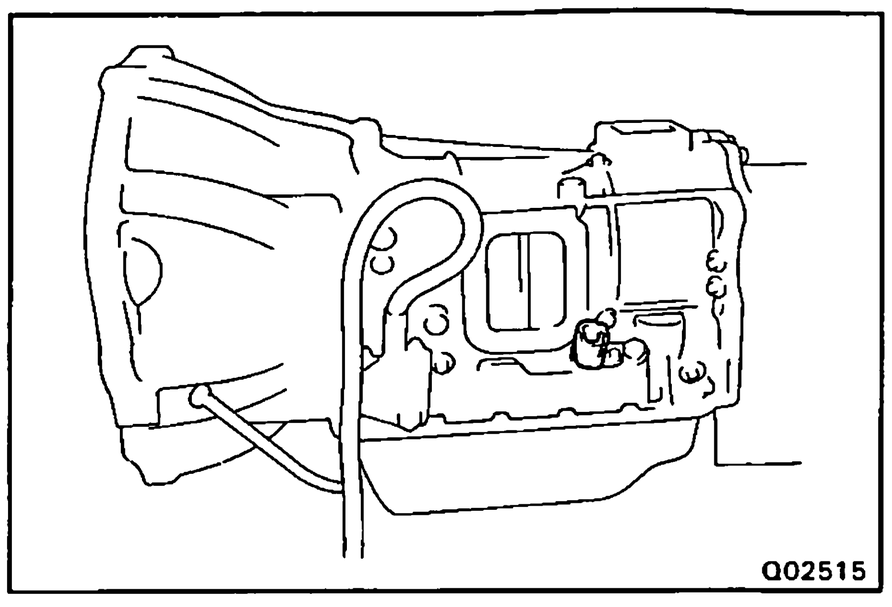



**6. INSPECT IDLE SPEED (N RANGE)**

Connect tachometer test probe to the check connector terminal IG ⊖, inspect the idle speed.

**Idle speed:**

**650 rpm**




# MANUAL SHIFTING TEST

HINT: With this test, it can be determine whether the trouble lies within the electrical circuit or is a mechanical problem in the transmission.

**1. DISCONNECT SOLENOID WIRE**

**2. INSPECT MANUAL DRIVING OPERATION**

Check that the shift and gear position correspond with the table below.

HINT: If the L, 2 and D range gear position are difficult to distinguish, perform the following road test.

- While driving, shift through the L, 2 and D ranges. Check that the gear change corresponds to the shift position.
- If any abnormality is found in the above test, the problem lies in transmission ifself.

**3. CONNECT SOLENOID WIRE**

**4. CANCEL OUT DIAGNOSTIC CODE**
**(See page AT-20)**

REFERANCE: Possible gear position in accordance with solenoid operating conditions.

| Range | NORMAL | | | NO.1 SOLENOID MALFUNCTIONING | | | NO.2 SOLENOID MALFUNCTIONING | | | BOTH SOLENOIDS MALFUNCTIONING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Solenoid Valve | | Gear Position | Solenoid Valve | | Gear Position | Solenoid Valve | | Gear Position | Solenoid Valve | | Gear Position |
| | No.1 | No.2 | | No.1 | No.2 | | No.1 | No.2 | | No.1 | No.2 | |
| D range | ON | OFF | 1st | x | ON (OFF) | 3rd (O/D) | ON | x | 1st | x | x | O/D |
| | ON | ON | 2nd | x | ON | 3rd | OFF (ON) | x | O/D (1st) | x | x | O/D |
| | OFF | ON | 3rd | x | ON | 3rd | OFF | x | O/D | x | x | O/D |
| | OFF | OFF | O/D | x | OFF | O/D | OFF | x | O/D | x | x | O/D |
| 2 range | ON | OFF | 1st | x | ON (OFF) | 3rd (O/D) | ON | x | 1st | x | x | 3rd |
| | ON | ON | 2nd | x | ON | 3rd | OFF (ON) | x | 3rd (1st) | x | x | 3rd |
| | OFF | ON | 3rd | x | ON | 3rd | OFF | x | 3rd | x | x | 3rd |
| L range | ON | OFF | 1st | x | OFF | 1st | ON | x | 1st | x | x | 1st |
| | ON | ON | 2nd | x | ON | 2nd | ON | x | 1st | x | x | 1st |

( ): No fail-safe function x: Malfunctions

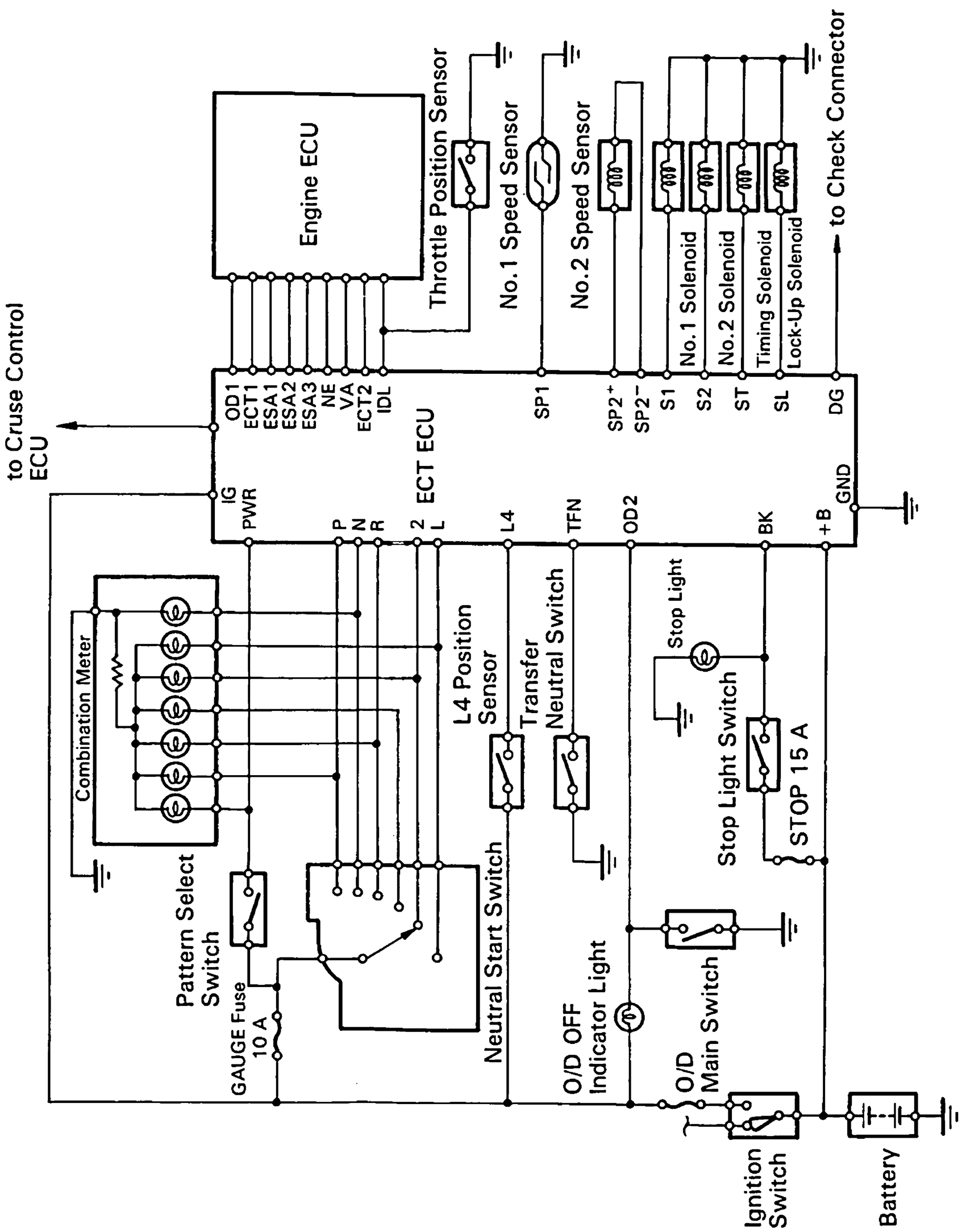
# ELECTRONIC CONTROL SYSTEM

## PRECAUTION

Do not open the cover or the case of the TCM and various computer unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

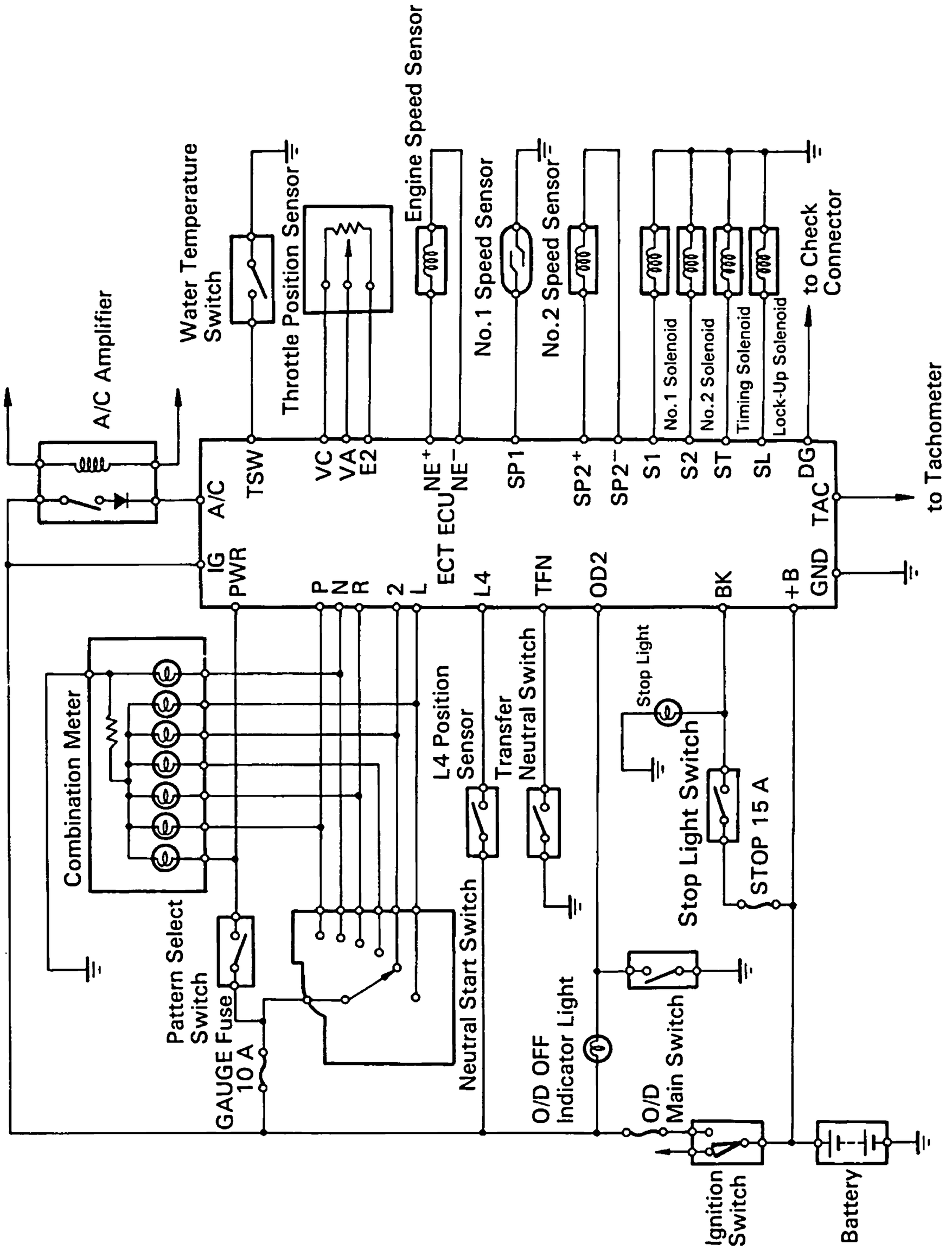
## ELECTRONIC CONTROL CIRCUIT

**1FZ-FE engine**



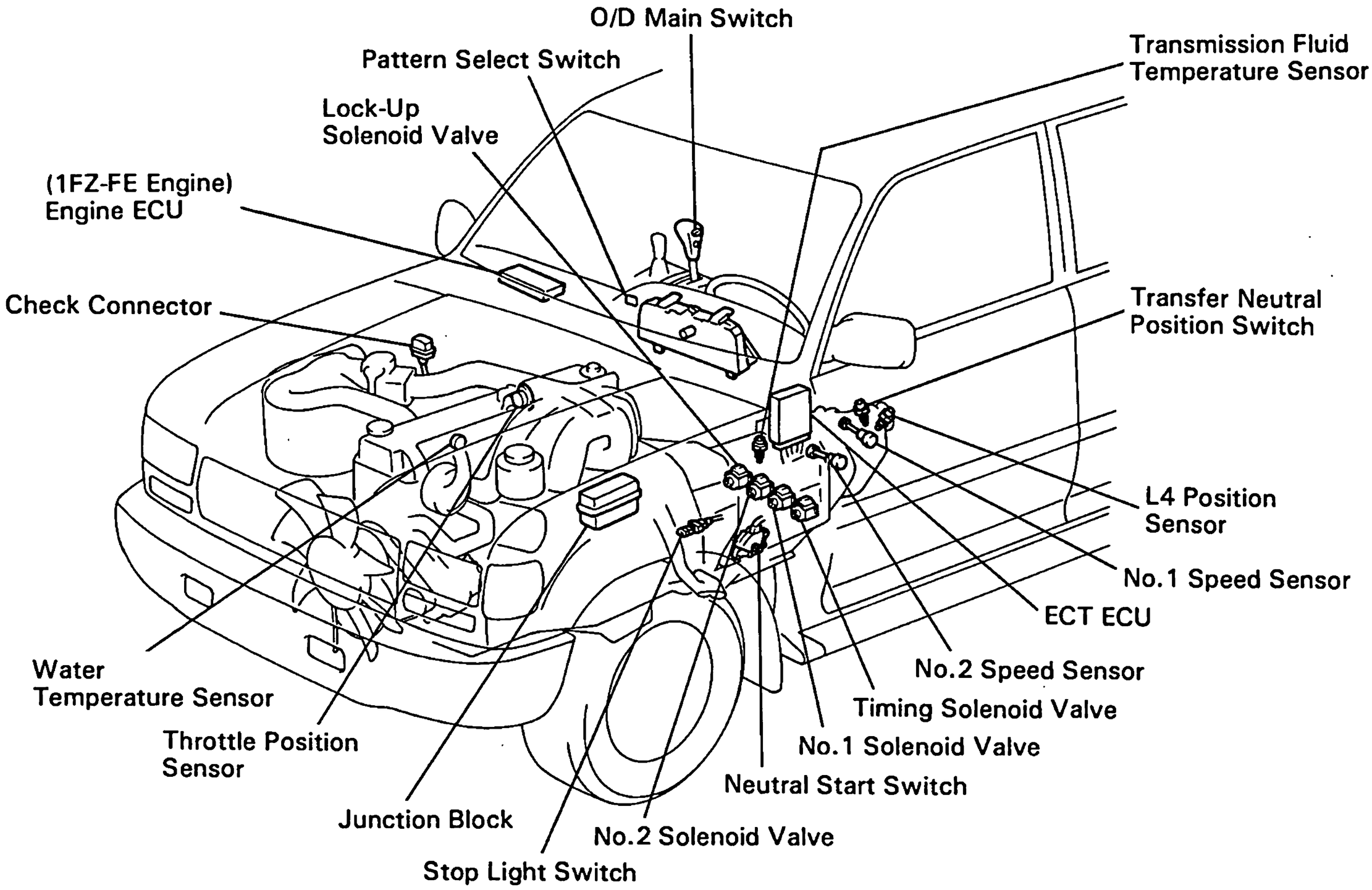

Q03072

**1HD-T engine**




Q03193

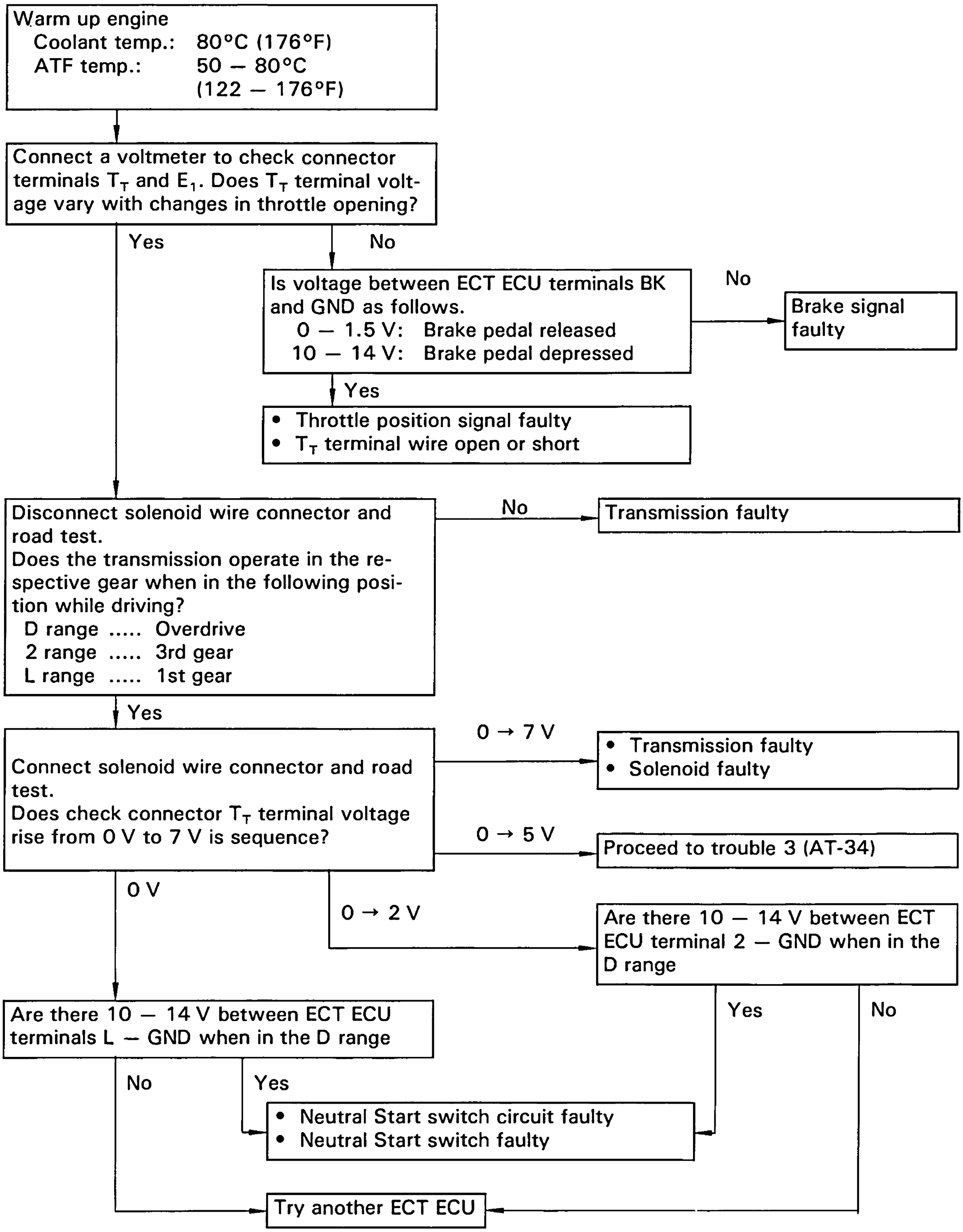
## ELECTRONIC CONTROL COMPONENTS



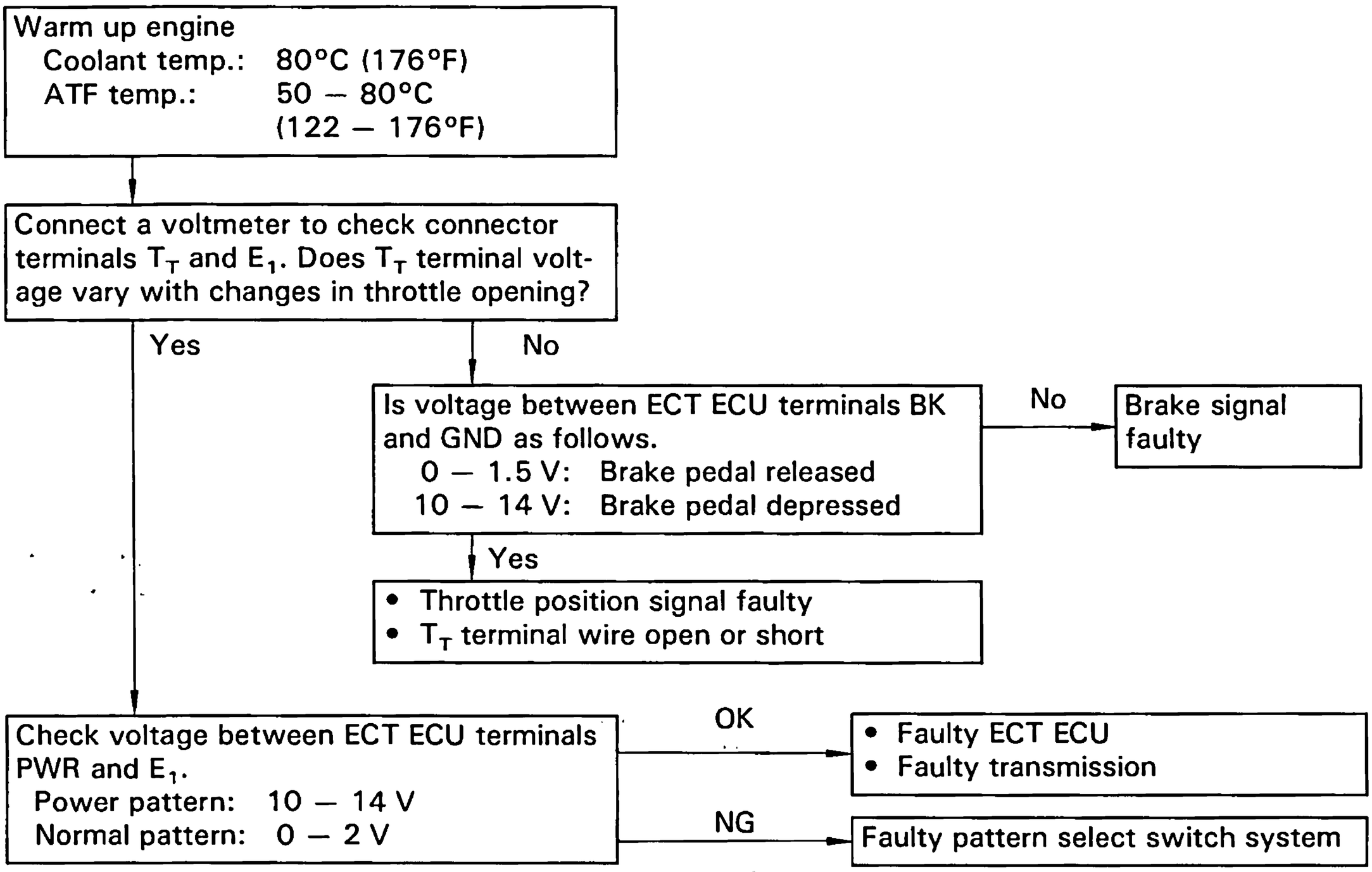

Q03073

## TROUBLESHOOTING FLOW — CHART

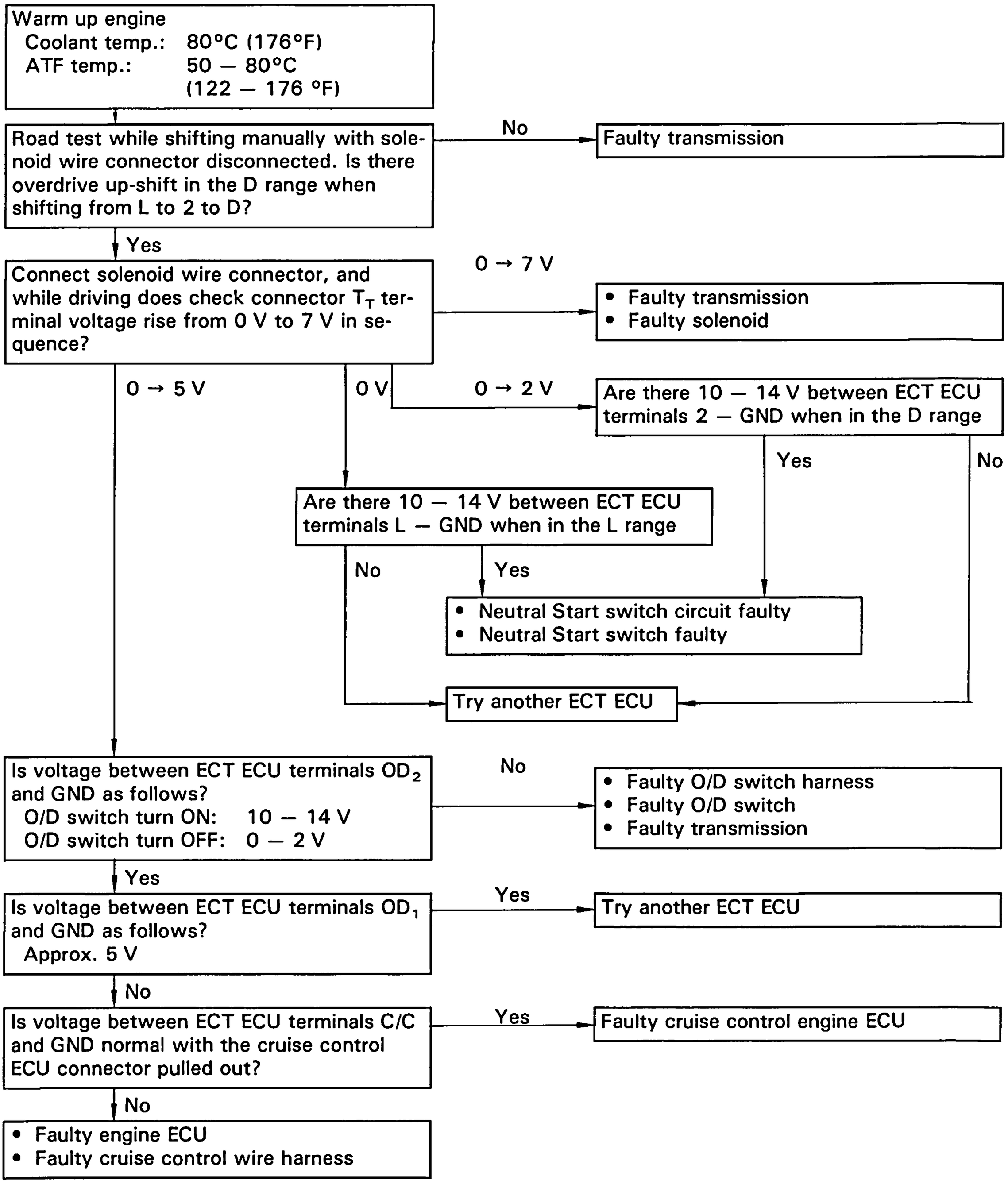
### Trouble No.1 No Shifting



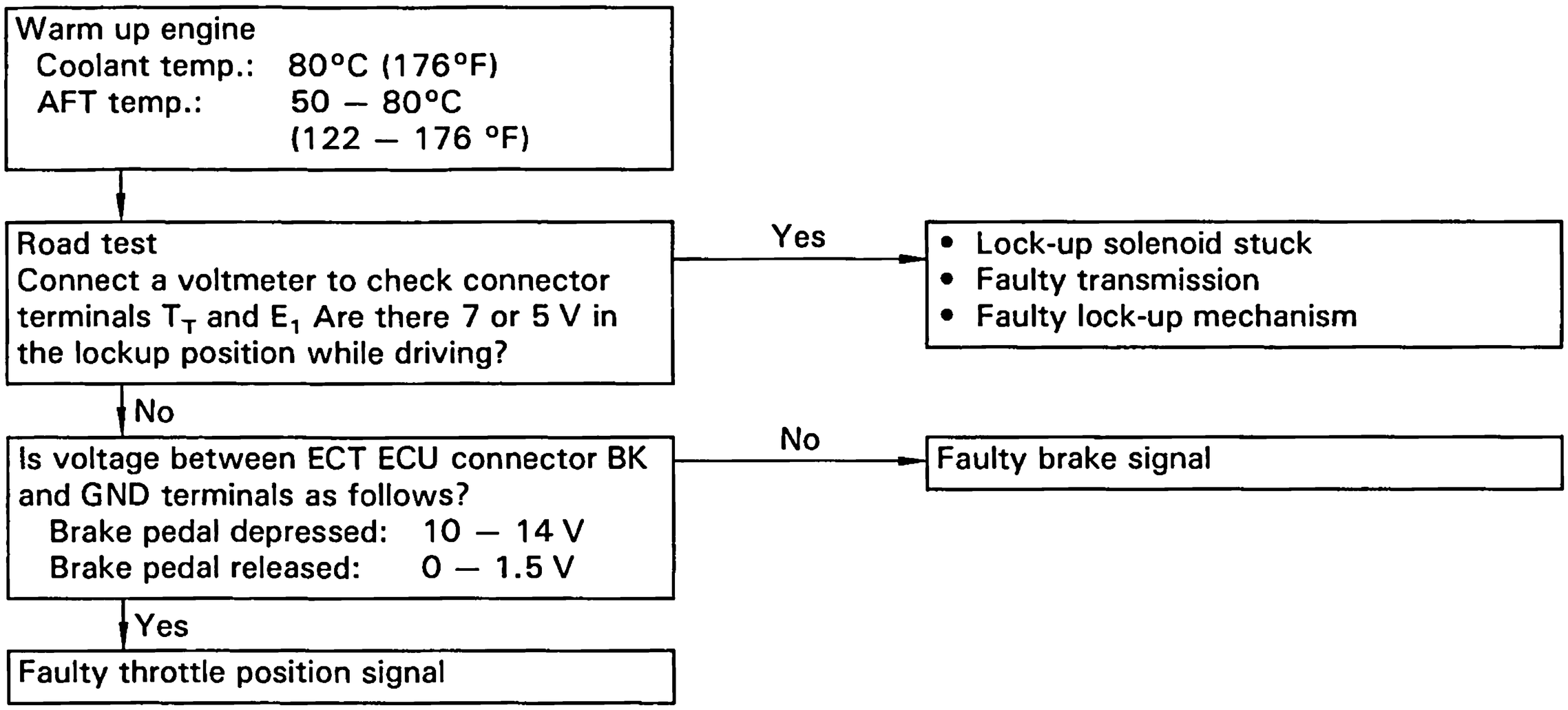
**Trouble No.2 Shift point too high or too low**

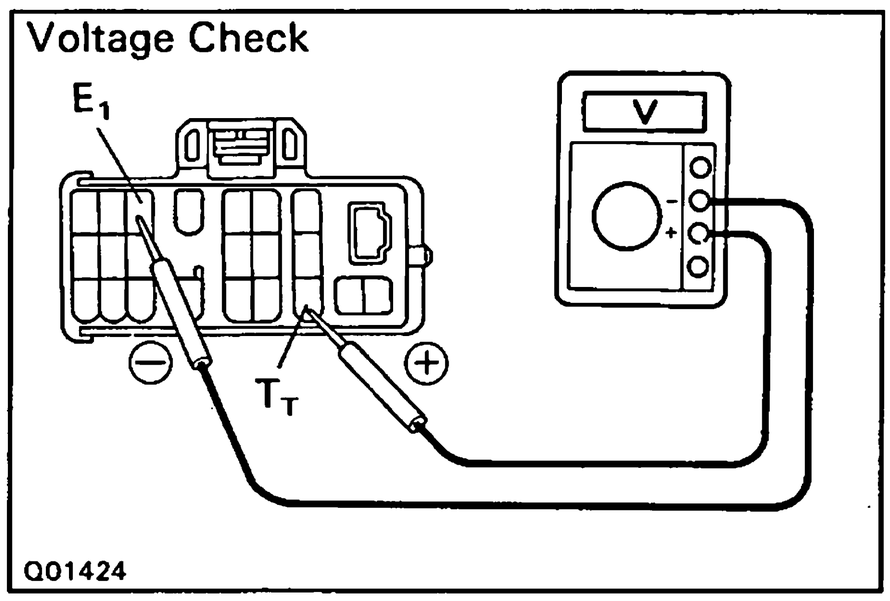


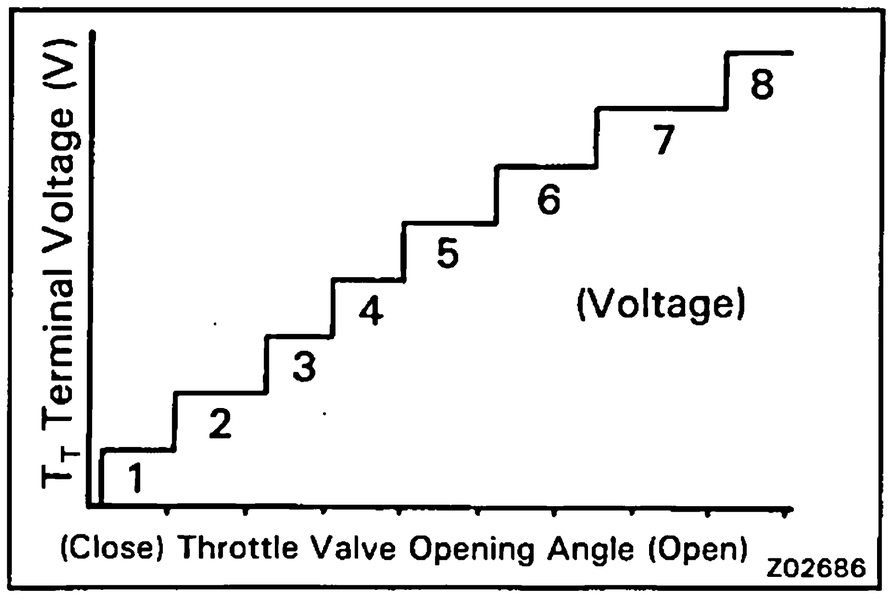
**Trouble No.3 No up-shift to overdrive (After warm-up)**

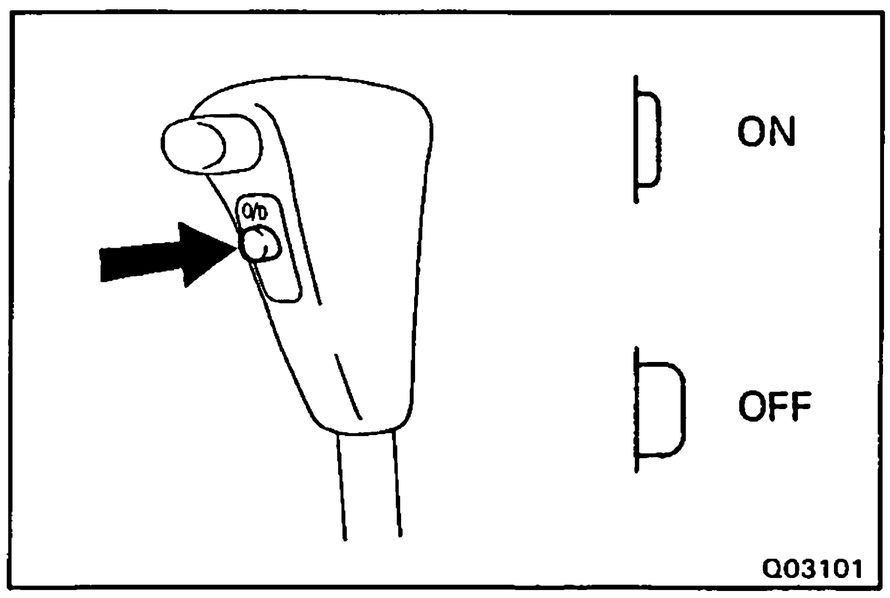


**Trouble No.4 No lock-up (After warm-up)**






| $T_T$ Terminal (V) | Gear Position |
|---|---|
| 0 | 1st |
| 2 | 2nd |
| 4 | 3rd |
| 5 | 3rd Lock-up |
| 6 | O/D |
| 7 | O/D Lock-up |

# $T_T$ TERMINAL VOLTAGE INSPECTION

## 1. INSPECT THROTTLE POSITION SENSOR SIGNAL

(a) Turn the ignition switch to ON. Do not start the engine.

(b) Connect a voltmeter to check connector terminals $T_T$ and $E_1$.

(c) While slowly depressing the accelerator pedal, check that $T_T$ terminal voltage rises in sequence.

If the voltage does not change in proportion to the throttle opening angle, there is a malfunction in the throttle position sensor or circuit.

## 2. INSPECT BRAKE SIGNAL

(a) Depress the accelerator pedal until the $T_T$ terminal indicates 8 V.

(b) Depress the brake pedal and check the voltage reading from the $T_T$ terminal.

Brake pedal depressed ..... 0 V

Brake pedal released ..... 8 V

If not as indicated, there is a malfunction in either the stop light switch or circuit.

## 3. INSPECT EACH UP-SHIFT POSITION

(a) Warm up the engine.

**Coolant temperature:**
**80°C (176 °F)**

(b) Turn the O/D switch to "ON".

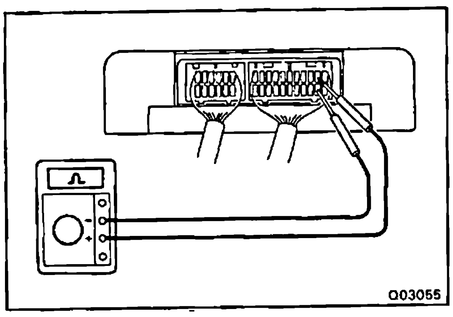
(c) Place the pattern select switch in "Normal" and the shift lever into the D range.

(d) During a road test (about 10 km/h or 6 mph) check that voltage at the $T_T$ terminal is as indicated below for each up—shift position.

If the voltage rises from 0 V to 7 V in the sequence shown, the control system is okay.

The chart on the left shows the voltmeter reading and corresponding gears.

HINT: Determine the gear position by a light shock or change in engine rpm when shifting. The lock-up clutch will turn ON only infrequently during normal 2nd and 3rd gear operation. To trigger this action, press the accelerator pedal to 50% or more of its stroke. At more than 50%, the voltage may change in the sequence 2 V — 4 V — 6 V — 7 V.




## ELECTRONIC CONTROL COMPONENETS INSPECTION

1. INSPECT VOLTAGE OF ECT ECU

(a) Turn on the ignition switch.

(b) Measure the voltage at each terminal.

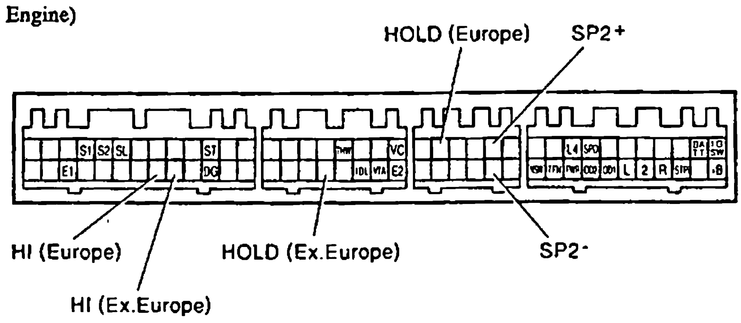
## ELECTRONIC CONTROL COMPONENTS INSPECTION

1. INSPECT VOLTAGE OF ECT ECU

(a) Turn on the ignition switch.

(b) Measure the voltage at each terminal.

(1FZ-FE Engine)



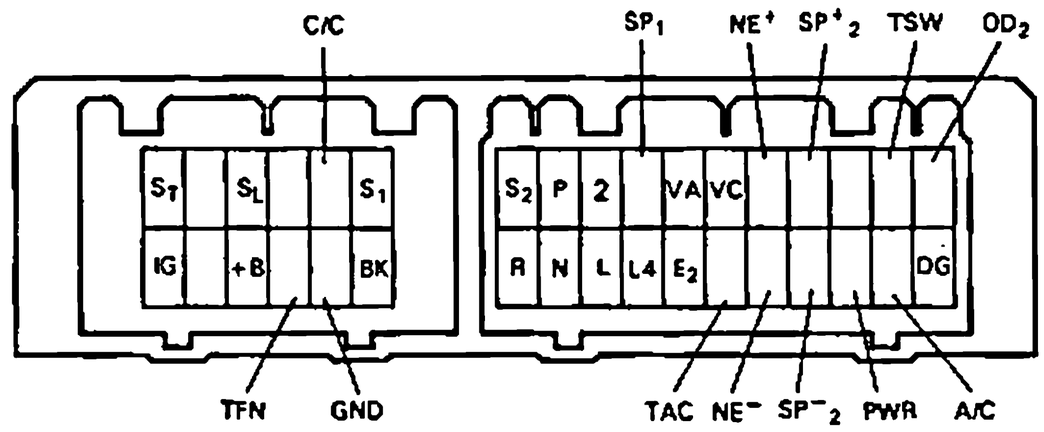

| Terminal | Measuring Condition | Voltage (V) |
|---|---|---|
| S1 - GND | Stop vehicle | 9 - 14 |
| S2 - GND | Stop vehicle | 0 - 1.5 |
| SL - GND | Stop vehicle | 0 - 1.5 |
| ST - GND | Stop vehicle | 0 - 1.5 |
| STP - GND | Brake pedal is depressed | 7.5 - 14 |
| | Brake pedal is released | 0 - 1.5 |
| TFN - GND | Transfer position is N range | 0 - 3 |
| | Transfer position is except N range | 9 - 14 |

*continued overleaf*
*Page 55*

| Terminal | Measuring Condition | Voltage (V) |
|---|---|---|
| THW - GND | Engine coolant temp. 80°C (176°F) | 0 - 1.5 |
| 2 - GND | 2 range | 7.5 - 14 |
| | Except 2 range | 0 - 1.5 |
| NSW - GND | P or N range | 0 - 3 |
| | Except P and N range | 7.5 - 14 |
| L - GND | L range | 7.5 - 14 |
| | Except L range | 0 - 1.5 |
| R - GND | R range | 7.5 - 14 |
| | Except R range | 0 - 1.5 |
| DG - GND | Ignition switch at ON position | 0 - 1.5 |
| PWR - GND | PWR pattern | 7.5 - 14 |
| | NORM pattern | 0 - 1.5 |
| L4 - GND | Transfer position is L4 position | 7.5 - 14 |
| | Transfer position is except L4 position | 0 - 1.5 |
| HI - GND | Ignition switch at ON position | 7.5 - 14 |
| HOLD - GND | 2nd start switch ON | 9 - 14 |
| | 2nd start switch OFF | 0 - 1.5 |
| BATT - GND | Stop engine and ignition switch ON | 9 - 14 |
| IGSW - GND | Stop engine and ignition switch ON | 9 - 141 |
| OD2 - GND | O/D main switch turned ON (O/D ON) | 9 - 14 |
| | O/D main switch turned OFF (O/D OFF) | 0 - 3 |
| OD1 - GND | Washer temperature 55°C (131°F) more than | 9 - 14 |
| | Washer temperature 55°C (131°F) or less | 0 - 3 |
| $SP2^+$ - $SP2^-$ | Vehicle moving | Pulse generation |
| SPD - GND | Vehicle moving | Pulse generation |
| IDL - GND | Accel. pedal is released | 0 - 3 |
| | Accel. pedal as depressed | 9 - 14 |
| VTA - GND | Accel. pedal is released | 0.3 - 0.8 |
| | Accel. pedal is depressed | 3.2 - 4.9 |

| Terminal | Measuring condition | Voltage (V) |
|---|---|---|
| 2 — GND | 2 range | 7.5 — 14 |
| | Except 2 range | 0 — 1.5 |
| P — GND | P range | 7.5 — 14 |
| | Except P range | 0 — 1.5 |
| L — GND | L range | 7.5 — 14 |
| | Except L range | 0 — 1.5 |
| N — GND | N range | 7.5 — 14 |
| | Except N range | 0 — 1.5 |
| R — GND | R range | 7.5 — 14 |
| | Except R range | 0 — 1.5 |
| DG — GND | Engine stop and place ignition key at ON position | 0 — 1.5 |
| ECT2 — GND | Engine coolant temperature 80°C (176°F) more than | 2 — 3 |
| PWR — GND | PWR pattern | 7.5 — 14 |
| | NORM pattern | 0 — 1.5 |
| ESA1 — GND | Engine idling speed (Engine start after 10 second) | 4.5 — 5.5 |
| ESA2 — GND | Engine idling speed (Engine start after 10 second) | 4.5 — 5.5 |
| ESA3 — GND | Engine idling speed (Engine start after 10 second) | 4.5 — 5.5 |
| L4 — GND | Transfer position is L4 position | 7.5 — 14 |
| | Transfer position is except L4 position | 0 — 15 |

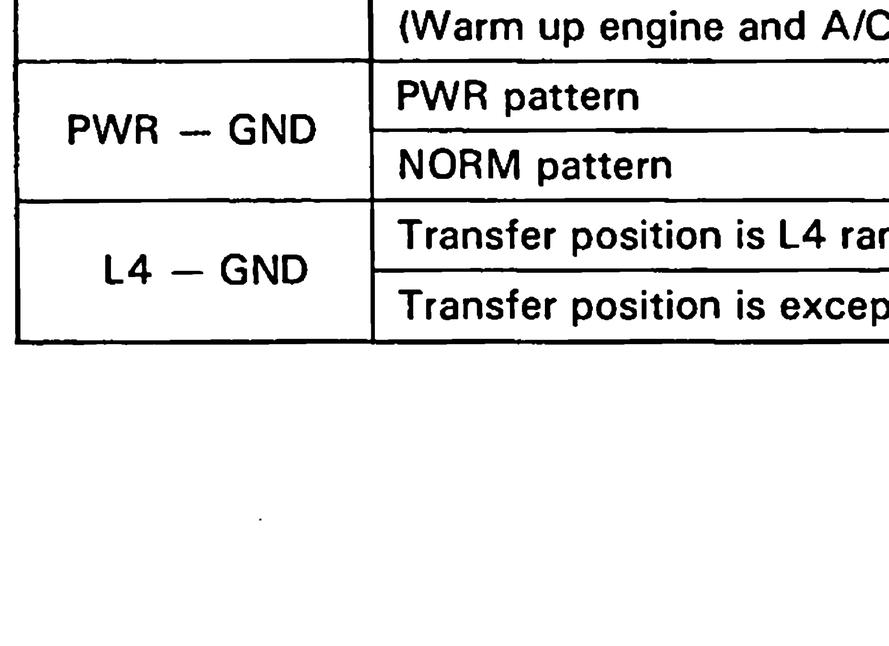
(1HD-T Engine)




Q03115

| Terminal | Measuring condition | | Voltage (V) |
|---|---|---|---|
| S1 — GND | Stop Vehicle | N range | 9 — 14 |
| | | D range | 9 — 14 |
| S2 — GND | Stop vehicle | | 0 — 1.5 |
| SL — GND | Stop vehicle | | 0 — 1.5 |
| ST — GND | Stop vehicle | | 0 — 1.5 |
| BK — GND | Brake pedal is depressed | | 7.5 — 14 |
| | Brake pedal is released | | 0 — 1.5 |
| TFN — GND | Transfer position is N range | | 0 — 3 |
| | Transfer position is except N range | | 9 — 14 |
| +B — GND | Stop engine and ignition switch ON | | 9 — 14 |
| IG — GND | Stop engine and ignition switch ON | | 9 — 14 |
| $OD_2$ — GND | O/D main switch turned ON | | 9 — 14 |
| | O/D main switch turned OFF | | 0 — 3 |

| Terminal | Measuring condition | Voltage (V) |
|---|---|---|
| 2 — GND | 2 range | 7.5 — 14 |
| | Except 2 range | 0 — 1.5 |
| P — GND | P range | 7.5 — 14 |
| | Except P range | 0 — 1.5 |
| L — GND | L range | 7.5 — 14 |
| | Except L range | 0 — 1.5 |
| N — GND | N range | 7.5 — 14 |
| | Except N range | 0 — 1.5 |
| R — GND | R range | 7.5 — 14 |
| | Except R range | 0 — 1.5 |
| DG — GND | Engine stop and place ignition key at ON position | 0 — 1.5 |
| VC — GND | Ignition switch ON | 4.5 — 5.5 |
| TAC — GND | Engine idling speed | Pulse generation |
| TSW — GND | Water temperature 55°C (131°F) more than | 9 — 14 |
| | Water temperature 43°C (109°F) or less | 0 — 3 |
| $SP2^+$ — $SP2^-$ | Vehicle moving | Pulse generation |
| SP1 — GND | Vehicle moving | Pulse generation |
| $NE^+$ — $NE^-$ | Enigne idling speed | Pulse generation |
| A/C — GND | A/C control switch ON (Engine idling speed) | 7.5 — 14 |
| | A/C control switch OFF | 0 — 1.5 |
| VA — GND | Throttle valve fully closed (Warm up engine and A/C control switch OFF) | 2.8 — 33 |
| | Throttle valve fully open (Warm up engine and A/C control switch OFF) | 0.3 — 0.8 |
| PWR — GND | PWR pattern | 7.5 — 14 |
| | NORM pattern | 0 — 1.5 |
| L4 — GND | Transfer position is L4 range | 7.5 — 14 |
| | Transfer position is except L4 range | 0 — 15 |




**2. INSPECT SOLENOID**

(a) Disconnect the connector from ECT ECU.

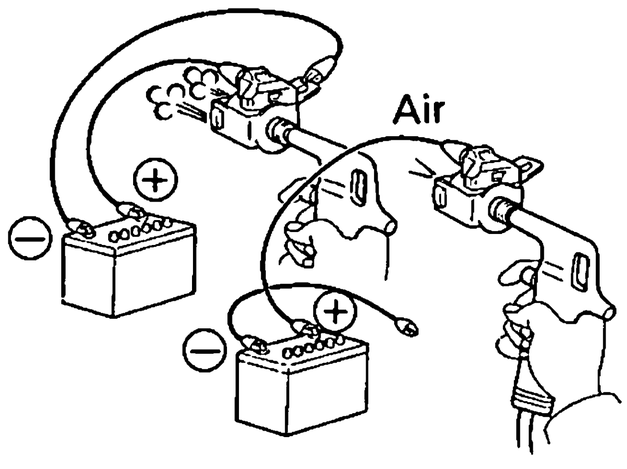
(b) Measure the resistance between $S_1$, $S_2$, $S_L$, $S_T$ and ground.

**Resistance:**

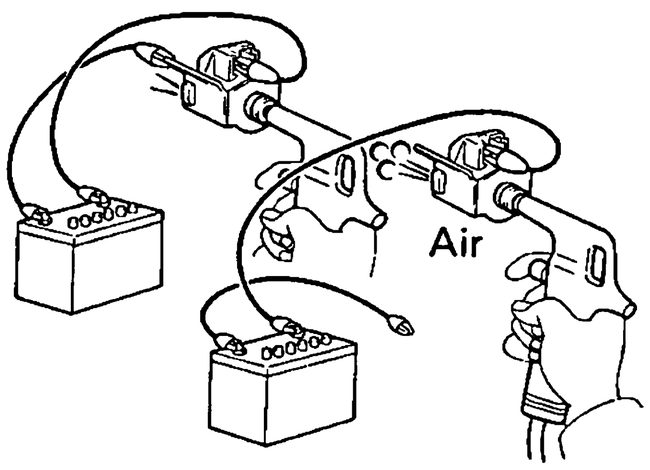
**11-15 Ω**

(c) Apply battery voltage to each terminal. Check that an operation noise can be heard from the solenoid.

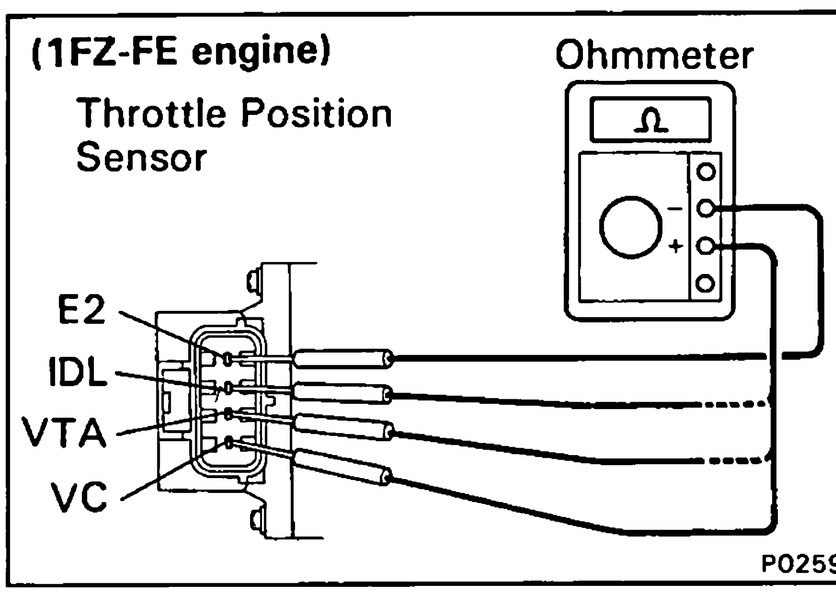
**No.1, No.2 and Timing Solenoid Valve**



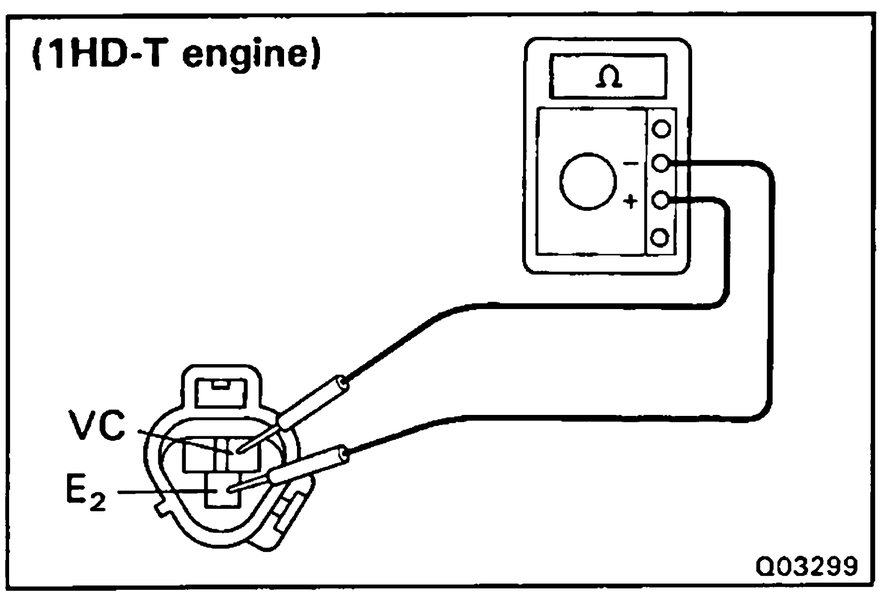

**Lock-Up Solenoid Valve**

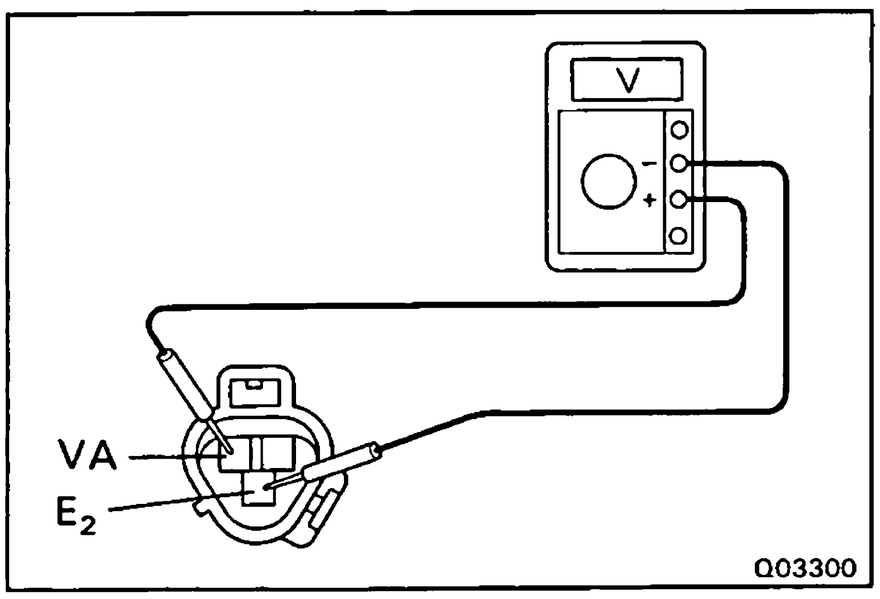



**(1FZ-FE engine)**




**(1HD-T engine)**




### 3. CHECK SOLENOID SEALS

If there is foreign material in the solenoid valve, there will be no fluid control even with sloenoid operation.

(a) Check No.1, No.2 and timing solenoid valves.

- Check that the solenoid valves do not leak when low-pressure compressed air is applied.
- When supply battery voltage to the solenoids, check that the solenoid valves open.

(b) Check the lock-up solenoid valve.

- Apply 490 kPa (5 kgf/cm$^2$, 71 psi) of compressed air, check that the solenoid valve opens.
- When supply battery voltage to the solenoid, check that the solenoid valve does not leak the air.

**If malfunction is found during voltage inspection (step 1.), inspect the components listed below.**

### 4. INSPECT THROTTLE POSITION SENSOR

(a) Using an ohmmeter, check the resistance between terminals.

(1FZ-FE)

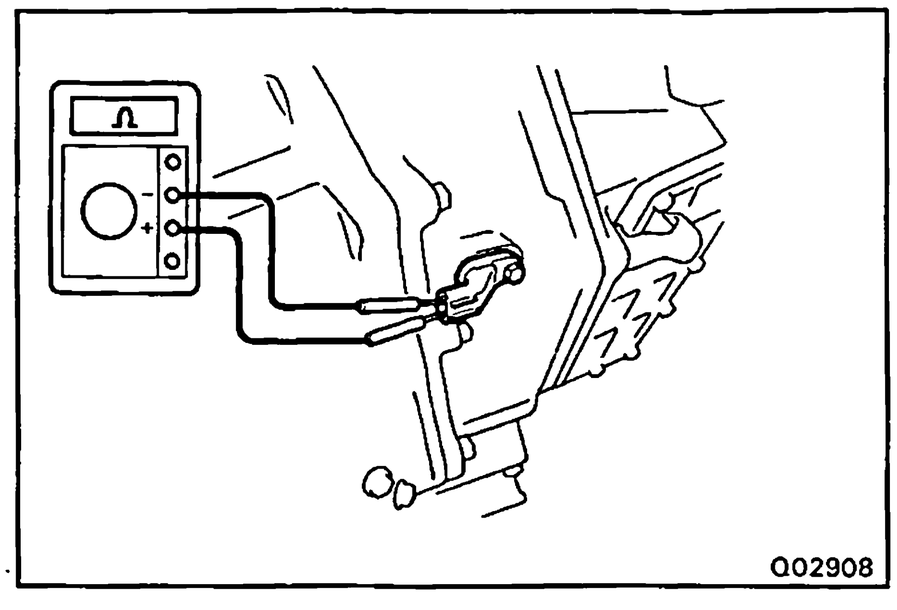
| Terminal | Throttle valve condition | Resistance (kΩ) |
|---|---|---|
| IDL — $E_2$ | Fully closed | 2.3 kΩ or less |
| | Open | Infinity |
| VC — $E_2$ | — | 2.5 — 5.9 |
| VTA — $E_2$ | Fully closed | 0.2 — 5.7 |
| | Fully open | 2.0 — 10.2 |

(1HD-T)

| Terminal | Throttle valve condition | Resistance (kΩ) |
|---|---|---|
| VC — $E_2$ | Fully open | 1.84 — 3.42 |

(b) (1HD-T engine)
When supply 5V to the between VC terminal and $E_2$ terminal, using a voltmeter, check the voltage between terminals.

| Terminal | Throttle valve condition | Voltage (V) |
|---|---|---|
| VA — $E_2$ | Fully open | 0.96 |




**5. INSPECT NO.2 SPEED SENSOR**

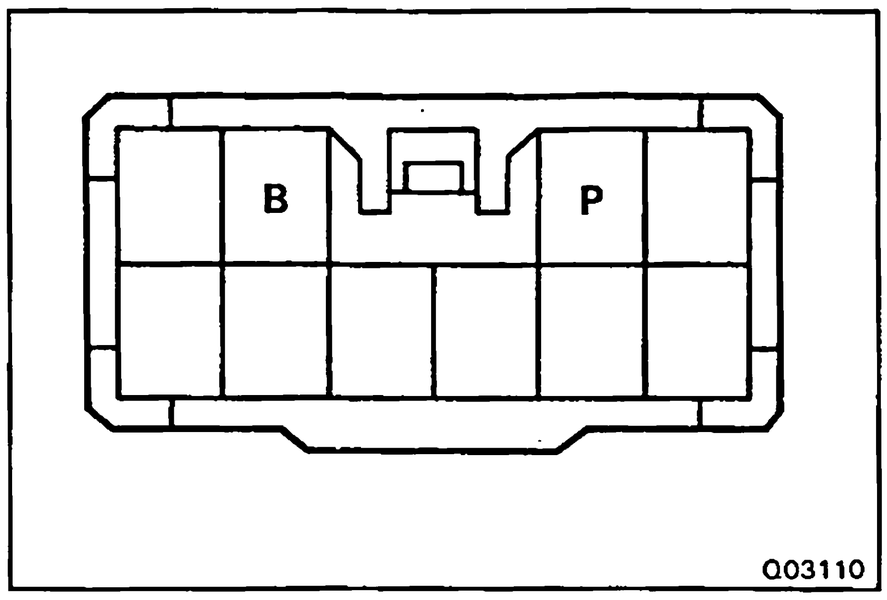
(a) Jack up the rear wheel on one side.

(b) Connect an ohmmeter between the terminals.

(c) Spin the wheel and check that the meter needle defects from 0 to ∞ Ω.

**6. INSPECT NO.1 SPEED SENSOR**

**(See page BE-10)**



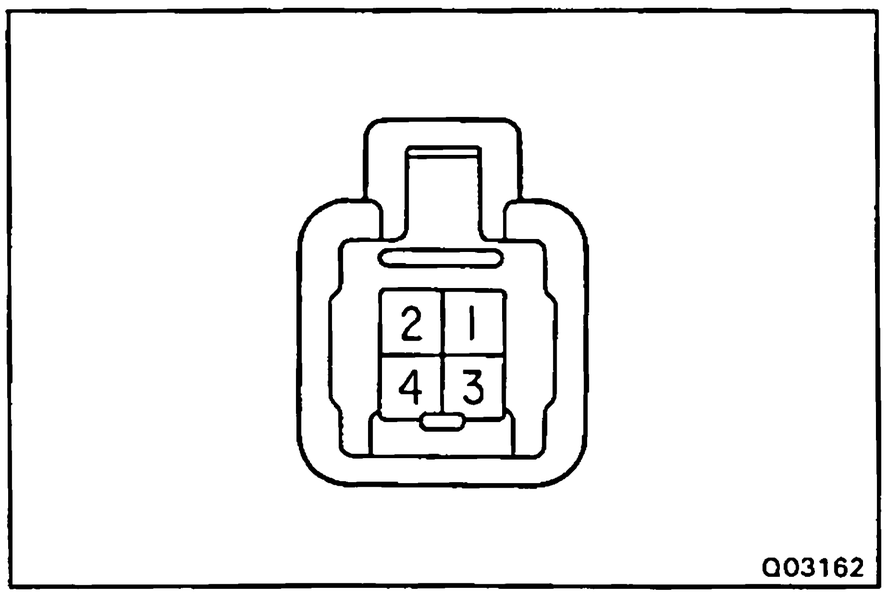

**7. INSPECT PATTERN SELECT SWITCH**

Using an ohmmeter, check the continuity of terminals for each switch position.

HINT: As there are diodes inside, be careful of the tester probe polarity.

| Pattern \ Terminal | B | P |
|---|---|---|
| PWR | ○—○ | |
| NORM | | |

V02104

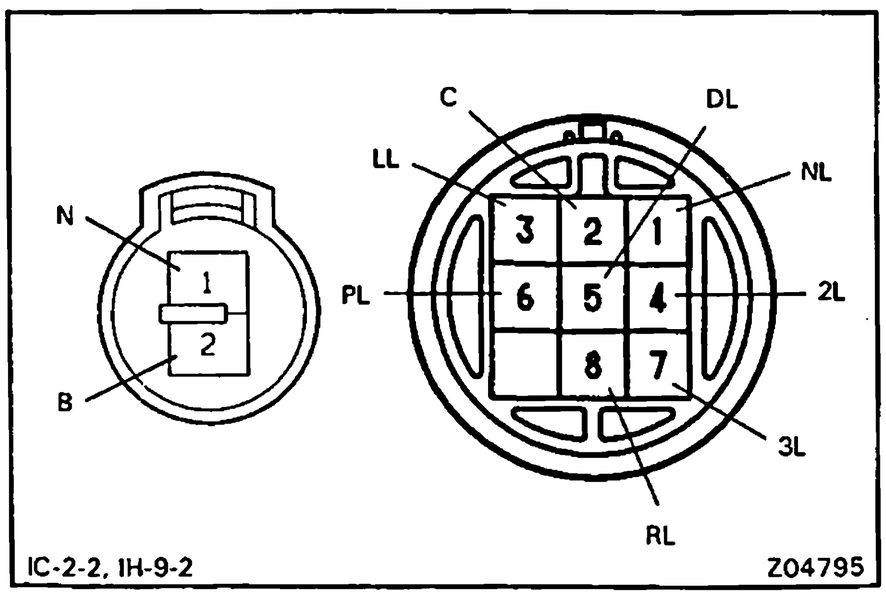



**8. INSPECT O/D SWITCH**

Using an ohmmeter, check the continuity of the terminals for each switch position.

| SW position \ Terminal | 2 | 4 |
|---|---|---|
| ON | | |
| OFF | ○—○ | |

V02105

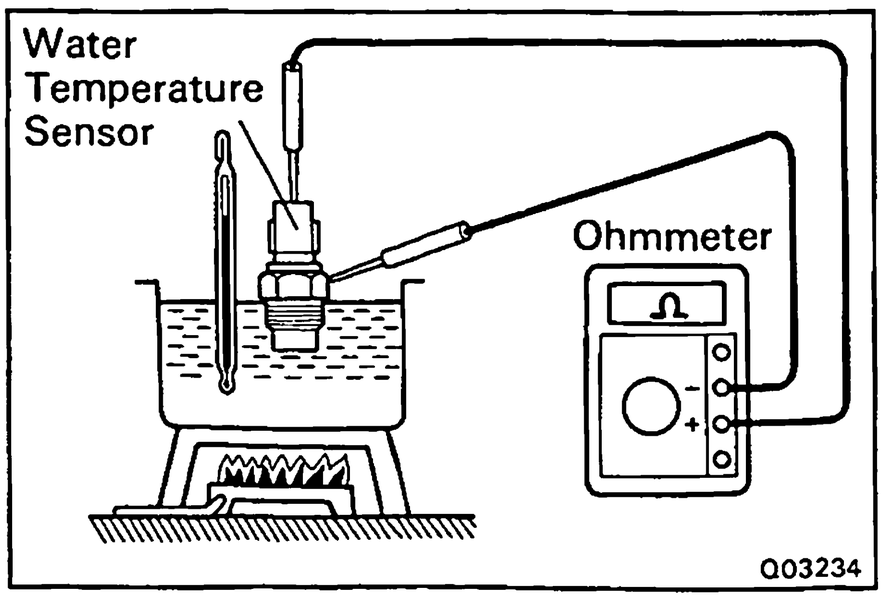



**9. INSPECT NEUTRAL START SWITCH**

Check that there is continuity between terminals.

○—○ : Continuity

| Shift range \ Terminal | B | N | C | PL | RL | NL | DL | 3I | 2L |
|---|---|---|---|---|---|---|---|---|---|
| P | ○—○ | | ○—○ | | | | | | |
| R | | | ○— | —○ | | | | | |
| N | ○—○ | | ○— | — | — | —○ | | | |
| D | | | ○— | — | — | — | —○ | | |
| 2 | | | ○— | — | — | — | — | —○ | |
| L | | | ○— | — | — | — | — | — | —○ |

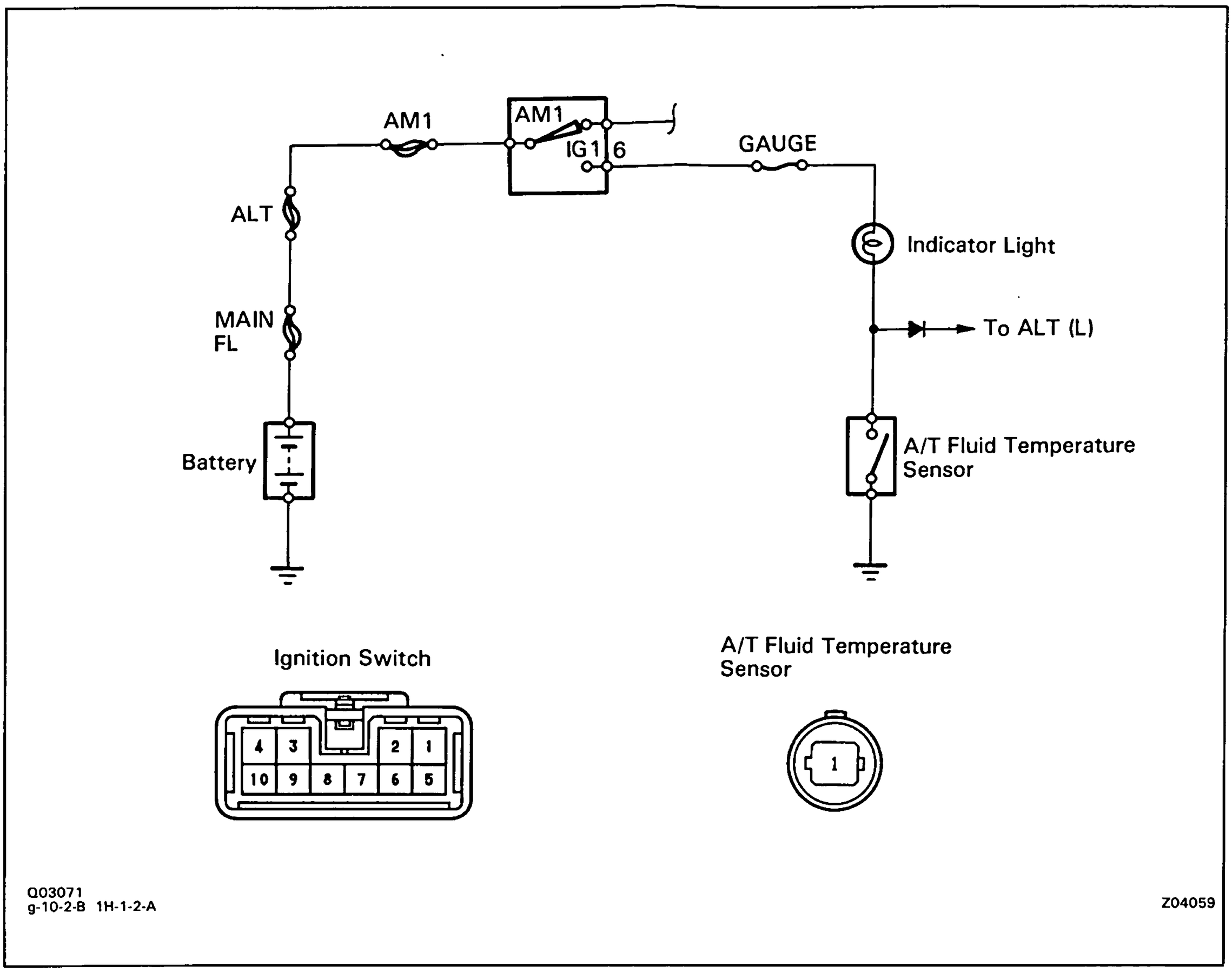


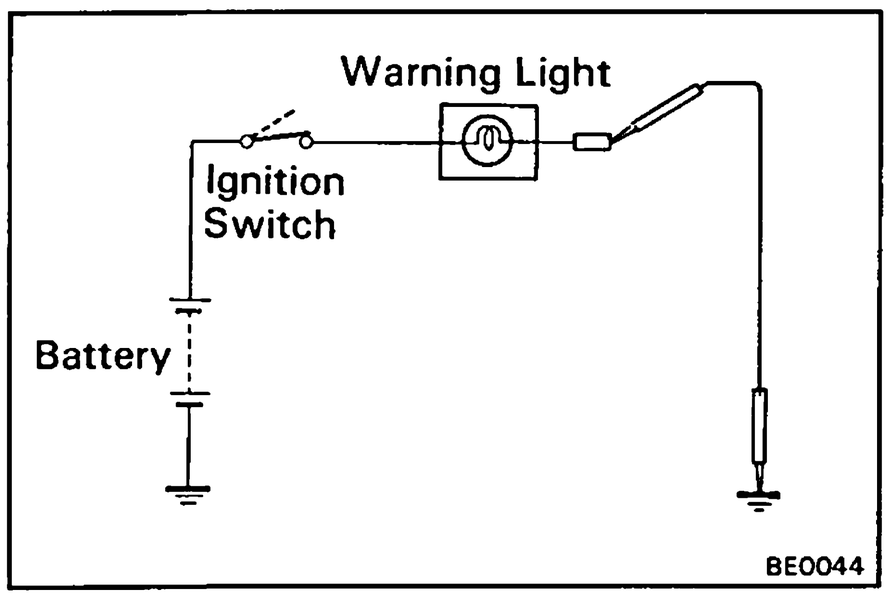

**10. (1HD-T engine)**
**INSPECT WATER TEMPERATURE SWITCH**

Check that there is continuity at the temperature of 45°C — 55°C (113°F — 131°F).

If continuity is not as specified, replace the switch.

## A/T FLUID TEMPERATURE WARNING SYSTEM CIRCUIT



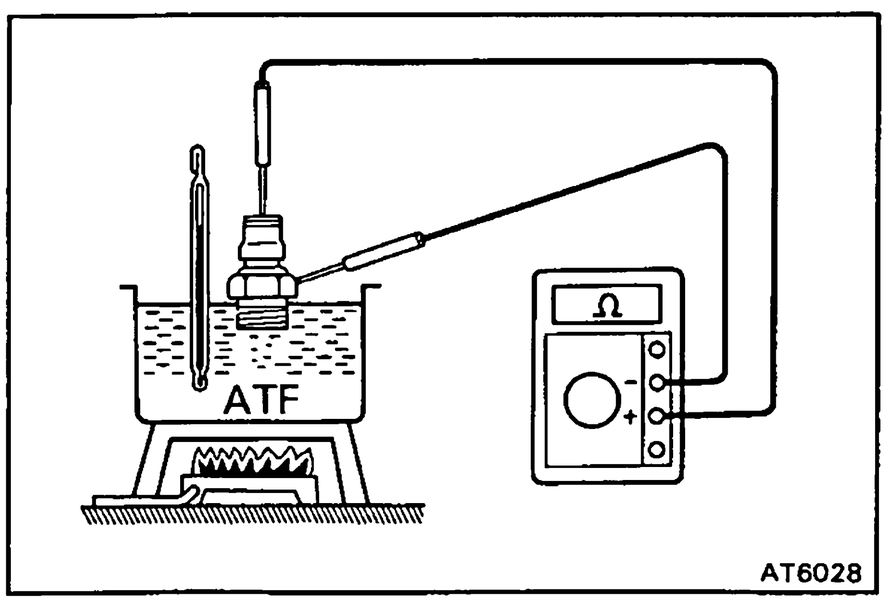




### 11. INSPECT A/T FLUID TEMPERATURE WARNING LIGHT

(a) Disconnect the connector from the temperature sensor. Connecct terminal of the wire harness side connector and body ground.

(b) Turn the ignition switch ON, check that the light go on.

If warning light does not light, test the bulb.




### 12. INSPECT A/T FLUID TEMPERATURE SENSOR

Check that there is continuity at the temperature of 145°C — 155°C (325°F — 343°F).

If continuity is not as specified, replace the sensor.

# STALL TEST

The objective of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D and R ranges.

**NOTICE:**

- **Perform the test at normal operating fluid temperature (50 — 80°C, or 122 — 176°F).**
- **Do not continuously run this test longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear, level area, which provides good traction.**
- **The stall test should always be carried out in pairs. One should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**

## MEASURE STALL SPEED

(a) Warm up the transmission fluid.

(b) Check the front and rear wheels.

(c) Connect a tachometer to the engine.

(d) Fully apply the parking brake.

(e) Keep your left foot pressed firmly on the brake pedal.

(f) Start the engine.

(g) Shift into the D range. Step all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

**NOTICE: Release the accelerator pedal and stop test if the rear wheels begin to rotate before the engine speed reaches specified stall speed.**

**Stall speed:**

| | |
|---|---|
| **(1FZ-FE engine)** | **2,150 ± 150 rpm** |
| **(1HD-T engine)** | **1,950 ± 150 rpm** |

(h) Perform the same test in R range.

## EVALUATION

(a) If the stall speed is the same for both positions but lower than specified value:

- Engine output may be insufficient
- Stator one-way clutch is not operating properly

HINT: If more than 600 rpm below the specified value, the torque converter clutch could be faulty.

(b) If the stall speed in D range is higher than specified:

- Line pressure too low
- Forward clutch slipping
- No.2 one-way clutch not operating properly
- O/D one-way clutch not operating properly

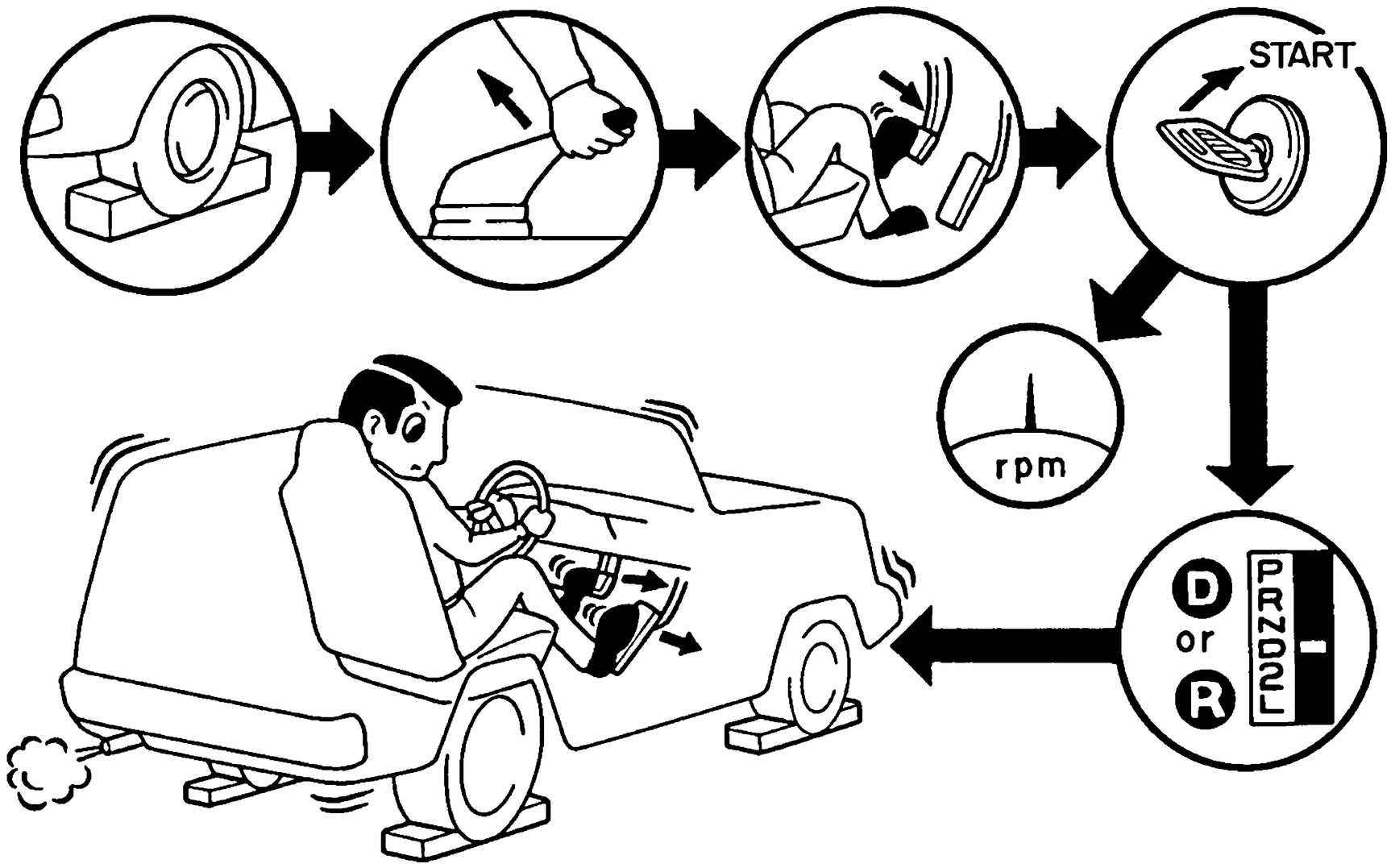
(c) If the stall speed in R range is higher than specified:

- Line pressure too low
- Direct clutch slipping
- First and reverse brake slipping
- O/D one-way clutch not operating properly

(d) If the stall speed in both R and D ranges are higher than specified:

- Line pressure too low
- Improper fluid level
- O/D one-way clutch not operating properly

## STALL TEST




Q03057

# TIME LAG TEST

When the shift lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, direct clutch and first and reverse brake.

**NOTICE:**

- **Perform the test at normal operating fluid temperature (50 — 80°C or 122 — 176°F).**
- **Be sure to allow one minute interval between tests.**
- **Make three measurements and take the average value.**

## MEASURE TIME LAG

(a) Fully apply the parking brake.

(b) Start the engine and check the idle speed.

**Idle speed:**
**650 rpm (N range)**

(c) Shift the shift lever from N to D range. Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.

**Time lag:**
**Less than 1.0 seconds**

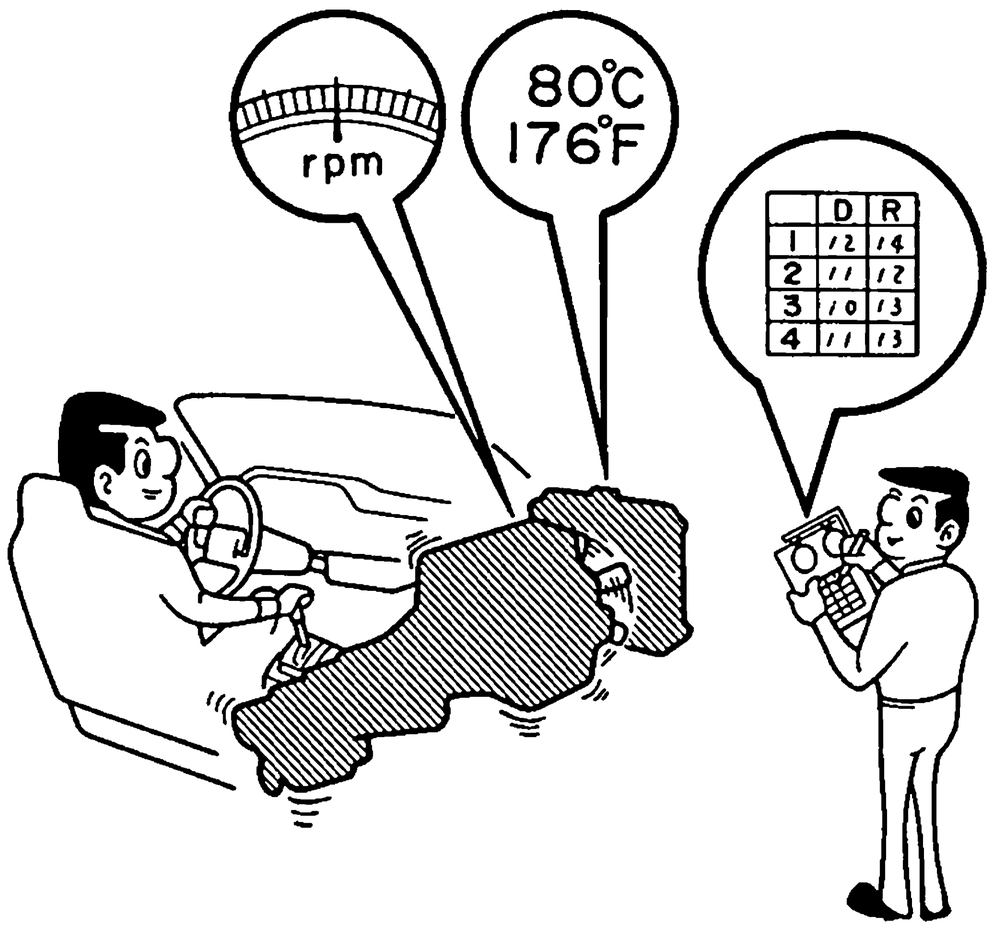
(d) In same manner, measure the time lag for N → R.

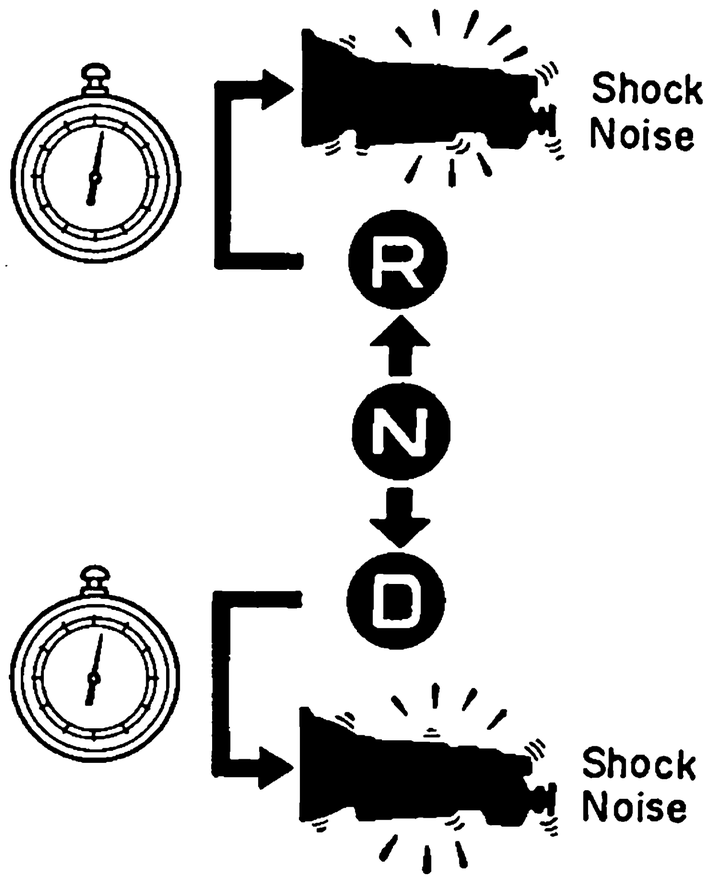
**Time lag:**
**Less than 1.5 seconds**

## EVALUATION

(a) If N → D time lag is longer than specified:
- Line pressure too low
- Forward clutch worn
- O/D one-way clutch not operating properly

(b) If N → R time lag is longer than specified:
- Line pressure too low
- Direct clutch worn
- First and reverse brake worn
- O/D one-way clutch not operating properly


rpm
80°C
176°F
D R
1 12 14
2 11 12
3 10 13
4 11 13


Shock
Noise
R
N
D
Shock
Noise

Q03198

# HYDRAULIC TEST

## PREPARATION

(a) Warm up the transmission fluid.

(b) Remove the transmission case test plug and connect the hydraulic pressure gauge.

SST 09992-00094 (Oil pressure gauge)

**NOTICE:**

- **Perform the test at normal operating fluid temperature (50 — 80°C or 122 — 176°F).**
- **The line pressure test should always be carried out in pairs. One should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**

## MEASURE LINE PRESSURE

(a) Fully apply the parking brake and chock the four wheels.

(b) Start the engine and check idling rpm.

(c) Keep your left foot pressed firmly on the brake pedal and shift into D range.

(d) Measure the line pressure when the engine is idling.

(e) Press the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

**NOTICE: Release the accelerator pedal and stop test if the rear wheels begin to rotate before the engine speed reaches specified stall speed.**

(f) In the same manner, perform the test in R range.

(1FZ-FE engine) kPa (kgf/cm$^2$, psi)

| D range | | R range | |
|---|---|---|---|
| Idling | Stall | Idling | Stall |
| 461 — 520 (4.7 — 5.3, 68 — 77) | 971 — 1,226 (9.9 — 12.5, 144 — 181) | 657 — 843 (6.7 — 8.6, 97 — 125) | 1,648 — 1,853 (16.8—18.9, 244—274) |

(1HD-T engine)

| D range | | R range | |
|---|---|---|---|
| Idling | Stall | Idling | Stall |
| 431 — 510 (4.4 — 5.2, 63 — 74) | 971 — 1,226 (9.9 — 12.5, 141 — 178) | 637 — 843 (6.5 — 8.6, 92 — 122) | 1,608 — 1,853 (16.4—18.9, 233—269) |

If the measured pressures are not up to specified values, recheck the throttle cable adjustment and perform a retest.

## EVALUATION

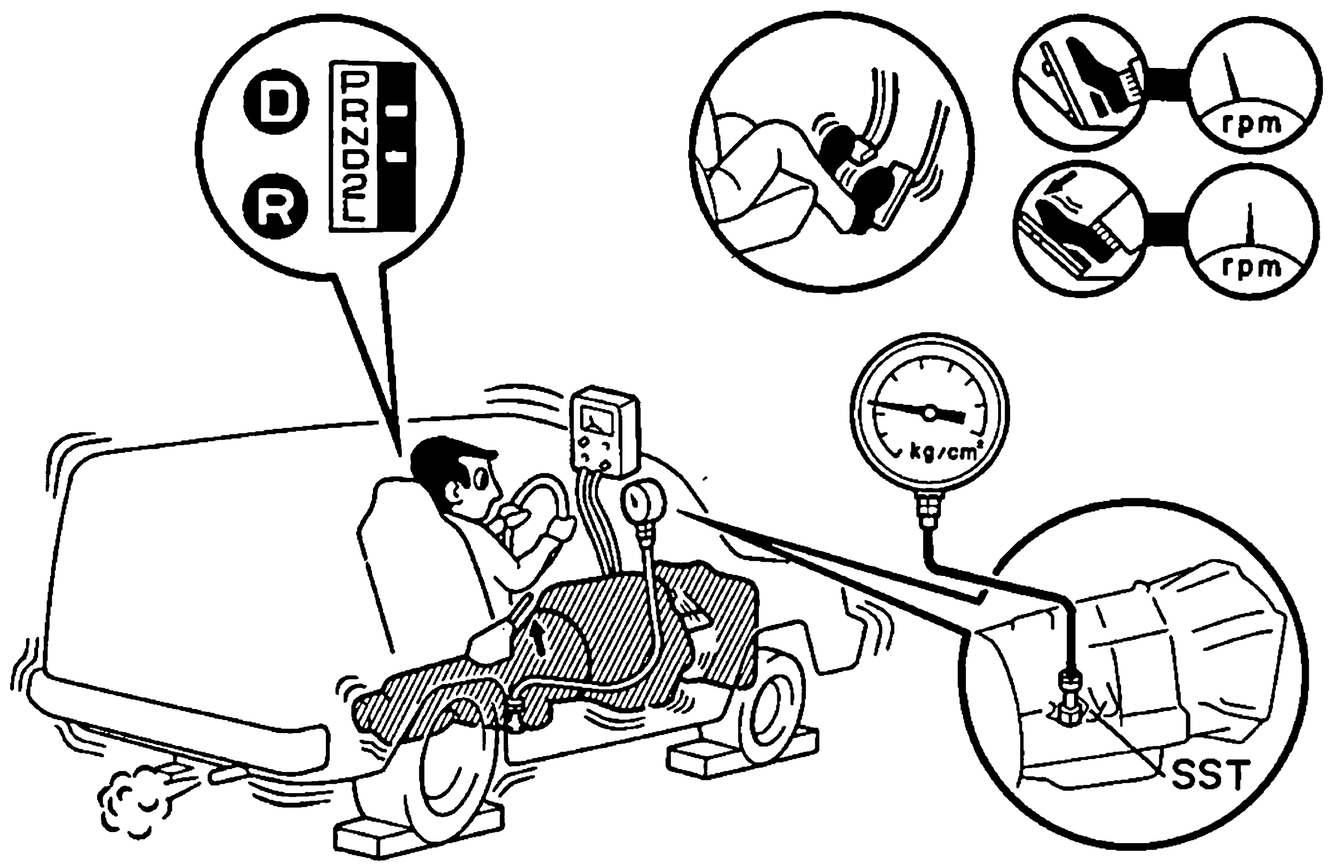
(a) If the measured values at all positions are higher than specified:
- Throttle cable out of adjustment
- Throttle valve defective
- Regulator valve defective

(b) If the measured values at all positions are lower than specified:
- Throttle cable out of adjustment
- Throttle valve defective
- Regulator valve defetive
- Oil pump defective
- O/D direct clutch defective

(c) If pressure is low in the D range only:
- D range circuit fluid leakage
- Forward clutch defective

(d) If pressure is low in the R range only:
- R range circuit fluid leakage
- Direct clutch defective
- First and reverse brake defective

**HYDRAULIC TEST**




Q03199

# ROAD TEST

**NOTICE: Perform the test at normal operating fluid temperature (50 — 80°C or 122 — 176°F).**

## 1. D RANGE TEST IN NORM AND PWR PATTERN RANGES

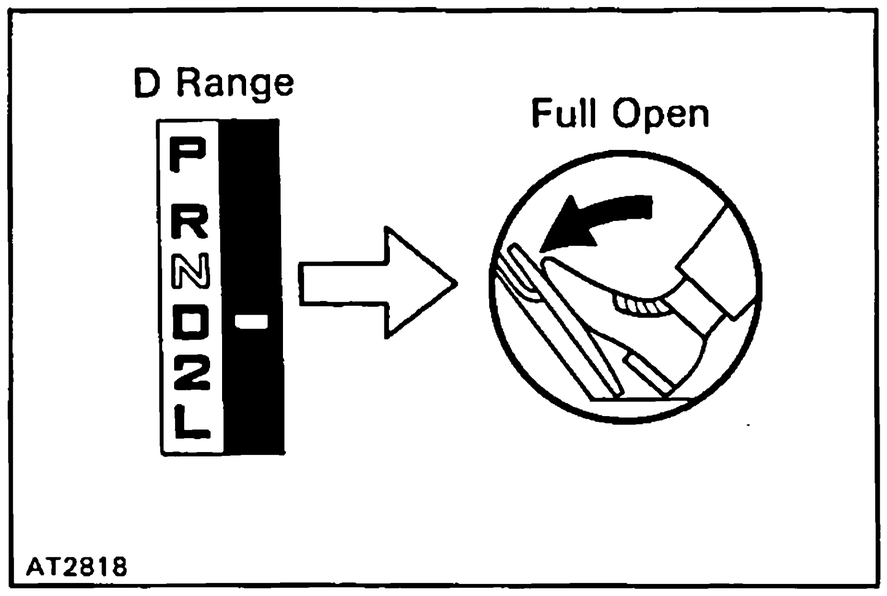
Shift into the D range and hold the accelerator pedal constant at the full throttle valve opening position.

Check the following:

(a) 1 — 2, 2 — 3 and 3 — O/D up-shifts should take place, and shift points should conform to those shown in the automatic shift schedule.

Conduct a test under both Normal and Power patterns.

HINT: There is no O/D up-shift or lock-up when the coolant temperature is below 55°C (131°F).




### EVALUATION

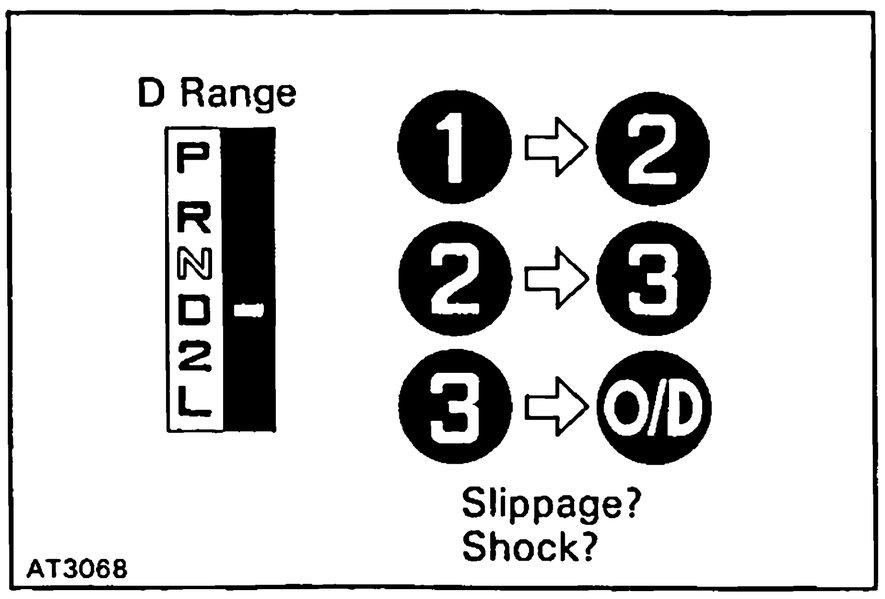
(1) If there is no 1 → 2 up-shift:
- No.2 solenoid is stuck.
- 1 — 2 shift valve is stuck.

(2) If there is no 2 → 3 up-shift:
- No.1 solenoid is stuck.
- 2 — 3 shift valve is stuck.

(3) If there is no 3 → O/D up-shift:
- 3 — 4 shift valve is stuck.

(4) If the shift point is defective:
- Throttle valve, 1 — 2 shift valve, 2 — 3 shift valve, 3 — 4 shift valve etc., are defective.

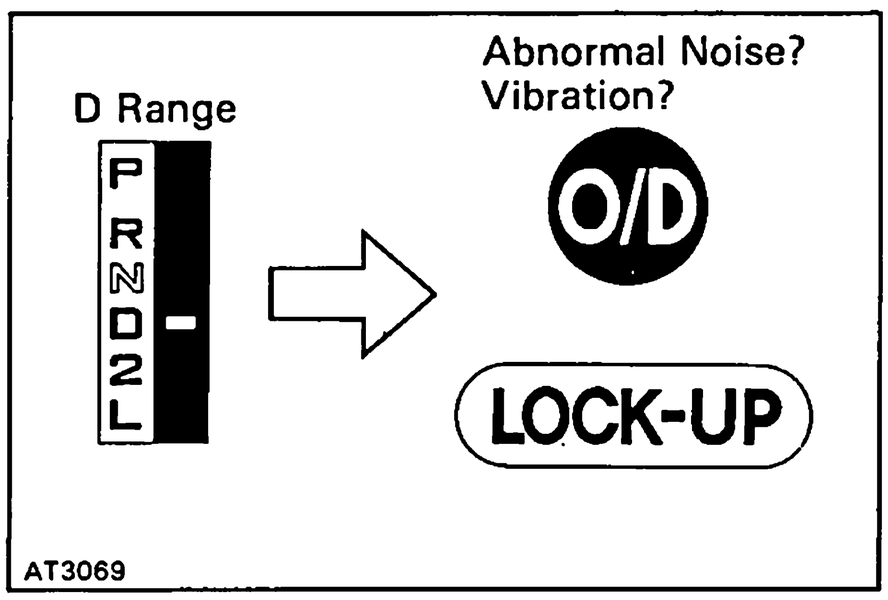
(5) If the lock-up is defective:
- Lock-up solenoid is stuck.
- Lock-up relay valve is stuck.




(b) In the same manner, check the shock and slip at the 1 → 2, 2 → 3, and 3 → O/D up-shifts.

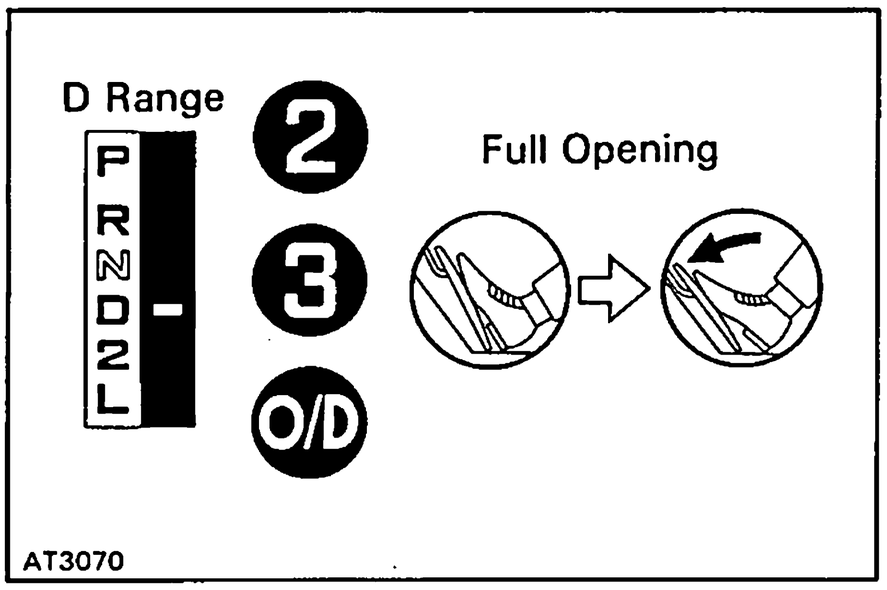
### EVALUATION

If the shock is excessive:
- Line pressure is too high.
- Accumulator is defective.
- Check ball is defective.



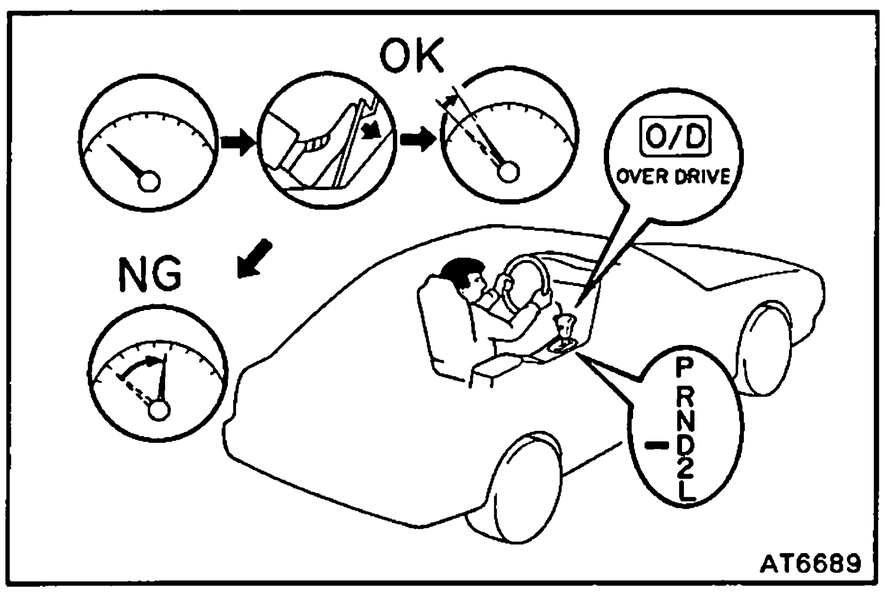

(c) Run at the D Range lock-up or O/D gear and check for abnormal noise and vibration.

HINT: The check for the cause of abnormal noise and vibration must be made with extreme care as it could also be due to loss of balance in the propeller shaft, differential, torque converter, etc.




(d) While running in the D range, 2nd, 3rd and O/D gears, check to see that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2 and O/D → 3 kick-downs conform to those indicated on the automatic shift schedule.

(e) Check for abnormal shock and slip at kick-down.

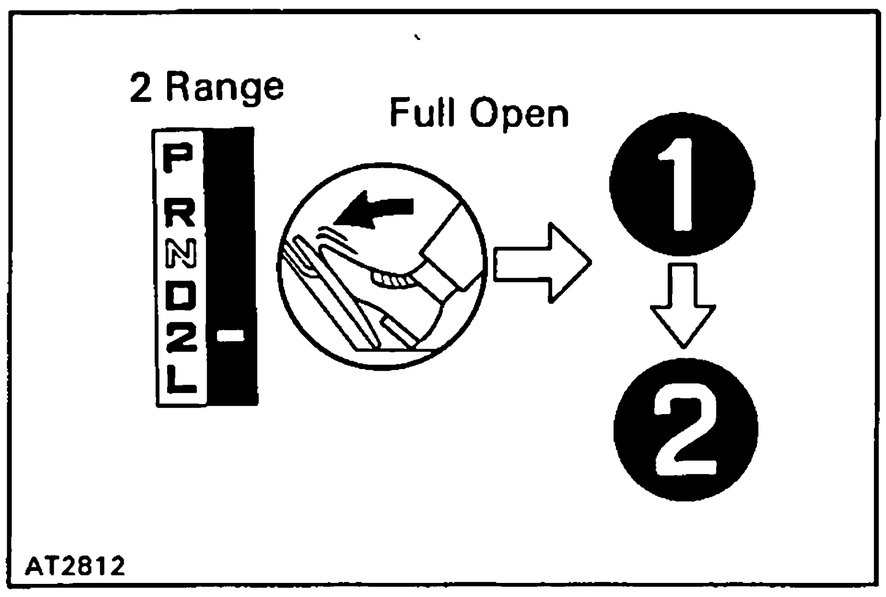



(f) Check for the lock-up mechanism.

(1) Drive in D position, O/D gear, at a steady speed (lock-up ON) of about 95 km/h (59 mph).

(2) Lightly depress the accelerator pedal and check that the engine rpm does not change abruptly.

If there is a big jump in engine rpm, there is no lock-up.




## 2. 2 RANGE TEST

Shift into the 2 range and, while driving with the accelerator pedal held constantly at the full throttle valve opening position, push in one of the pattern selectors and check on the following points.

(a) Check to see that the 1 → 2 up-shift takes place and that the shift point conforms to it shown on the automatic shift schedule.

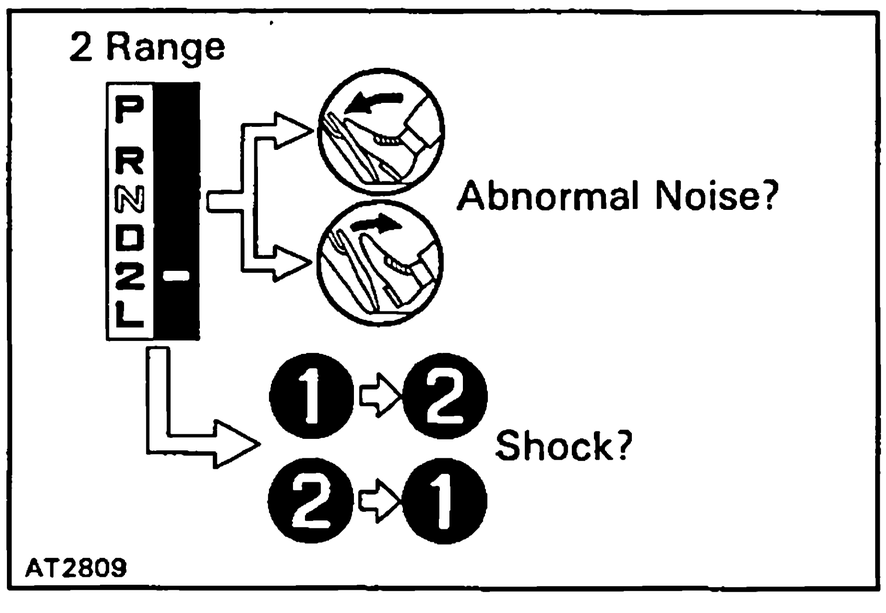
HINT: There is no O/D up-shift and lock-up in the 2 position.

(b) While running in the 2 range and 2nd gear, release the accelerator pedal and check the engine braking effect.

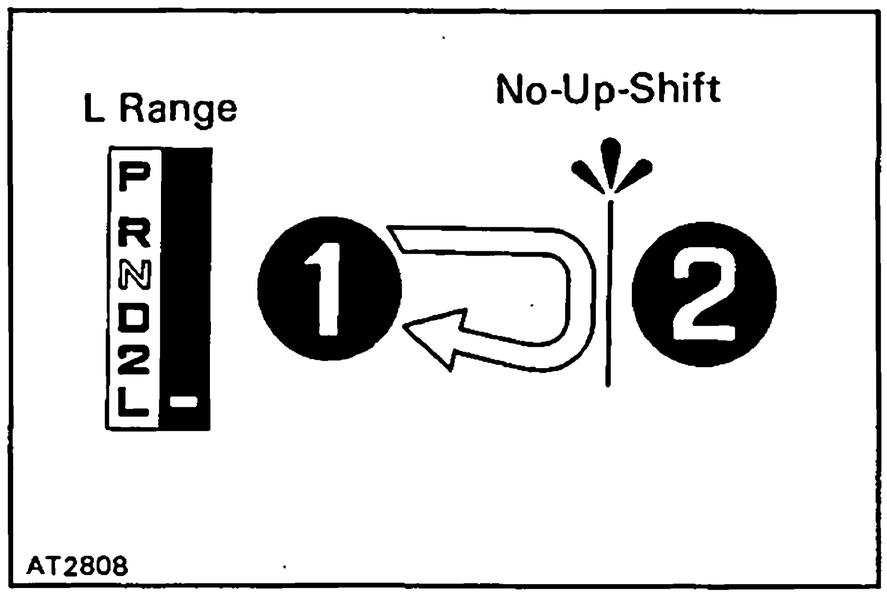
### EVALUATION

If there is no engine braking effect:

- Second coast brake is defective.

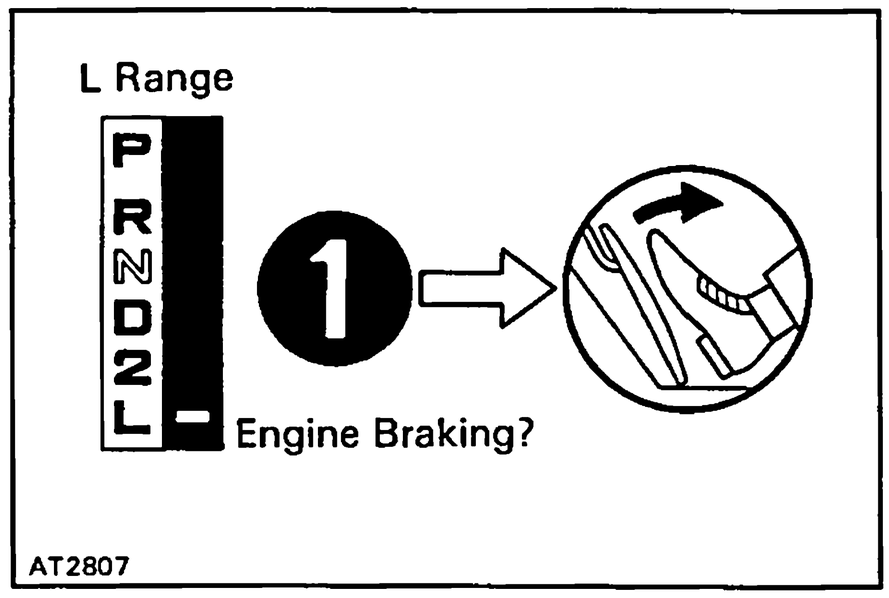



(c) Check for abnormal noise at acceleration and deceleration, and for shock at up-shift and down-shift.




### 3. L RANGE TEST

(a) While running in the L range, check to see that there is no up-shift to 2nd gear.

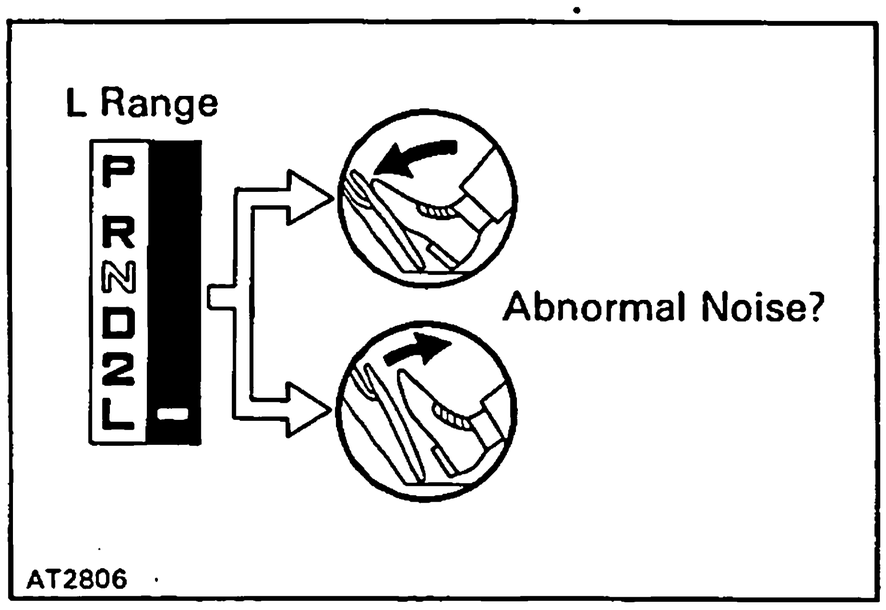



(b) While running in the L range, release the accelerator pedal and check the engine braking effect.

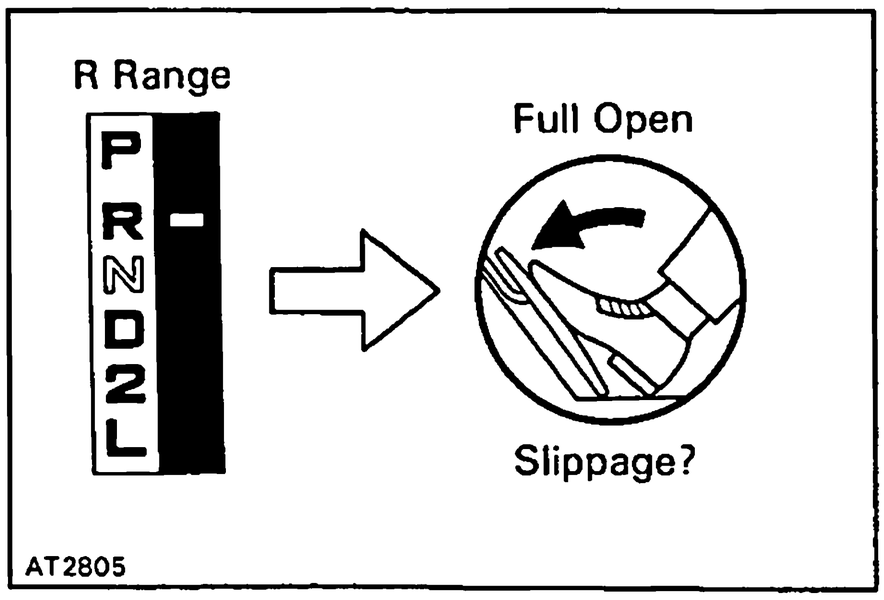
**EVALUATION**

If there is no engine braking effect:

- First and reverse brake is defective.

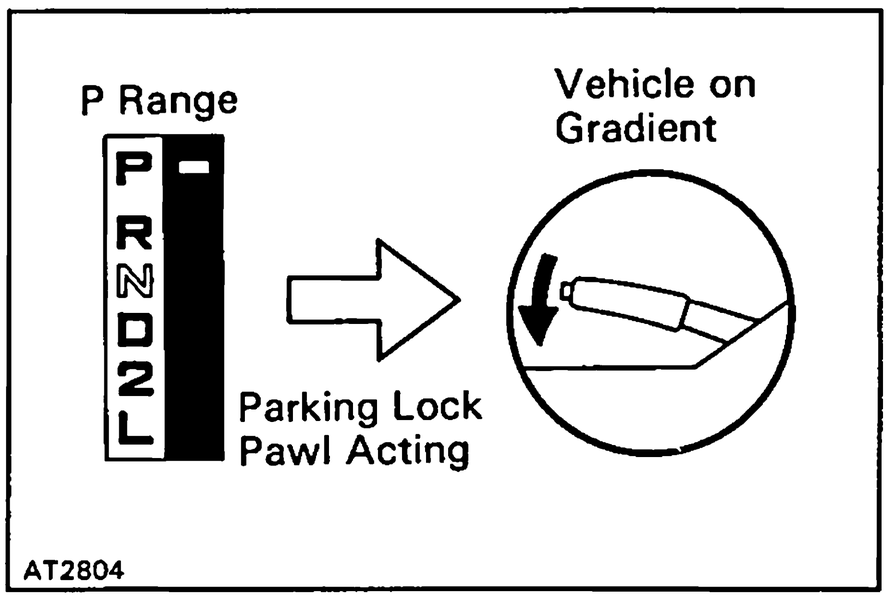



(c) Check for abnormal noise during acceleration and deceleration.




### 4. R RANGE TEST

Shift into the R range and, while starting at full throttle, check for slipping.




## 5. P RANGE TEST

Stop the vehicle on a gradient (more than 5°) and after shifting into the P range, release the parking brake. Then check to see that the parking lock pawl holds the vehicle in place.

# AUTOMATIC SHIFT SCHEDULE

**Engine: 1FZ-FE**
**Tire size: 7.50R16-6**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 53—60 (33—37) | 108—122 (67—76) | 153—170 (95—106) | 61—69 (38—43) | 55—63 (34—39) | 147—163 (91—101) | 99—109 (62—68) | 42—49 (26—30) |
| | Power mode | 53—60 (33—37) | 108—122 (67—76) | 153—170 (95—106) | 89—99 (55—62) | 73—80 (45—50) | 147—163 (91—101) | 99—109 (62—68) | 42—49 (26—30) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 118—132 (73—82) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 60—68 (37—42) |

**Engine: 1FZ-FE**
**Tire size: 245/85-R16**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 56—62 (35—39) | 114—125 (71—78) | 161—174 (100—108) | 64—70 (40—43) | 58—64 (36—40) | 154—167 (96—103) | 105—112 (65—70) | 44—48 (27—30) |
| | Power mode | 56—62 (35—39) | 114—125 (71—78) | 161—174 (100—108) | 93—100 (58—62) | 73—80 (45—50) | 154—167 (96—103) | 105—112 (65—70) | 44—48 (27—30) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 124—135 (77—84) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 63—69 (39—43) |

**Engine: 1FZ-FE**
**Tire size: 215/80-R16**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 49—54 (30—34) | 101—111 (63—69) | 143—153 (89—95) | 63—69 (39—43) | 57—63 (35—39) | 137—147 (85—91) | 93—99 (58—62) | 40—45 (25—28) |
| | Power mode | 49—54 (30—34) | 101—111 (63—69) | 143—153 (89—95) | 83—89 (52—55) | 72—78 (45—48) | 137—147 (85—91) | 93—99 (58—62) | 40—45 (25—28) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 110—119 (68—74) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 56—61 (34—38) |

**Engine: 1FZ-FE**
**Tire size: 275/70-R16**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 52—58 (32—36) | 106—117 (66—73) | 152—163 (94—101) | 60—66 (37—41) | 55—60 (34—37) | 145—156 (90—97) | 98—104 (61—65) | 42—47 (26—29) |
| | Power mode | 52—58 (32—36) | 106—117 (66—73) | 152—163 (94—101) | 88—94 (55—58) | 68—74 (42—46) | 145—156 (90—97) | 98—104 (61—65) | 42—47 (26—29) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 116—127 (72—79) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 59—65 (37—40) |

**Engine: 1HD-T**
**Tire size: 7.50R16-6**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 41—47 (25—29) | 81—90 (50—56) | 122—136 (76—85) | 56—64 (35—40) | 50—58 (31—36) | 115—129 (71—80) | 75—82 (47—51) | 33—39 (21—24) |
| | Power mode | 41—47 (25—29) | 81—90 (50—56) | 122—136 (76—85) | 78—87 (48—54) | 72—80 (45—50) | 115—129 (71—80) | 75—82 (47—51) | 34—41 (21—25) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 89—98 (55—61) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 38—45 (24—28) |

**Engine: 1HD-T**
**Tire size: 245/85-R16**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 43—49 (27—30) | 85—92 (53—57) | 129—140 (80—87) | 59—65 (37—40) | 53—59 (33—36) | 121—132 (75—82) | 75—82 (47—51) | 34—40 (21—25) |
| | Power mode | 43—49 (27—30) | 85—92 (53—57) | 129—140 (80—87) | 82—89 (51—55) | 75—82 (47—51) | 121—132 (75—82) | 75—82 (47—51) | 36—42 (22—26) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 93—100 (58—62) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 40—46 (25—29) |

**Engine: 1HD-T**
**Tire size: 215/80-R16**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 37—42 (23—26) | 76—81 (47—50) | 113—123 (70—76) | 53—58 (33—36) | 47—52 (29—32) | 108—117 (67—73) | 67—72 (42—44) | 30—35 (19—22) |
| | Power mode | 37—42 (23—26) | 76—81 (47—50) | 113—123 (70—76) | 73—79 (45—49) | 66—72 (41—45) | 108—117 (67—73) | 67—72 (42—44) | 32—37 (20—23) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 83—89 (52—55) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 35—40 (22—25) |

**Engine: 1HD-T**
**Tire size: 275/70-R16**

km/h (mph)

| Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|
| Gear position | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| D position | Normal mode | 41—46 (25—29) | 80—86 (50—53) | 120—131 (75—81) | 56—61 (35—38) | 50—55 (31—34) | 114—124 (71—77) | 70—76 (43—47) | 32—37 (20—23) |
| | Power mode | 41—46 (25—29) | 80—86 (50—53) | 120—131 (75—81) | 77—83 (48—52) | 70—76 (43—47) | 114—124 (71—77) | 70—76 (43—47) | 34—39 (21—24) |
| 2 position | Normal mode Power mode | — | — | — | — | — | — | 88—94 (55—58) | — |
| L position | Normal mode Power mode | — | — | — | — | — | — | — | 38—43 (24—27) |

# TROUBLESHOOTING MATRIX CHART

You will find the troubles easier using the table will shown below. In this table, each number shows the priority of cause in troubles. Check each part in order. If necessary, replace these parts.

(ON — VEHICLE)

| Trouble \ Parts Name | | 1—2 shift valve | 2—3 shift valve | 3—4 shift valve | Low Coast modulator valve | Reverse control valve | Manual valve | No.1 solenoid | No.2 solenoid | Timing solenoid | Lock-up solenoid | $C_o$ exhaust valve | $B_o$ accumulator | $C_1$ accumulator | $B_1$ accumulator | $C_2$ accumulator | 2—3 shift timing valve | Modulator valve | Accumulator control valve | Lock-up signal valve | Lock-up control valve | OFF-vehicle repairmatrix chart | ECT ECU | Throttle cable | Check ball |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| See Page | | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | AT-57 | ★ | ★ | ★ |
| Does not move in any forward range | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| Does not move in reverse range | | | | | | 3 | | 2 | 2 | | | | | | | | | | | | | 4 | 1 | | |
| Does not move in any range | | | | | | | 2 | | | | | | | | | | | | | | | 3 | 1 | | |
| No up-shift | 1st → 2nd | 3 | | | | | | | 2 | | | | | | | | | | | | | 4 | 1 | | |
| | 2nd → 3rd | | 3 | | | | | 2 | | | | | | | | | | | | | | 4 | 1 | | |
| | 3rd → O/D | | | 3 | | | | | 2 | | | | | | | | | | | | | 4 | 1 | | |
| No down-shift | O/D → 3rd | | | 3 | | | | | 2 | | | | | | | | | | | | | 4 | 1 | | |
| | 3rd → 2nd | | 3 | | | | | 2 | | | | | | | | | | | | | | 4 | 1 | | |
| | 2nd → 1st | 3 | | | | | | | 2 | | | 4 | | | | | | | | | | | 1 | | |
| Shift point too high or too low | | | | | | | | | | | | | | | | | | | | | | | 1 | 2 | |
| Harsh engagement | "N" → "R" | | | | | | | | | | | | | | 1 | | | 2 | | | | 3 | | | |
| | "N" → "D" | | | | | | | | | | | | 1 | | | | | 2 | | | | 3 | | | |
| | "N"→ "D", "N" → "R" | | | | | | | | | | | | | | | | | 3 | | | | 2 | | 1 | |
| | 1st → 2nd | | | | | | | | | | | | | 4 | | | | 5 | | | | 6 | 1 | 2 | 3 |
| | 2nd → 3rd | | | | | | | | | 3 | | | | | 5 | 4 | | 6 | | | | 7 | 1 | 2 | |
| | 3rd → O/D | | | | | | | | | | | | 4 | | | | | 5 | | | | 6 | 1 | 2 | 3 |
| | 1st → 2nd → 3rd → O/D | | | | | | | | | | | | | | | | | 2 | | | | 3 | | 1 | |
| | O/D → 3rd | | | | | | | | | | | | | | | | | | | | | 4 | 1 | 2 | 3 |
| | 3rd → 2nd | | | | | | | | | 3 | | | | 6 | | 5 | | 7 | | | | 8 | 1 | 2 | 4 |
| Slip | Forward & Reverse | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| | "R" range | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| | 1st | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| | 2nd | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| | 3rd | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| | O/D | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| No engine braking | 1st ("L" range) | | | | 4 | | | | 2 | 3 | | | | | | | 5 | | | | | 6 | 1 | | |
| | 2nd ("2" range) | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| No kick-down | | 4 | 4 | 4 | | | | 3 | 3 | | | | | | | | | | | | | | 1 | 2 | |
| Poor acceleration | | | | | | | | | 2 | | | 3 | | | | | | | | | | 4 | 1 | | |
| No lock-up | | | | | | | | | | | 2 | | | | | | | | 3 | 4 | | 5 | 1 | | |

Remark ★: Refer to A442F Automatic Transmission Repair Manual. (Pub. No. RM314E)

(OFF — VEHICLE)

| Parts Name / Trouble | | Torque converter | Oil pump | O/D brake ($B_0$) | 2nd brake ($B_1$) | 1st and reverse brake ($B_2$) | O/D direct clutch ($C_0$) | Front clutch ($C_1$) | Rear clutch ($C_2$) | O/D one-way clutch ($F_0$) | No.2 one-way clutch ($F_2$) | ON-Vehicle matrix chart | Front planetary gear | Rear planetary gear |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| See Page | | AT-76 | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | AT-56 | ★ | ★ |
| Does not move in any forward range | | | | | | | | 1 | | | | | | |
| Does not move in reverse range | | | | | | 3 | | | 2 | | | 1 | | |
| Does not move in any range | | 1 | 3 | | | | 2 | | | 4 | | | 5 | 6 |
| No up-shift | 1st → 2nd | | | | 2 | | | | | | 3 | 1 | | |
| | 2nd → 3rd | | | | | | 2 | 3 | | | | 1 | | |
| | 3rd → O/D | | | 2 | | | | | | | | 1 | | |
| No down-shift | O/D → 3rd | | | | | | 2 | | | 3 | | 1 | | |
| | 3rd → 2nd | | | | | 2 | | | | | | 1 | | |
| | 2nd → 1st | | | | | | 2 | | | | 3 | 1 | | |
| Shift point too high or too low | | | | | | | | | | | | 1 | | |
| Harsh engagement | "N" → "R" | | | | | 3 | | | 2 | | | 1 | | |
| | "N" → "D" | | | | | | | 2 | | | 3 | 1 | | |
| | "N" → "D", "N" → "R" | | | | | | 2 | | | 3 | | 1 | | |
| | 1st → 2nd | | | | 2 | | | | | | | 1 | | |
| | 2nd → 3rd | | | | | | 3 | | 2 | | | 1 | | |
| | 3rd → O/D | | | 2 | | | | | | | | 1 | | |
| | 1st → 2nd → 3rd → O/D | | | | | | | 2 | | | | 1 | | |
| | O/D → 3rd | | | | | | 2 | | | 3 | | 1 | | |
| | 3rd → 2nd | | | | 2 | | | | | | | 1 | | |
| Slip | Forward & Reverse | 2 | 3 | | | | | | | 4 | | 1 | | |
| | "R" range | | | | | 2 | | | 1 | | | | | |
| | 1st | | | | | | | 1 | | | 2 | | | |
| | 2nd | | | | | | | 2 | | | | | | |
| | 3rd | | | | | | | 2 | 3 | | | | | |
| | O/D | | | 3 | | | | 1 | 2 | | | | | |
| No engine braking | 1st ("L" range) | | | | | 2 | | | | | | 1 | | |
| | 2nd ("2" range) | | | | | | 2 | | | | | 1 | | |
| No kick-down | | | | | | | | | | | | 1 | | |
| Poor acceleration | | 2 | | | | | 3 | | | | | 1 | | |
| No lock-up | | 2 | | | | | | | | | | 1 | | |

Remark ★: Refer to A442F Automatic Transmission Repair Manual. (Pub. No. RM314E)

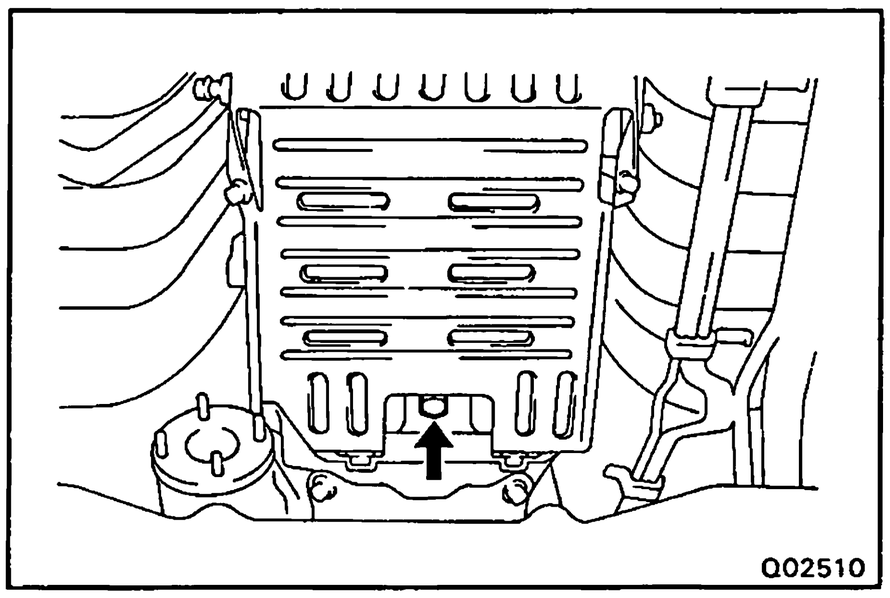
# VALVE BODY

## VALVE BODY REMOVAL

1. **REMOVE TRANSMISSION AND TRANSFER UNDER COVER**

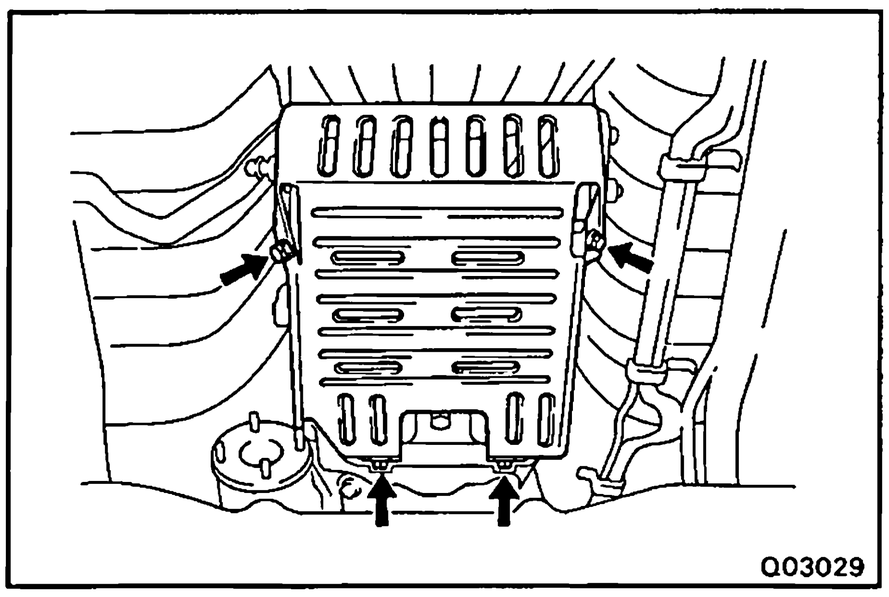
2. **CLEAN TRANSMISSION EXTERIOR**

   To prevent contamination, clean the exterior transmission.



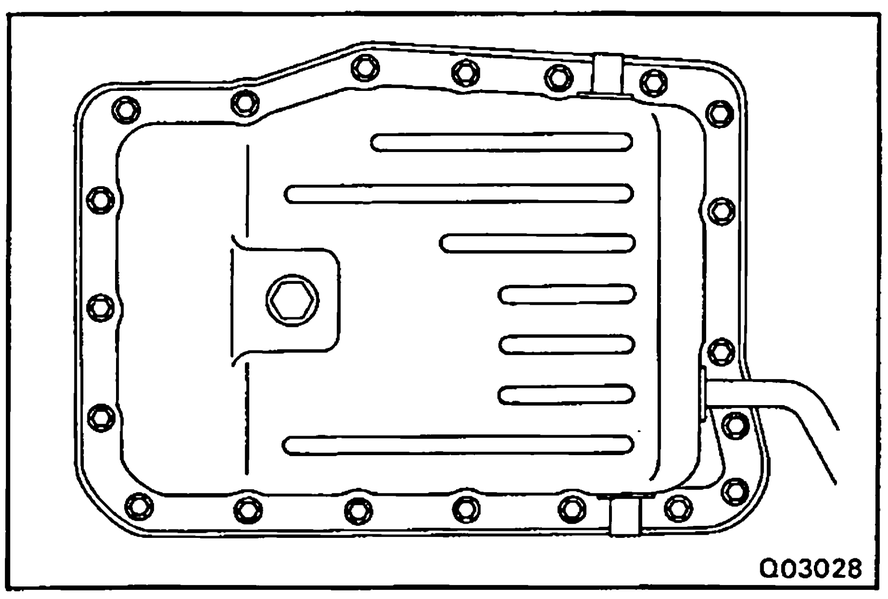

3. **DRAIN TRANSMISSION FLUID**

   Remove the drain plug and drain fluid into a suitable container.




4. **REMOVE OIL PAN PROTECTOR**

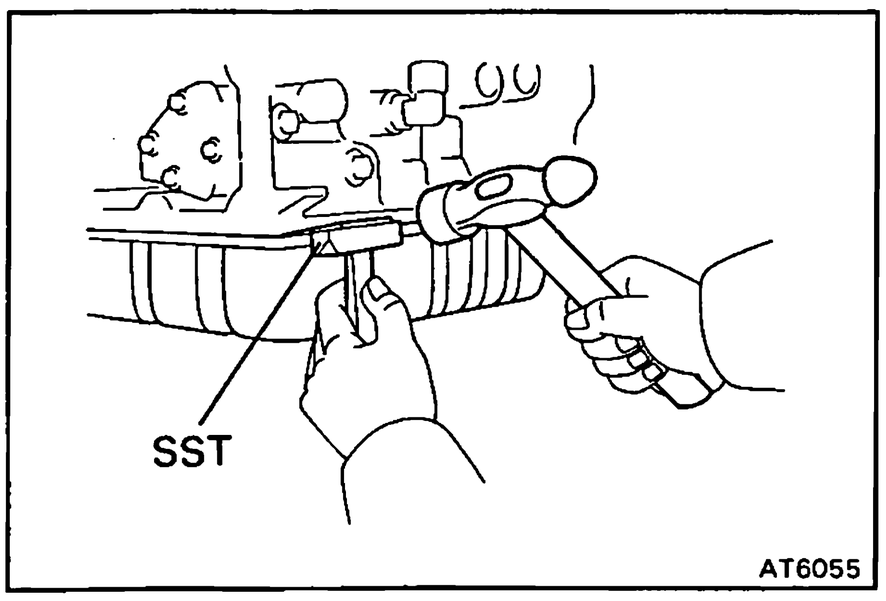
   Remove the four bolts and the oil pan protector.




5. **REMOVE OIL PAN AND GASKET**

   **NOTICE: Some fluid will remain in the oil pan. Be careful not to damage the filler tube.**

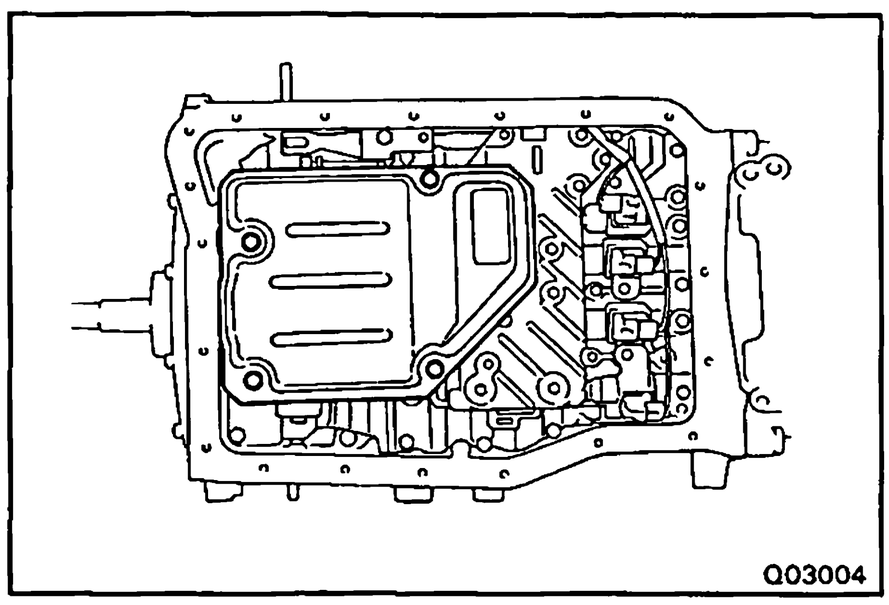
(a) Remove the twenty bolts.




(b) Install the blade off SST between the transmission and oil pan, cut-off applied sealer.

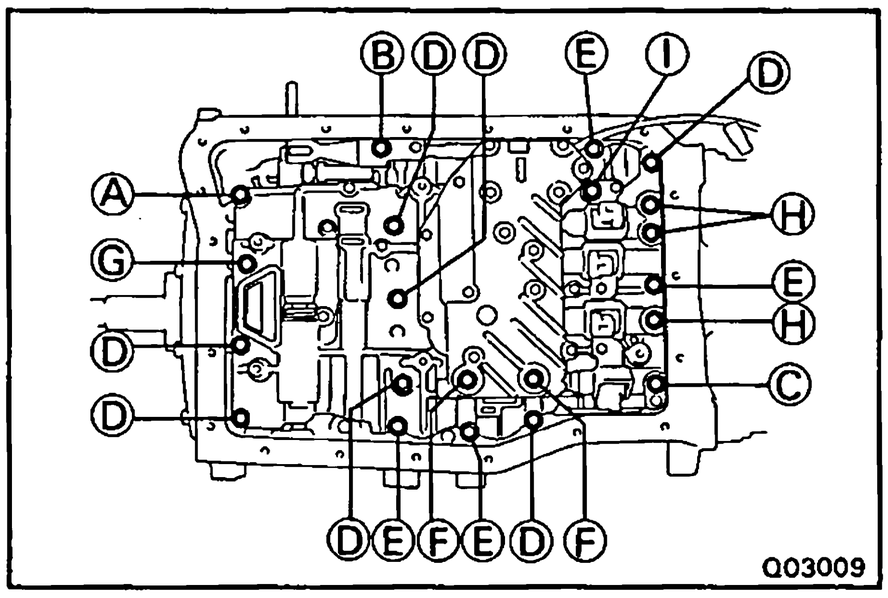
SST 09302-00100

**NOTICE: Be careful not to damage the oil pan flange.**



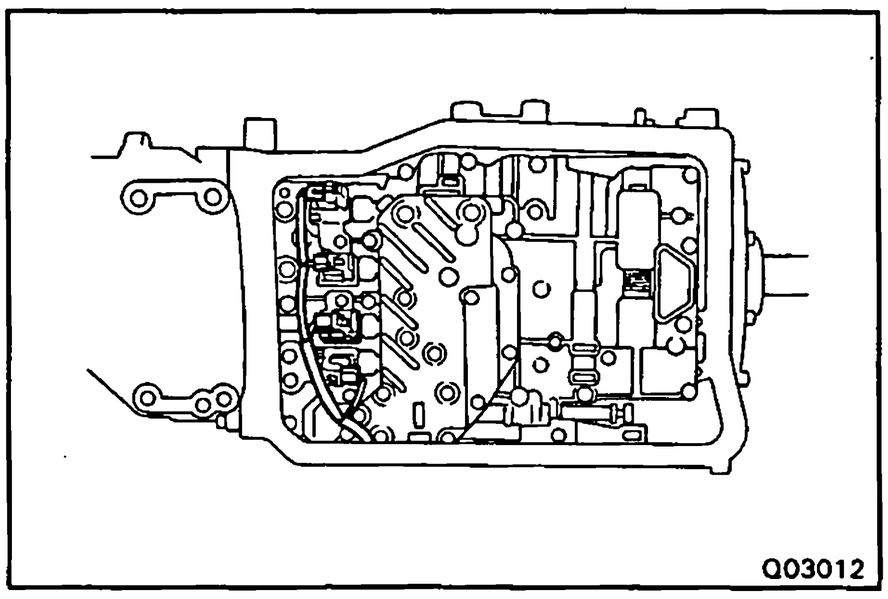

**6. REMOVE OIL STRAINER**

Remove the four bolts and oil strainer.

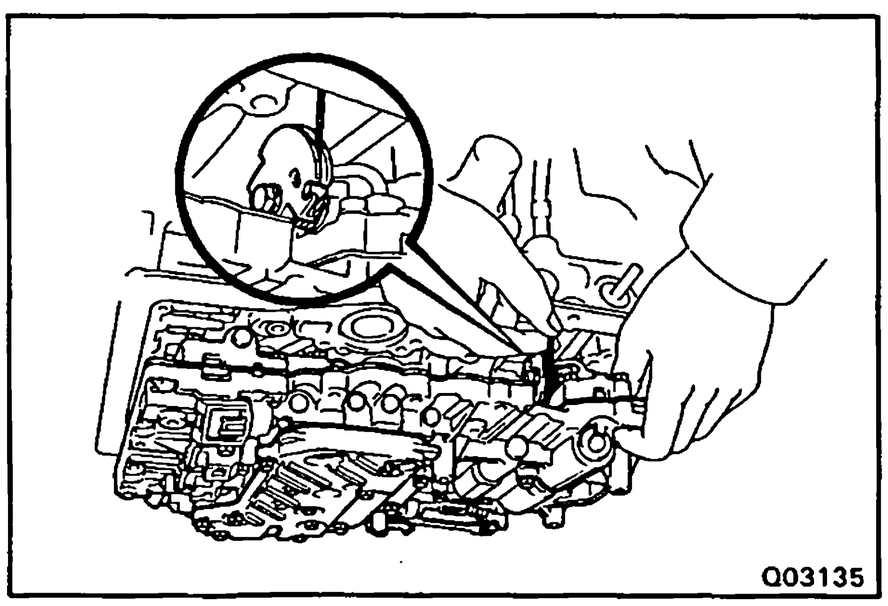



**7. REMOVE VALVE BODY**

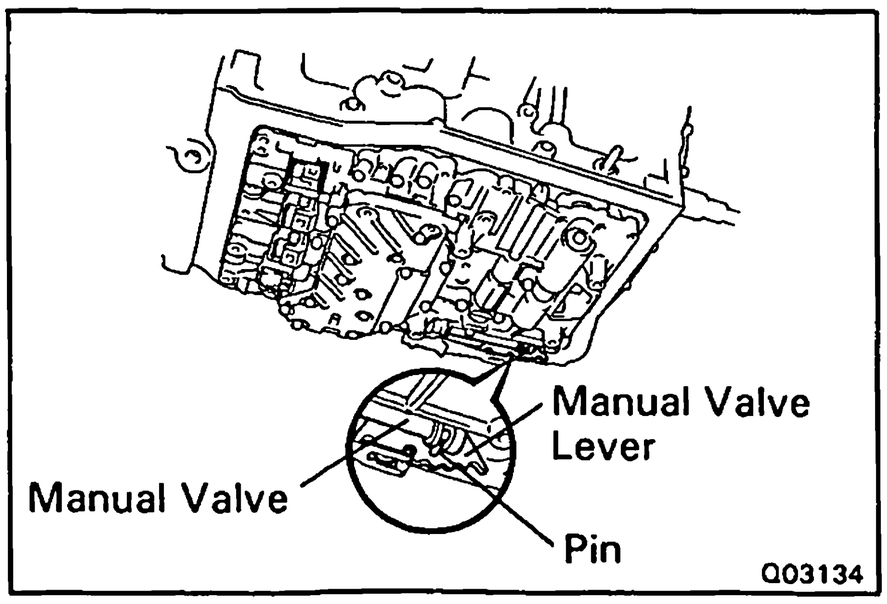
(a) Remove the twenty-one bolts.




(b) Disconnect the four connectors from the solenoids.



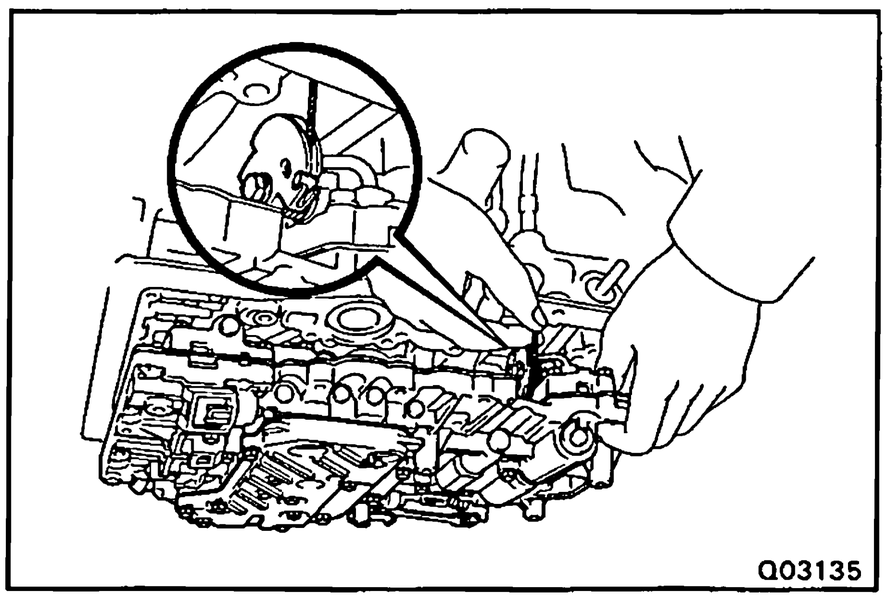

(c) Remove the throttle cable the cam and remove the valve body.



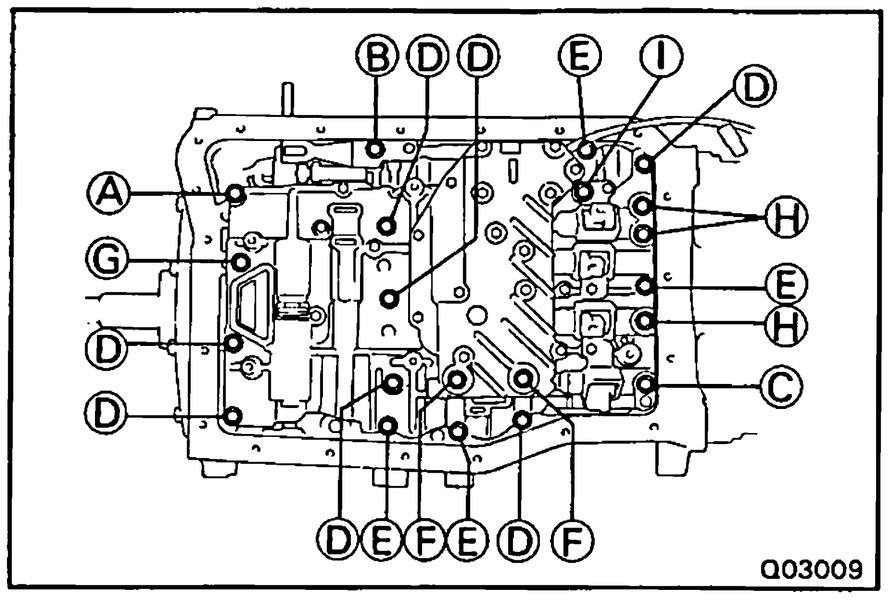

## VALVE BODY INSSTALLATION

**1. INSTALL VALVE BODY**

(a) Align the groove of the manual valve with the pin of the manual valve lever.


Q03135

(b) Connect the throttle cable to the cam.



Q03009

(c) Install the other bolts.

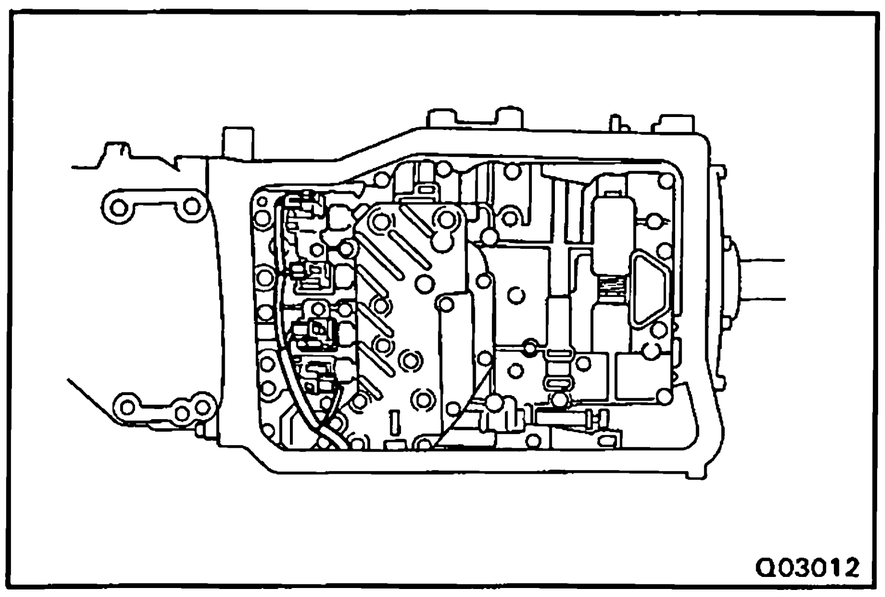
HINT: Each bolt length is indicated below.

**Bolt length:**
**A 41 mm (1.61 in.)**
**B 45 mm (1.77 in.)**
**C 22 mm (0.87 in.)**
**D 32 mm (1.26 in.)**
**E 28 mm (1.10 in.)**
**F 52 mm (2.05 in.)**
**G 40 mm (1.57 in.)**
**H 22 mm (0.87 in.)**
**I 42 mm (1.65 in.)**

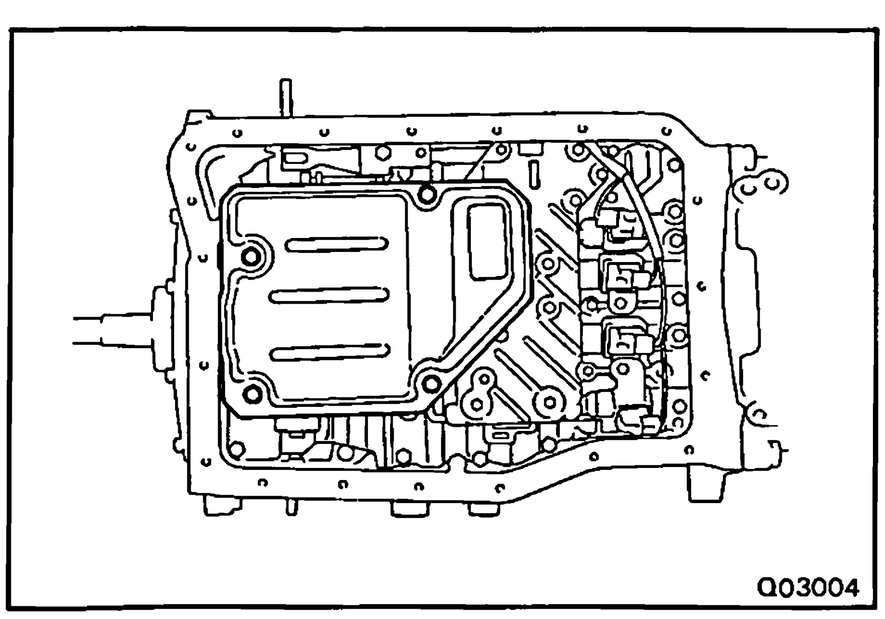
(d) Check that the manual valve lever contacts the center of the roller at the tip of the detente spring.

(e) Tighten the bolts.

**Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)**


Q03012

## 2. CONNECT FOUR SOLENOID CONNECTORS

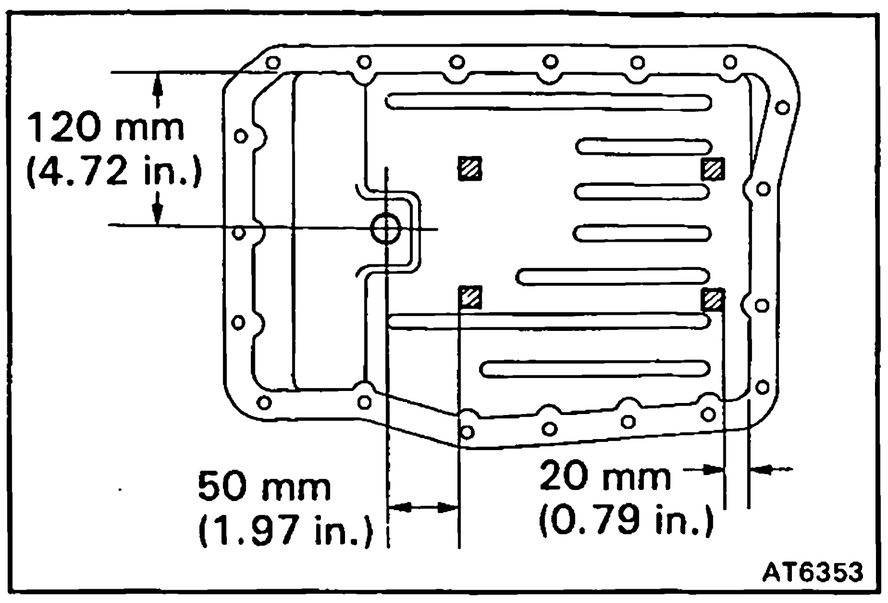

Q03004

## 3. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the four bolts.

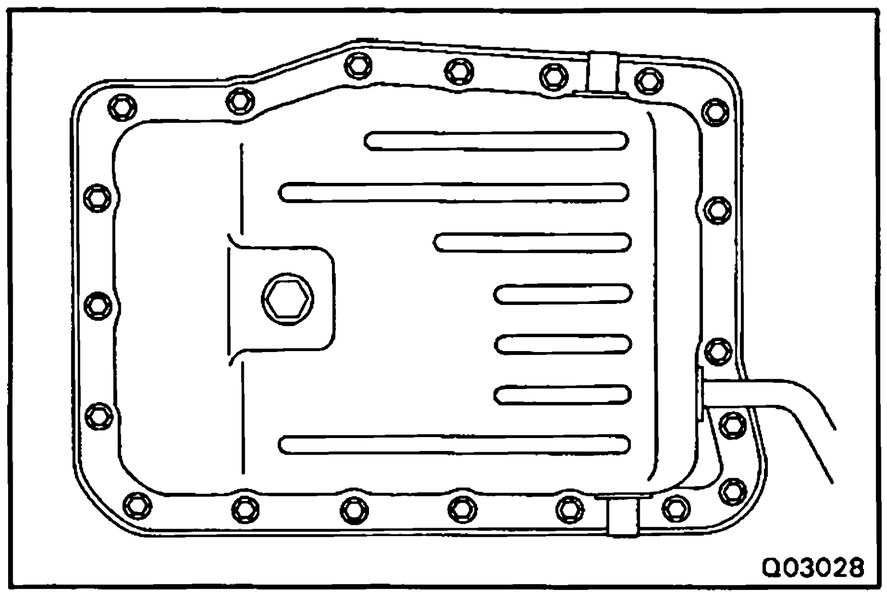
**Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)**

**Bolt length:**
**16 mm (0.63 in.)**




**4. INSTALL MAGNETS IN PAN**

Install the two magnets in the oil pan as shown in the illustration.




**5. INSTALL OIL PAN**

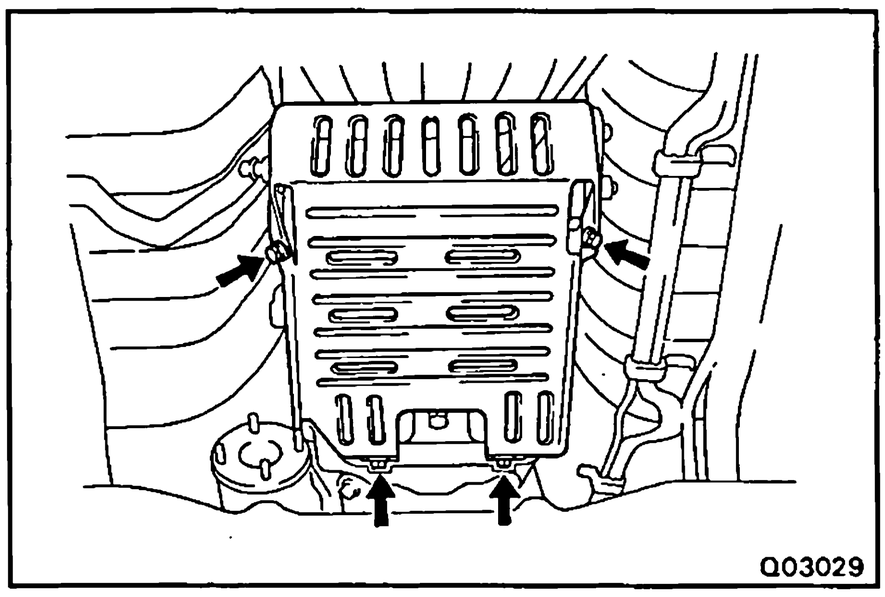
(a) Remove any packing material and be careful not to drop oil on the contacting surface of the transmission case and oil pan.

(b) Apply seal packing to the oil pan.

**Seal packing:**
**Part No. 08826-00090, THREE BOND 1281B or equivalent**

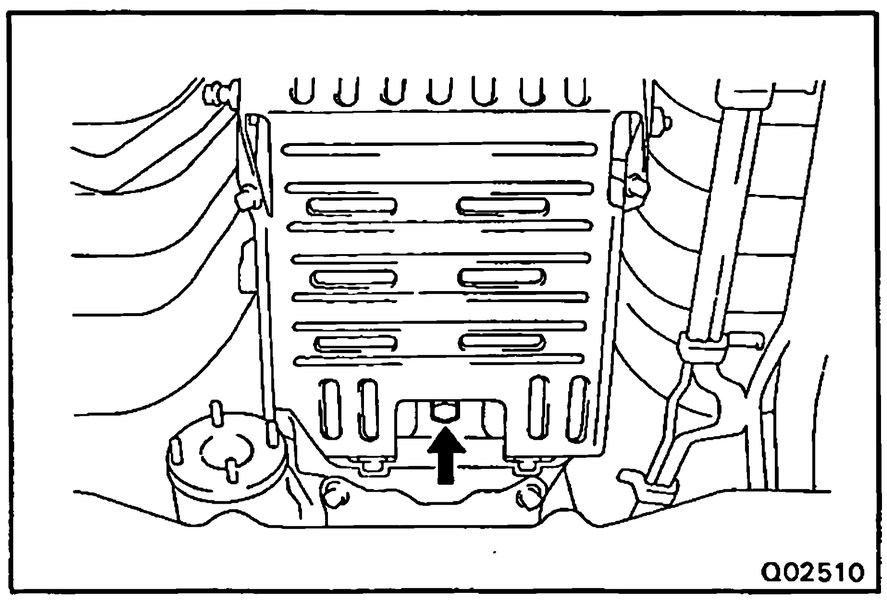
(c) Install and tighten the twenty bolts.

**Torque: 6.9 N·m (70 kgf·cm, 61 in.·lbf)**




**6. INSTALL OIL PAN PROTECTOR**

Install the protector with the four bolts.



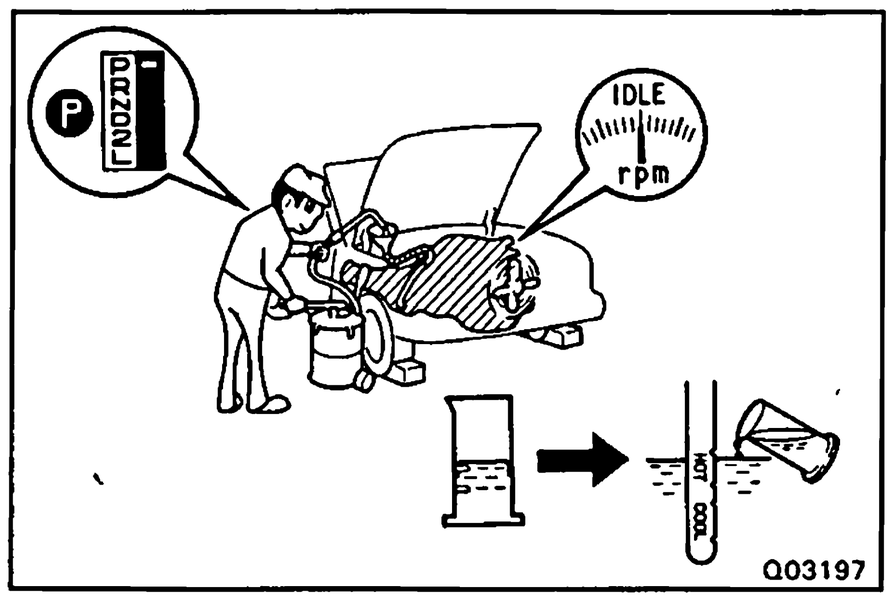

**7. INSTALL DRAIN PLUG**

(a) Install the drain plug with a new gasket.

(b) Torque the drain plug.

**Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)**

**8. INSTALL TRANSMISSION UNDER COVER AND TRANSFER UNDER COVER**

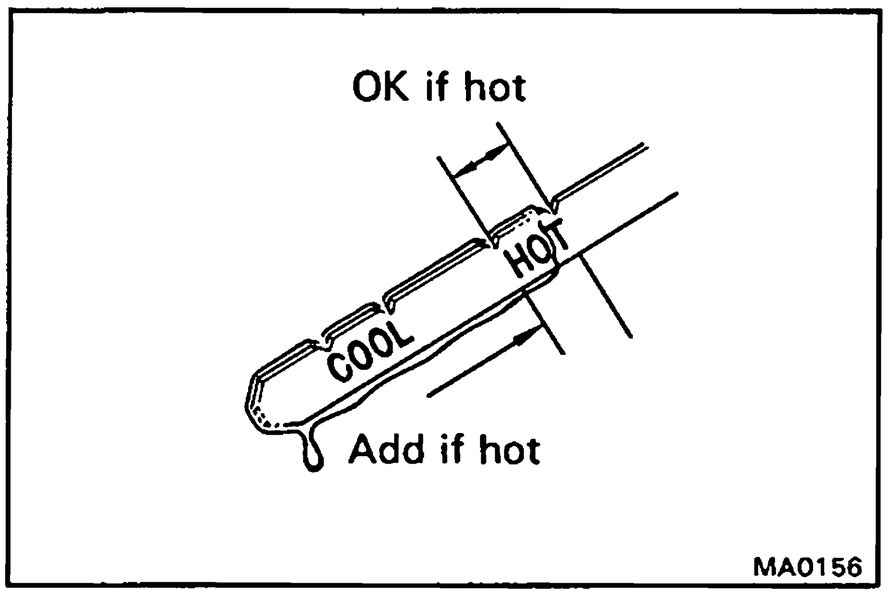



**9. FILL TRANSMISSION WITH ATF**

**Capacity:**
**6.0 liters (6.3 US qts, 5.3 Imp.qts)**

**NOTICE: Do not overfill.**

**Fluid type:**
**ATF DEXRON® II**




**10. CHECK FLUID LEVEL**
**(See page AT-25)**

# THROTTLE CABLE

## THROTTLE CABLE REMOVAL

1. **REMOVE FRONT PROPELLER SHAFT**
   **(See Pub No. RM184E, page PR-3)**

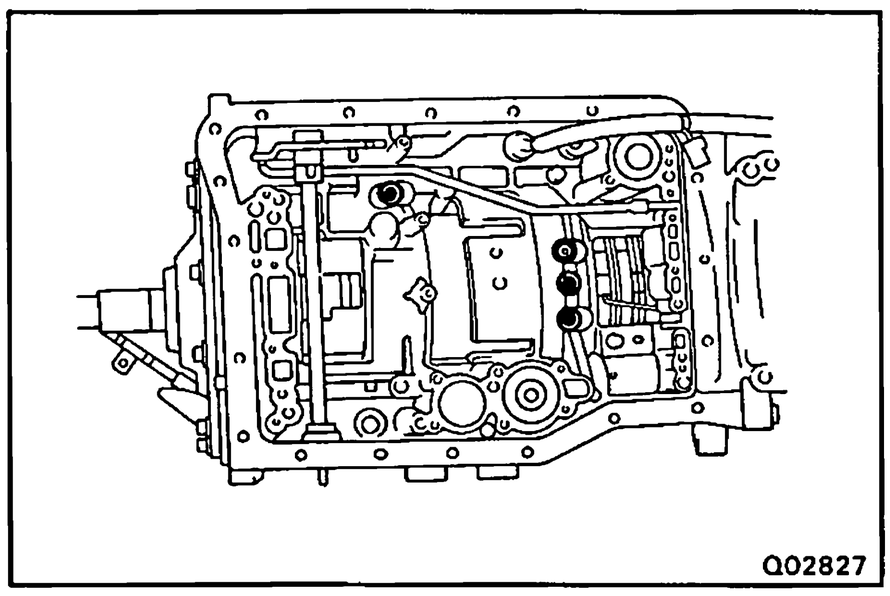
2. **DISCONNECT THROTTLE CABLE**

(a) Disconnect the cable housing from the bracket.

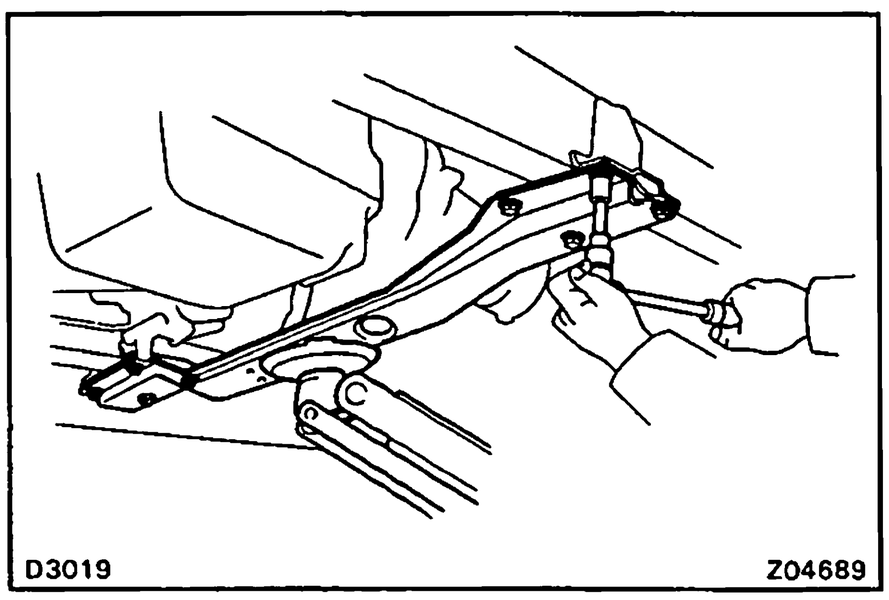
(b) Disconnect the cable from the throttle linkage.

(c) Disconnect the cable from the torque converter housing.

3. **REMOVE VALVE BODY**
   **(See page AT-58)**


Q02827

4. **REMOVE FOUR CENTER SUPPORT APPLY GASKETS**


D3019 Z04689

5. **REMOVE FRAME CROSSMEMBER SET BOLTS**

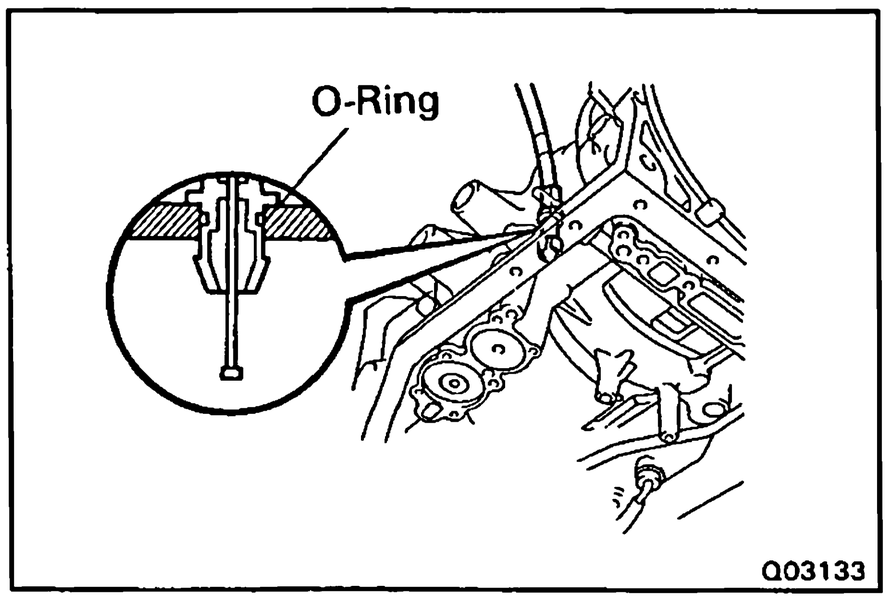
(a) Support the frame crossmember with a jack.

(b) Remove the eight set bolts.

6. **REMOVE THROTTLE CABLE CLAMP**

(a) Lower the jack.

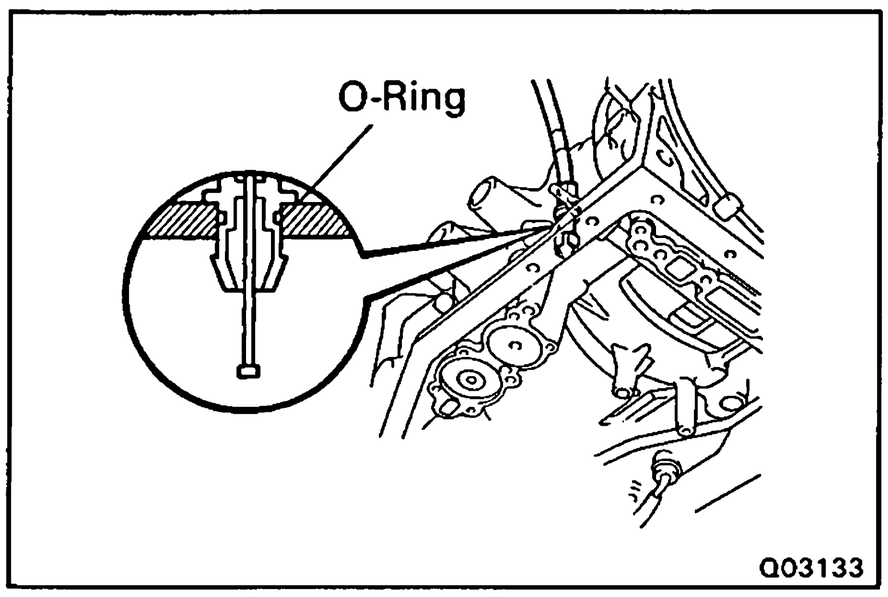
(b) Remove the cable clamp from the transmission housing.



Q03133

7. **REMOVE THROTTLE CABLE**

Using 10 mm socket driver, remove the throttle cable by pushing the retainer portion of the throttle cable.



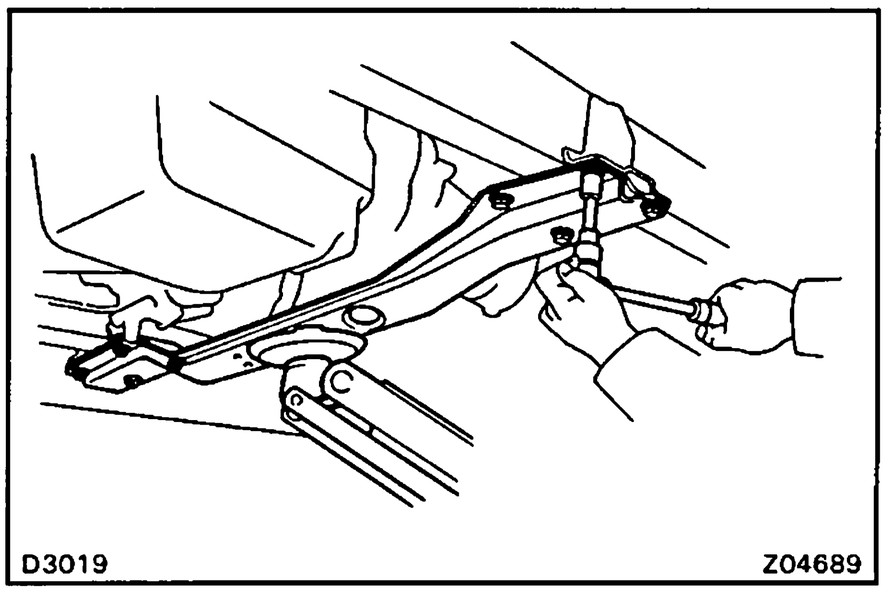

# THROTTLE CABLE INSTALLATION

**1. INSTALL CABLE IN TRANSMISSION CASE**

(a) Coat a new O-ring with ATF, and install it to the cable.

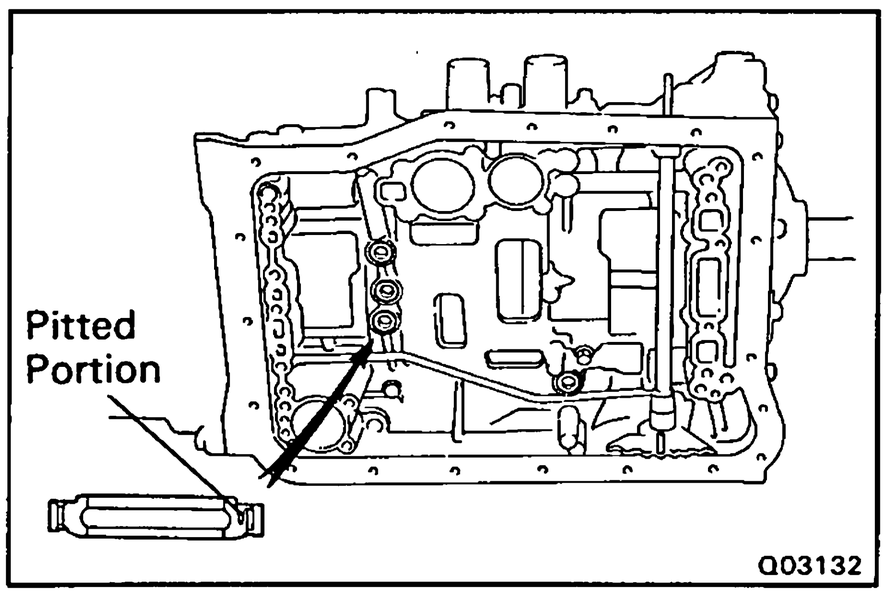
(b) Install the cable to the transmission case.

**2. INSTALL THROTTLE CABLE CLAMP TO TRANSMISSION HOUSING**




**3. INSTALL FRAME CROSSMEMBER SET BOLTS**

**Torque: 61 N·m (620 kgf·cm, 45 ft·lbf)**

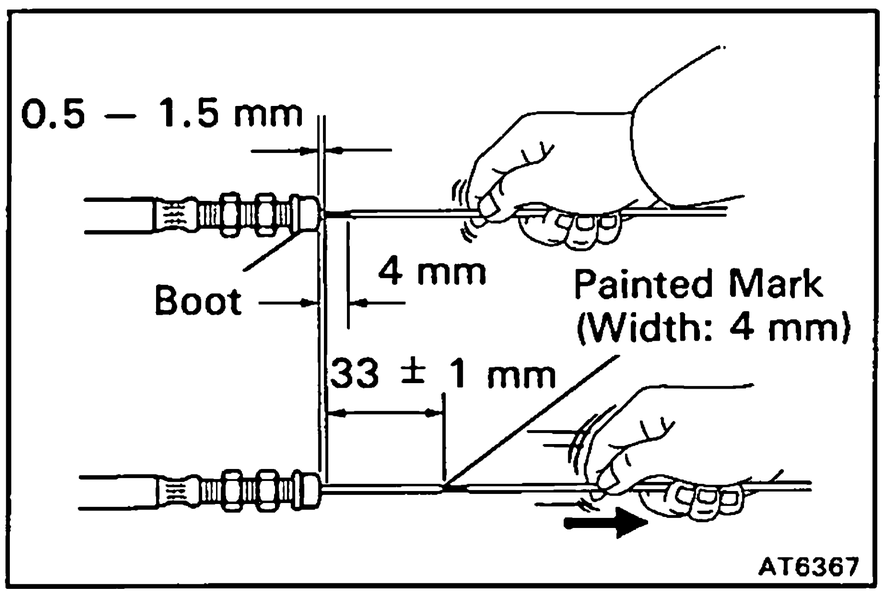



**4. INSTALL FOUR CENTER SUPPORT APPLY GASKET**

Install new four gaskets, facing the pitted side toward the transmission case.

**5. INSTALL VALVE BODY**
**(See page AT-59)**

**6. INSTALL FRONT PROPELLER SHAFT**
**(See Pub No. RM184E, page PR-8)**




**7. IF THROTTLE CABLE IS NEW, PAINT MARK ON INNER CABLE**

HINT: New cable do not have a cable stopper installed. Therefore to mark adjustment possible, paint a mark as described below.

(a) Connect the throttle cable to the throttle cam of valve body.

(b) Pull the inner cable lightly until resistance is felt, and hold it.

(c) Paint a mark as shown, about 4 mm (0.16 in.) in width.

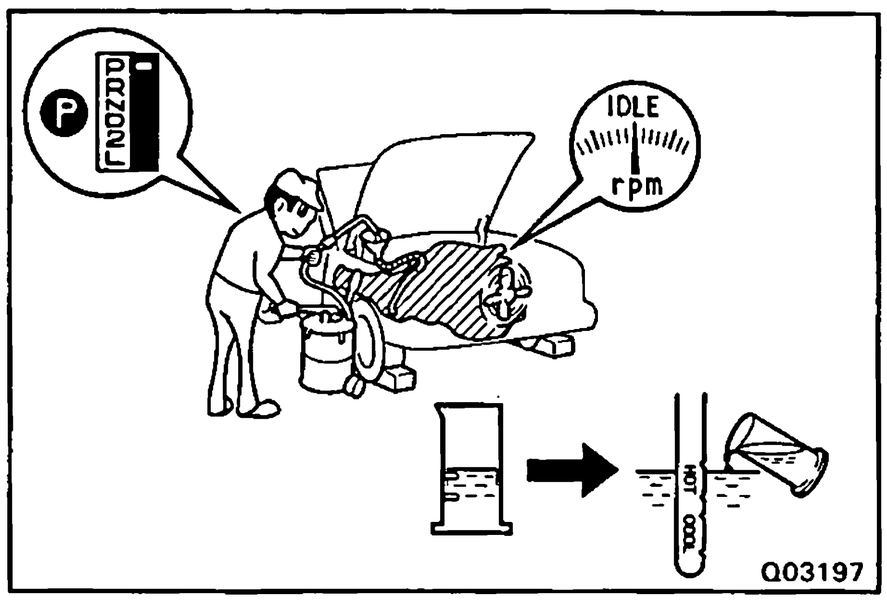
(d) Pull the inner cable fully, measure the cable stroke.

**Cable stroke:**
**33 ± 1 mm (1.30 ± 0.04 in.)**

**8. CONNECT THROTTLE CABLE**

(a) Connect the cable to the throttle linkage.

(b) Connect the cable housing to the bracket on the valve cover.



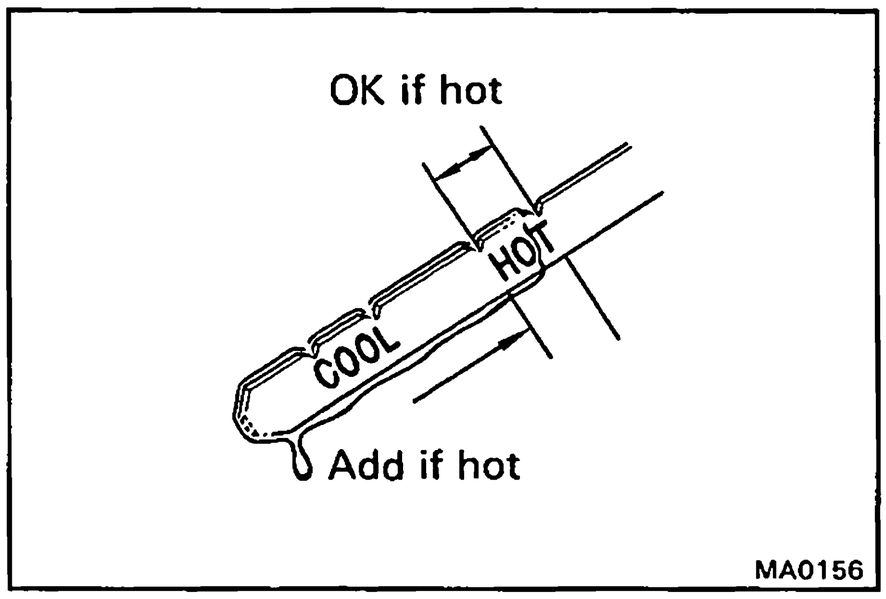

9. ADJUST THROTTLE CABLE
(See page AT-26)

10. FILL TRANSMISSION WITH ATF

Capacity:
6.0 liters (6.3 US qts, 5.3 Imp.qts)

NOTICE: Do not overfill.

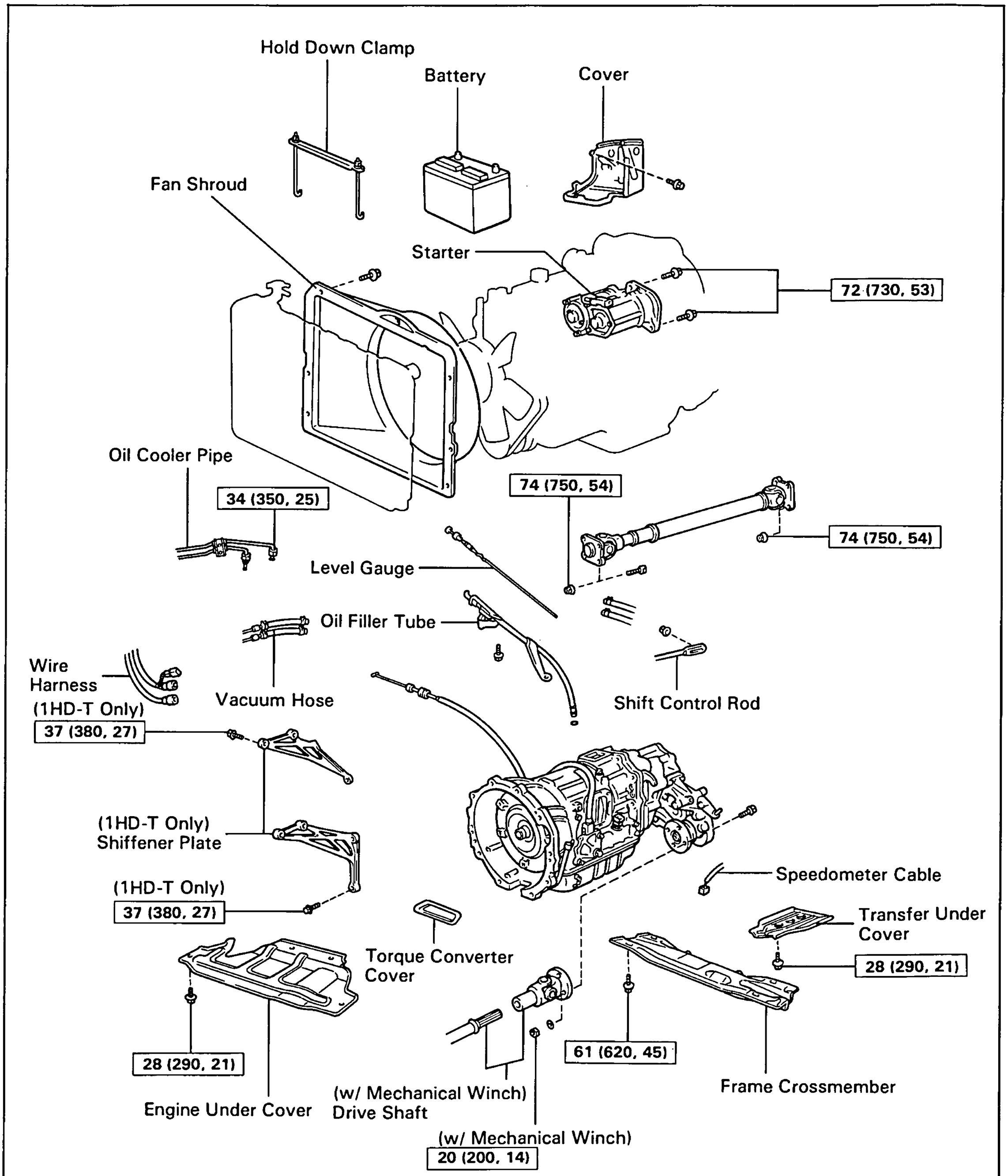
Fluid type:
ATF DEXRON® II




11. CHECK FLUID LEVEL
(See page AT-25)

# ASSEMBLY REMOVEAL AND INSTALLATION

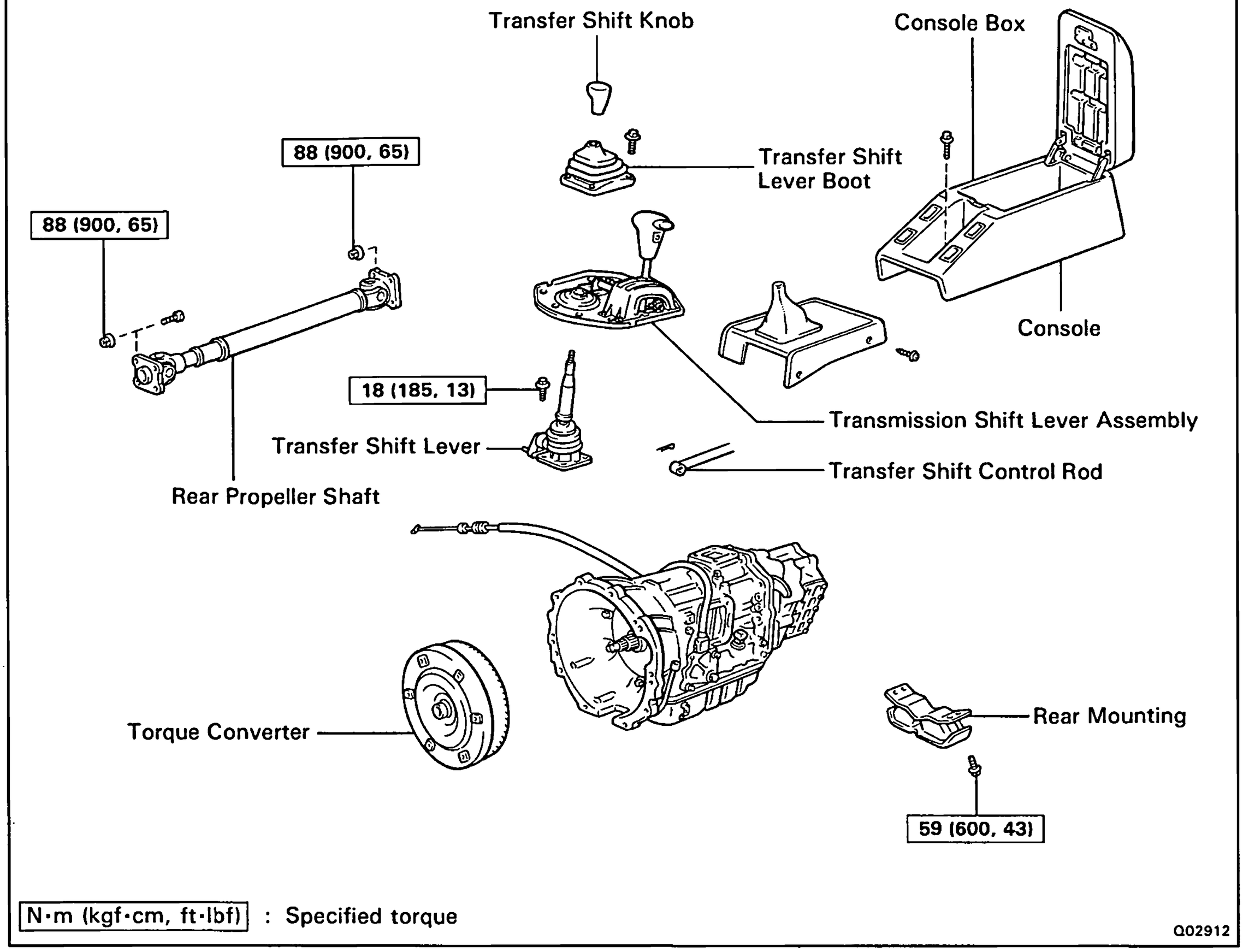
## COMPONENTS




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

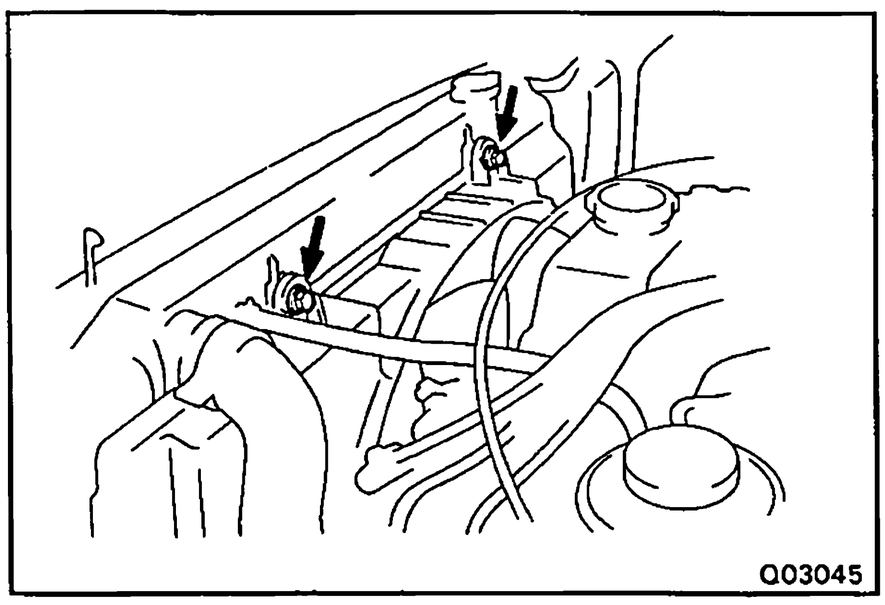
Q03192



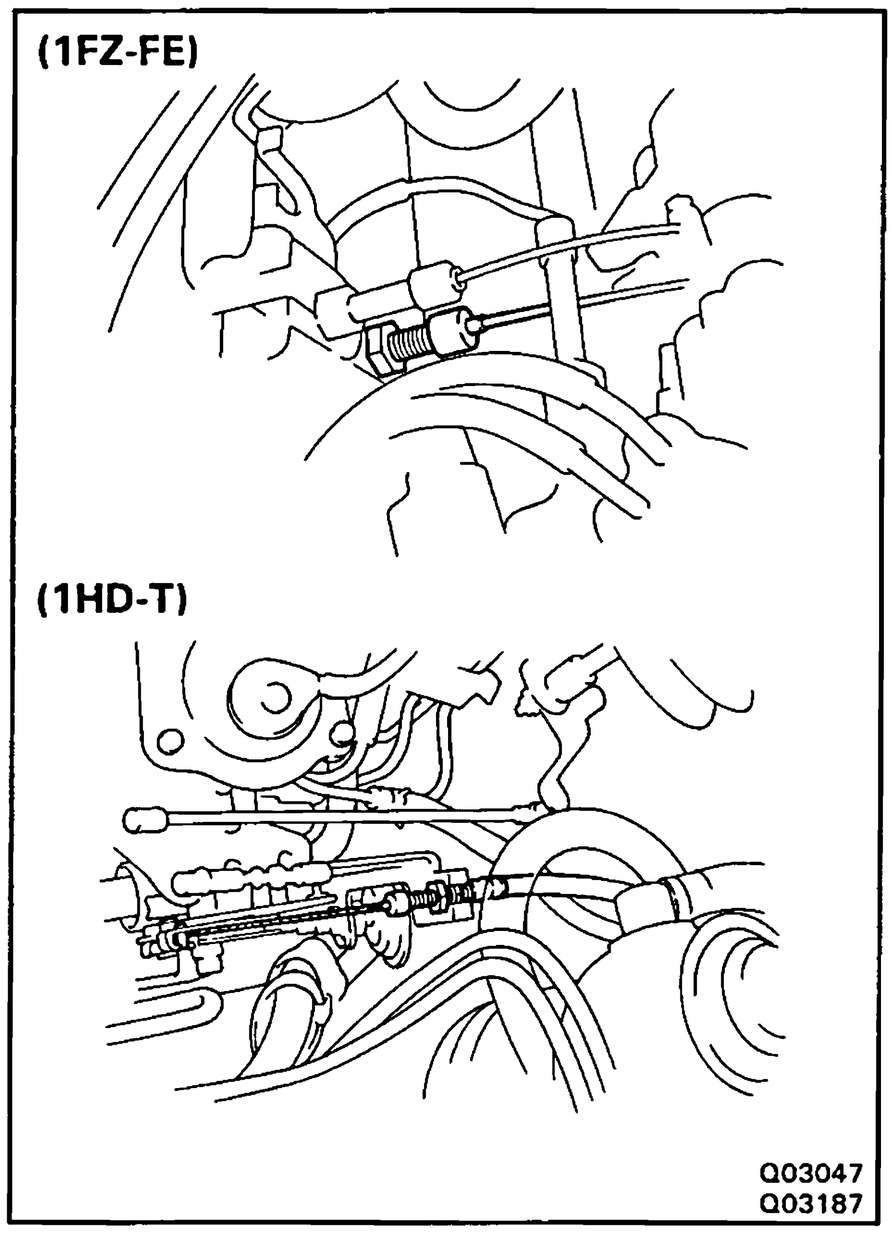

## TRANSMISSION REMOVAL

1. DISCONNECT BATTERY CABLE FROM NEGATIVE TERMINAL

2. REMOVE BATTERY AND COVER



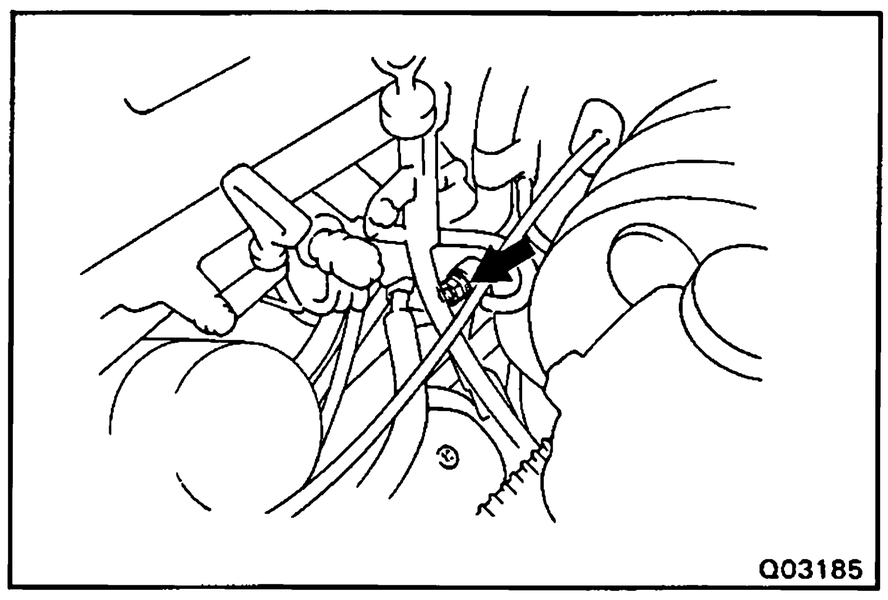

3. LOOSEN FAN SHROUD OF COOLING FAN TO AVOID DAMAGE TO FAN



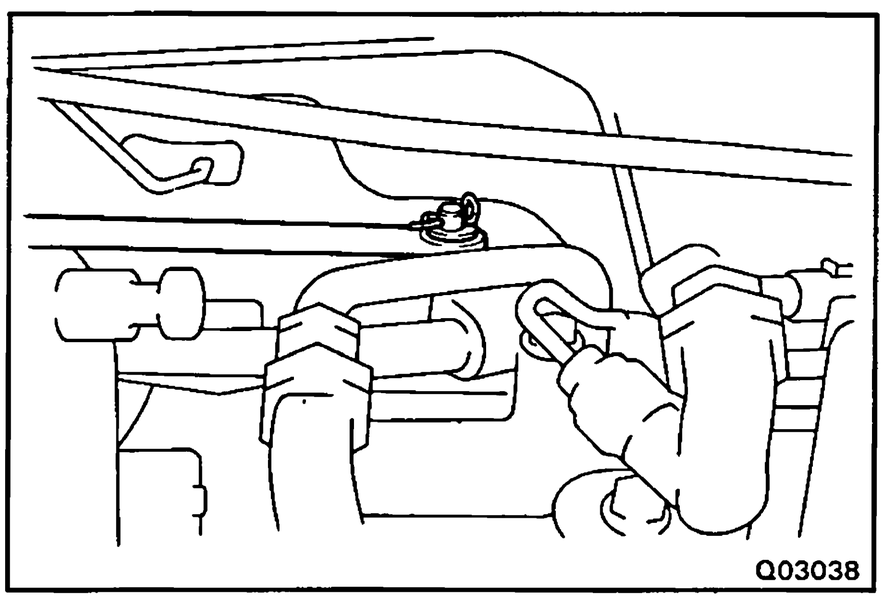

**4. DISCONNECT THROTTLE CABLE**

(a) Loosen the adjusting nut and disconnect the cable housing from the bracket.

(b) Disconnect the cable from the linkage.

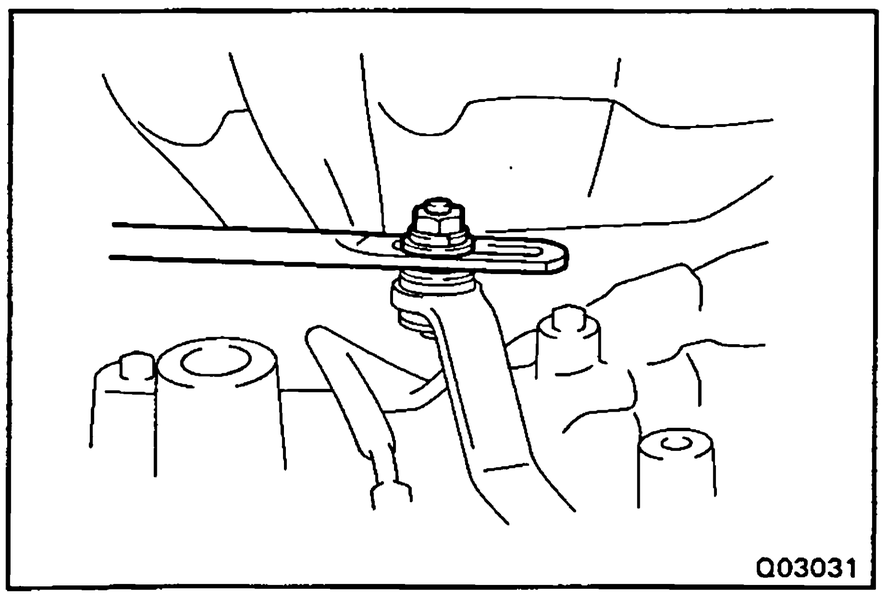



**5. (1HD-T)
REMOVE STARTER MOUNTING BOLT**

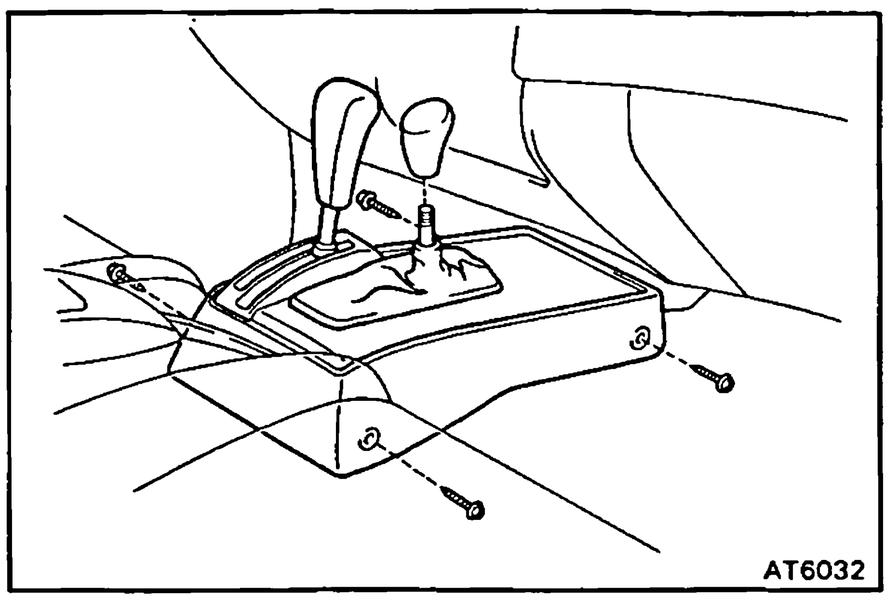



**6. REMOVE TRANSMISSION SELECT LEVER AND TRANSFER SHIFT LEVER**

(a) Remove the clip, washer and wave washer, and disconnect the link.

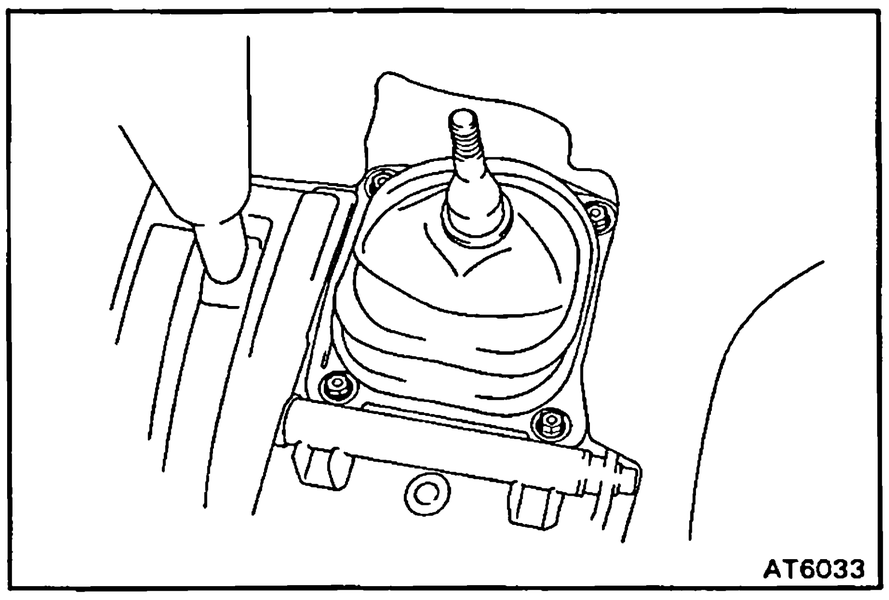



(b) Remove the nut and washer, disconnect the link.

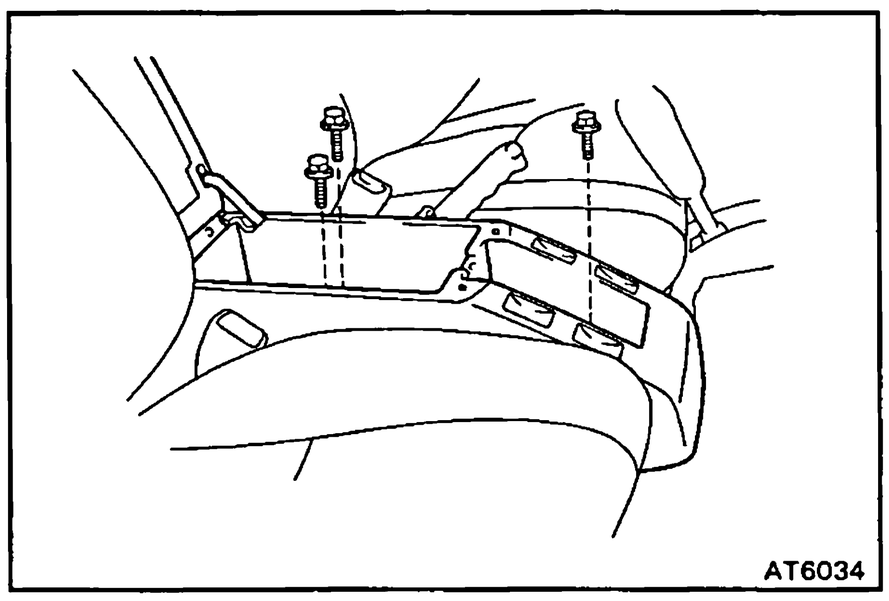



(c) Remove the transfer shift lever knob.

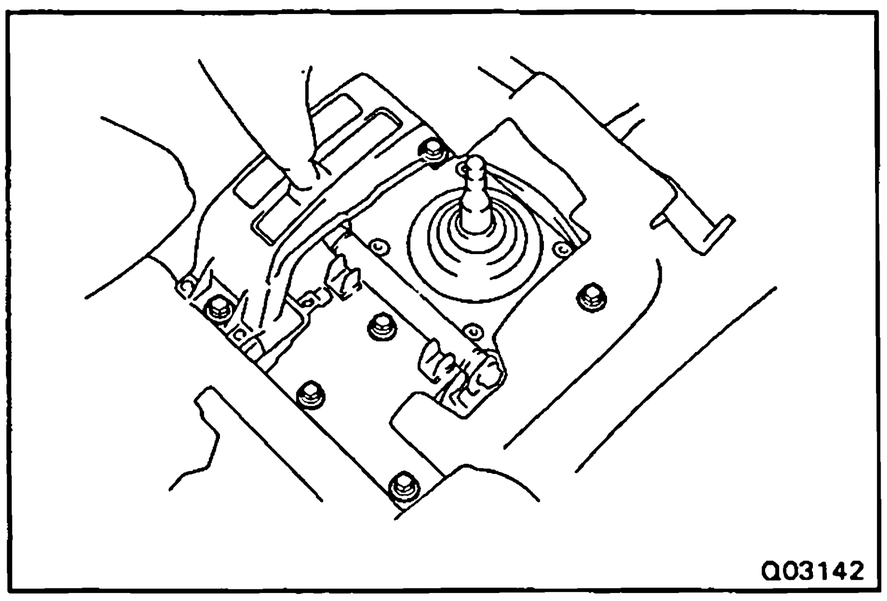
(d) Remove the four screws and the console.



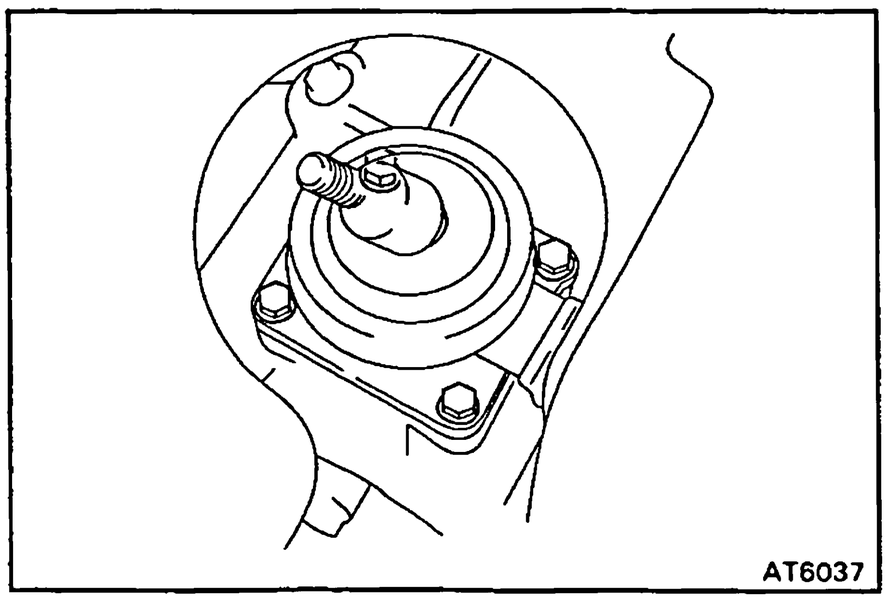

(e) Remove the four bolts and transfer shift lever bolt.



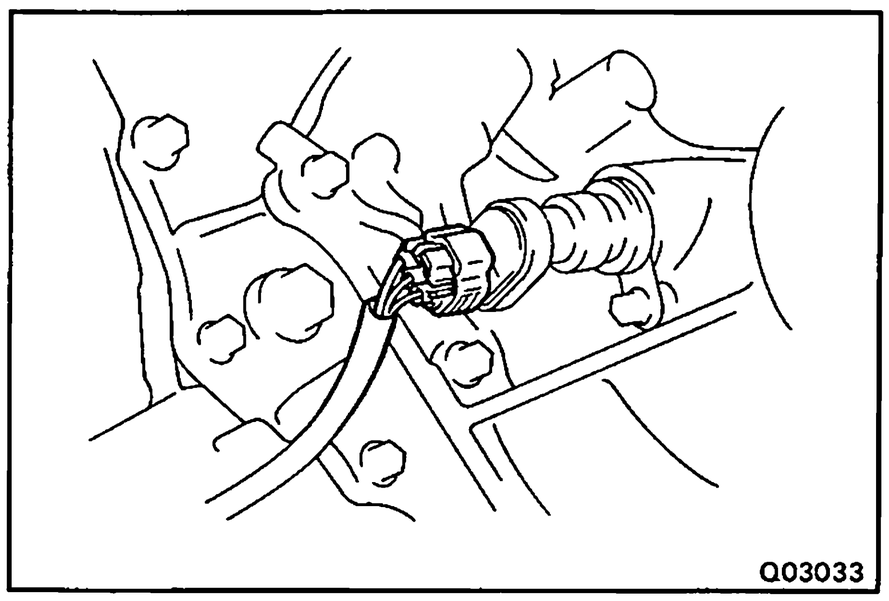

(f) Remove the three bolts and the console box.




(g) Remove the six bolts and the transmission shift lever assembly.

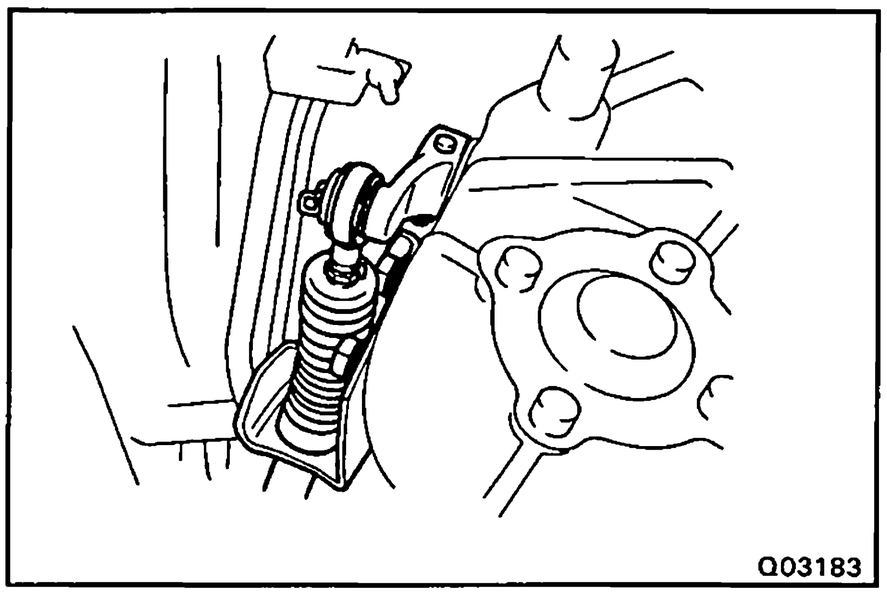



(h) Remove the four screws and the transfer shift lever.


Q03033

**7. REMOVE NO.1 SPEED SENSOR CONNECTOR**

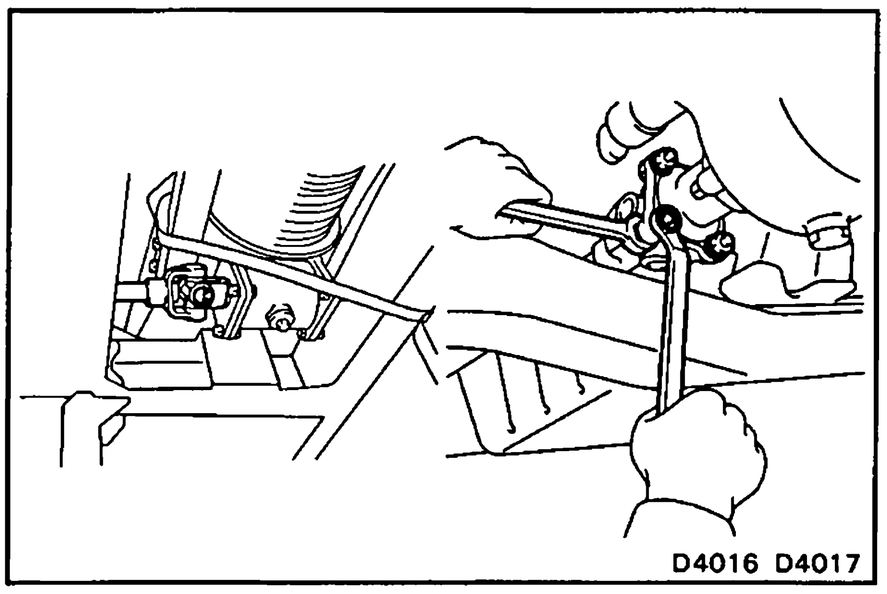
**8. REMOVE FRONT AND REAR PROPELLER SHAFTS**
**(See Pub. No. RM184E, page PR-3)**


Q03183

**9. (w/ MECHAICAL WINCH)**
**REMOVE POWER TAKE OF SHIFT CABLE**

(a) Pull out the pin and disconnect the cable.

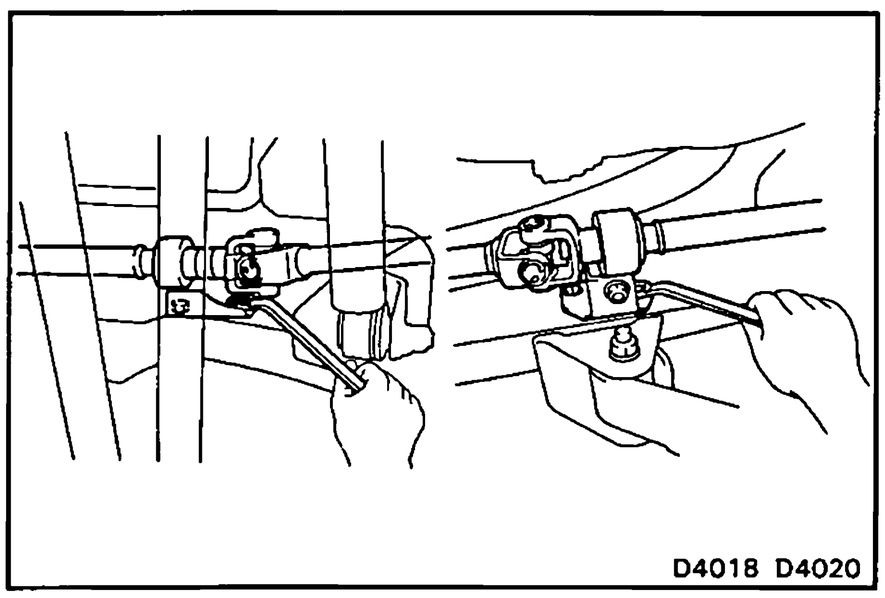
(b) Remove the two bolts and the cable bracket.


D4016 D4017

(c) Remove the engine under cover.

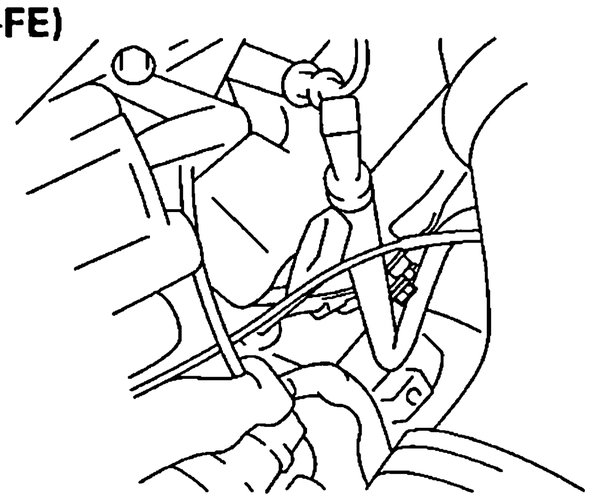
(d) Place matchmarks on the yoke and flange.

(e) Remove the bolts and nuts, disconnect the drive shaft from the PTO.


D4018 D4020

(f) Remove the front and rear bracket set bolts, and then remove the drive shaft.

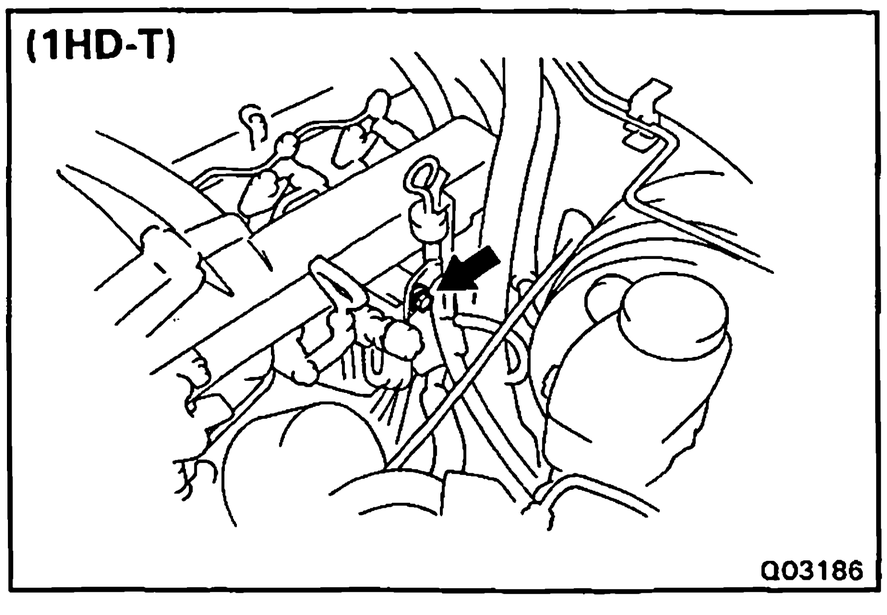
(1FZ-FE)


Q02632

**10. REMOVE OIL FILLER TUBE**

(a) Remove the level gauge.

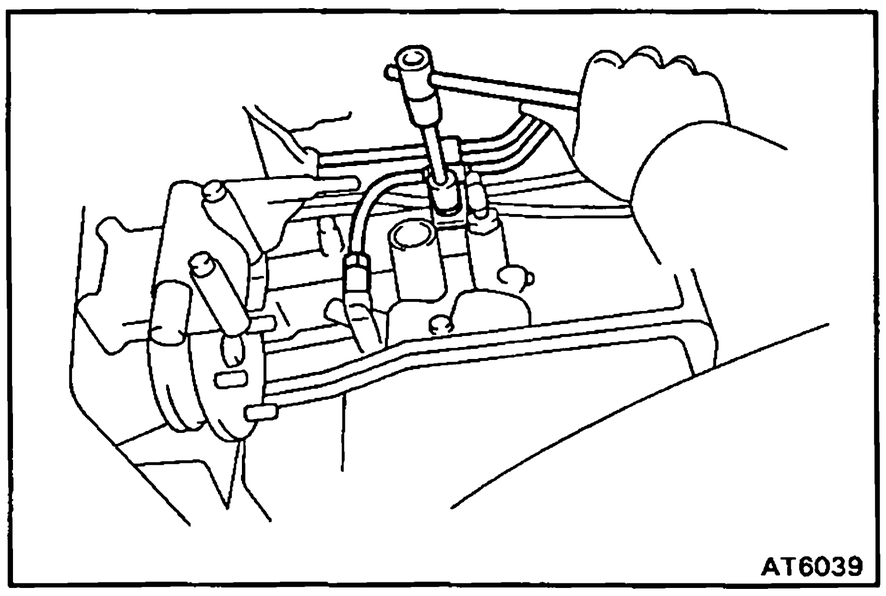
(b) Remove the bolt.





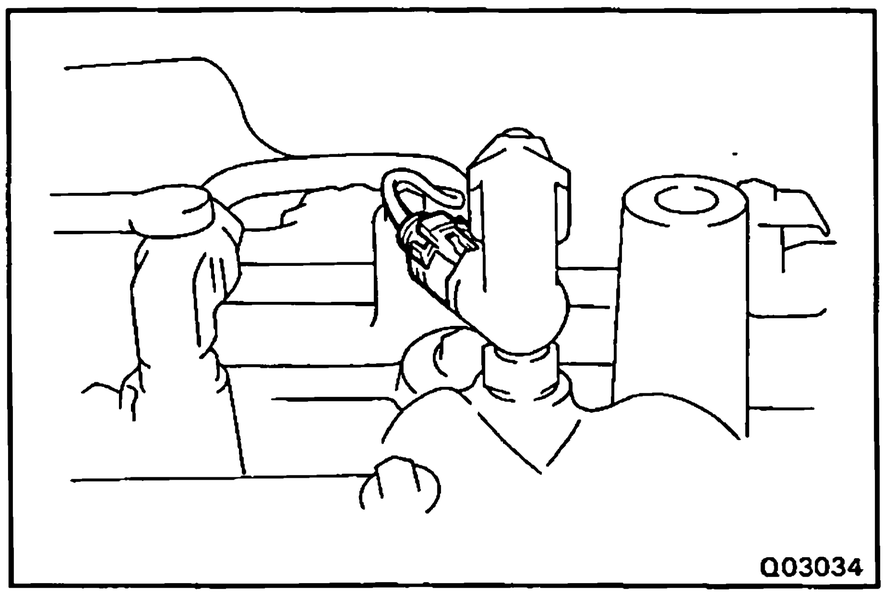


(c) Remove the bolt and the filler tube.

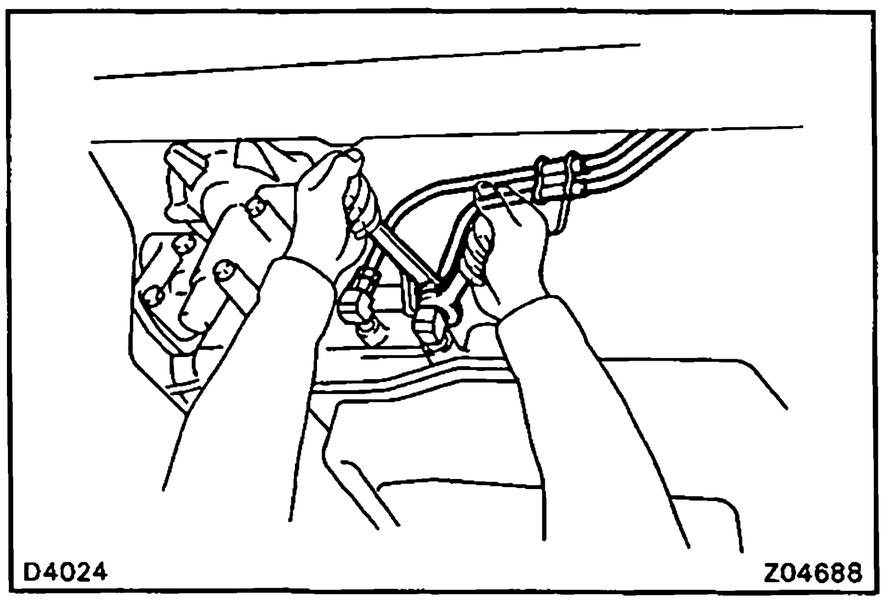



**11. DISCONNECT TWO OIL COOLER TUBES**

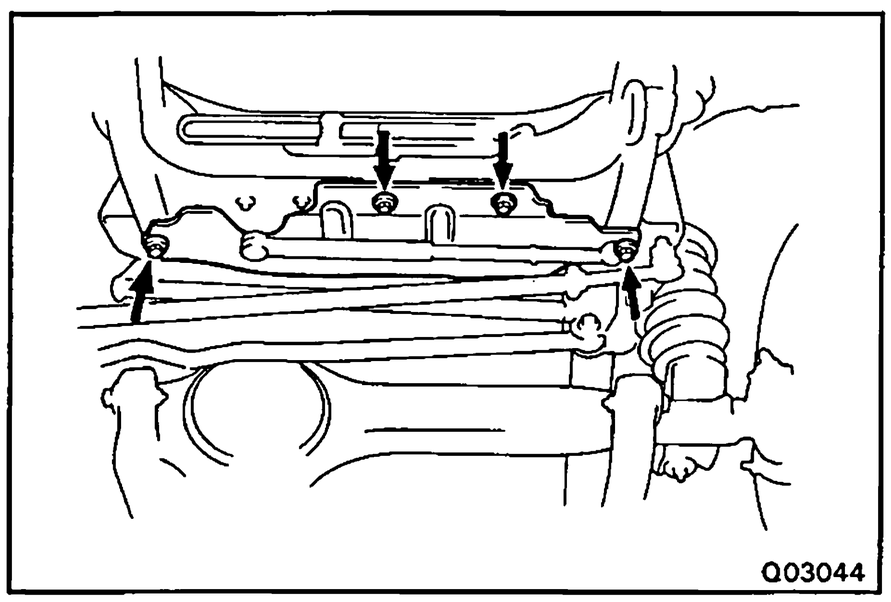
(a) Remove the bolt and clamp.




(b) Disconnect the temperature sensor connector.

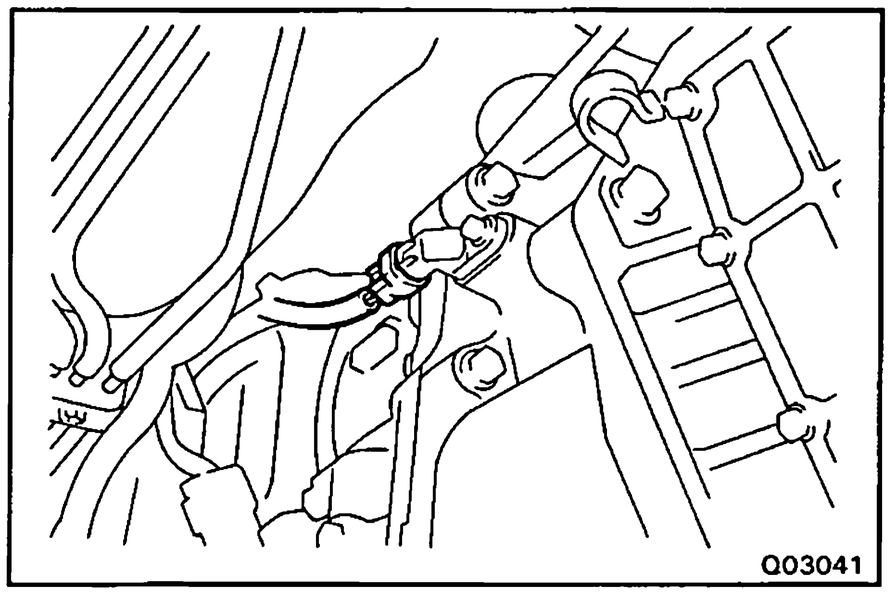



(c) Disconnect the two oil cooler tubes.

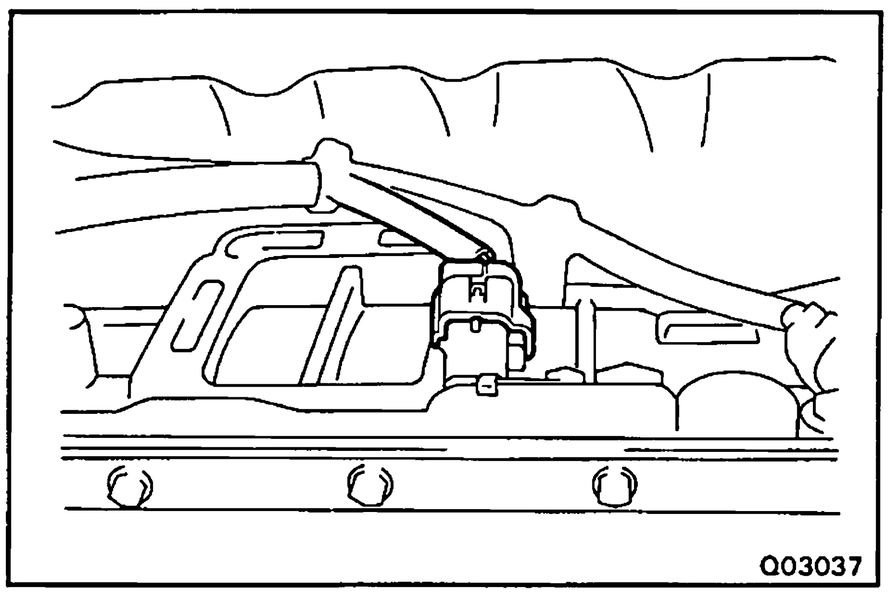



**12. REMOVE ENGINE UNDER COVER**

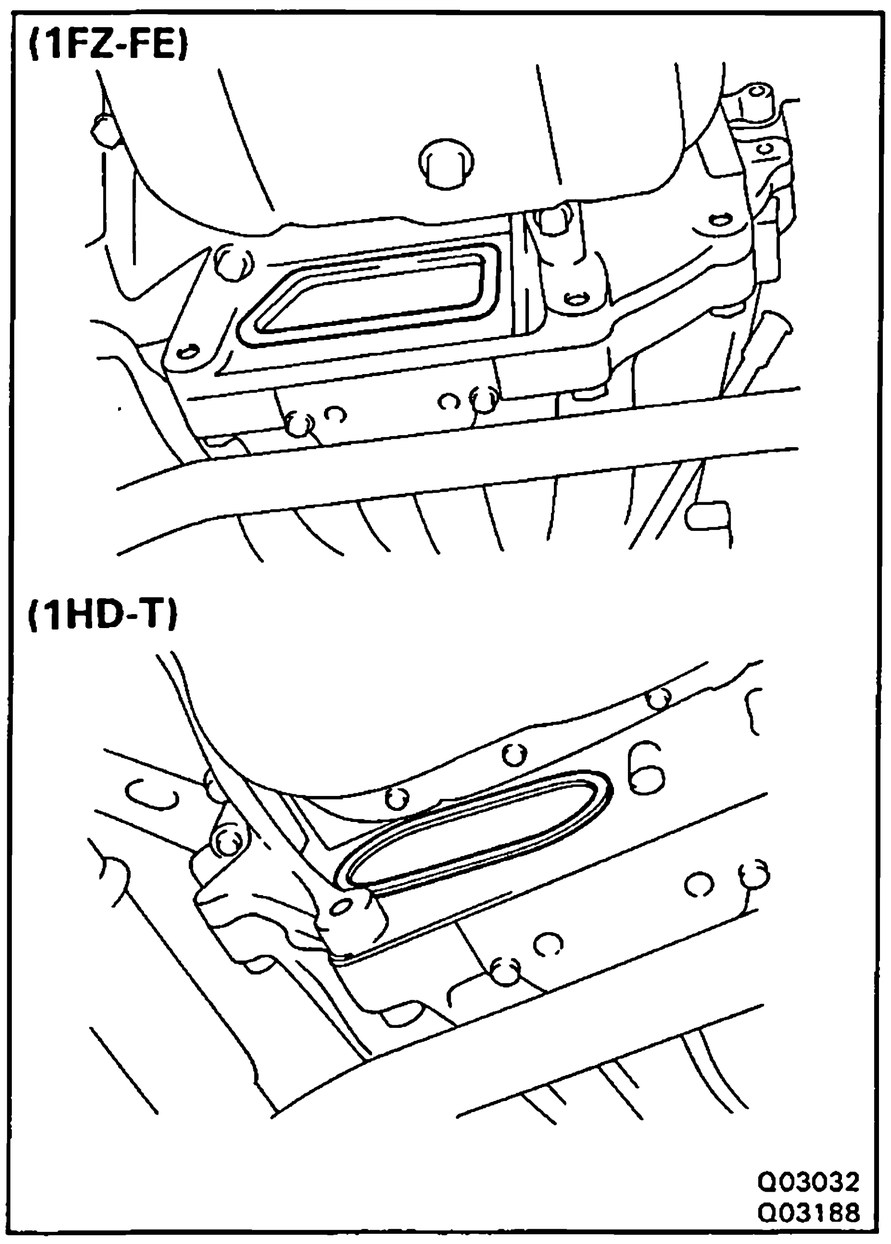
Remove the four bolts and the cover.




**13. DISCONNECT NO.2 SPEED SENSOR CONNECTOR**

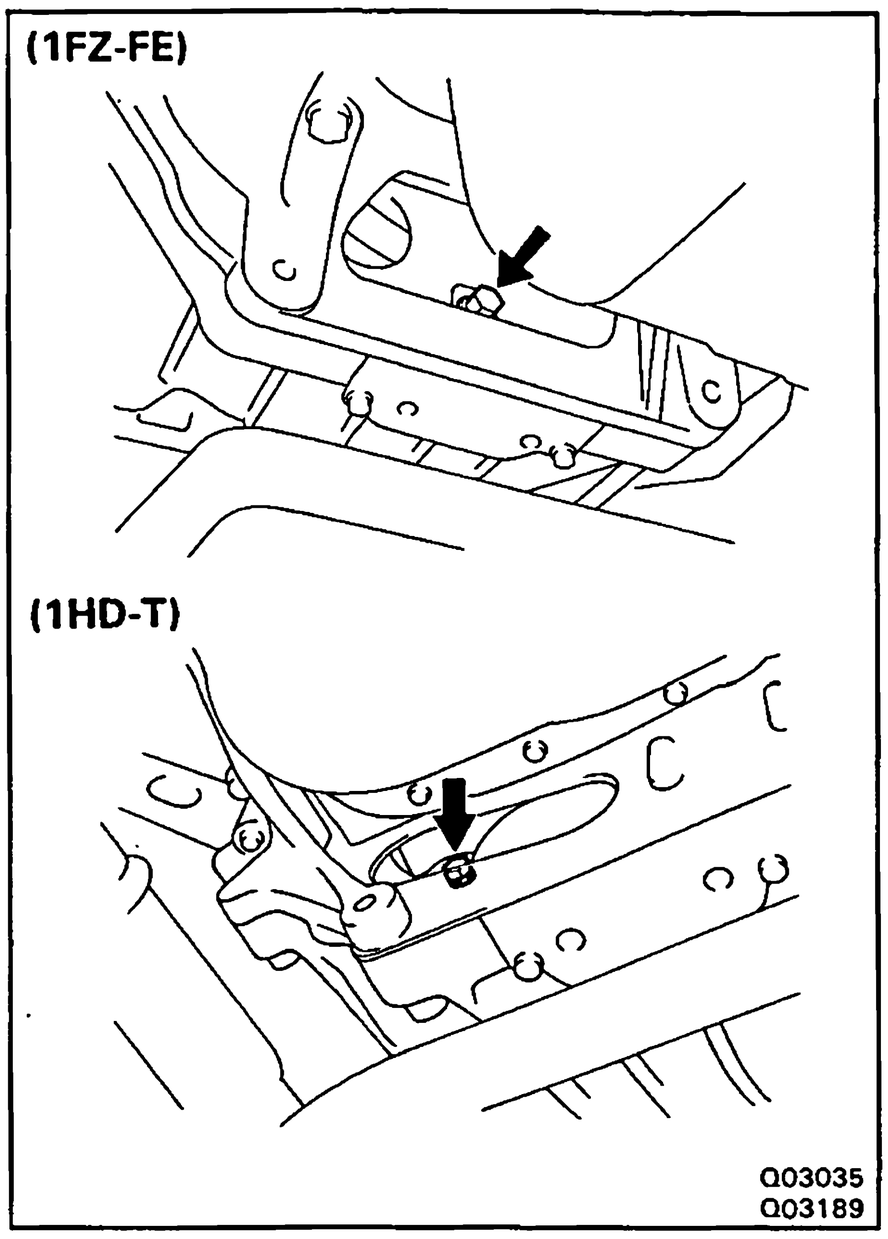



**14. DISCONNECT SOLENOID CONNECTOR**

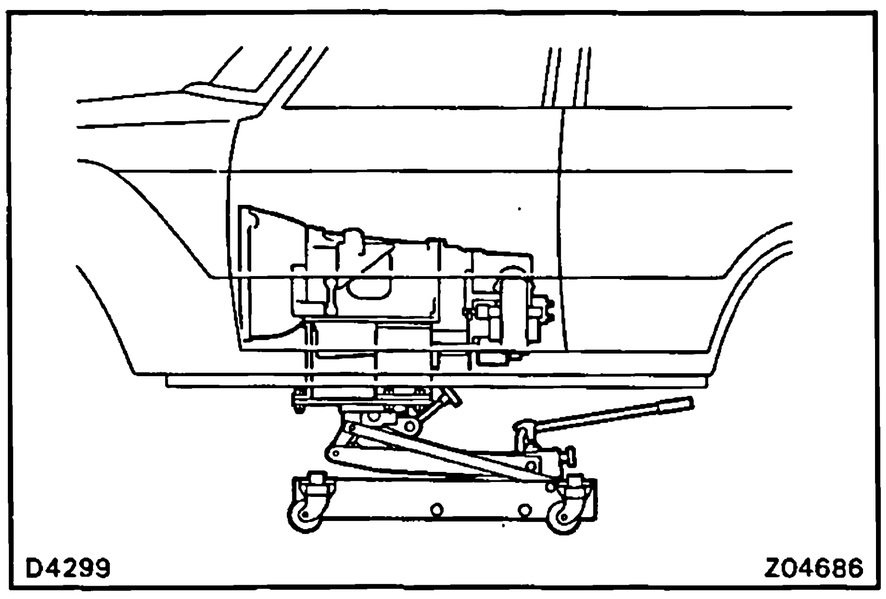



**15. REMOVE SIX TORQUE CONVERTER MOUNTING BOLTS**

(a) Remove the converter hole plug.

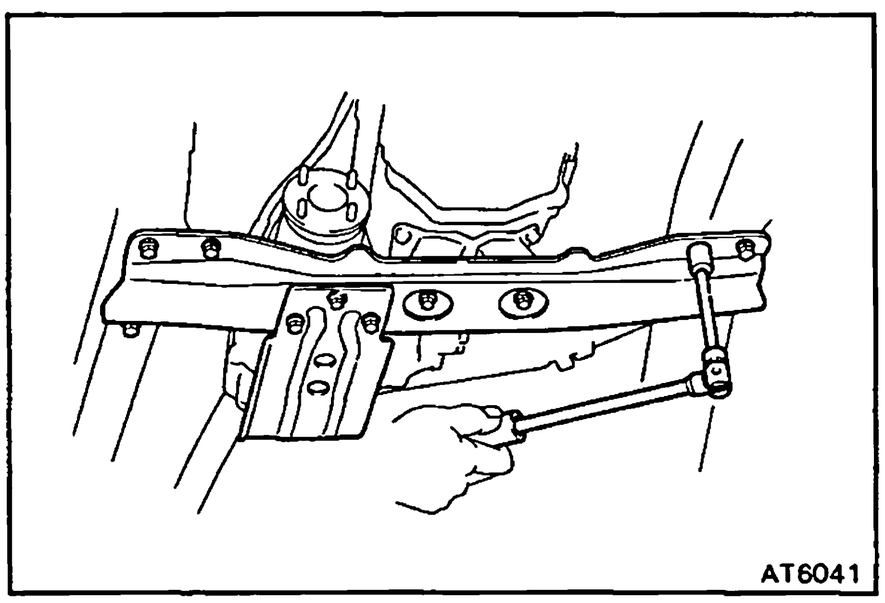



(b) Turn the crankshaft to gain access to each bolt. Remove the six bolt.

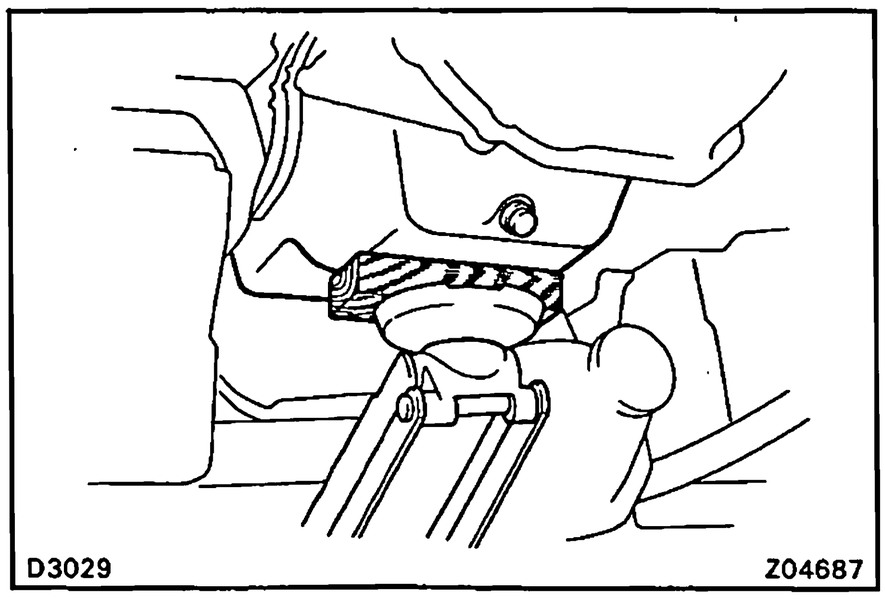



## 16. REMOVE CROSSMEMBER

(a) Support the transmission with the transmission jack.



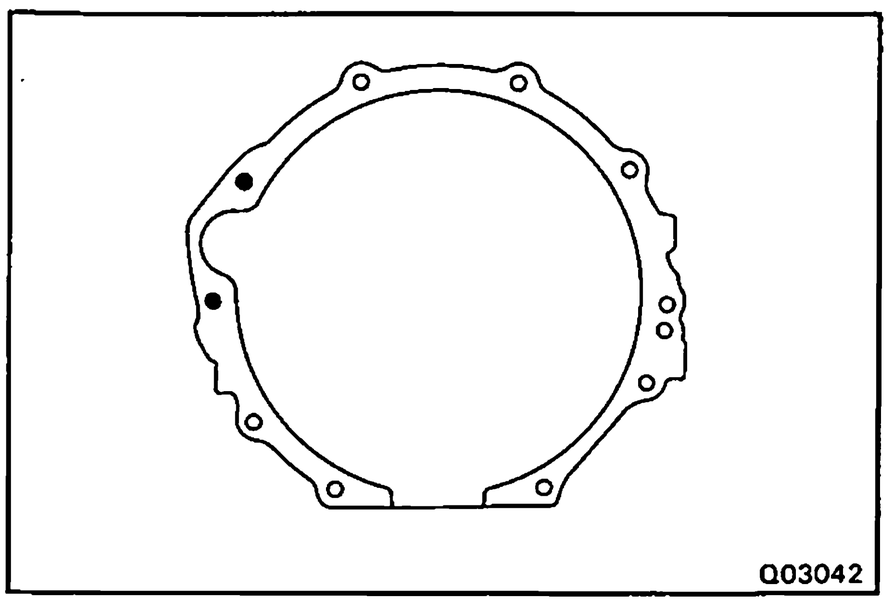

(b) Remove the eight bolts and then remove the frame crossmember.




## 17. REMOVE TRANSMISSION ASSEMBLY

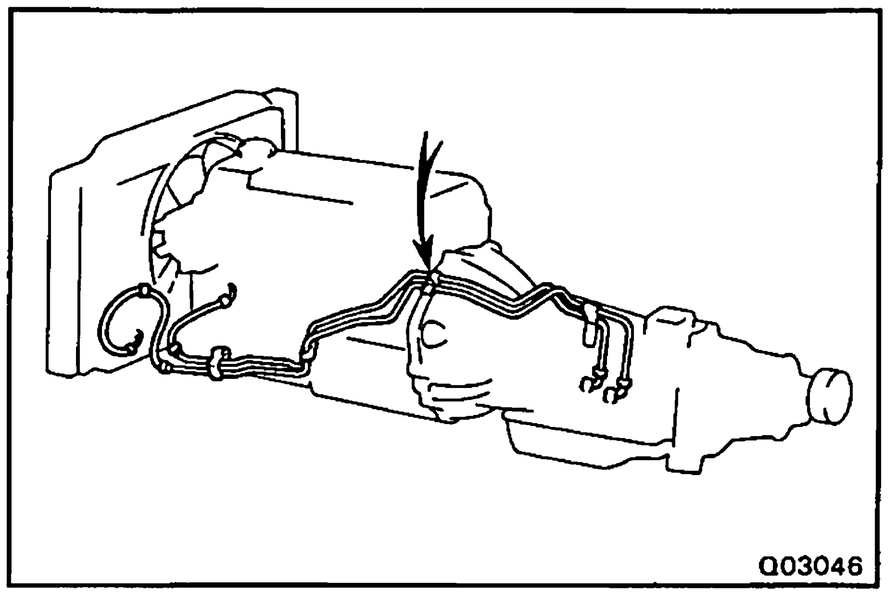
(a) Be sure to out a wooden block or equivalent between the jack and oil pan to prevent damage. Support the oil pan with a jack.

(b) Lower the rear end of transmission.




(c) (1FZ-FE)
Remove the nut and disconnect the connectors from the starter.

(d) (1FZ-FE)
Remove the two bolts and the starter.

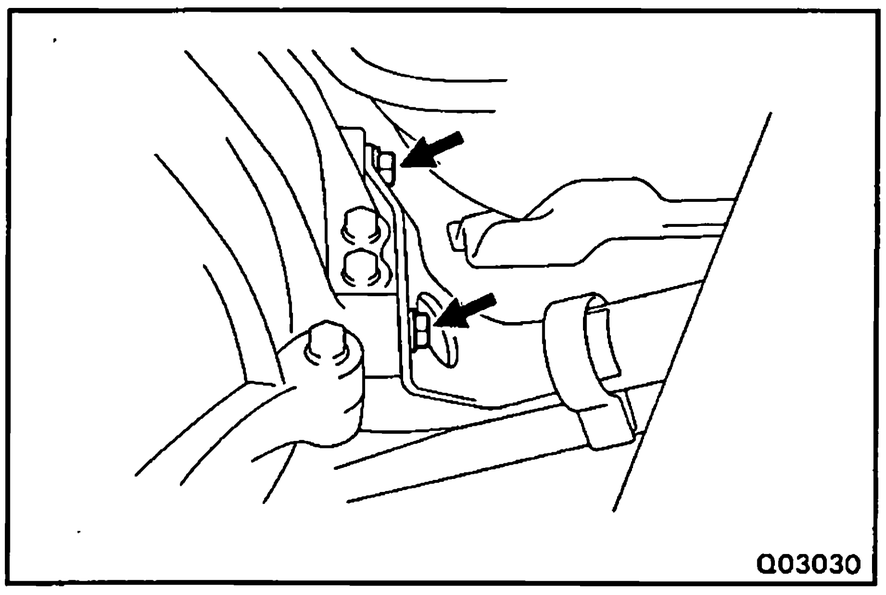



(e) Disconnect the neutral start switch connectors.

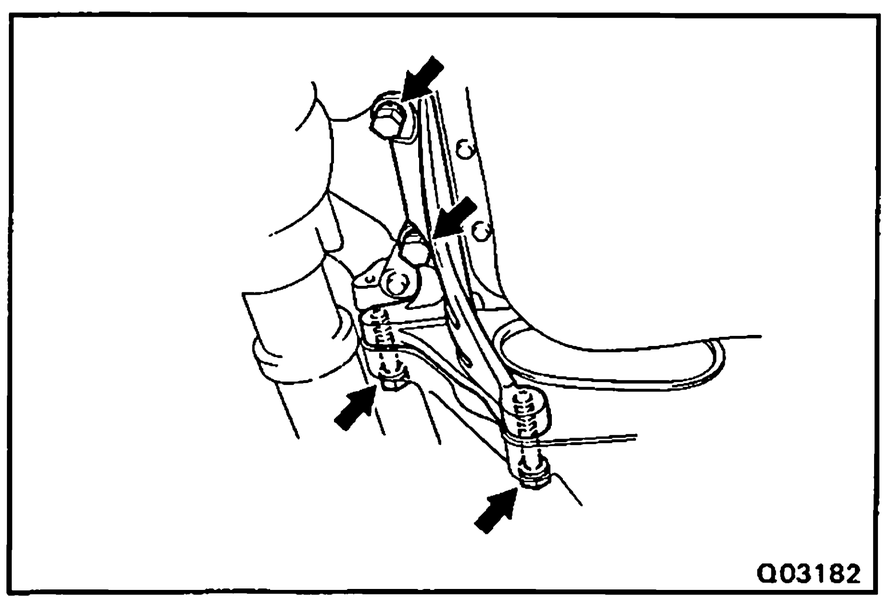
(f) Remove the bolt and disconnect the oil cooler tube clamp from the converter housing.

(g) Disconnect the connectors from the transfer.

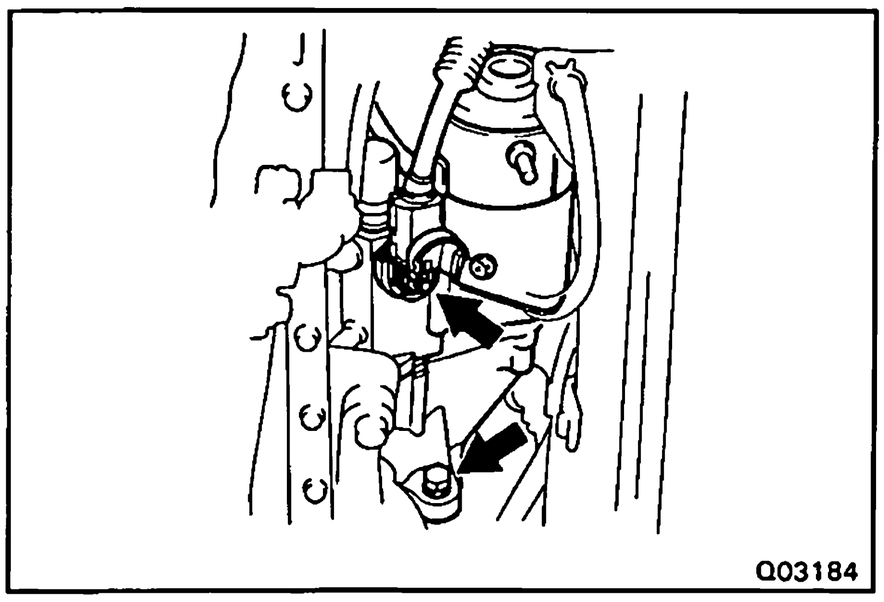
(h) Remove the clamp and disconnect the wire harness from the transmission and transfer.




(i) Remove the two bolts and disconnect the exhaust pipe bracket from the converter housing.

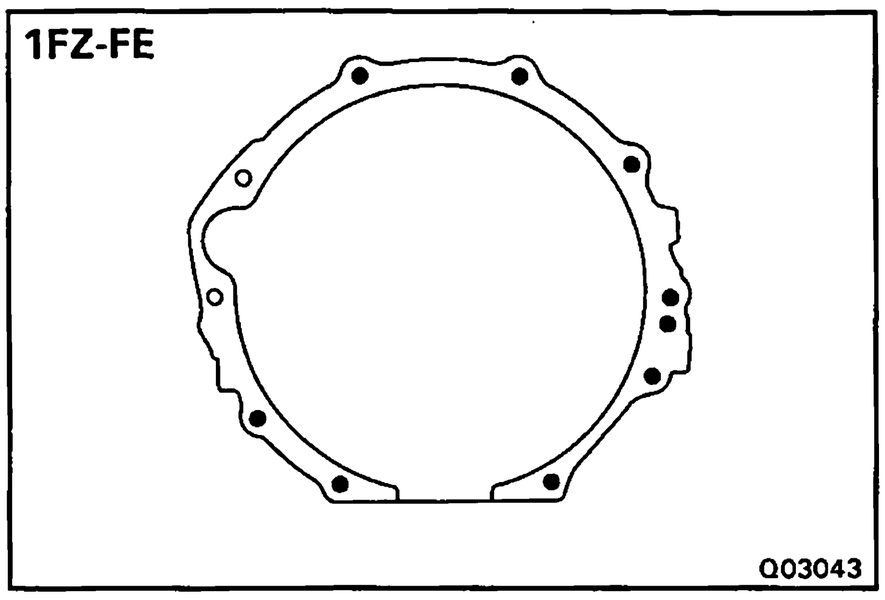



(j) (1HD-T)
Remove the four bolts and the stiffener plate.




(k) (1HD-T)
Remove the nut and disconnect the connectors from the starter.

(l) (1HD-T)
Remove the nut and the starter.




(m) Remove the bolts and the transmission.

## TORQUE CONVERTER CLEANING

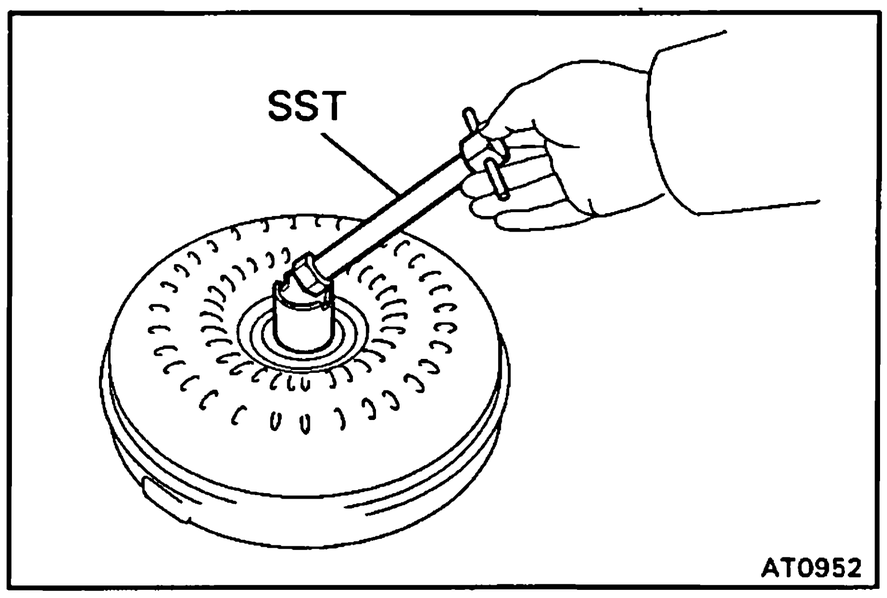
If the transmission is contaminated, the torque converter and transmission cooler should be thoroughly flashed with ATF.

## TORQUE CONVERTER AND DRIVE PLATE INSPECTION

### 1. INSPECT ONE-WAY CLUTCH

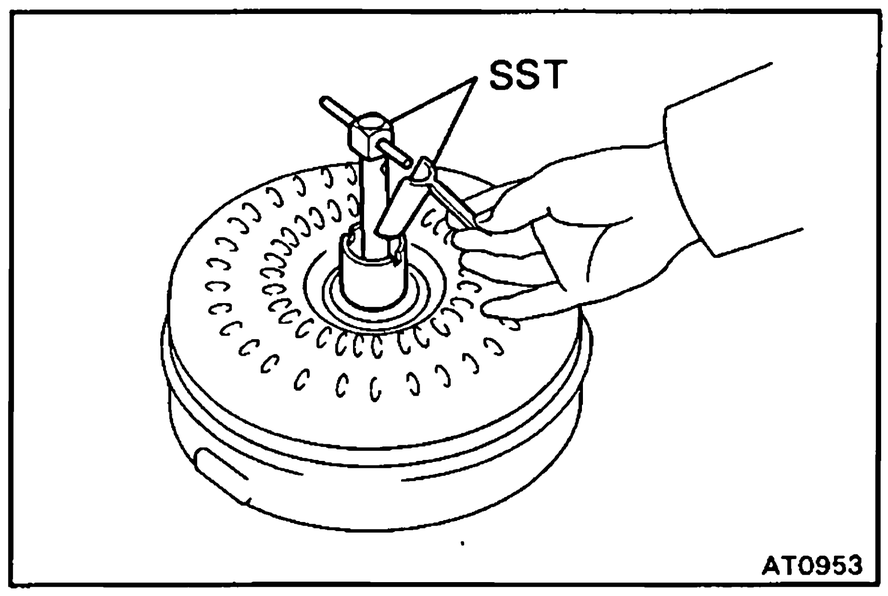
(a) Install SST in the inner race of one-way clutch.

SST 09350-30020 (09351-32010)



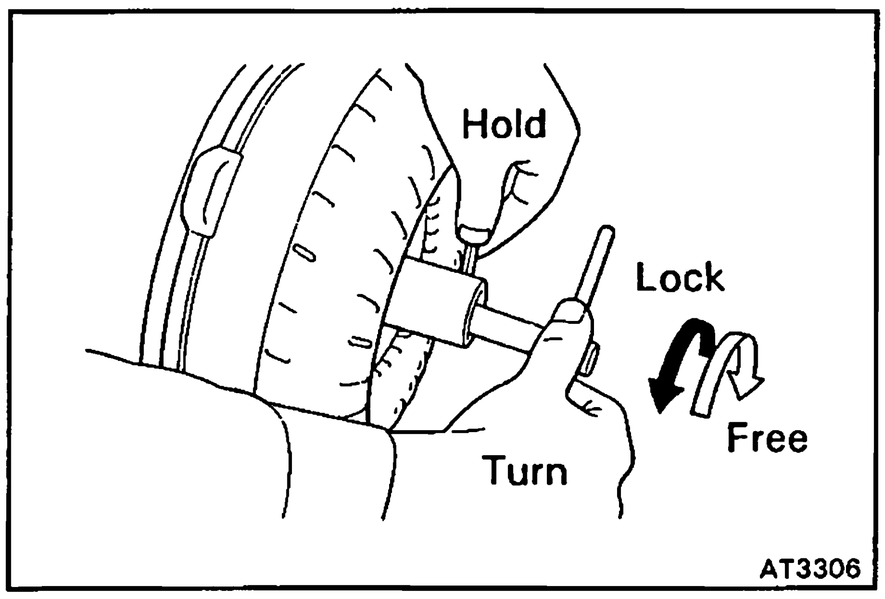

(b) Install SST so that it fits in the notch of the converter hub and outer race of the one-way clutch.

SST 09350-30020 (09351-32010)




(c) With the torque converter made stand, the clutch should lock when turned counterclockwise, and rotate freely and smoothly clockwise.

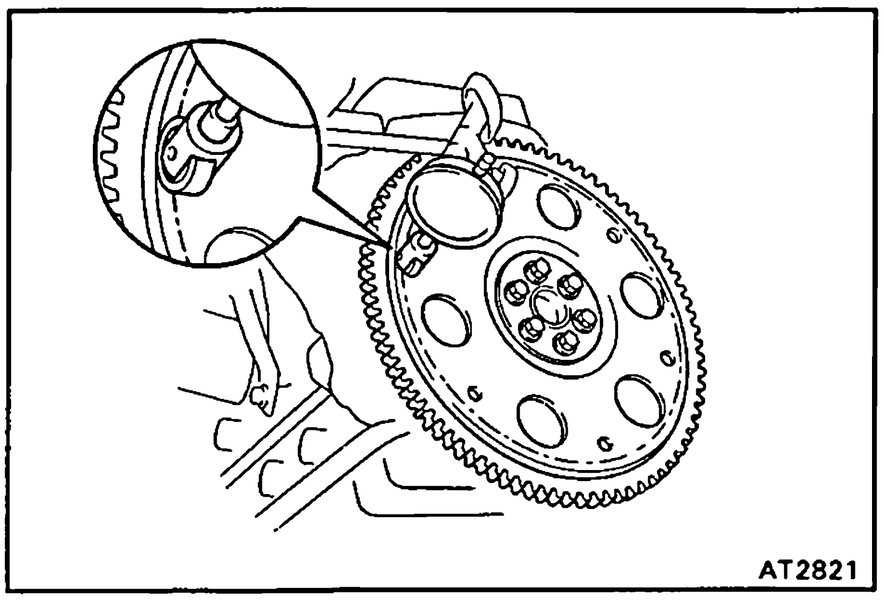
If necessary, clean the converter and retest the clutch. Replace the converter if the clutch still fails the test.

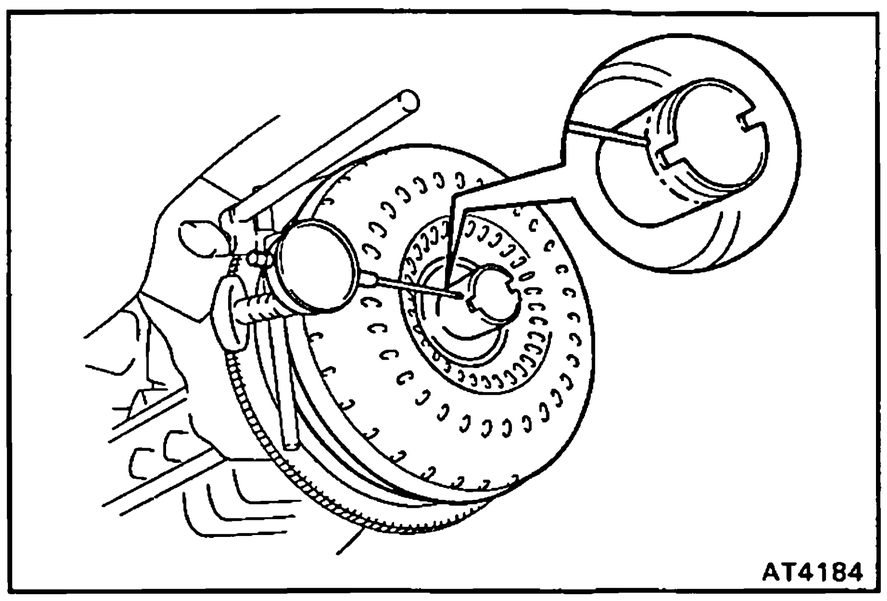



### 2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator and measure the drive plate runout. If runout exceeds 0.20 mm (0.0079 in.) or if the ring gear is damaged, replace the drive plate. If installing a new drive plate, note the orientation of spacers and tighten the bolts.

**Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)**





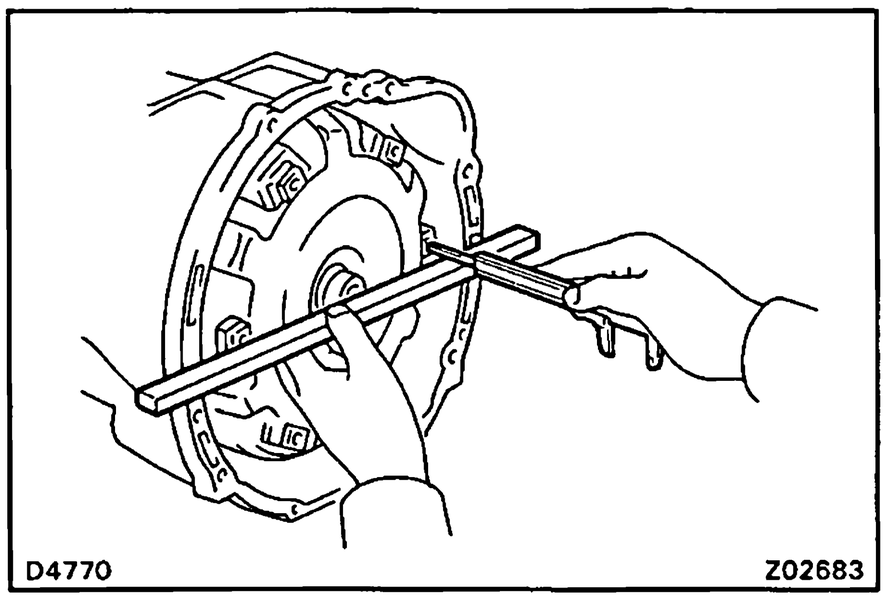

### 3. MEASURE TORQUE CONVERTER SLEEVE RUNOUT

(a) Temporarily mount the torque converter to the drive plate. Set up a dial indicator.

If runout exceeds 0.30 mm (0.0118 in.), try to correct by reorienting the installation of the converter. If excessive runout cannot be corrected, replace the torque converter.

HINT: Mark the position of the converter to ensure correct installation.

(b) Remove the torque converter.




## TRANSMISSION INSTALLATION

### 1. INSTALL TORQUE CONVERTER IN TRANSMISSION

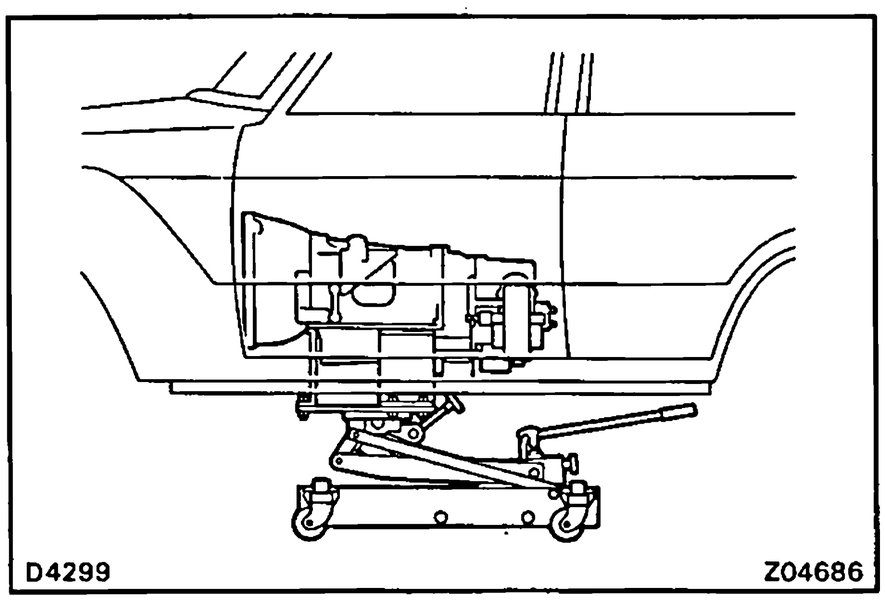
If the torque converter clutch has been drained and washed, refill with new ATF.

**Fluid type:**
**AFT DEXRON® II**

### 2. CHECK TORQUE CONVERTER INSTALLATION

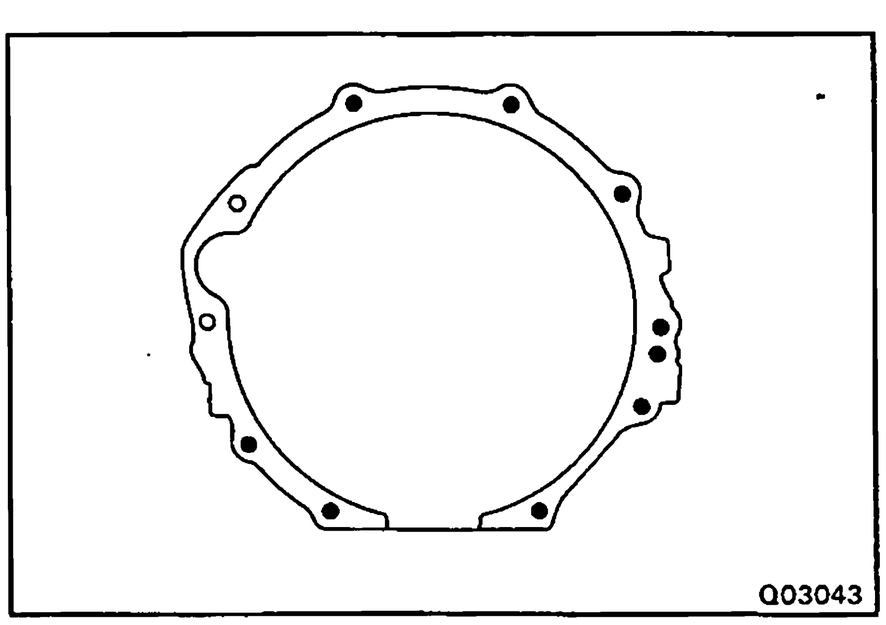
Using calipers and a straight edge, measure from the installed surface to the front surface of the transmission.

**Correct distance:**
**(1FZ-FE)**
**More than 37.2 mm (1.465 in.)**
**(1HD-T)**
**More than 43.8 mm (1.724 in.)**




### 3. PLACE TRANSMISSION AT INSTALLATION POSITION

Jack up and push the transmission fully into position.



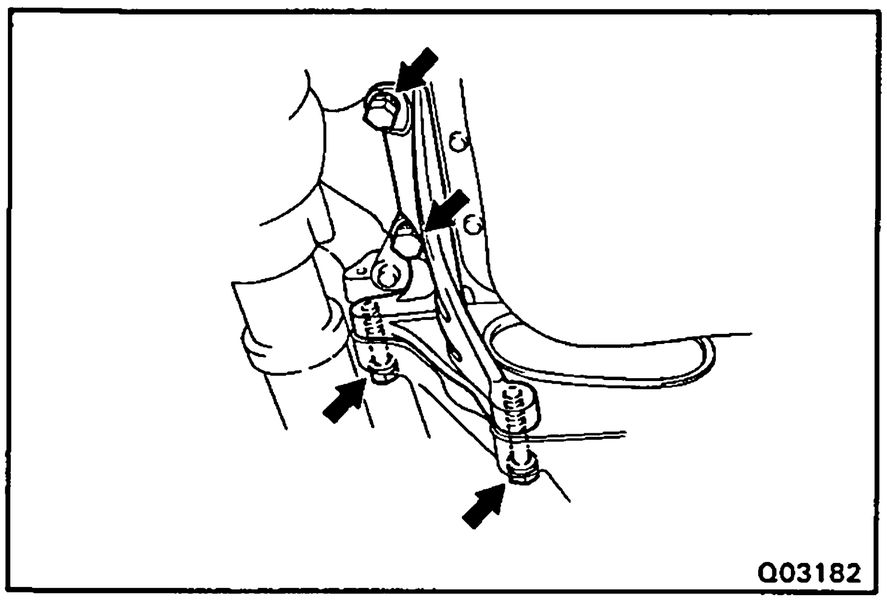

### 4. INSTALL TRANSMISSION BOLTS

(a) Install the transmission with the bolts.

**Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)**

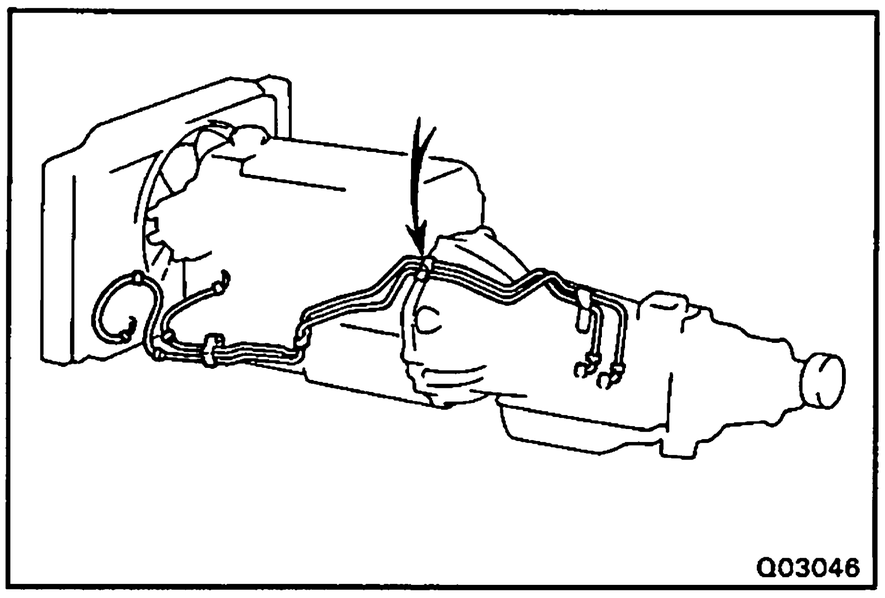
(b) Connect the wire harness to the transmission and transfer with the clamp.

(c) Connect the connectors to the transfer.


Q03182

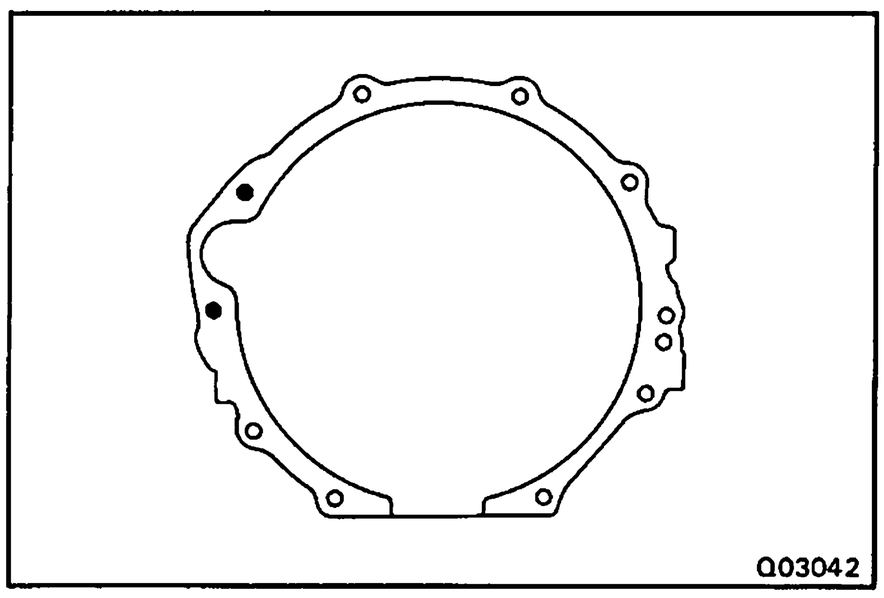
(d) (1HD-T)
Install the left and right stiffener plates with the eight bolt.

**Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)**


Q03046

(e) Connect the oil cooler tube clamp to the converter housing with the bolt.

(f) Connect the park/neutral position switch.

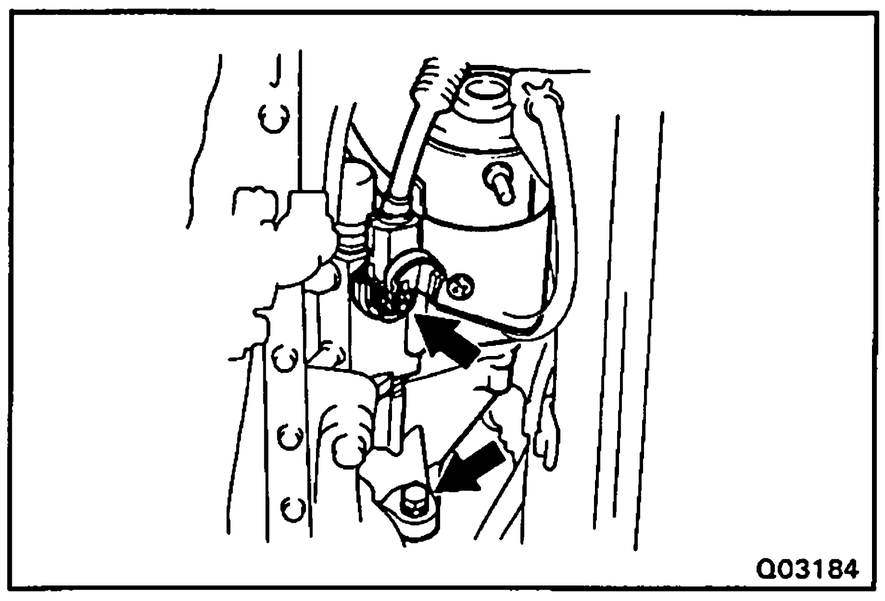

Q03042

(g) (1FZ-FE)
Install the starter with the two bolts.

**Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)**

(h) (1FZ-FE)
Connect the connectors.

(i) Install the nut.

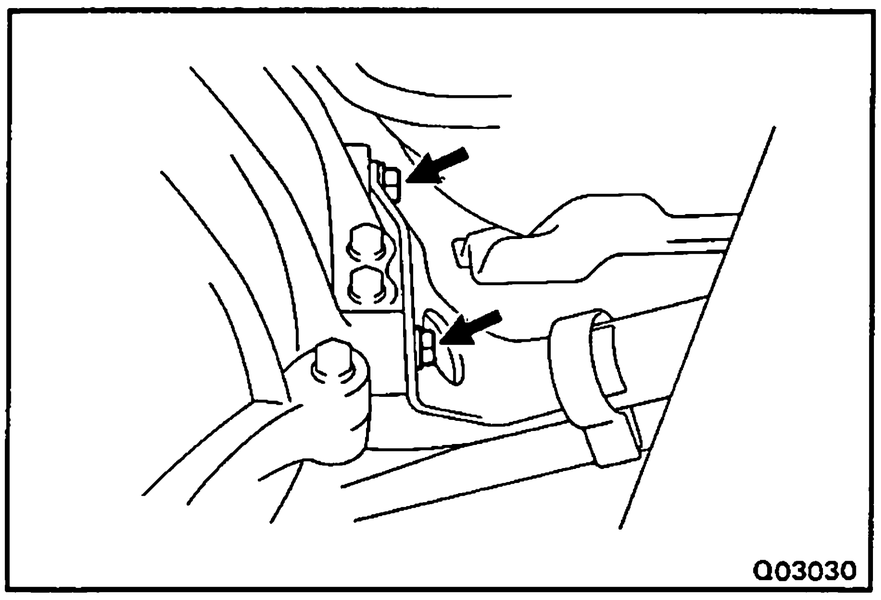

Q03184

(j) (1HD-T)
Install the starter with the bolt.

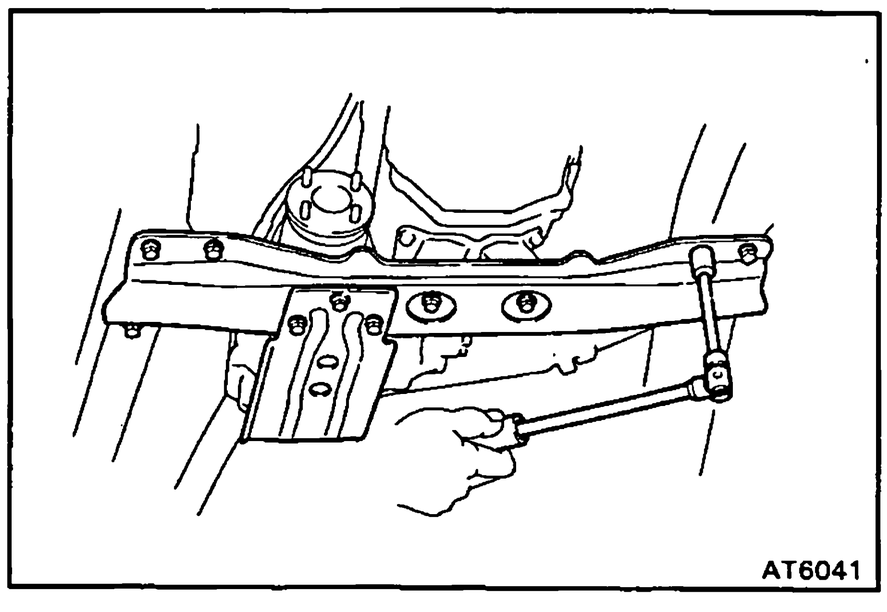
**Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)**

(k) (1HD-T)
Connect the connectors.

(l) (1HD-T)
Install the nut.


Q03030

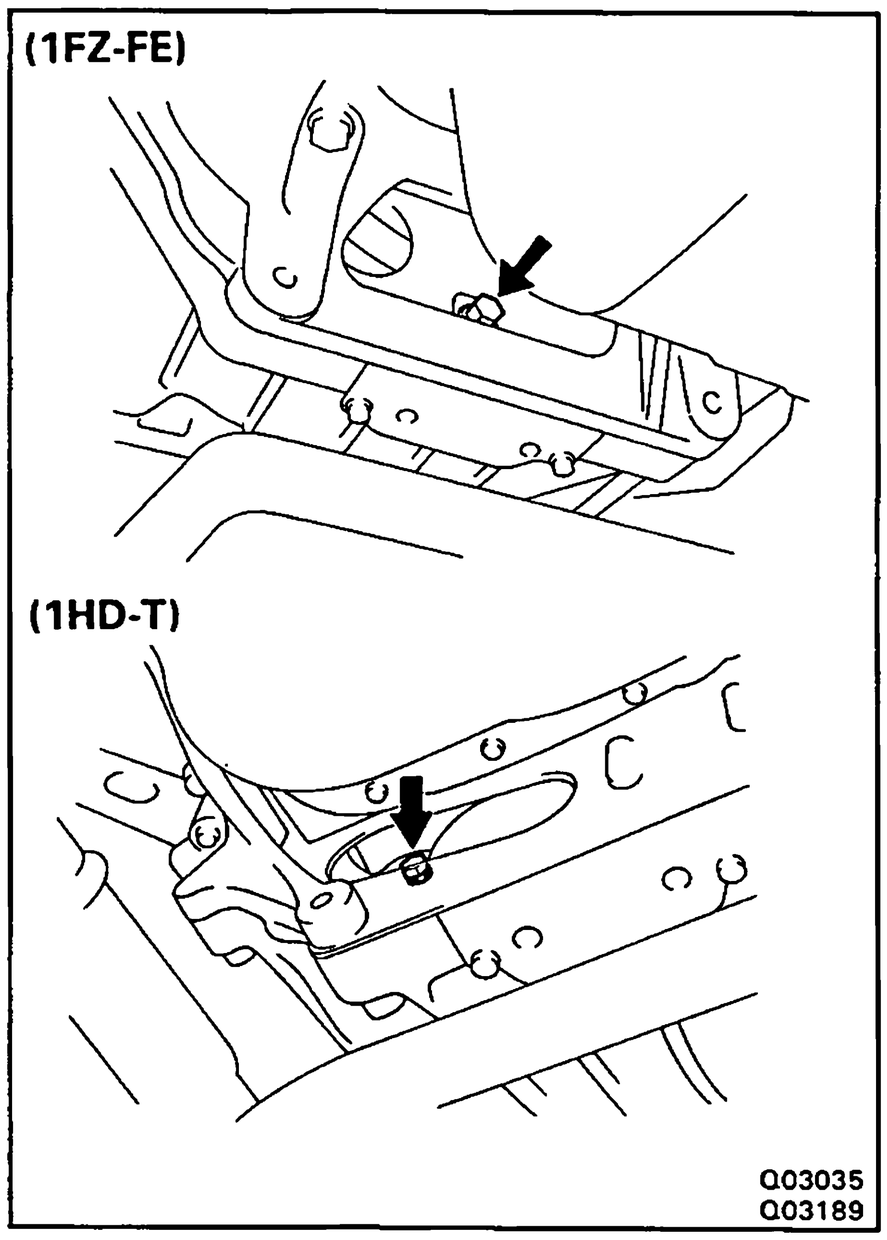
(m) Connect the exhaust pipe bracket to the converter housing with the two bolts.




**5. INSTAL CROSSMEMBER**

Install the crossmember with eight bolts and two nuts.

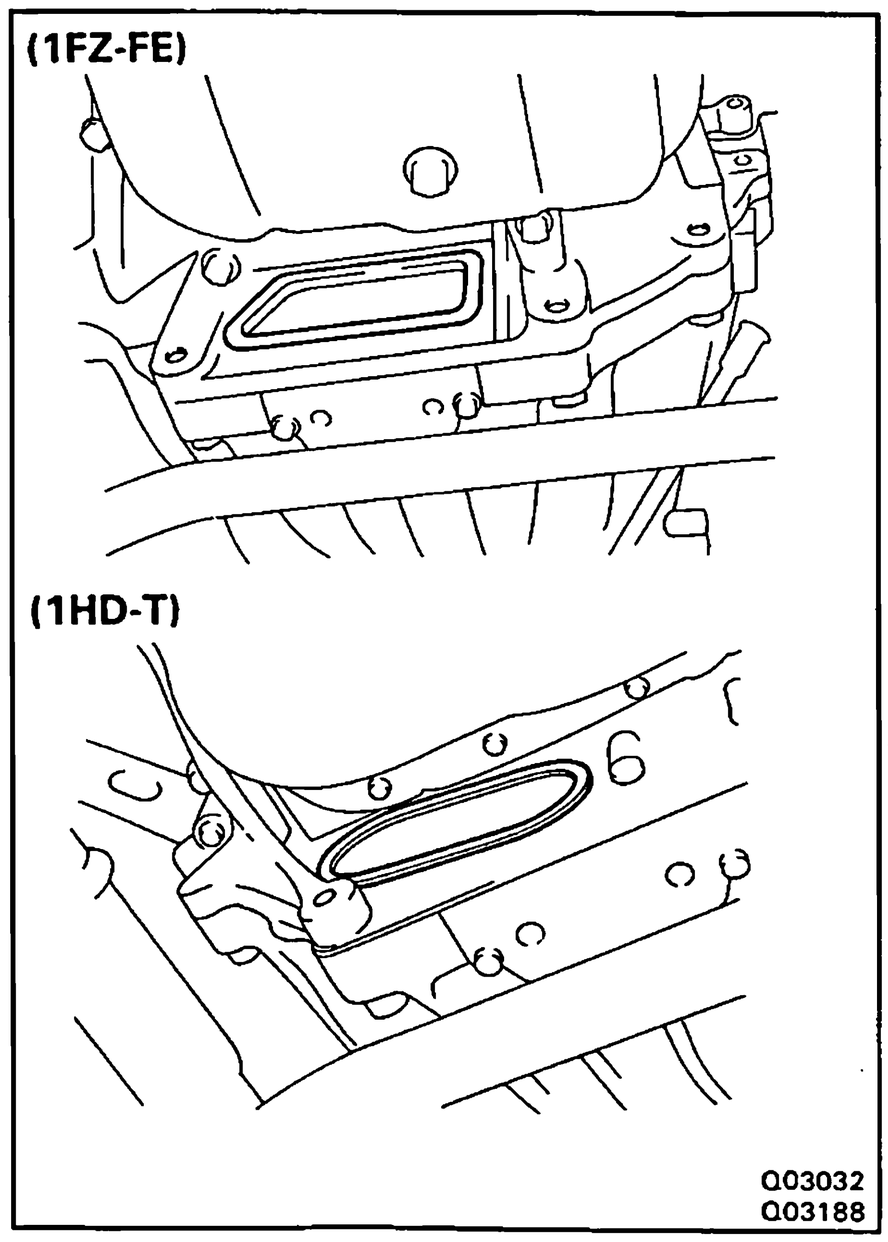
**Torque: 61 N·m (620 kgf·cm, 45 ft·lbf)**




**6. INSTALL TORQUE CONVERTER MOUNTING BOLTS**

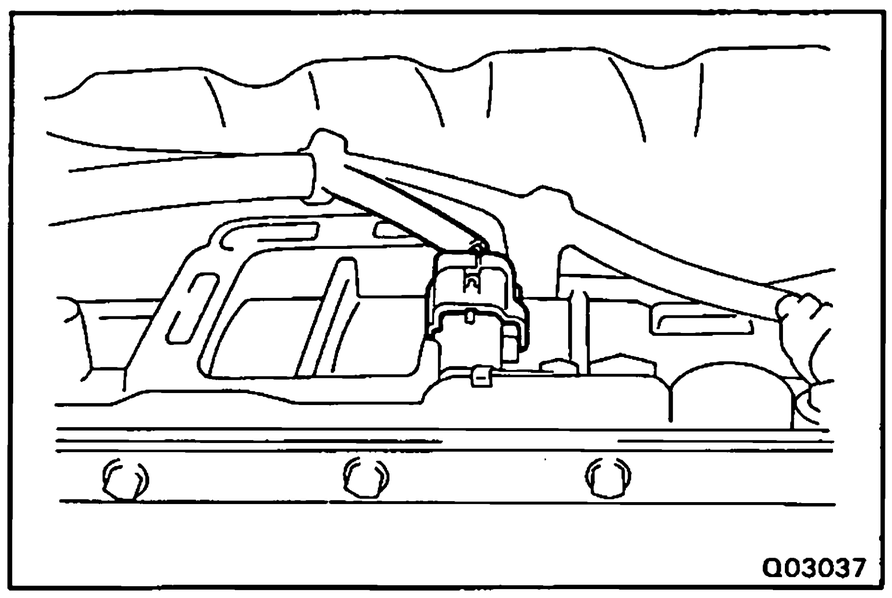
(a) Install the six bolts while turning the crankshaft.

**Torque: 55 N·m (550 kgf·cm, 40 ft·lbf)**

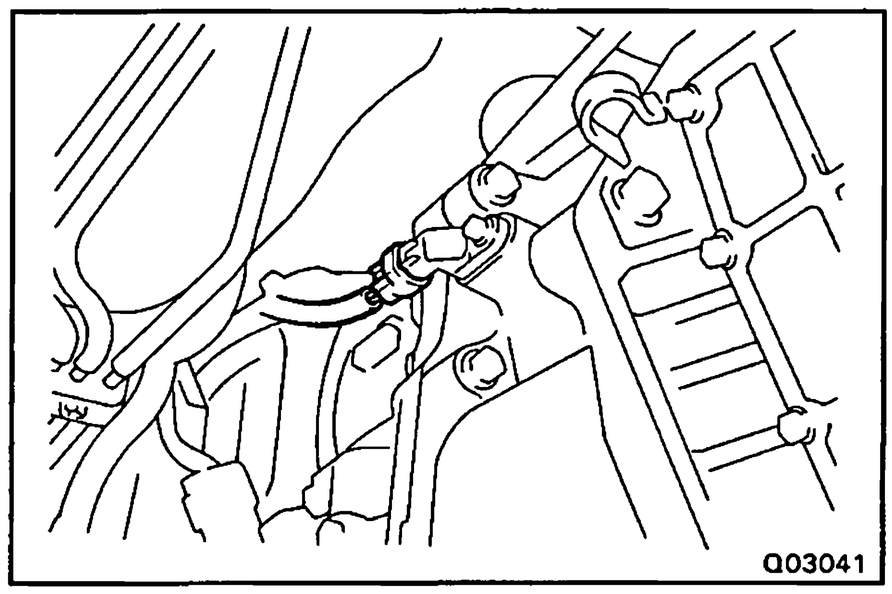



(b) Seal the converter hole plug with adhesive.

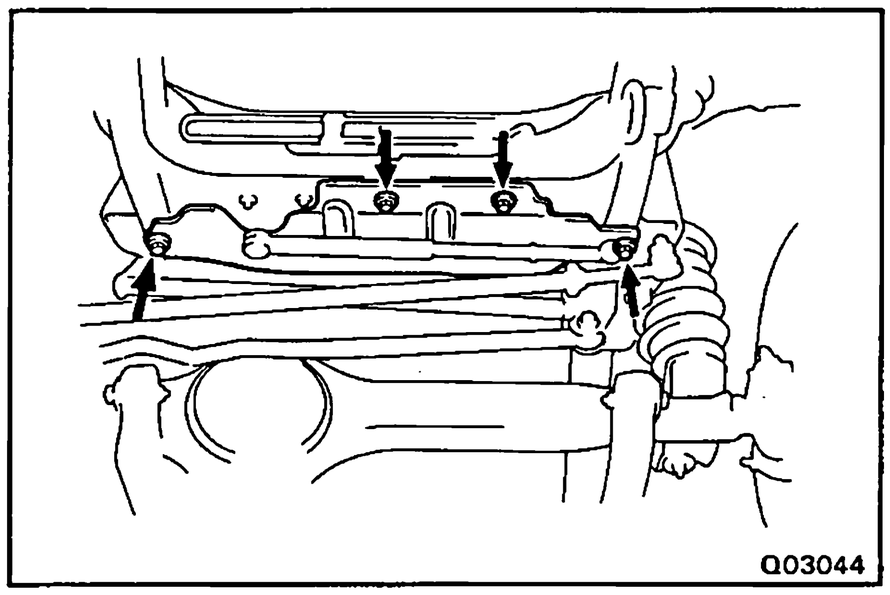
(c) Install the converter hole plug.


Q03037

**7. CONNECT SOLENOID CONNECTOR**


Q03041

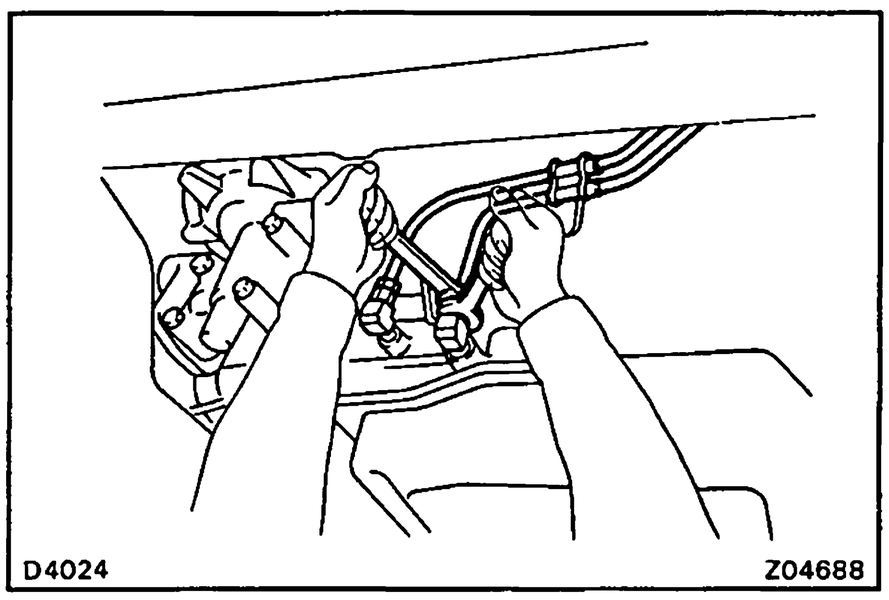
**8. CONNECT NO.2 SPEED SENSOR CONNECTOR**


Q03044

**9. INSTALL ENGINE UNDER COVER**

Install the cover with the four bolts.

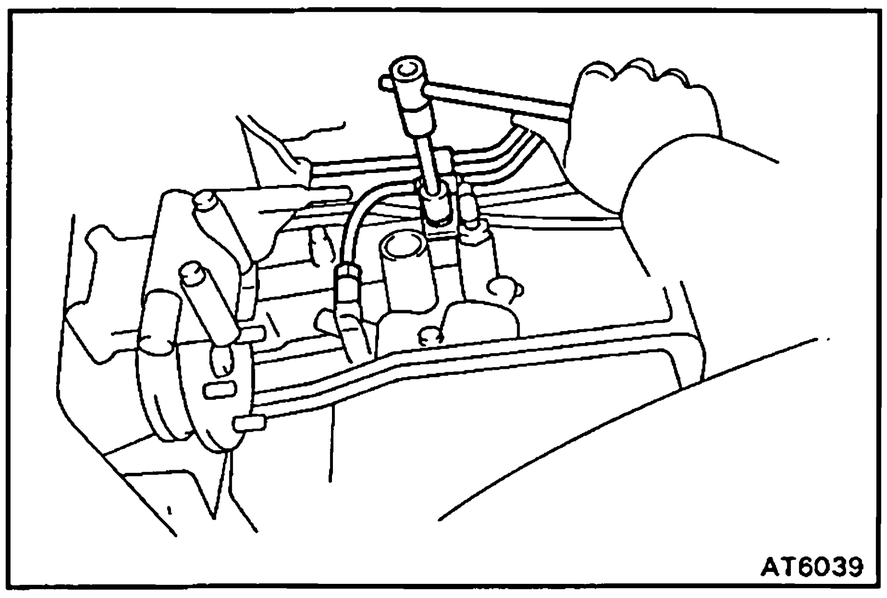
**Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)**


D4024 Z04688

**10. CONNECT TWO OIL COOLER TUBES**

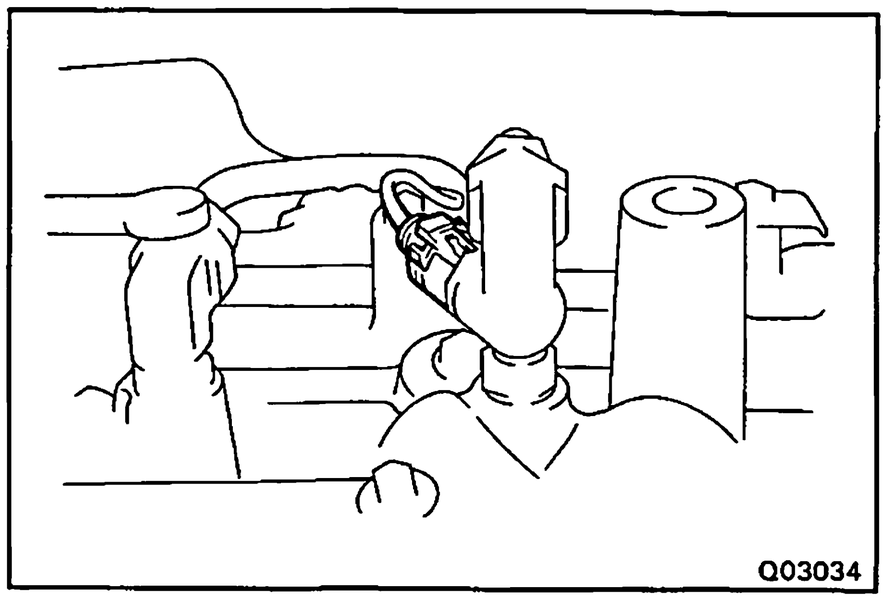
(a) Connect the two oil cooler tubes.

**Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)**


AT6039

(b) Install the cooler tube clamp.

**Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)**

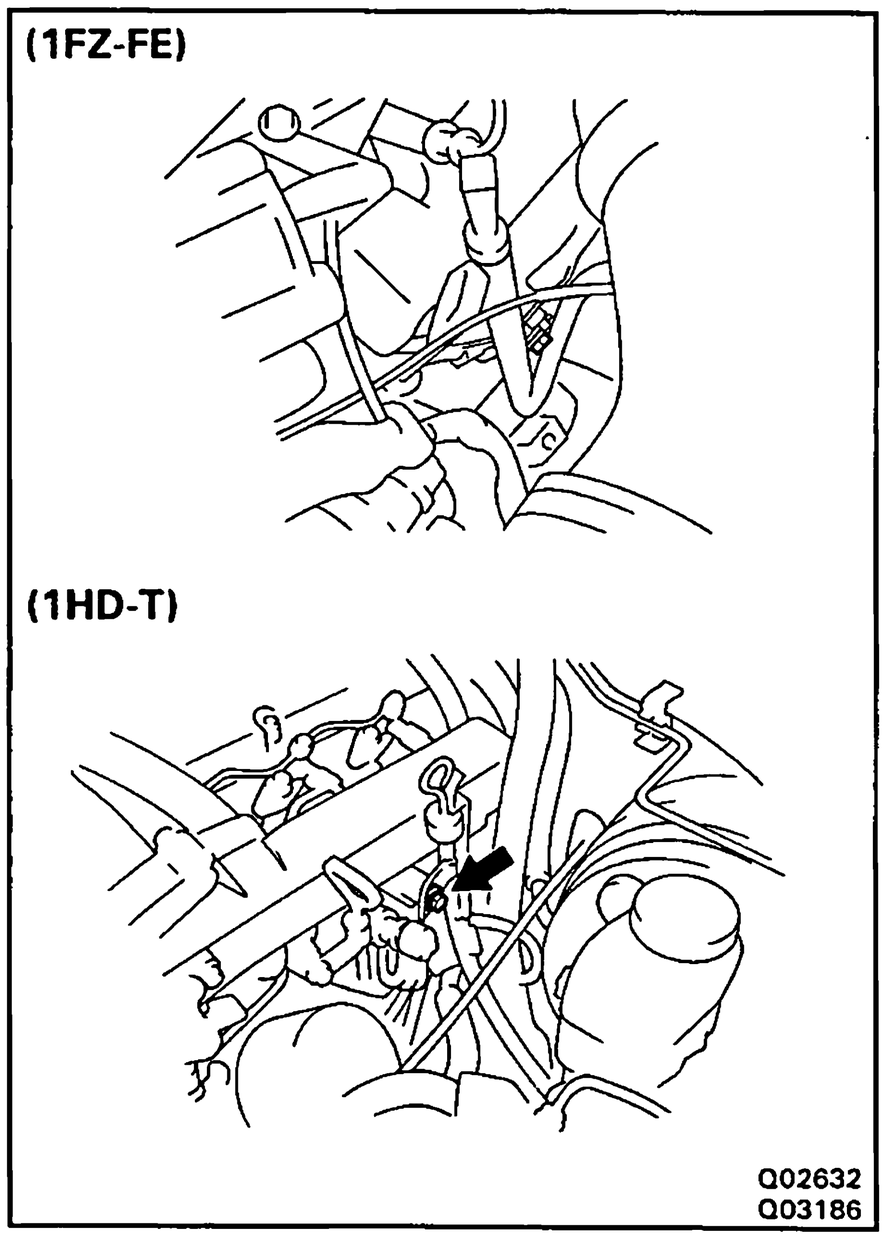

Q03034

(c) Connect the oil temperature sensor connector.


Q03036

**11. REMOVE OIL FILLER TUBE**

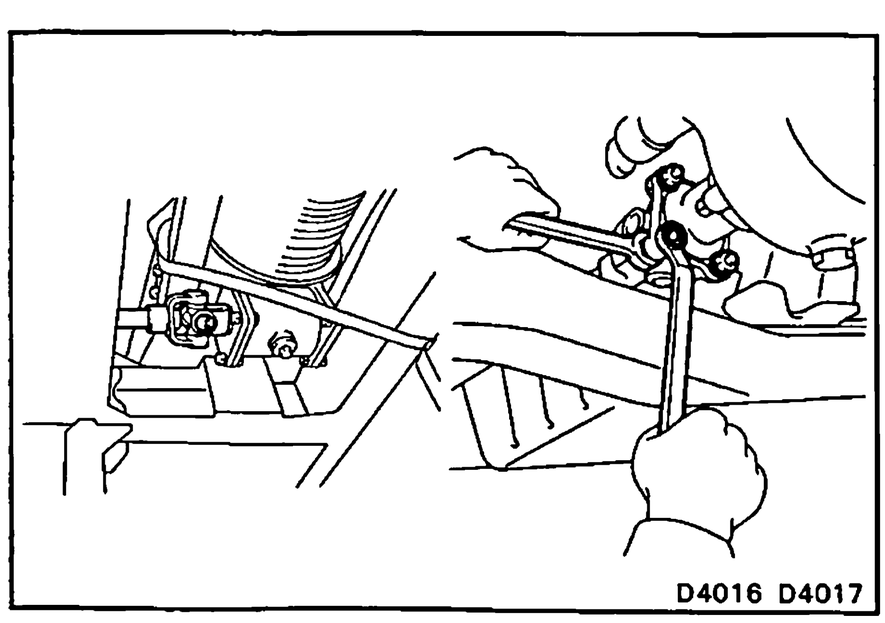
(a) Install the filler tubes with the bolt.



Q02632
Q03186

(b) Install the bolt.

(c) Install the level gauge.


D4016 D4017

**12. (w/ MECHANICAL WINCH) INSTALL POWER TAKE-OFF DRIVE SHAFT**

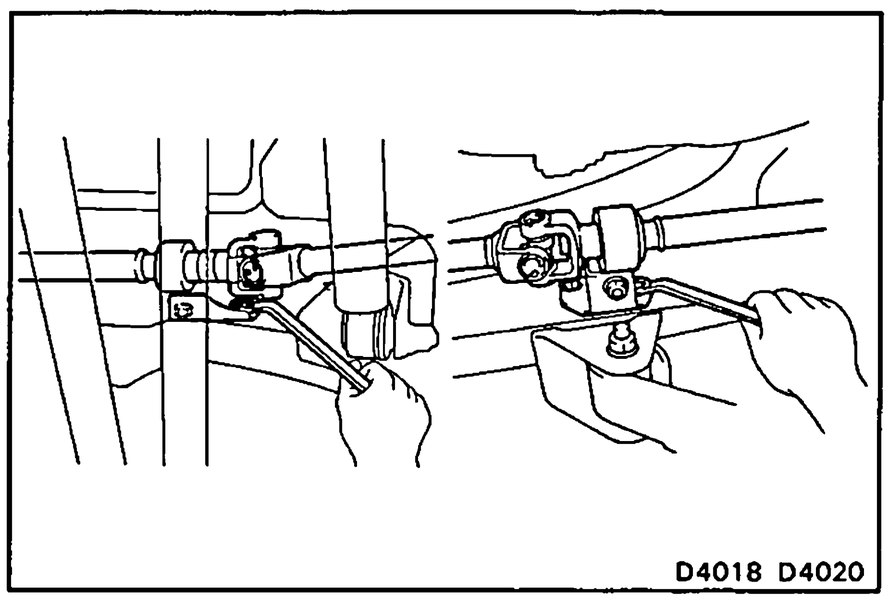
(a) Align the matchmarks on the joint flange yoke and drive shaft.

(b) Install the drive shaft.

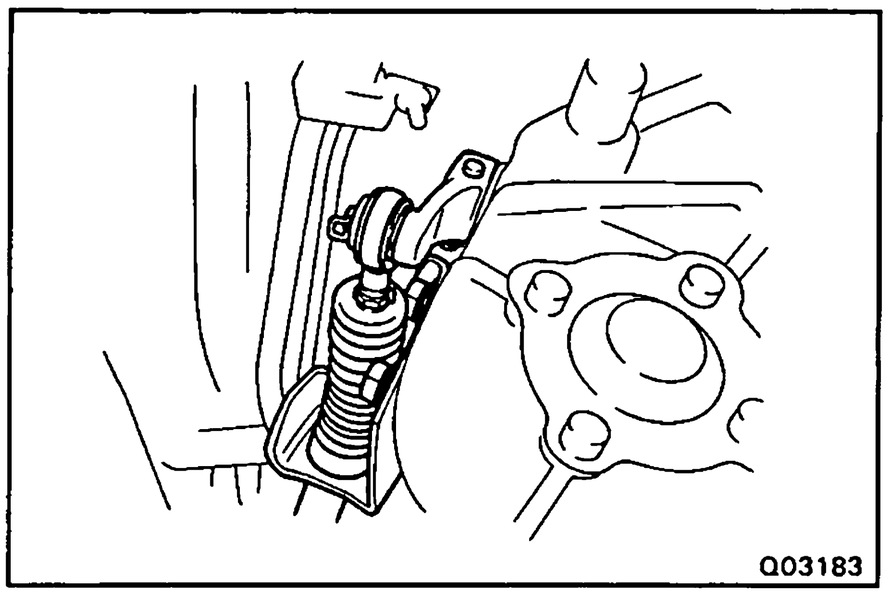
(c) Align the matchmarks on the drive shaft and PTO.

(d) Torque the nuts.

**Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)**



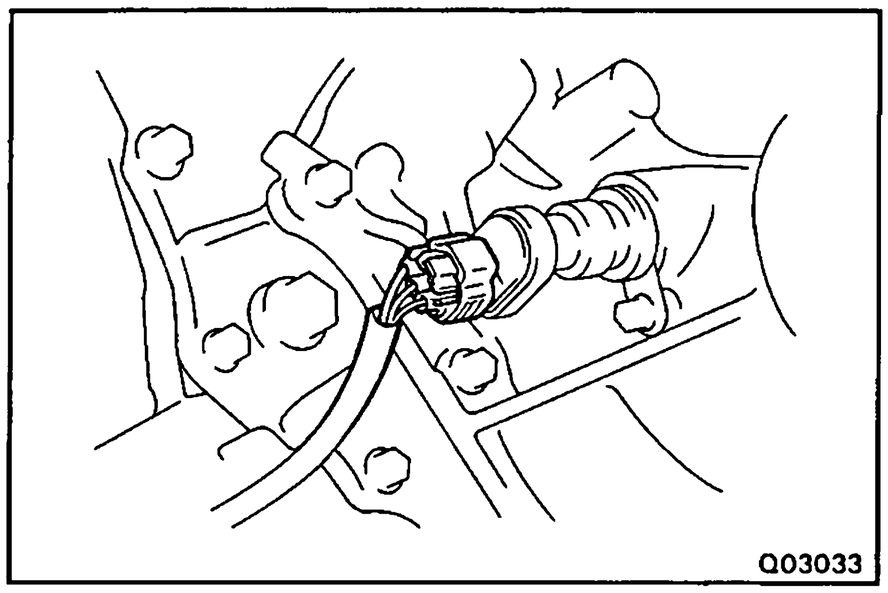

(e) Install the front and rear bracket.




**13. (w/ MECHANICAL WINCH) INSTALL POWER TAKE-OFF SHIFT CABLE**

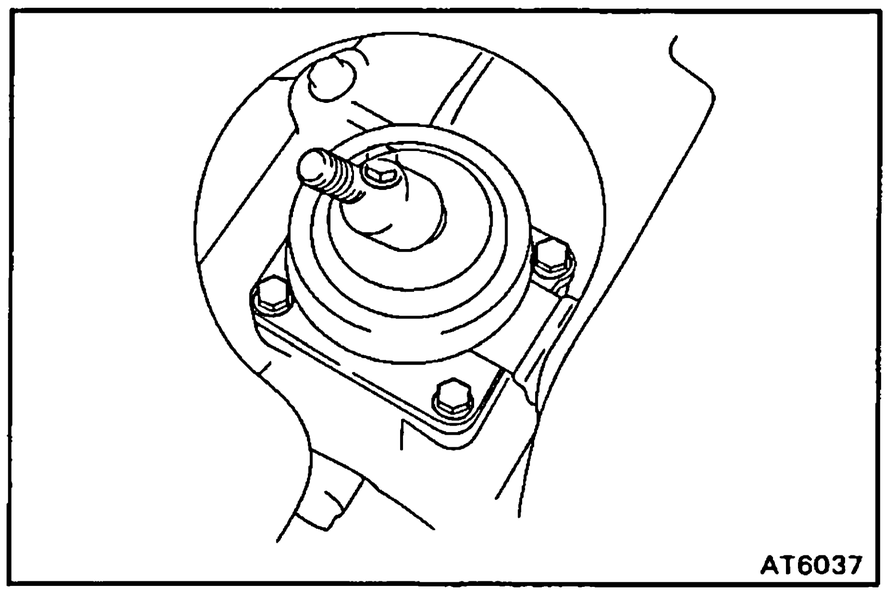
(a) Install the two bolts and the cable bracket.

(b) Connect the cable and insert the pin.



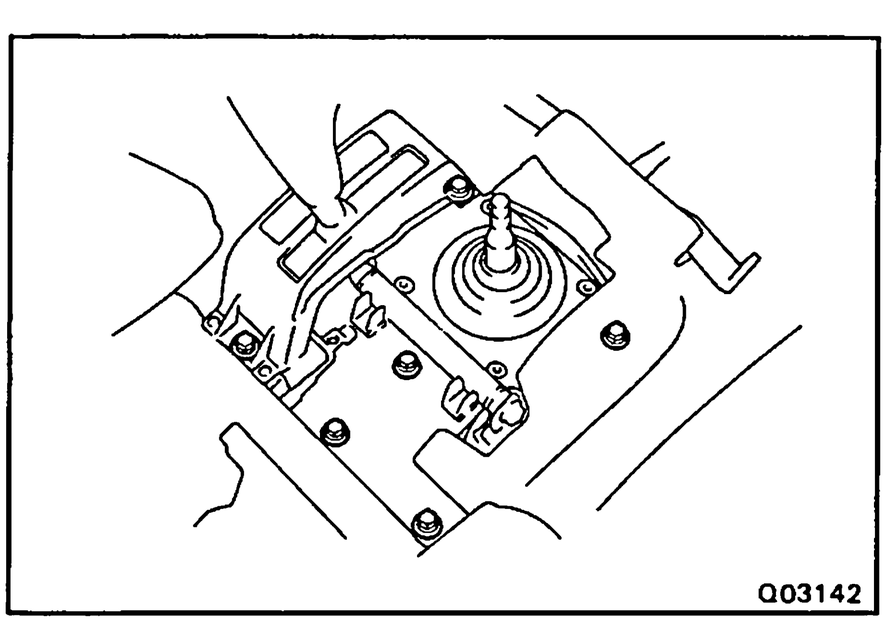

**14. CONNECT NO.1 SPEED SENSOR CONNECTOR**

**15. INSTALL FRONT AND REAR PROPELLER SHAFTS (See Pub. No. RM184E, page PR-8)**

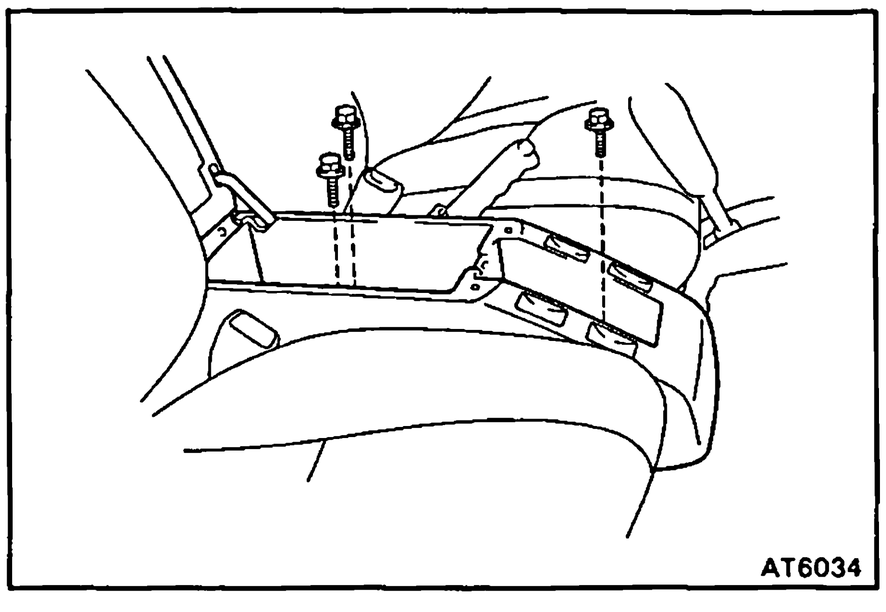



**16. INSTALL TRANSMISSION SELECT LEVER AND TRANSFER SHIFT LEVER**

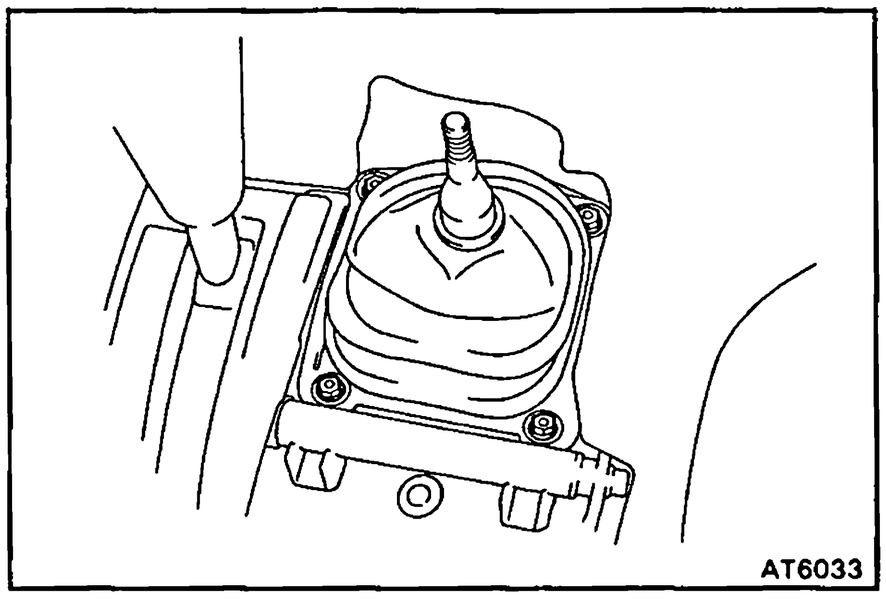
(a) Remove the four bolts and the transfer shift lever.



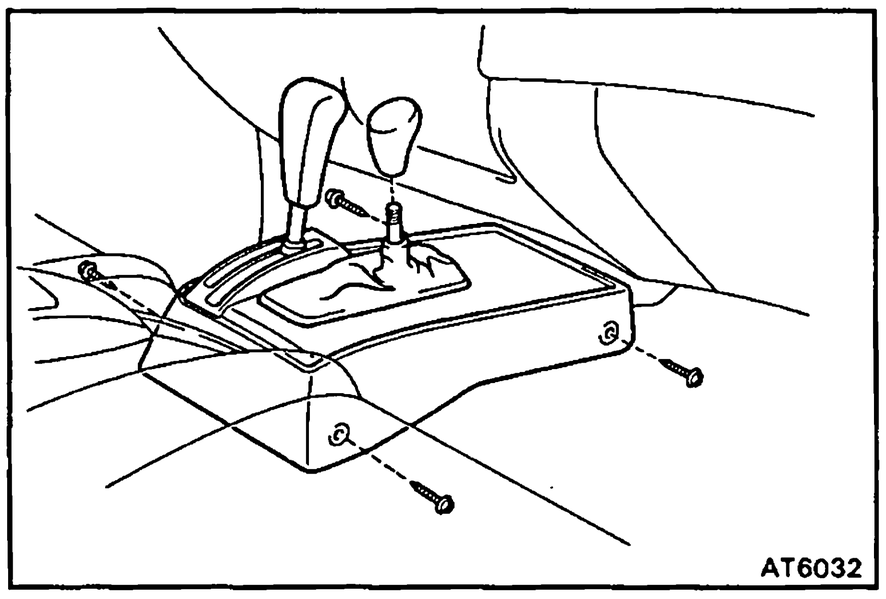

(b) Install the transmission shift lever assembly with the six bolts.


AT6034

(c) Install the console box with the three bolts.

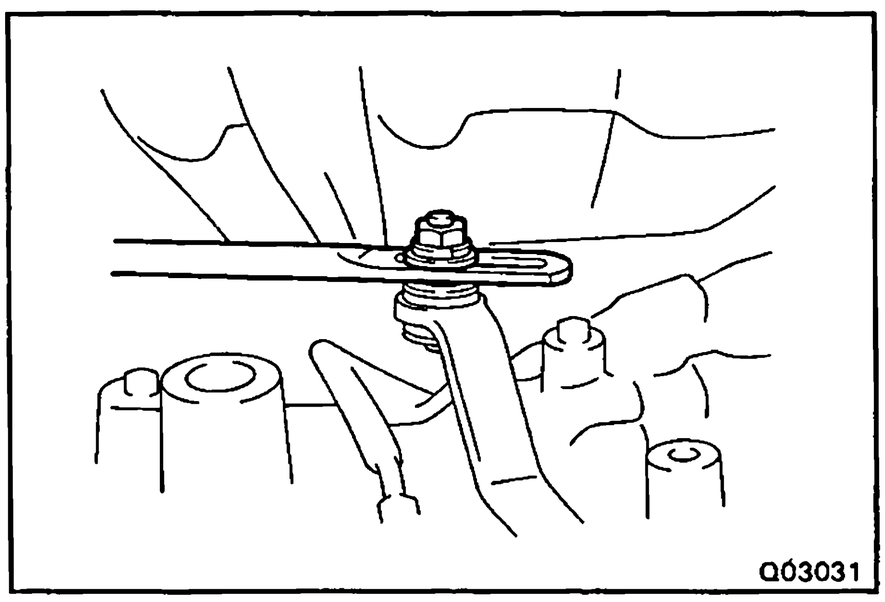

AT6033

(d) Install the transfer shift lever boot with the four bolts.

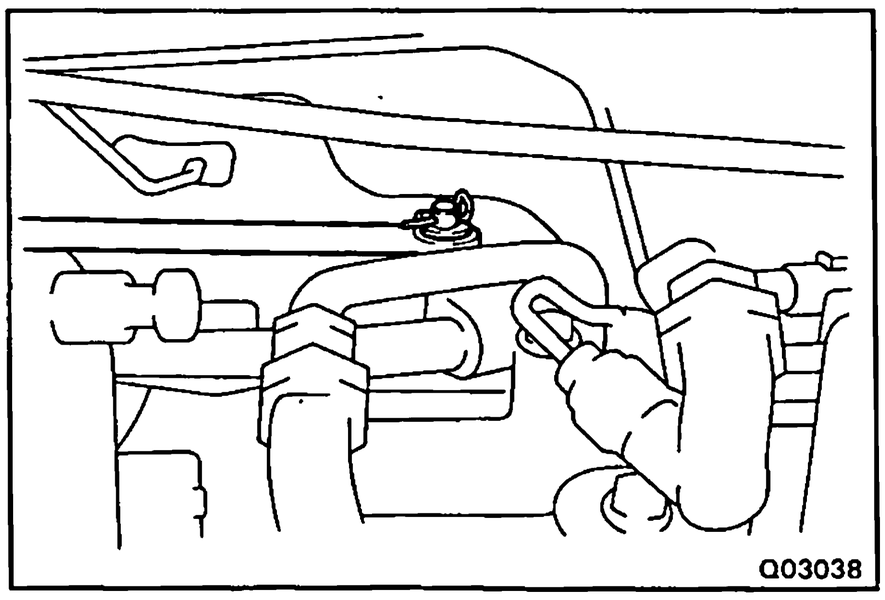

AT6032

(e) Install the four screws and the console.

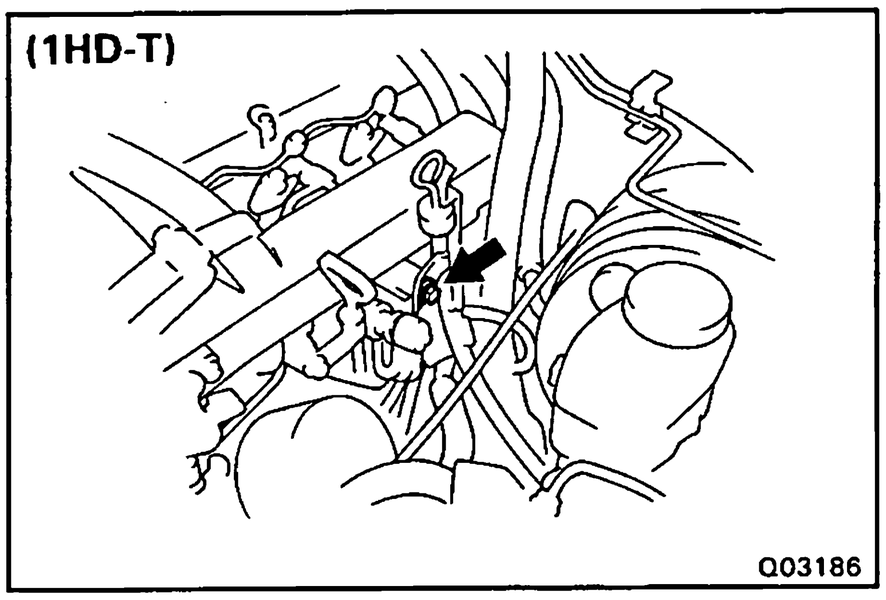
(f) Install the transfer shift lever knob.


Q03031

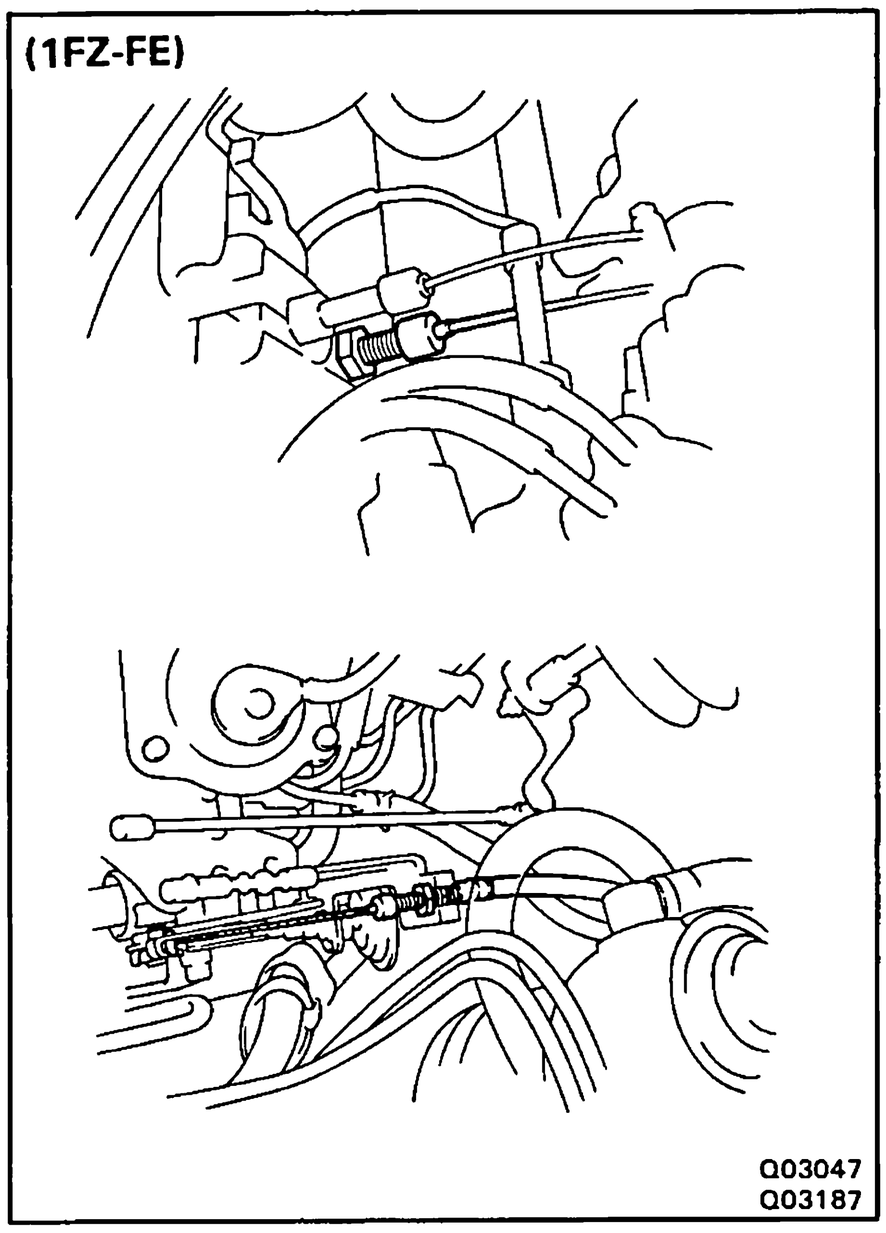
(g) Connect the link with the washer and nut.


Q03038

(h) Connect the link with the wave washer, washer and clip.



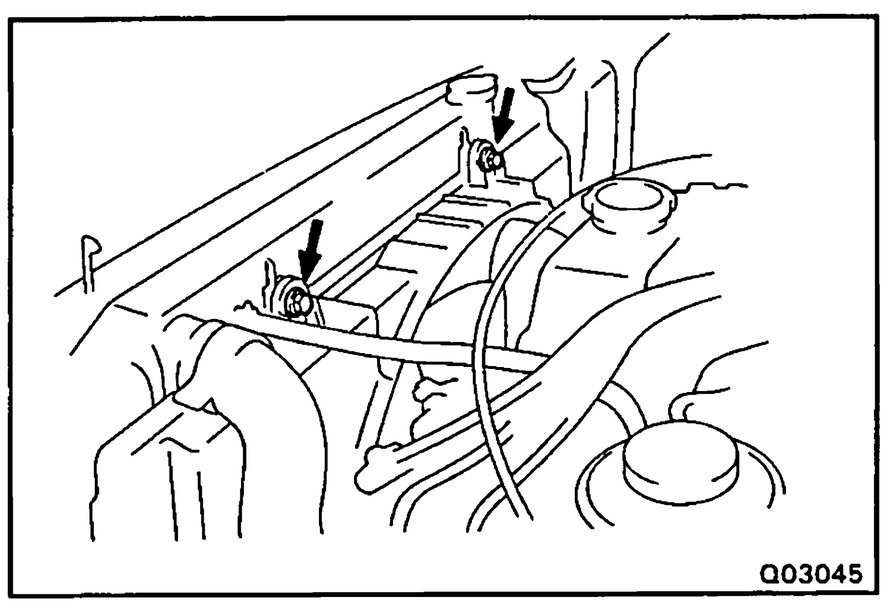

17. (1HD-T)
INSTALL STARTER MOUNT BOLT




18. CONNECT THROTTLE CABLE

(a) Connect the cable from the throttle linkage.

(b) Tighten the adjusting nuts and connect the cable housing to the bracket.

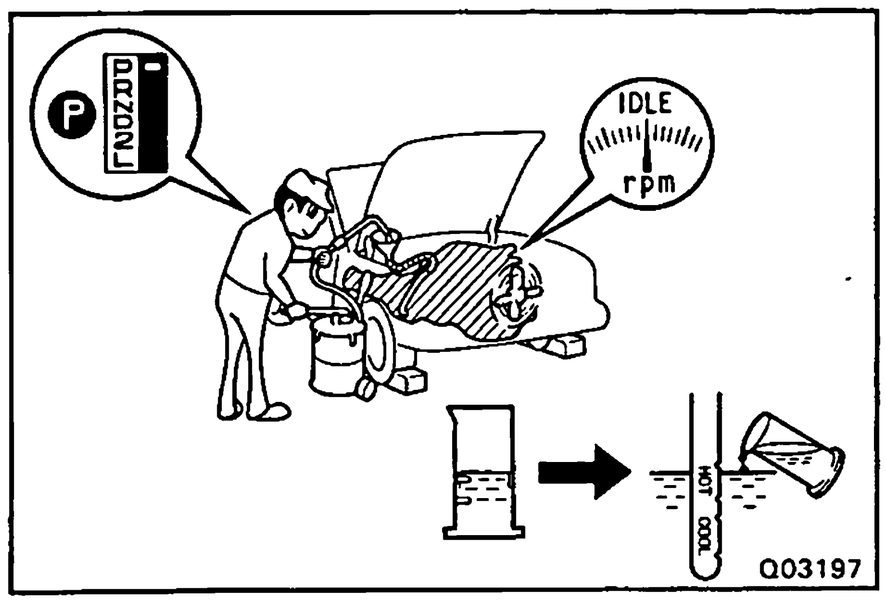



19. TIGHTEN FAN SHROUD OF COOLING FAN TO AVOID DAMAGE TO FAN

20. INSTALL BATTERY AND COVER

21. CONNECT BATTERY CABLE FROM NEGATIVE TERMINAL

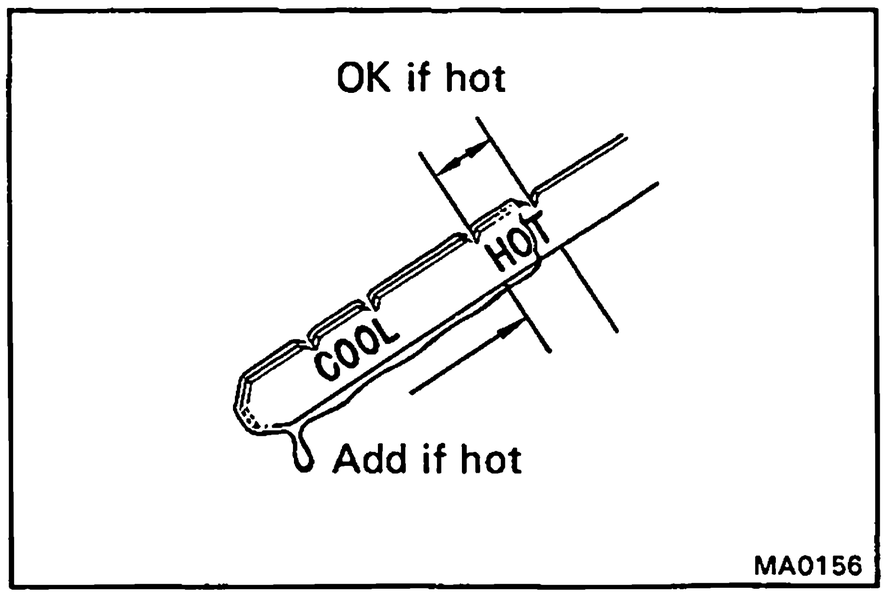
22. ADJUST SHIFT CONTROL ROD
(See page AT-26)




23. FILL SHIFT CONTROL ROD

Fluid type:
ATF DEXRON® II

Capacity:
6.0 liters (6.3 US qts, 5.3 Imp.qts)




**24. CHECK FLUID LEVEL**
**(See page AT-25)**

# SERVICE SPECIFICATIONS

## SERVICE DATE

| | | | | | |
|---|---|---|---|---|---|
| Engine stall revolution | | 1FZ-FE | 2,150 ± 150 rpm | | |
| | | 1HD-T | 1,950 ± 150 rpm | | |
| Engine idle speed | | N range | 650 rpm | | |
| Time lag | N range → D range | | Less than 1.0 seconds | | |
| | N range → R range | | Less than 1.5 seconds | | |
| Line pressure (wheel locked) | | | | | |
| Engine idling | (1FZ-FE) | D range | 461 — 520 kPa | 4.7 — 5.3 kgf/cm² | 68 — 77 psi |
| | | R range | 657 — 843 kPa | 6.7 — 8.6 kgf/cm² | 97 — 125 psi |
| | (1HD-T) | D range | 431 — 510 kPa | 4.4 — 5.2 kgf/cm² | 63 — 74 psi |
| | | R range | 637 — 843 kPa | 6.5 — 8.6 kgf/cm² | 92 — 122 psi |
| At stall | (1FZ-FE) | D range | 971 — 1,226 kPa | 9.9 — 12.5 kgf/cm² | 144 — 181 psi |
| | | R range | 1,648 — 1,853 kPa | 16.8 — 18.9 kgf/cm² | 244 — 274 psi |
| | (1HD-T) | D range | 971 — 1,226 kPa | 9.9 — 12.5 kgf/cm² | 144 — 181 psi |
| | | R range | 1,608 — 1,853 kPa | 16.4 — 18.9 kgf/cm² | 233 — 274 psi |
| Throttle cable adjustment | | | | | |
| Throttle valve fully closed | | | Between boot end and inner cable stopper | | |
| | | (1FZ-FE) | 0 — 1 mm | 0 — 0.04 in. | |
| | | (1HD-T) | 0.5 — 1.5 mm | 0.020 — 0.059 in. | |
| Throttle valve fully opened | | | 32 — 34 mm | 1.26 — 1.34 in. | |
| Torque convertor correct distance | | (1FZ-FE) | 37.2 mm (1.465 in.) or more | | |
| | | (1HD-T) | 43.8 mm (1.724 in.) | | |
| Torque convertor sleeve runout | | Limit | 0.30 mm | 0.0118 in. | |
| Drive plate runout | | Limit | 0.20 mm | 0.0079 in. | |

### Shift point schedule

km/h (mph)

| | | Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Engine | Tire size | Gear range | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| 1FZ-FE | 7.50R16-6 | D range | Normal mode | 53—60 (33—37) | 108—122 (67—76) | 153—170 (95—106) | 61—69 (38—43) | 55—63 (34—39) | 147—163 (91—101) | 99—109 (62—68) | 42—49 (26—30) |
| | | | Power mode | 53—60 (33—37) | 108—122 (67—76) | 153—170 (95—106) | 89—99 (55—62) | 73—80 (45—50) | 147—163 (91—101) | 99—109 (62—68) | 42—49 (26—30) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 118—132 (73—82) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 60—68 (37—42) |
| | 245/85-R16 | D range | Normal mode | 56—62 (35—39) | 114—125 (71—78) | 161—174 (100—108) | 64—70 (40—43) | 58—64 (36—40) | 154—167 (96—103) | 105—112 (65—70) | 44—48 (27—30) |
| | | | Power mode | 56—62 (35—39) | 114—125 (71—78) | 161—174 (100—108) | 93—100 (58—62) | 73—80 (45—50) | 154—167 (96—103) | 105—112 (65—70) | 44—48 (27—30) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 124—135 (77—84) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 63—69 (39—43) |
| | 215/80-R16 | D range | Normal mode | 49—54 (30—34) | 101—111 (63—69) | 143—153 (89—95) | 63—69 (39—43) | 57—63 (35—39) | 137—147 (85—91) | 93—99 (58—62) | 40—45 (25—28) |
| | | | Power mode | 49—54 (30—34) | 101—111 (63—69) | 143—153 (89—95) | 83—89 (52—55) | 72—78 (45—48) | 137—147 (85—91) | 93—99 (58—62) | 40—45 (25—28) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 110—119 (68—74) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 56—61 (34—38) |
| | 275/70-R16 | D range | Normal mode | 52—58 (32—36) | 106—117 (66—73) | 152—163 (94—101) | 60—66 (37—41) | 55—60 (34—37) | 145—156 (90—97) | 98—104 (61—65) | 42—47 (26—29) |
| | | | Power mode | 52—58 (32—36) | 106—117 (66—73) | 152—163 (94—101) | 88—94 (55—58) | 68—74 (42—46) | 145—156 (90—97) | 98—104 (61—65) | 42—47 (26—29) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 116—127 (72—79) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 59—65 (37—40) |

| | | Throttle valve opening | | 100 % | | | 5 % | | 100 % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Engine | Tire size | Gear range | | 1 → 2 | 2 → 3 | 3 → O/D | Lock-up ON | Lock-up OFF | O/D → 3 | 3 → 2 | 2 → 1 |
| 1HD-T | 7.50R16-6 | D range | Normal mode | 41—47 (25—29) | 81—90 (50—56) | 122—136 (76—85) | 56—64 (35—40) | 50—58 (31—36) | 115—129 (71—80) | 75—82 (47—51) | 33—39 (21—24) |
| | | | Power mode | 41—47 (25—29) | 81—90 (50—56) | 122—136 (76—85) | 78—87 (48—54) | 72—80 (45—50) | 115—129 (71—80) | 75—82 (47—51) | 34—41 (21—25) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 89—98 (55—61) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 38—45 (24—28) |
| | 245/85-R16 | D range | Normal mode | 43—49 (27—30) | 85—92 (53—57) | 129—140 (80—87) | 59—65 (37—40) | 53—59 (33—36) | 121—132 (75—82) | 75—82 (47—51) | 34—40 (21—25) |
| | | | Power mode | 43—49 (27—30) | 85—92 (53—57) | 129—140 (80—87) | 82—89 (51—55) | 75—82 (47—51) | 121—132 (75—82) | 75—82 (47—51) | 36—42 (22—26) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 93—100 (58—62) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 40—46 (25—29) |
| | 215/80-R16 | D range | Normal mode | 37—42 (23—26) | 76—81 (47—50) | 113—123 (70—76) | 53—58 (33—36) | 47—52 (29—32) | 108—117 (67—73) | 67—72 (42—44) | 30—35 (19—22) |
| | | | Power mode | 37—42 (23—26) | 76—81 (47—50) | 113—123 (70—76) | 73—79 (45—49) | 66—72 (41—45) | 108—117 (67—73) | 67—72 (42—44) | 32—37 (20—23) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 83—89 (52—55) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 35—40 (22—25) |
| | 275/70-R16 | D range | Normal mode | 41—46 (25—29) | 80—86 (50—53) | 120—131 (75—81) | 56—61 (35—38) | 50—55 (31—34) | 114—124 (71—77) | 70—76 (43—47) | 32—37 (20—23) |
| | | | Power mode | 41—46 (25—29) | 80—86 (50—53) | 120—131 (75—81) | 77—83 (48—52) | 70—76 (43—47) | 114—124 (71—77) | 70—76 (43—47) | 34—39 (21—24) |
| | | 2 range | Normal mode Power mode | — | — | — | — | — | — | 88—94 (55—58) | — |
| | | L range | Normal mode Power mode | — | — | — | — | — | — | — | 38—43 (24—27) |

# TORQUE SPECIFICATION

| Part tightened | | N·m | kgf·cm | ft·lbf |
|---|---|---|---|---|
| Engine × Transmission | 14 mm (0.55 in.) head bolt | 37 | 380 | 27 |
| Engine × Transmission | 17 mm (0.67 in.) head bolt | 72 | 730 | 53 |
| Torque converter × Drive plate | | 55 | 550 | 40 |
| Frame crossmember set bolt | | 61 | 620 | 45 |
| Frame crossmember set nut | | 59 | 600 | 43 |
| Oil cooler pipe union nut | | 34 | 350 | 25 |
| Oil cooler pipe tube clamp × Transmission | | 10 | 100 | 7 |
| Front differentail × Front propeller shaft | | 74 | 750 | 54 |
| Transfer × Front propeller shaft | | 74 | 750 | 54 |
| Transfer × Rear propeller shaft | | 88 | 900 | 65 |
| Rear differentail × Rear propeller shaft | | 88 | 900 | 65 |
| Crank shaft × Drive plate | | 100 | 1,000 | 72 |
| Engine under cover × Frame | | 28 | 290 | 21 |
| Transfer shift lever × Transmission | | 18 | 185 | 13 |
| Oil pan set bolt | | 6.9 | 70 | 61 in.·lbf |
| Drain plug | | 27 | 280 | 20 |
| Vaive body × Transmission case | | 10 | 100 | 7 |
| Transfer under cover × Frame | | 28 | 290 | 21 |

# TRANSFER

**REFER TO LAND CRUISER (STATION WAGON) REPAIR MANUAL FOR CHASSIS AND BODY (Pub. No. RM184E)**

NOTE: The following pages contain only the points which differ from the above listed manual.

**(HF2AV FOR STATION WAGON WITH ABS)**

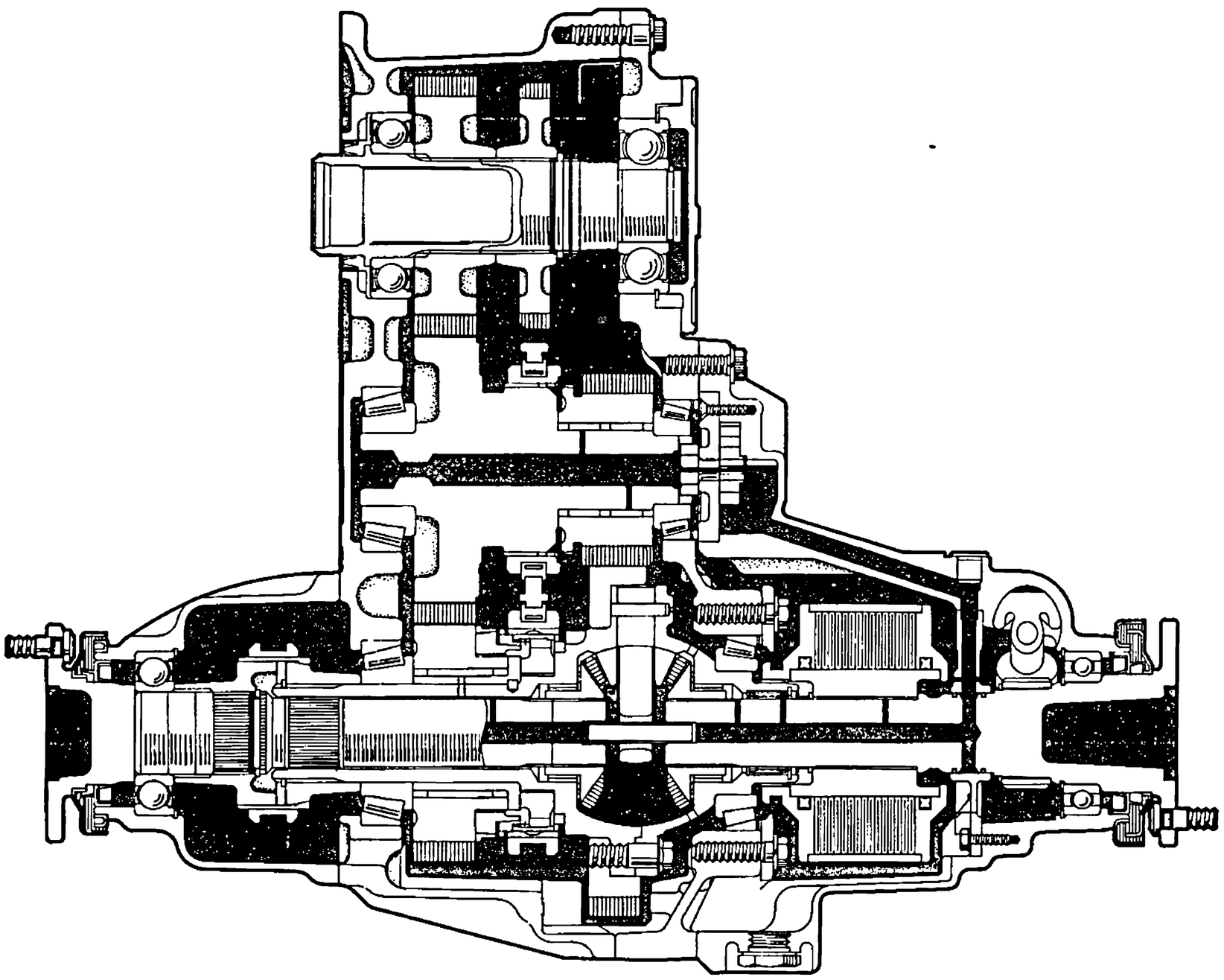

DESCRIPTION ..... TR-2
PRECAUTIONS ..... TR-3
TROUBLESHOOTING ..... TR-3
COMPONENTS ..... TR-4
TRANSFER DISASSEMBLY ..... TR-5
COMPONENT PARTS ..... TR-12
- Input Shaft Assembly ..... TR-12
- Idler Gear Assembly ..... TR-16
- Center Differential Assembly ..... TR-19
- Front Extension Housing Assembly ..... TR-28
- Rear Extension Housing Assembly ..... TR-32

TRANSFER ASSEMBLY ..... TR-41
MOTOR SHIFT CONTROL SYSTEM ..... TR-49
SERVICE SPECIFICATIONS ..... TR-51

# DESCRIPTION

The transfer transmits the drive force from the transmission to the front and rear wheels.

The specifications and cross-section diagrams are as shown.



HF2AV TRANSFER

V01733

## Specifications

| | | | |
|---|---|---|---|
| Type of Transfer | | HF2AV | |
| Type of Transmission | | H150F | H151F, A442F |
| Type of Engine | | 1HZ | 1FZ-FE, 1HD-T |
| Gear Ratio | High Speed Range | 1.000 | |
| | Low Speed Range | 2.488 | |
| Oil Capacity Liters (US qts. Imp. qts.) | w/o PTO | 1.7 (1.8, 1.5) | |
| | w/ PTO | 1.8 (1.9, 1.6) | |
| Type of Oil | | API GL-4 or GL-5 SAE 75W-90 | |

# PRECAUTIONS

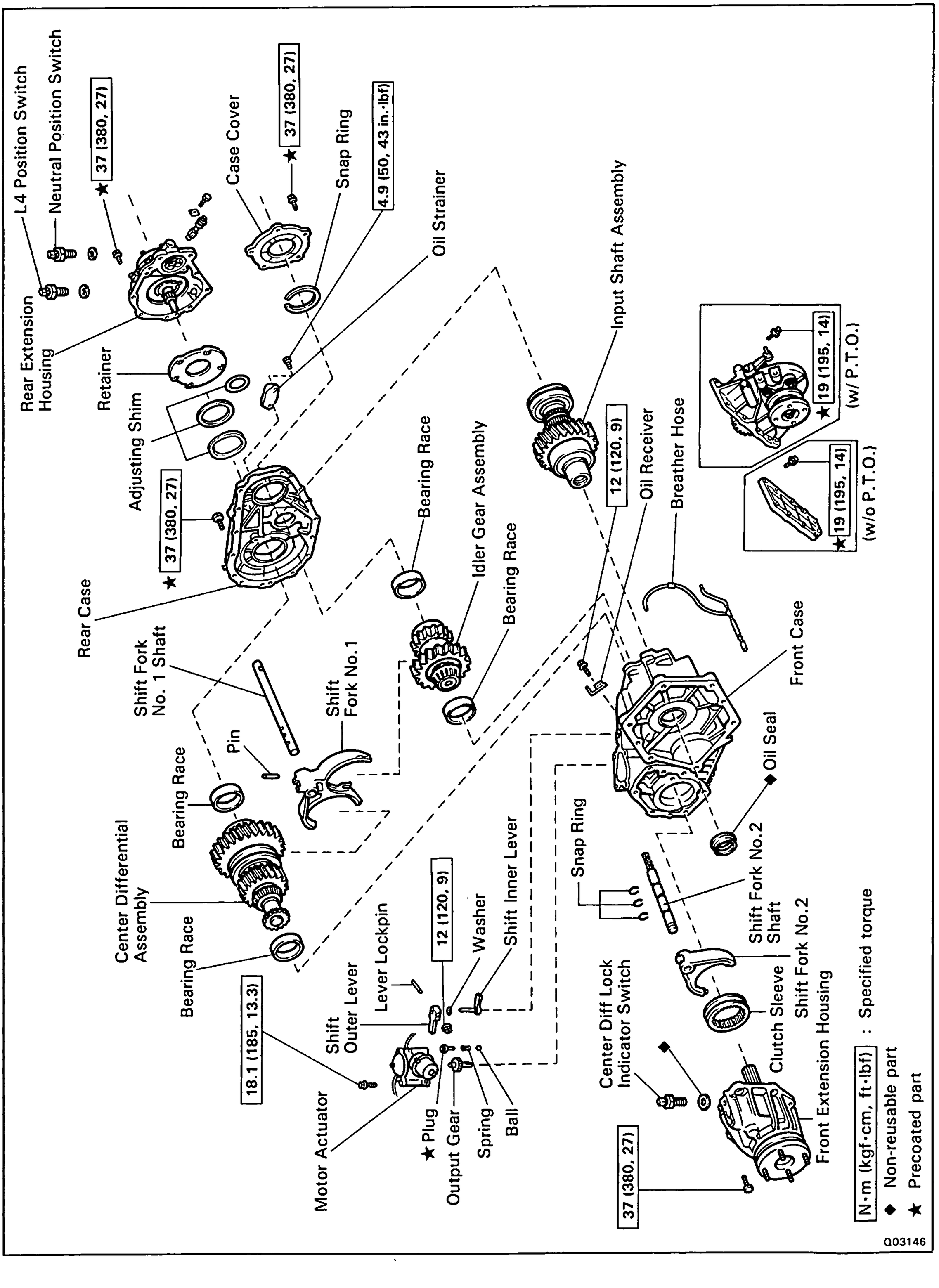
When working with FIPG material, you must be observe the following.

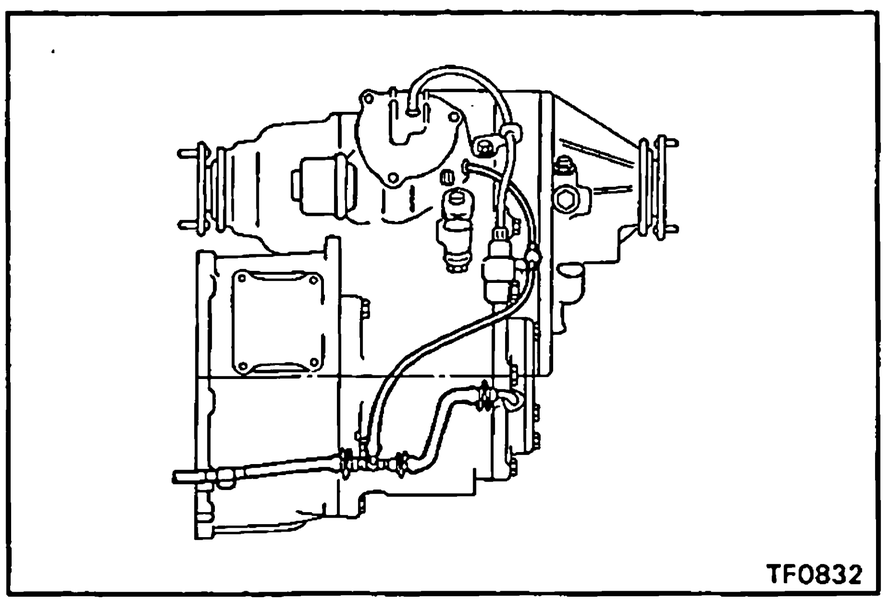
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces.
- Thoroughly clean all components to remove all the loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply the seal packing in approx. 1 mm (0.04 in.) bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.

# TROUBLESHOOTING

| Problem | Possible cause | Remedy | Page |
|---|---|---|---|
| Hard to shift or will not shift | Transfer faulty | Disassemble and inspect transfer | TR-4<br>TR-49 |
| Transfer jumps out of gear | Transfer faulty | Disassemble and inspect transfer | TR-4 |
| Noise | Transfer faulty<br>Wrong oil grade<br>Oil level low | Disassembly and inspect transfer<br>Replace oil<br>Add oil | TR-4<br>TR-2<br>TR-2 |
| Oil leakage | Oil level too high<br>Oil seal, O-ring or gasket worn or damaged | Drain oil<br>Replace oil seal, O-ring or gasket | TR-2<br>TR-4 |
| Tight corner braking | Center differential or transfer faulty | Replace center differential or transfer | RM184E<br>MT-5 |

# COMPONENTS

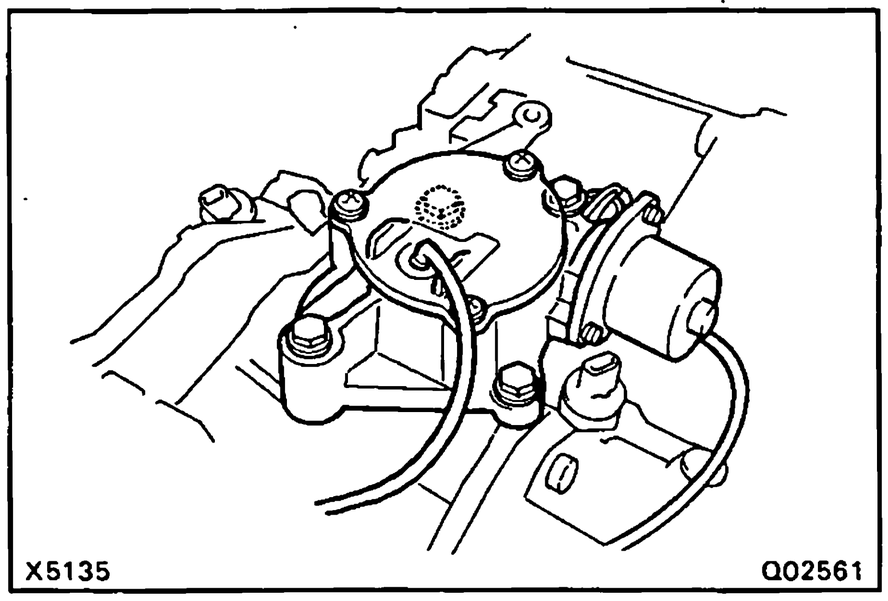

L4 Position Switch
Neutral Position Switch
37 (380, 27)
Case Cover
37 (380, 27)
Snap Ring
4.9 (50, 43 in.·lbf)
Oil Strainer
Rear Extension Housing
Retainer
Adjusting Shim
37 (380, 27)
Rear Case
Bearing Race
Idler Gear Assembly
Bearing Race
Input Shaft Assembly
12 (120, 9)
Oil Receiver
Breather Hose
19 (195, 14)
(w/ P.T.O.)
19 (195, 14)
(w/o P.T.O.)
Front Case
Shift Fork No.1 Shaft
Pin
Shift Fork No.1
Bearing Race
Center Differential Assembly
Bearing Race
18.1 (185, 13.3)
Shift Outer Lever
Lever Lockpin
12 (120, 9)
Washer
Shift Inner Lever
Snap Ring
Oil Seal
Shift Fork No.2 Shaft
Shift Fork No.2
Clutch Sleeve
Front Extension Housing
Center Diff Lock Indicator Switch
37 (380, 27)
Motor Actuator
Plug
Output Gear
Spring
Ball
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
Q03146




# TRANSFER DISASSEMBLY

(See page TR-4)

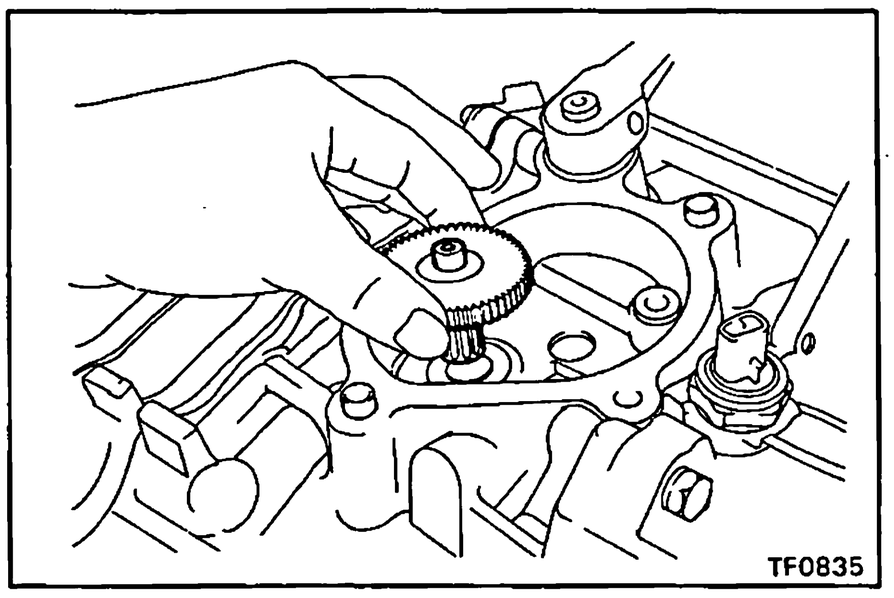
1. REMOVE BREATHER HOSE



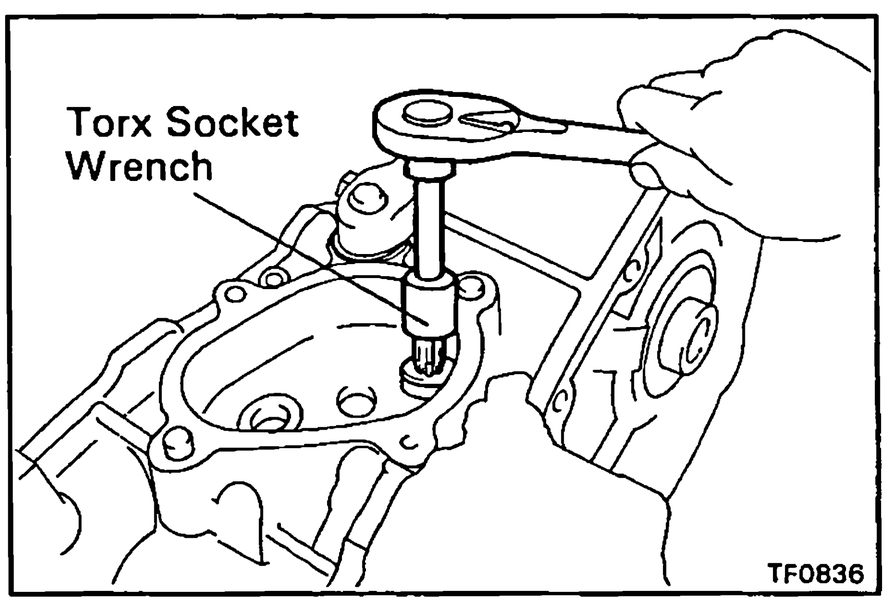

2. REMOVE MOTOR ACTUATOR

Remove the four bolts and motor actuator.

HINT: Remove the motor actuator in differential lock condition.

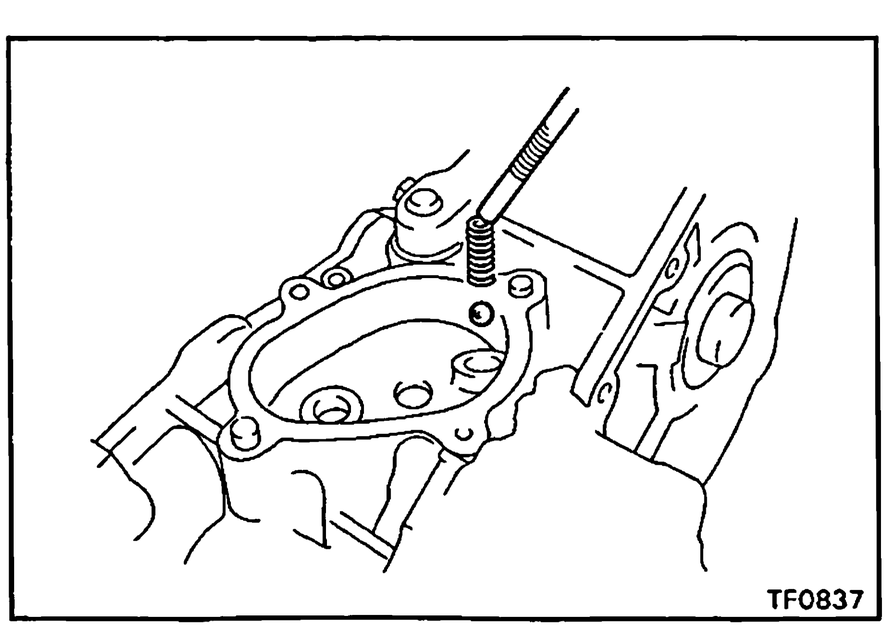



3. REMOVE OUTPUT GEAR

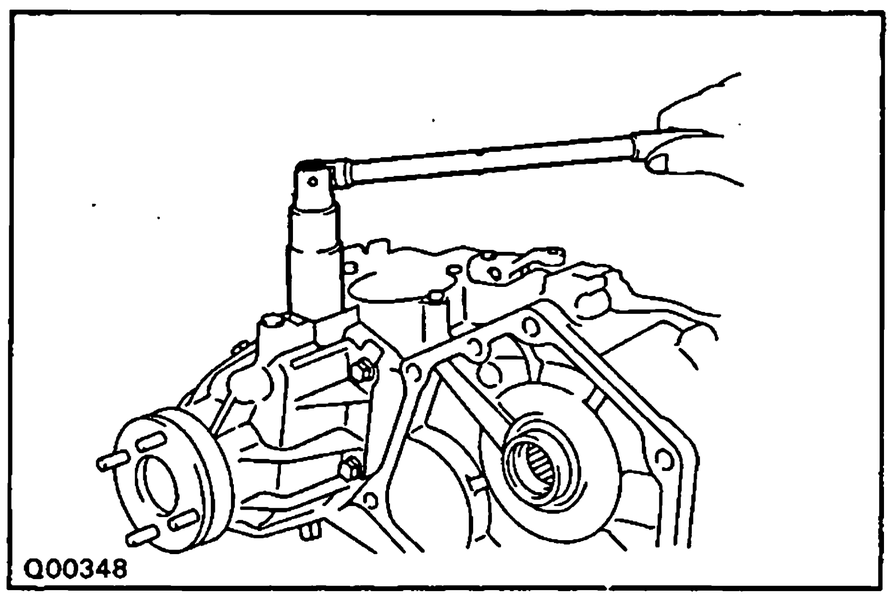



4. REMOVE SCREW PLUG, SPRING AND BALL

(a) Using a torx socket wrench, remove the screw plug. (Torx socket wrench T40 09042-00020)

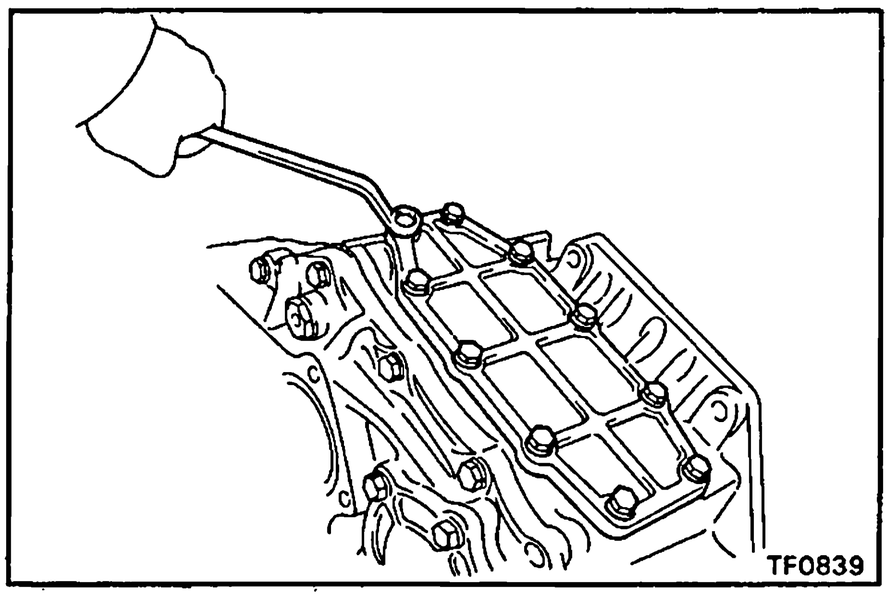



(b) Using a magnetic finger, remove the spring and ball.


Q00348

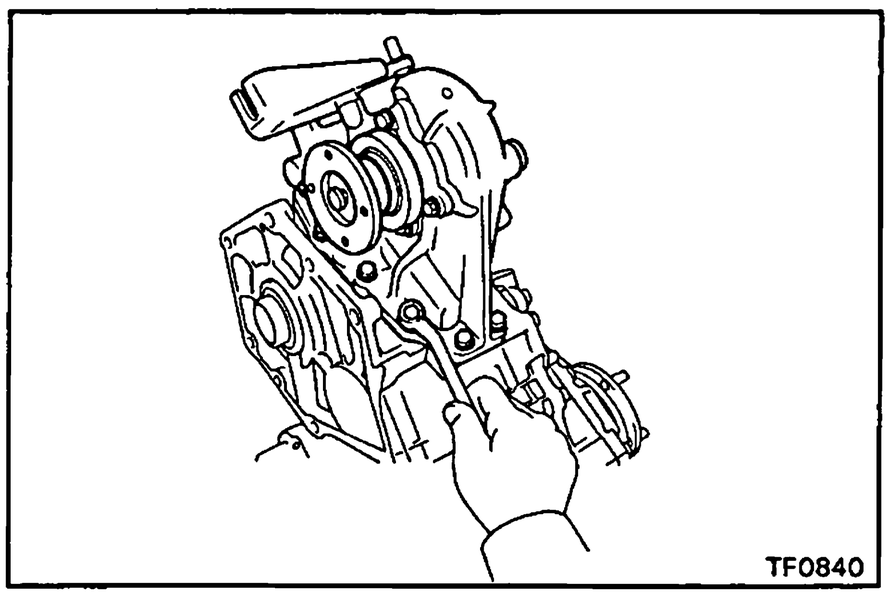
**5. REMOVE TRANSFER INDICATOR SWITCHES**

Remove the Center Diff Lock indicator switch, L4 position switch and neutral position switch.


TF0839

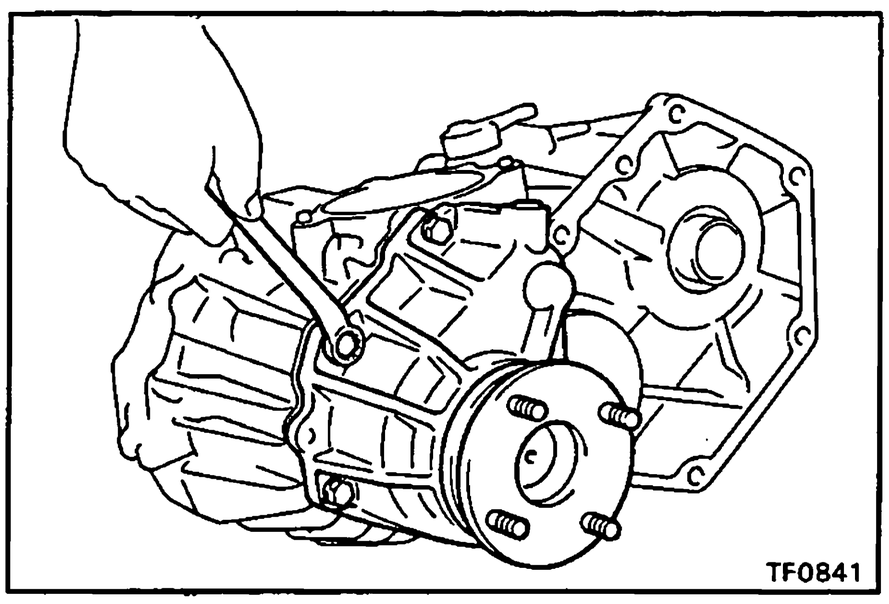
**6. (w/o POWER TAKE-OFF)**
**REMOVE POWER TAKE-OFF COVER**

Remove the ten bolts, power take-off cover and gasket.


TF0840

**7. (w/ POWER TAKE-OFF)**
**REMOVE POWER TAKE-OFF CASE**

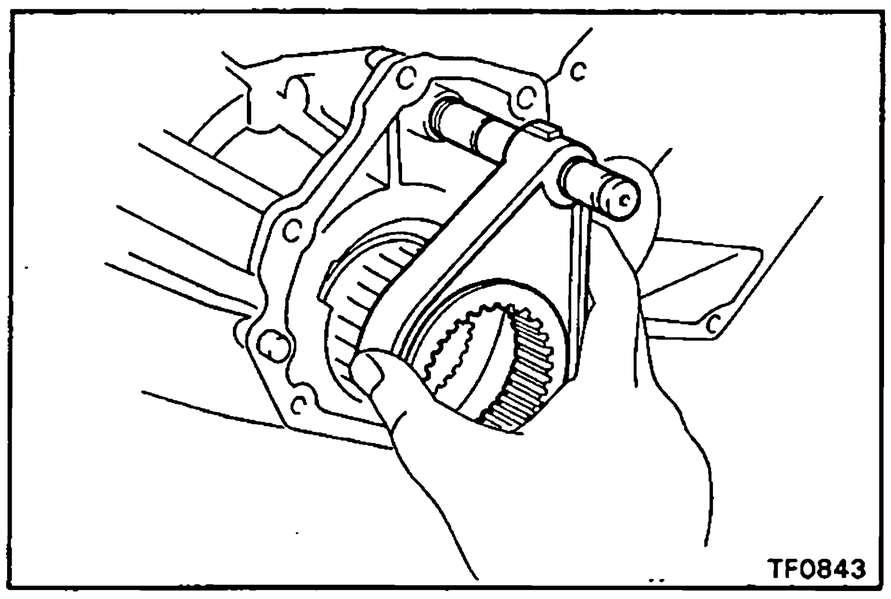
Remove the ten bolts, power take-off case and gasket.


TF0841

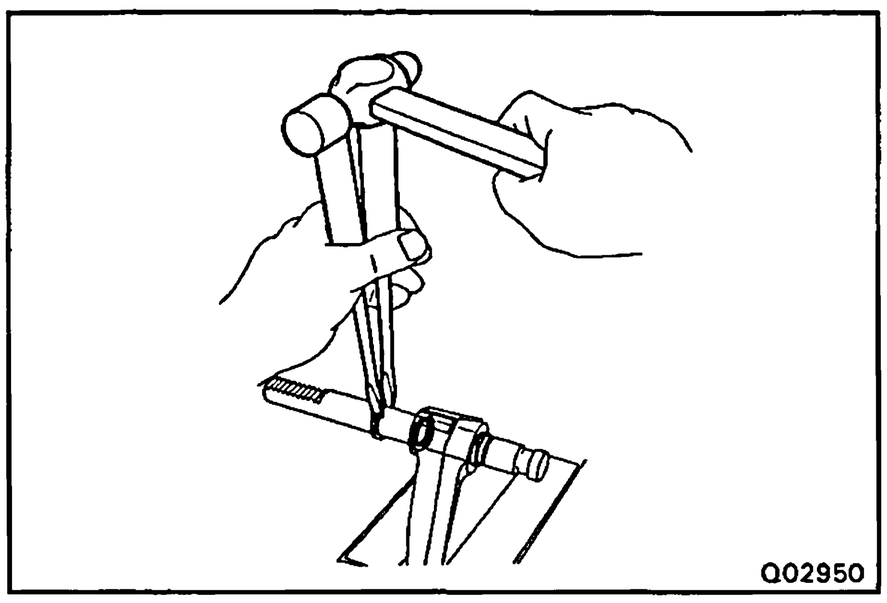
**8. REMOVE FRONT EXTENSION HOUSING**

(a) Remove the six bolts.

(b) If necessary, tap the front extension housing with a plastic hammer.


TF0843

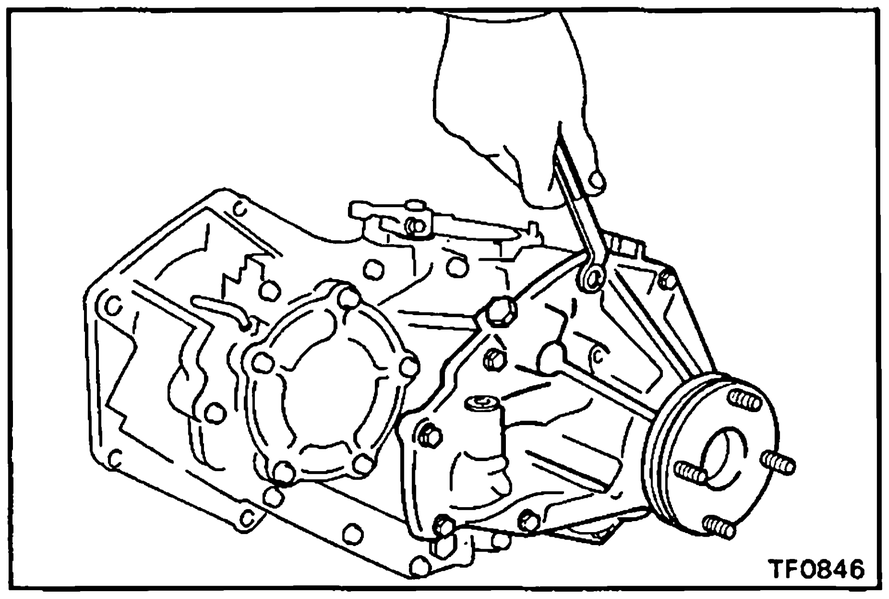
**9. REMOVE CLUTCH SLEEVE, SHIFT FORK NO.2 AND FORK SHAFT**




**10. SEPARATE SHIFT FORK NO.2 AND FORK SHAFT**

(a) Using two screwdrivers and a hammer, tap out the three snap rings.

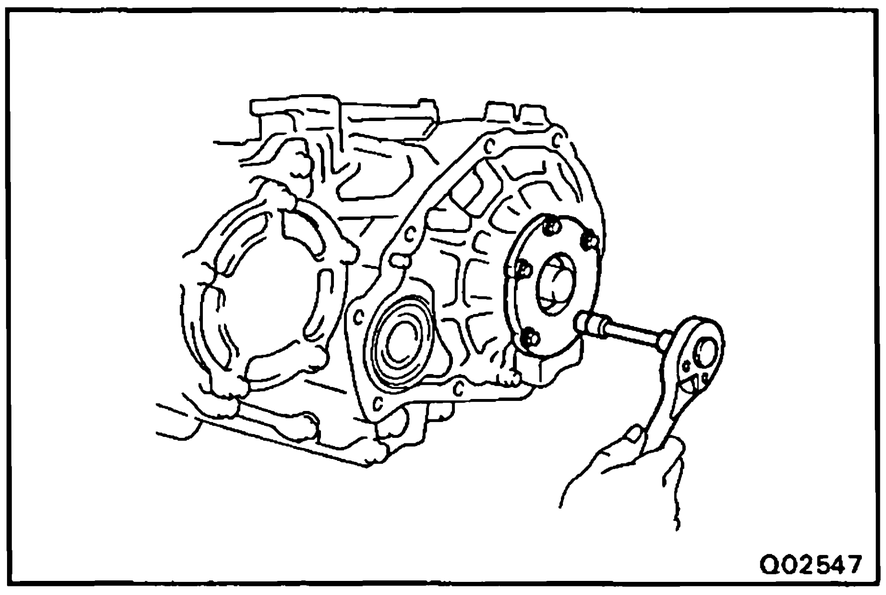
(b) Separate the shift fork No.2 and fork shaft.




**11. REMOVE REAR EXTENSION HOUSING**

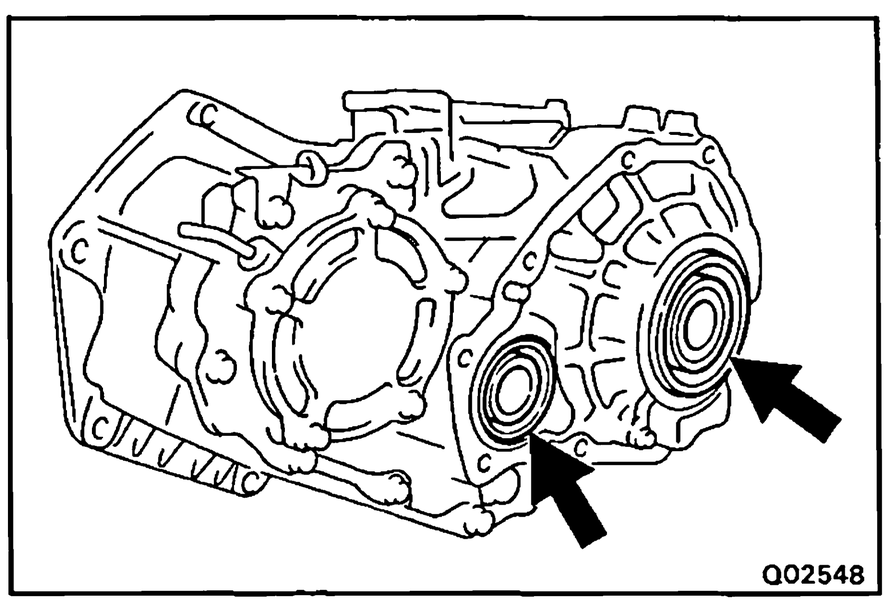
Remove the nine bolts and rear extension housing.

HINT: If necessary, tap the rear extension housing with a plastic hammer.

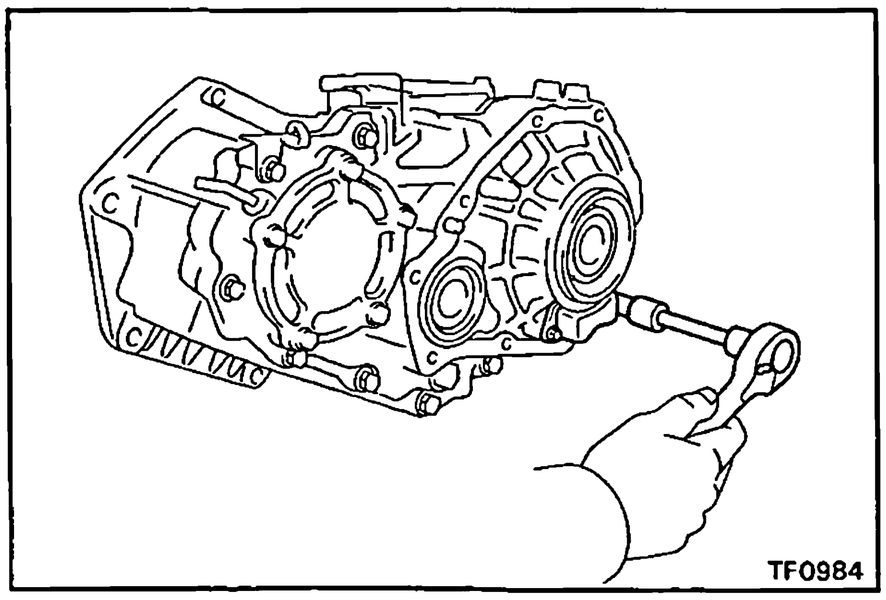



**12. REMOVE RETAINER**

Remove the five bolts and retainer.

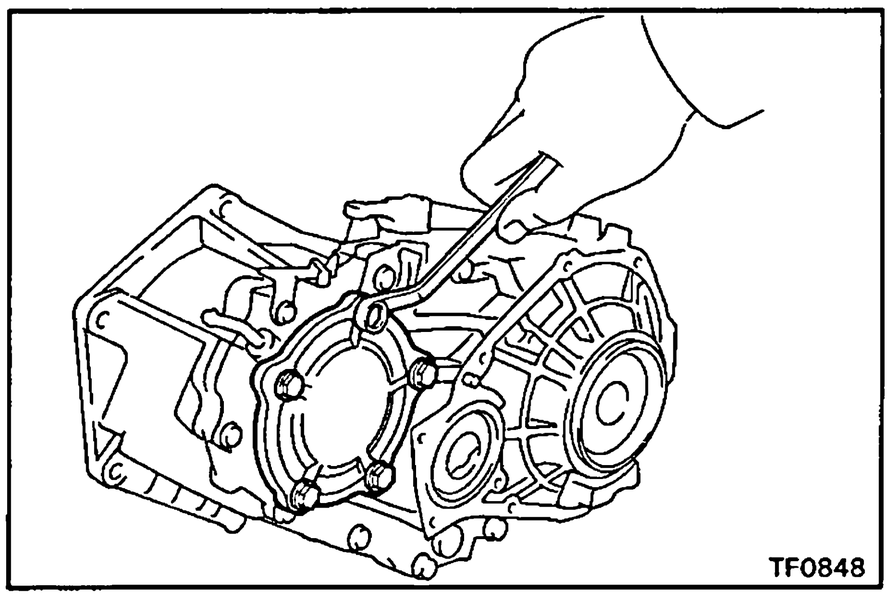



**13. REMOVE ADJUSTING SHIMS**



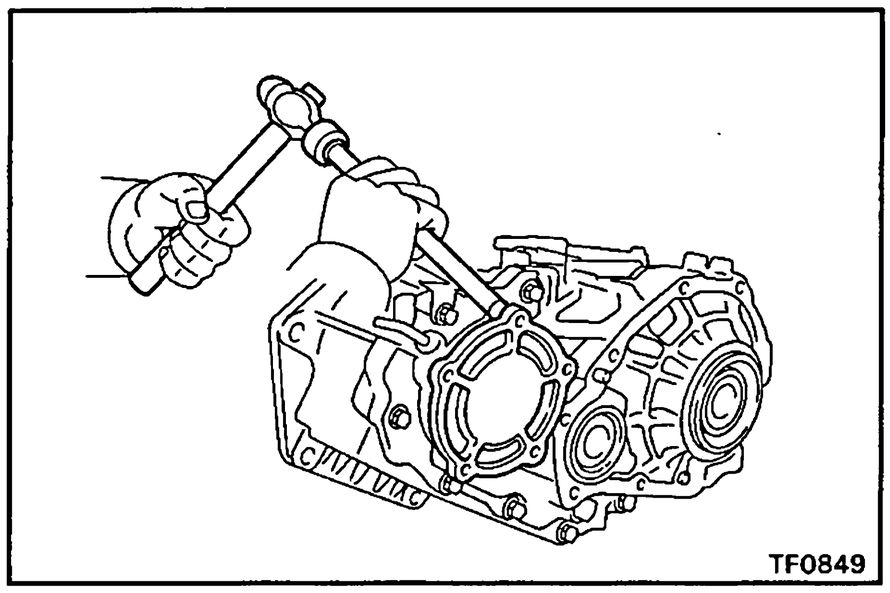

**14. REMOVE OIL STRAINER FROM REAR CASE**

Remove the two set bolts and oil strainer.

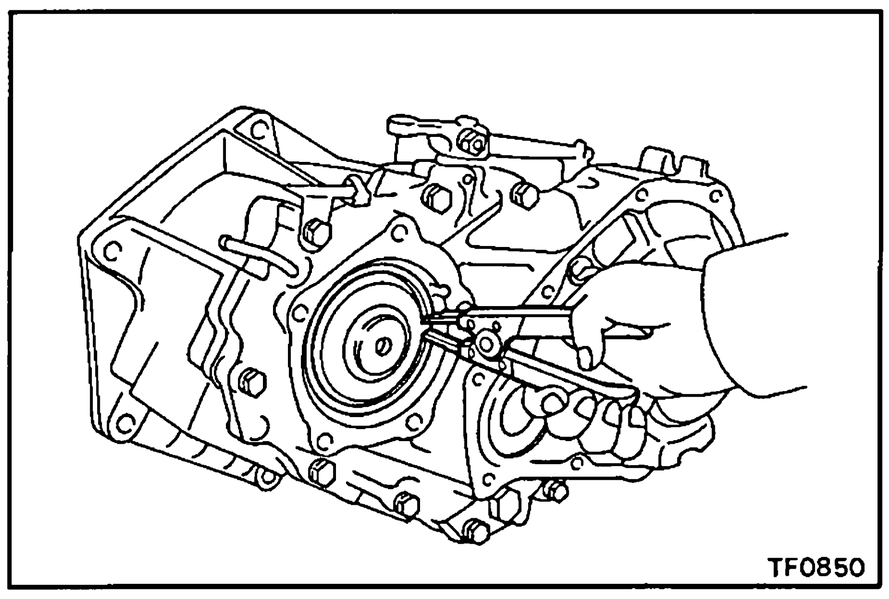



**15. REMOVE CASE COVER**

(a) Remove the five bolts.

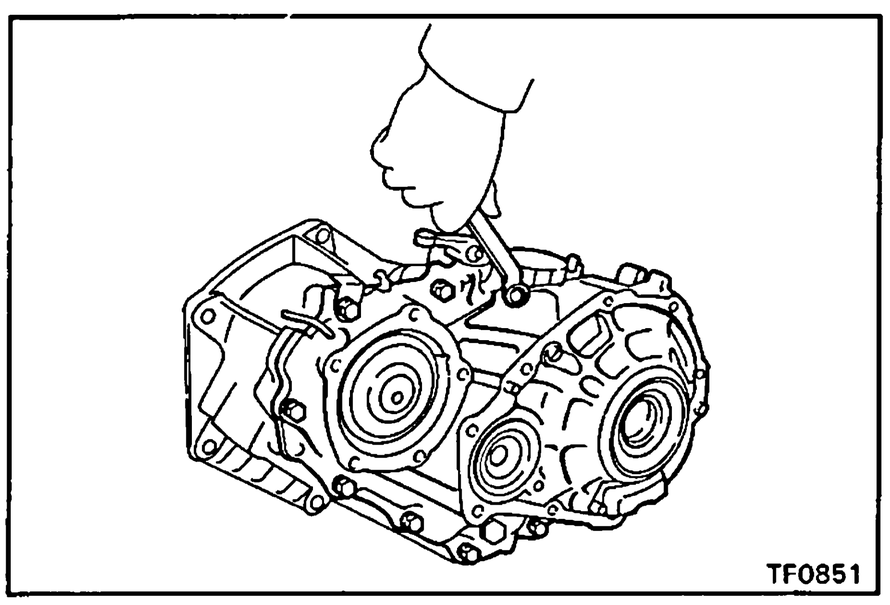



(b) Using a brass bar and hammer, tap the case cover and remove it.

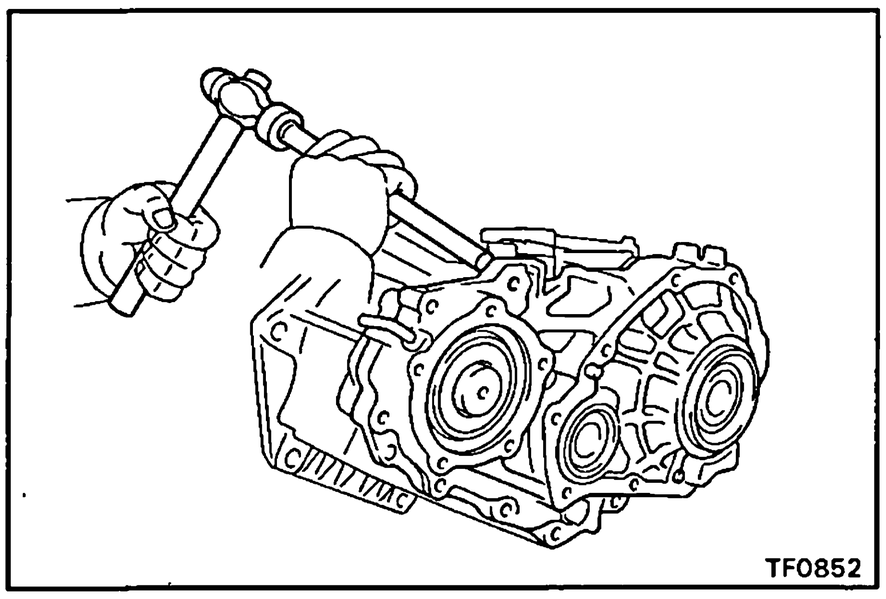



**16. SEPARATE FRONT CASE AND REAR CASE**

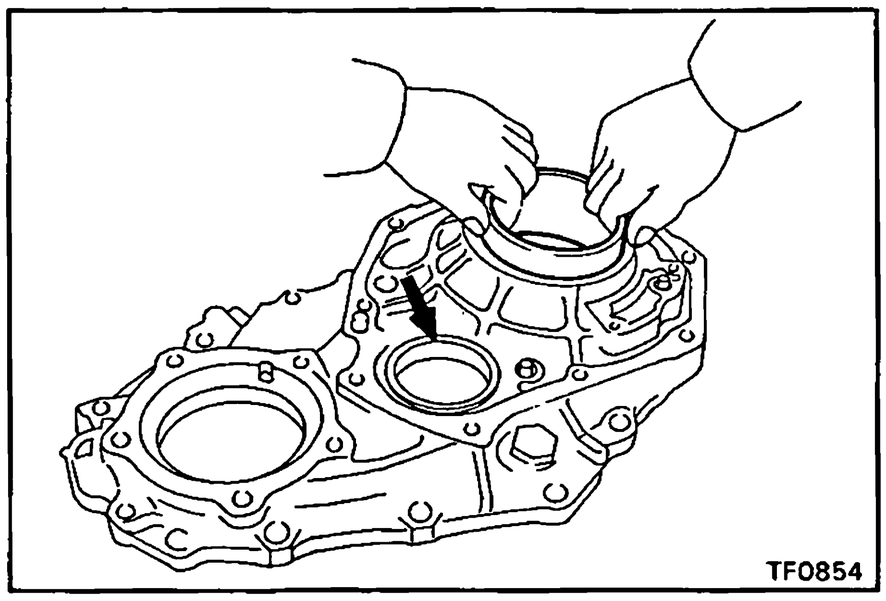
(a) Using snap ring pliers, remove the snap ring.



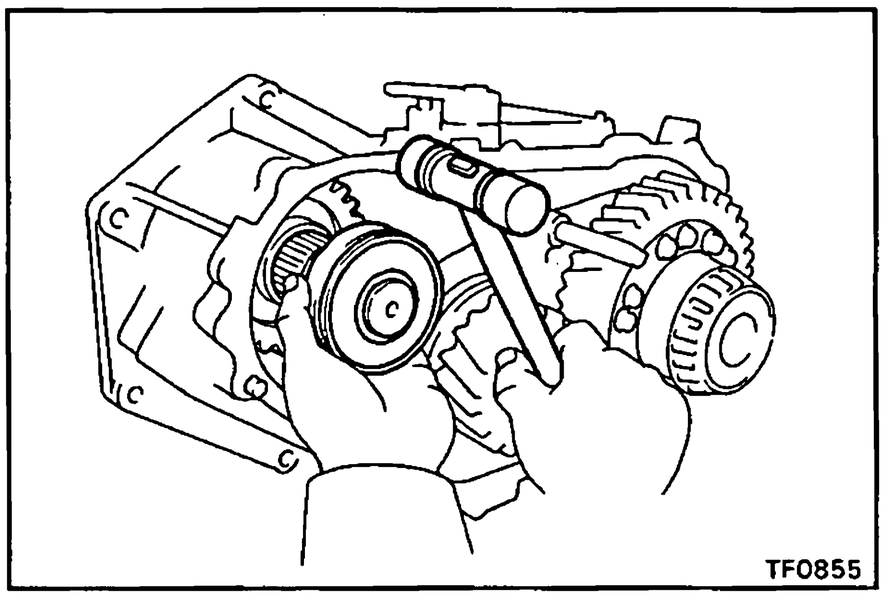

(b) Remove the eight bolts.




(c) Using a brass bar and hammer, tap the rear case and separate it.

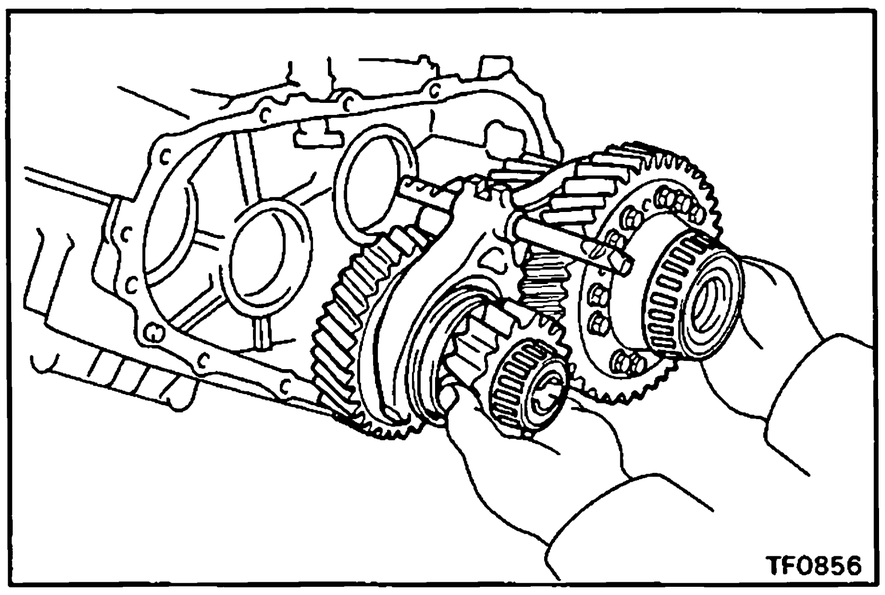



**17. REMOVE TWO BEARING RACES FROM REAR CASE**

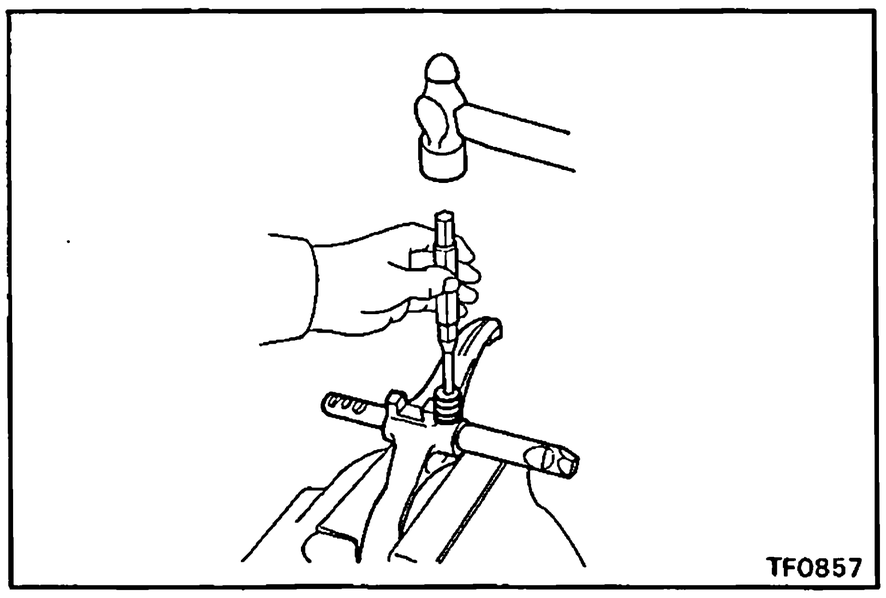



**18. REMOVE INPUT SHAFT ASSEMBLY**

Using a plastic hammer, remove the input shaft assembly.



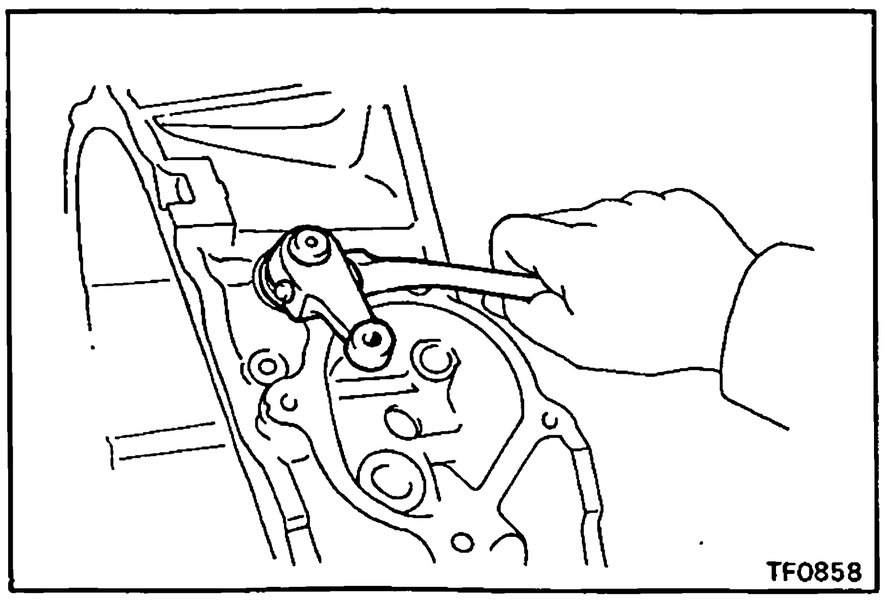

**19. REMOVE IDLE GEAR ASSEMBLY, CENTER DIFFERENTIAL ASSEMBLY AND HIGH AND LOW SHIFT FORK ASSEMBLY**




**20. SEPARATE SHIFT FORK NO.1 AND FORK SHAFT**

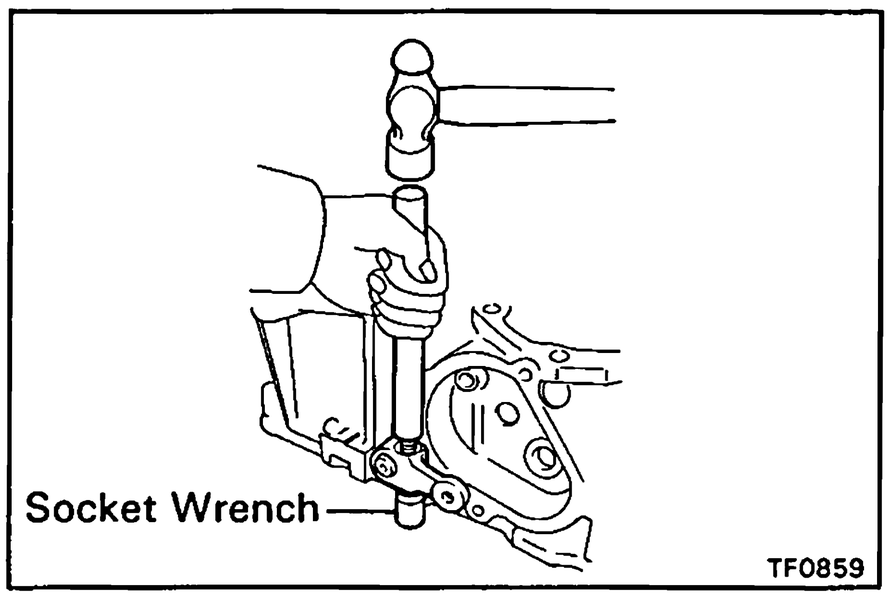
(a) Using a pin punch and hammer, drive out the slotted spring pin.

(b) Separate the shift fork No.1 and fork shaft.

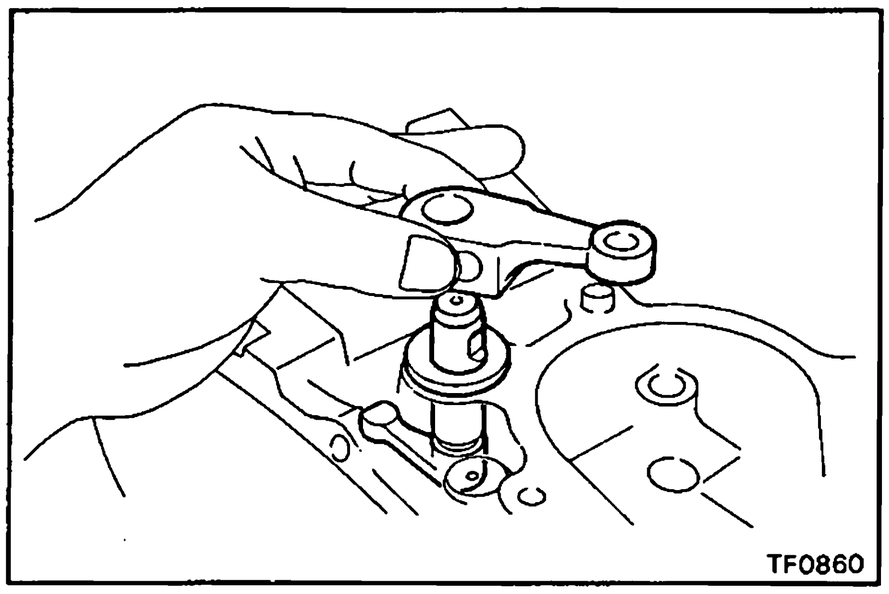



**21. REMOVE SHIFT OUTER LEVER AND INNER LEVER**

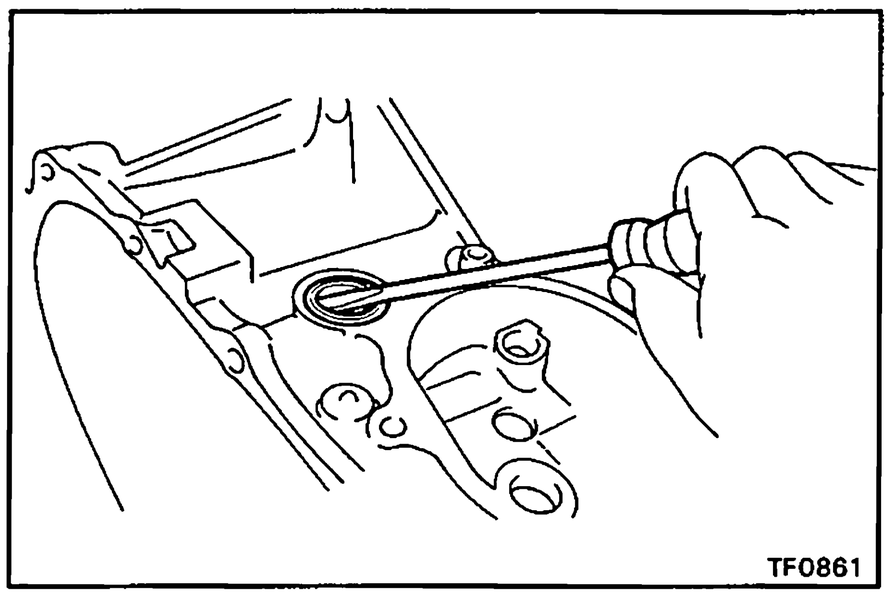
(a) Remove the nut and washer.




(b) Using a brass bar, hammer and socket wrench, tap out the lever lock pin.

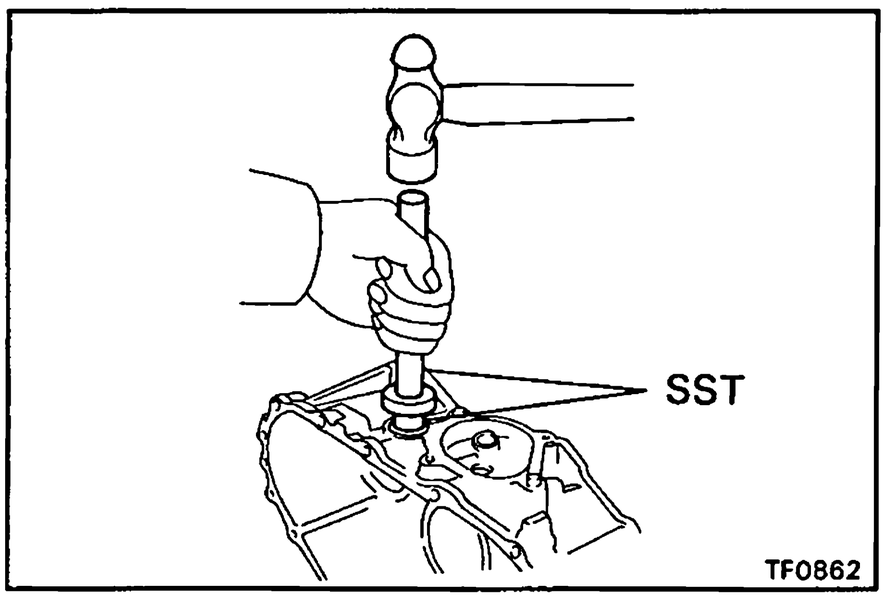



(c) Remove the shift outer lever and inner lever.



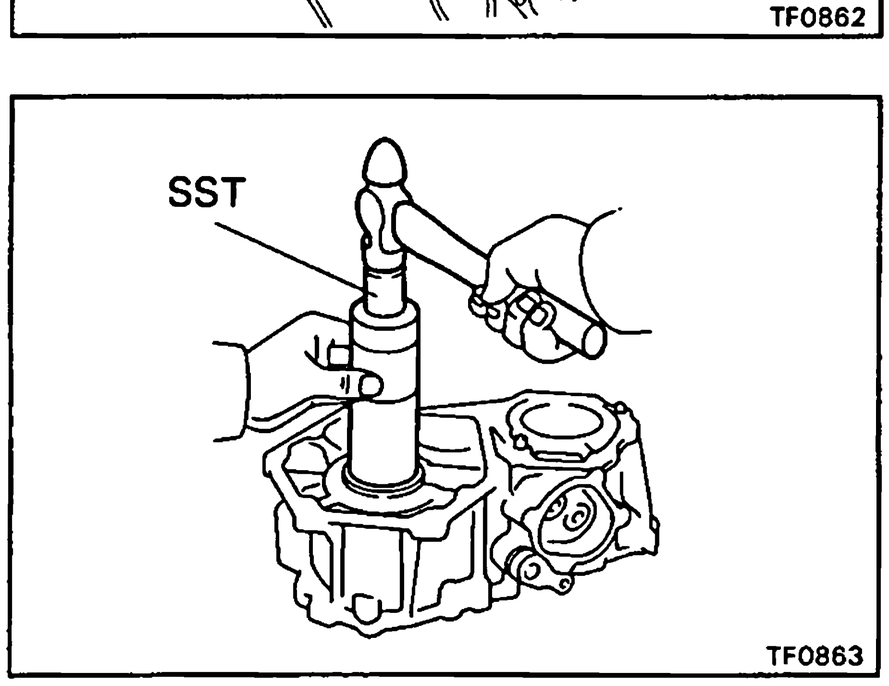

**22. IF NECESSARY, REPLACE SHIFT LEVER OIL SEAL**

(a) Using a screwdriver, pry out the oil seal.




(b) Using SST and a hammer, drive in a new oil seal.

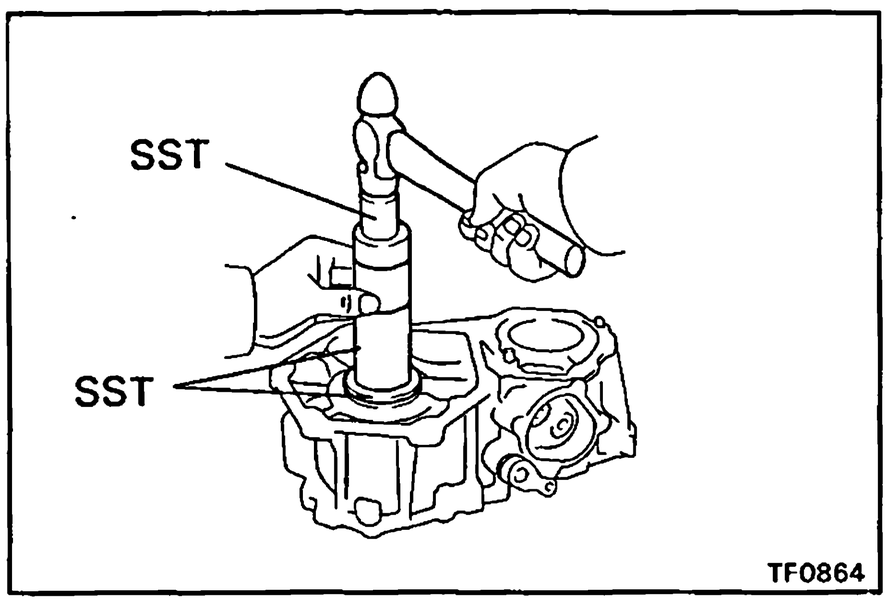
SST 09608-20012 (09608-00080, 09608-03020)



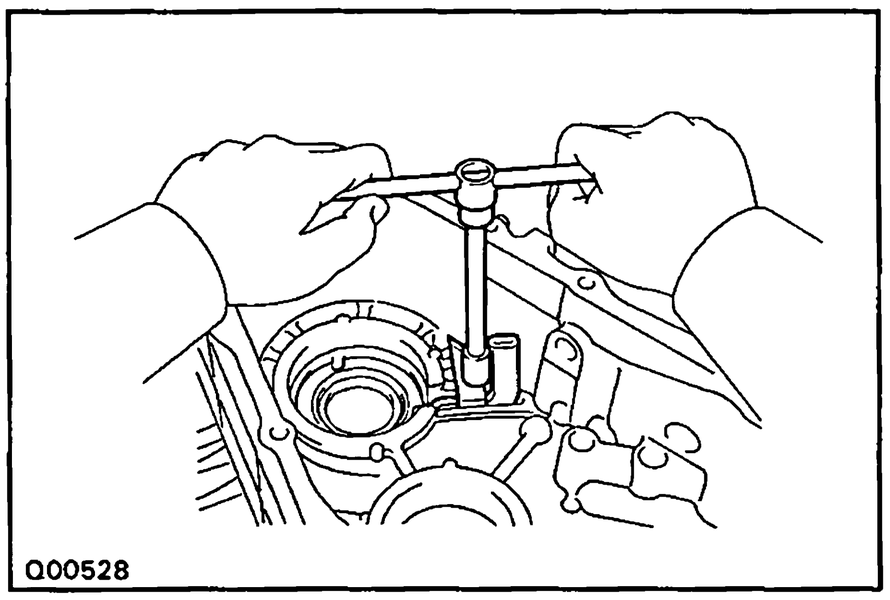

**23. IF NECESSARY, REPLACE INPUT SHAFT OIL SEAL**

(a) Using SST and a hammer, drive out the oil seal.

SST 09316-60010 (09316-00010)

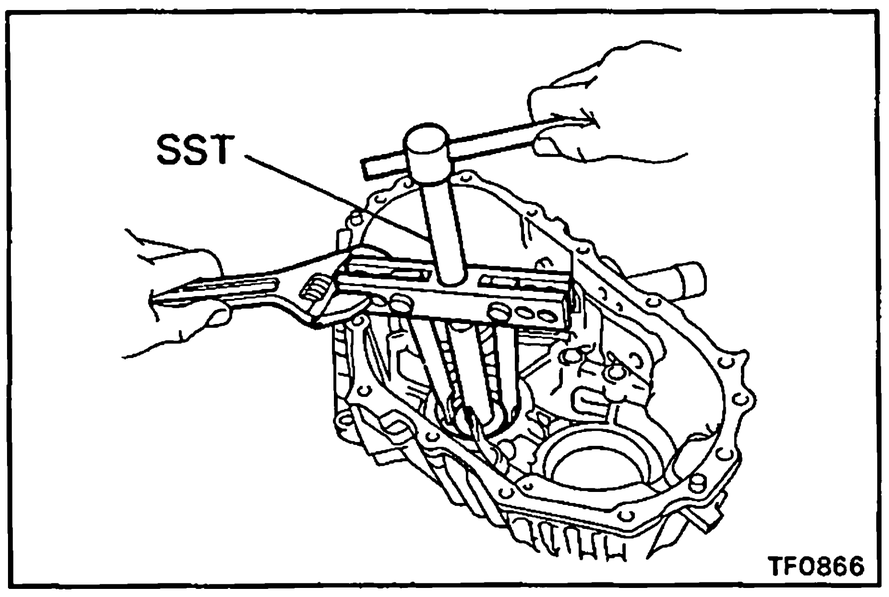



(b) Using SST and a hammer, drive in a new oil seal.
SST 09316-60010 (09316-00010, 09316-00030)



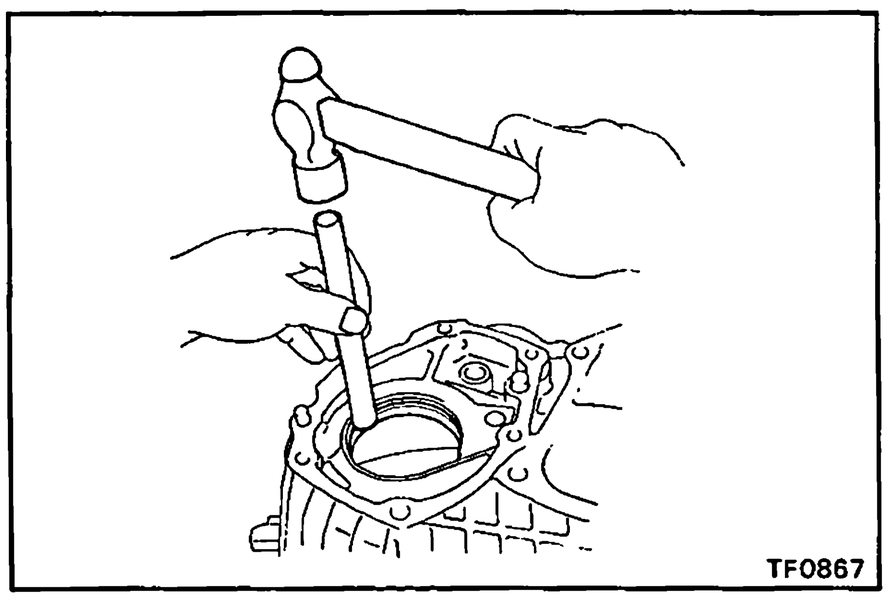

**24. REMOVE OIL RECEIVER FROM FRONT CASE**

Remove the set bolt and oil receiver.

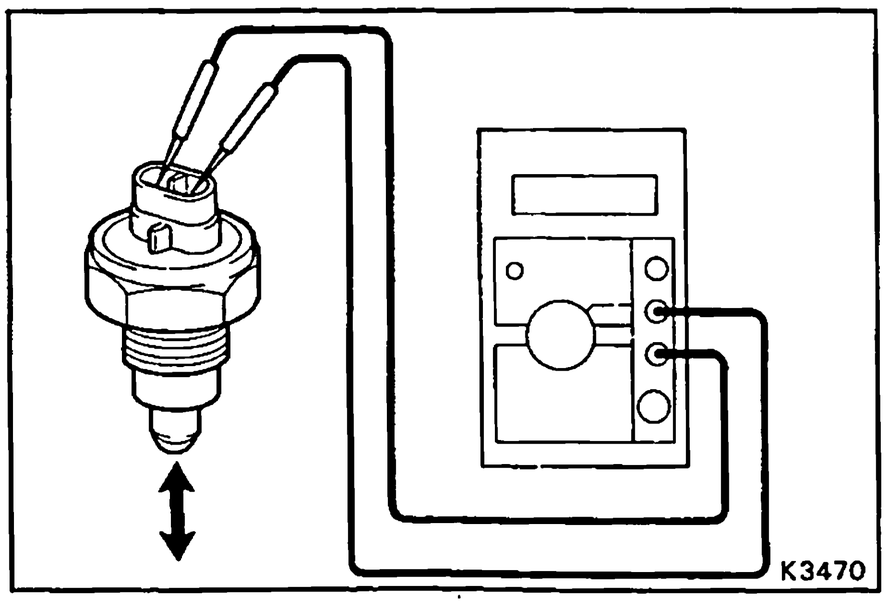



**25. REMOVE TWO BEARING RACES FROM FRONT CASE**

(a) Using SST, remove the bearing race.
SST 09950-20017




(b) Using a brass bar and hammer, remove the bearing race.




**26. INSPECTION OF TRANSFER INDICATOR SWITCHES**

Check that there is continuity between terminals as shown.

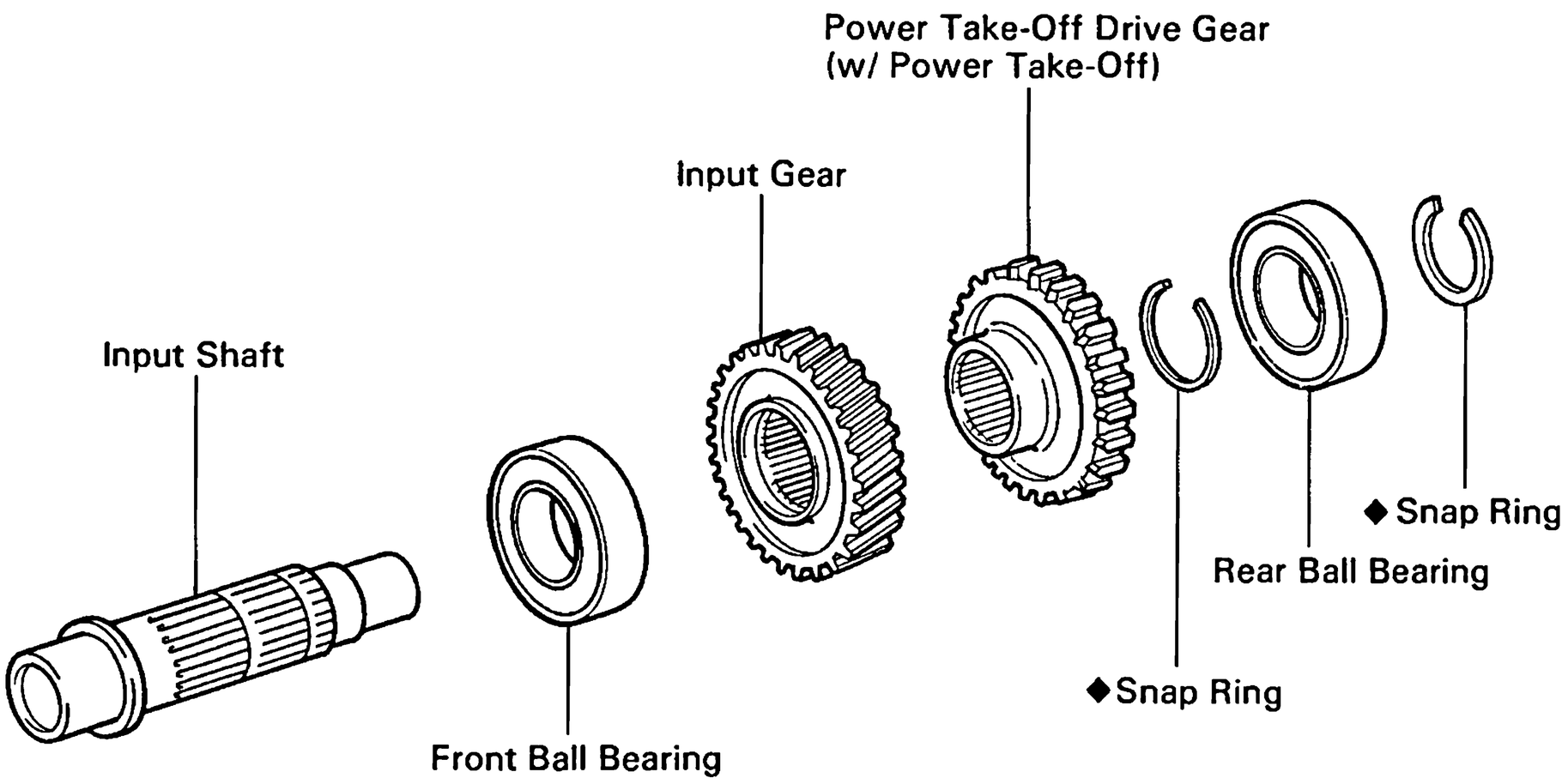
| Switch Position | Specified |
|---|---|
| Push | Continuity |
| Free | No continuity |

If continuity is not as specified, replace the switch.

# COMPONENT PARTS

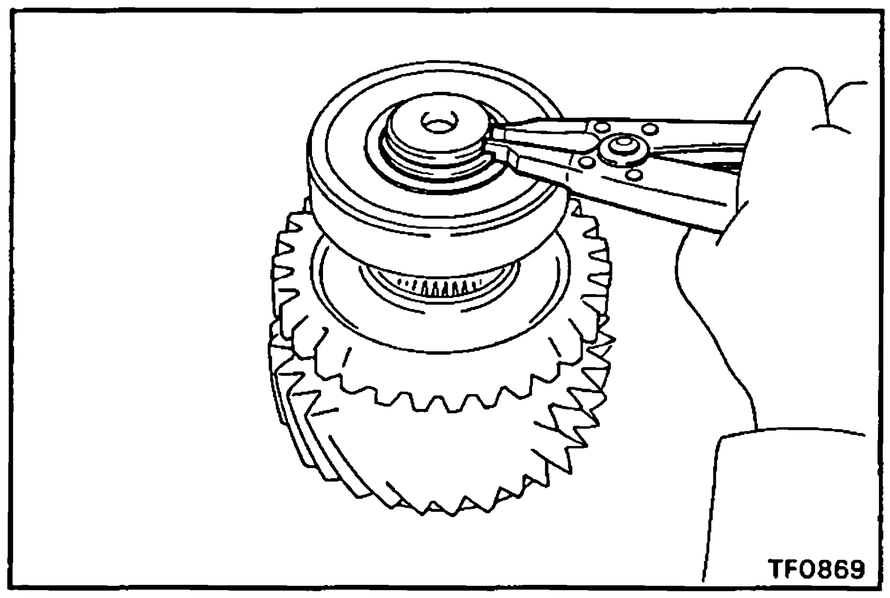
## Input Shaft Assembly

### COMPONENTS




◆ Non-reusable part

TF0868

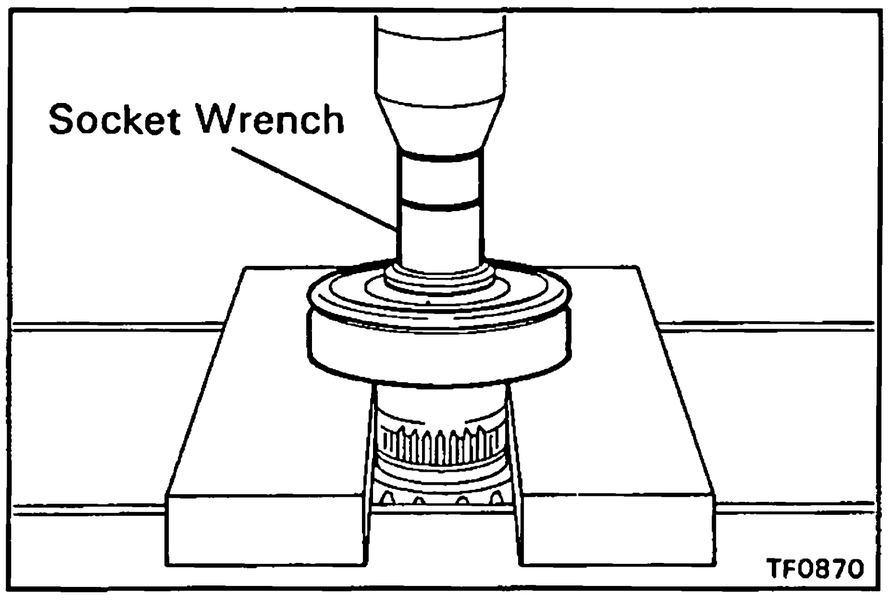


TF0869

## DISASSEMBLY OF INPUT SHAFT ASSEMBLY

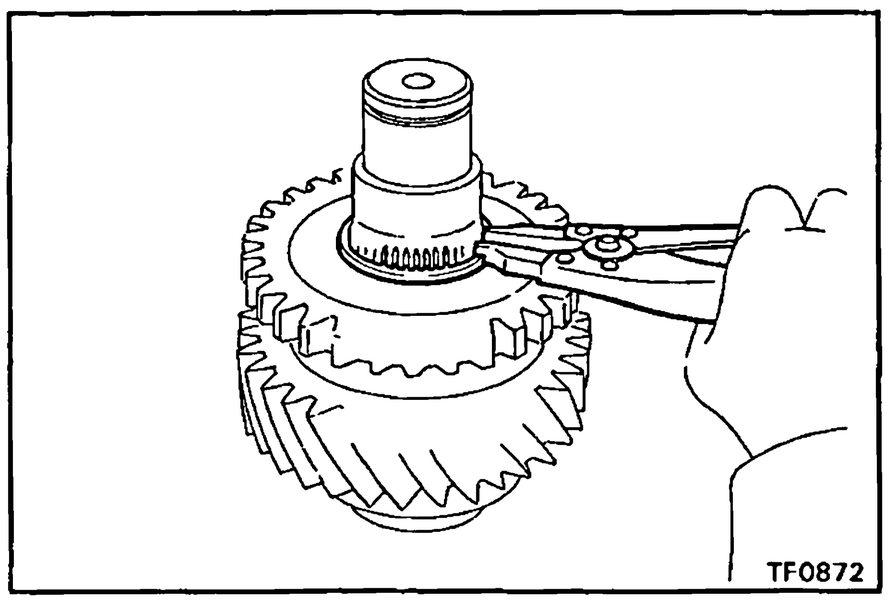
### 1. REMOVE REAR BALL BEARING

(a) Using snap ring pliers, remove the snap ring.



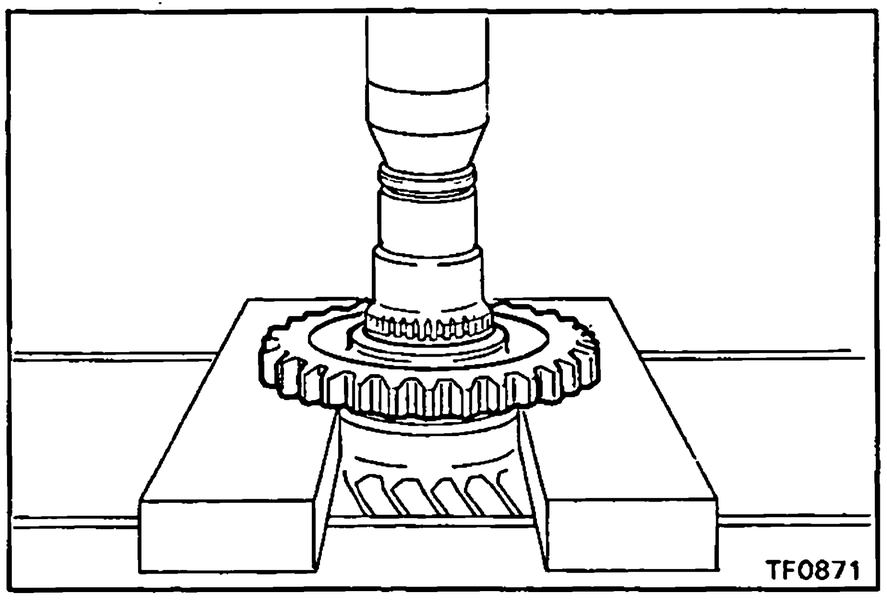

TF0870

(b) Using a press and socket wrench, remove the rear ball bearing.

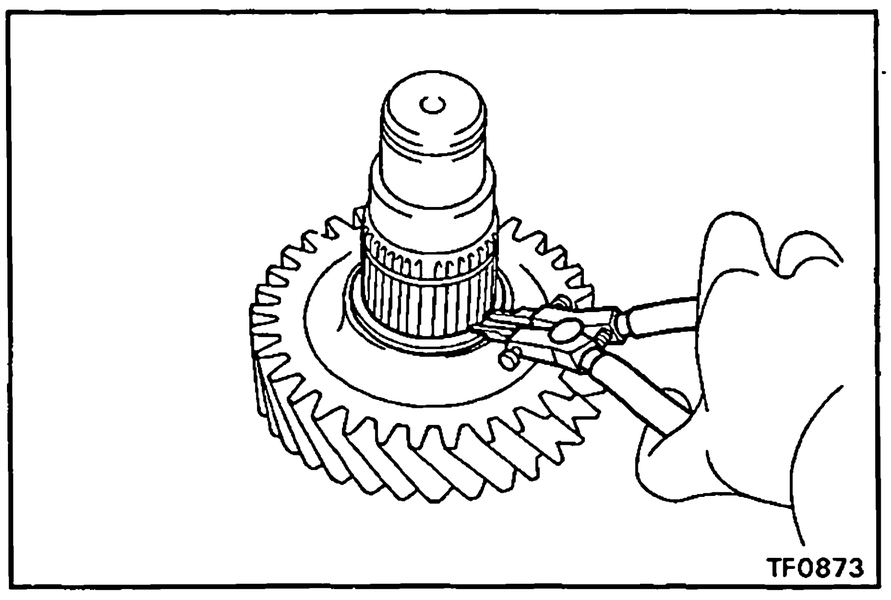



**2. (w/ POWER TAKE-OFF)
REMOVE POWER TAKE-OFF DRIVE GEAR**

(a) Using snap ring pliers, remove the snap ring.

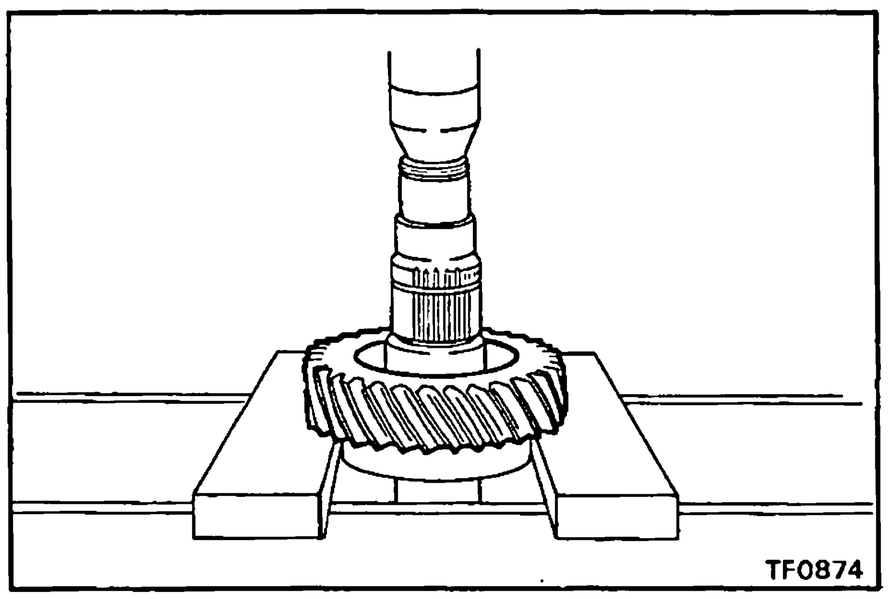



(b) Using a press, remove the power take-off drive gear.

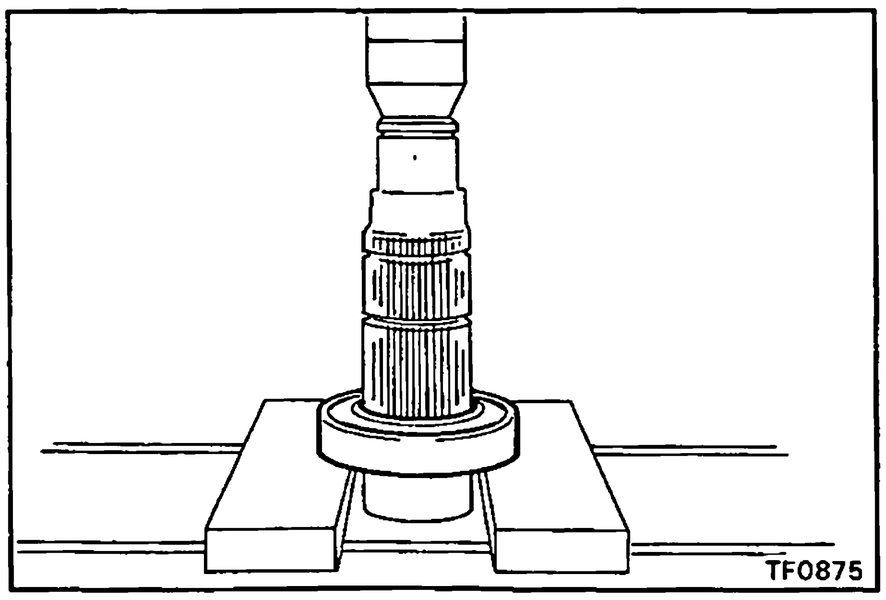



**3. REMOVE INPUT GEAR**

(a) (w/o Power take-off)
Using snap ring pliers, remove the snap ring.

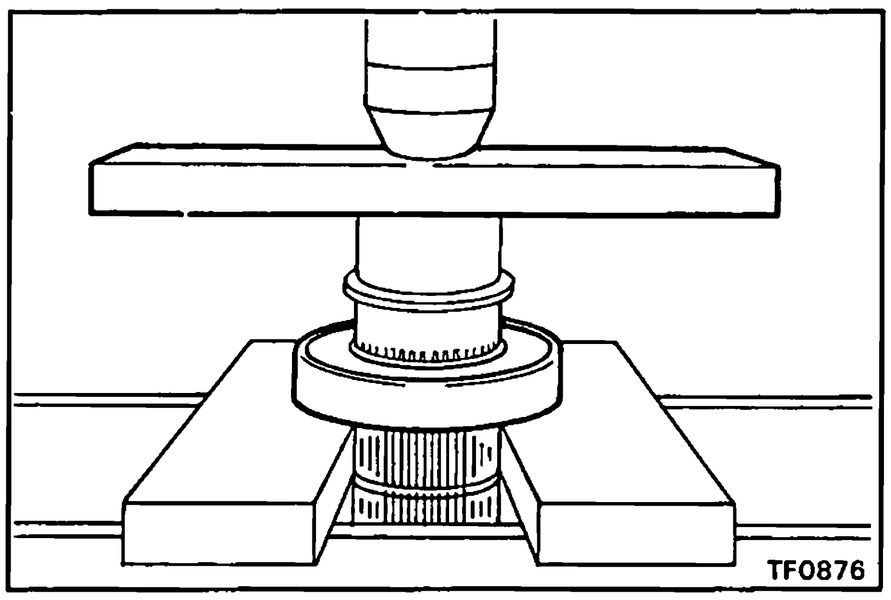



(b) Using a press, remove the input gear.




**4. REMOVE FRONT BALL BEARING**

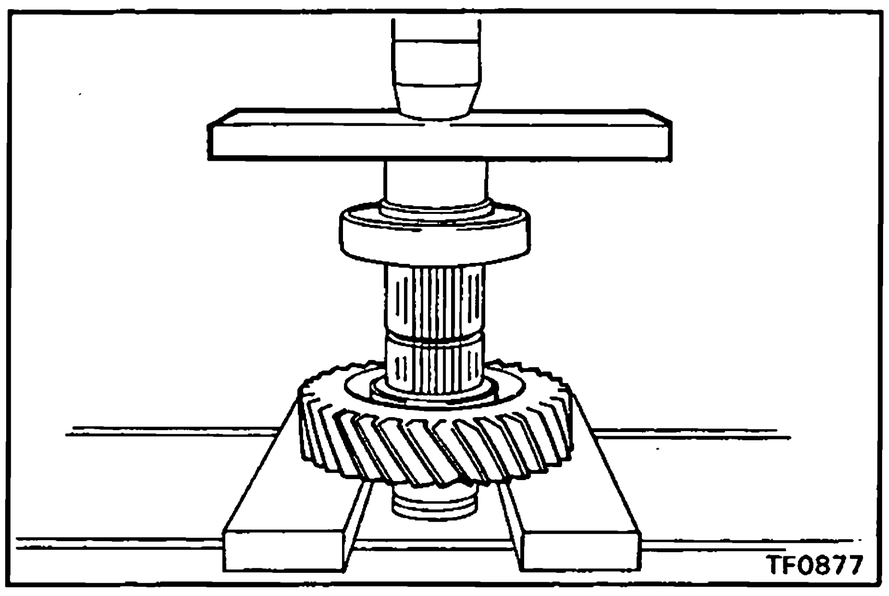
Using a press, remove the front ball bearing.




# ASSEMBLY OF INPUT SHAFT ASSEMBLY

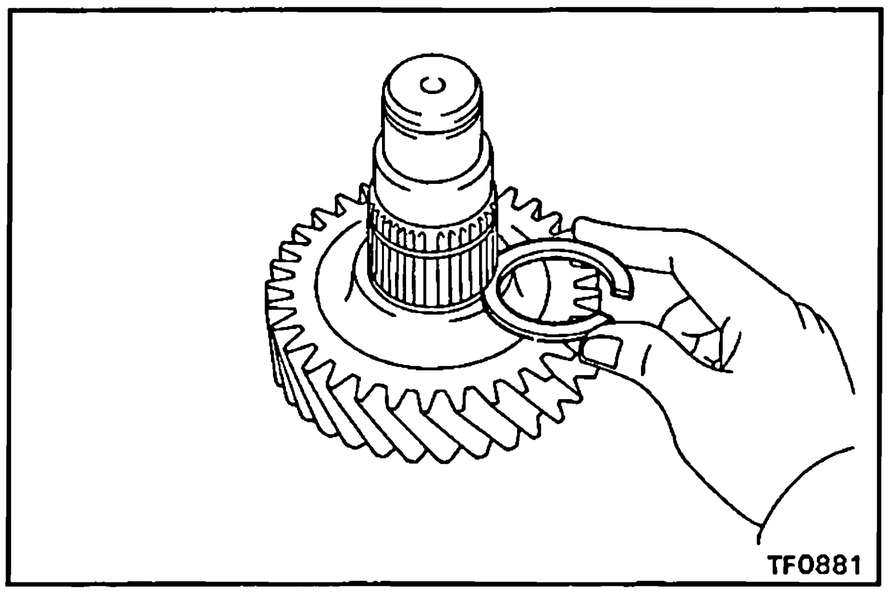
## 1. INSTALL FRONT BALL BEARING

Using a press, install the front ball bearing.



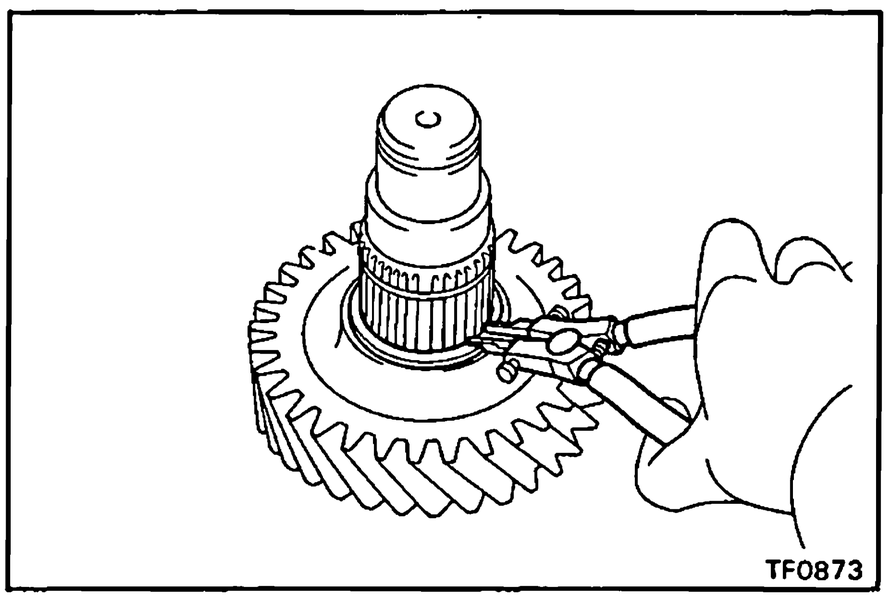

## 2. INSTALL INPUT GEAR

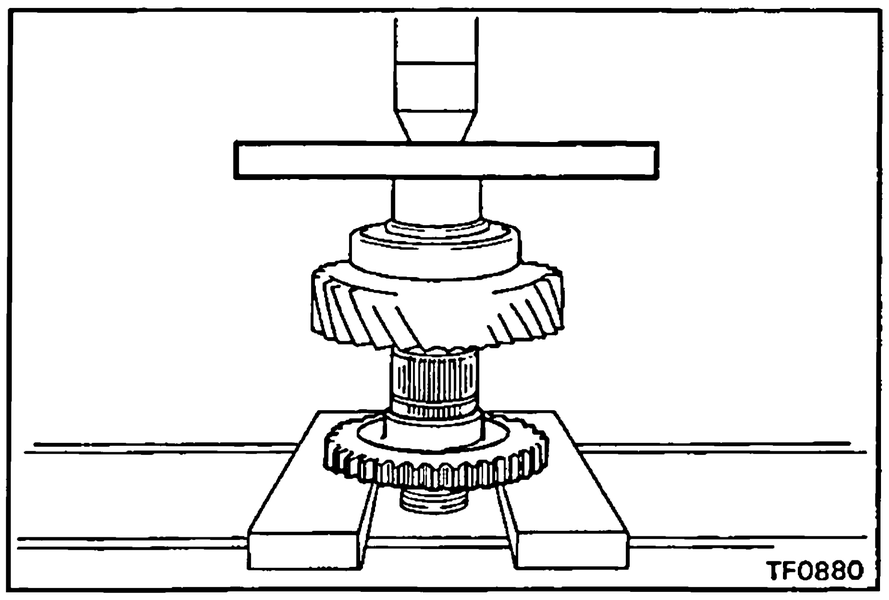
(a) Using a press, install the input gear.




(b) (w/o Power take-off)
Select a snap ring that will allow minimum axial play and install it on the shaft.

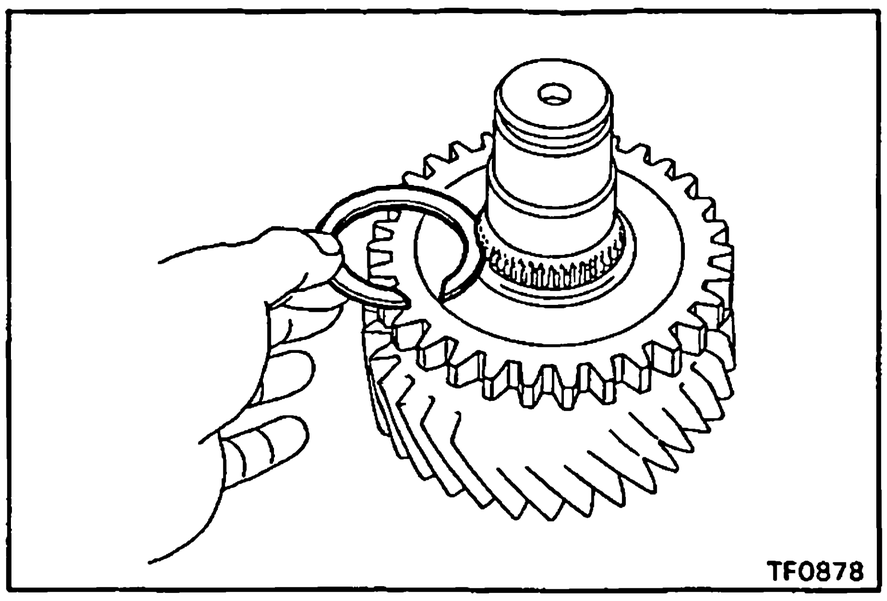
| Mark | Thickness mm (in.) |
|---|---|
| A | 2.0 (0.0787) |
| B | 2.1 (0.0827) |
| C | 2.2 (0.0866) |
| D | 2.3 (0.0906) |
| E | 2.4 (0.0945) |
| F | 2.5 (0.0984) |
| G | 2.6 (0.1024) |
| H | 2.7 (0.1063) |
| J | 2.8 (0.1102) |



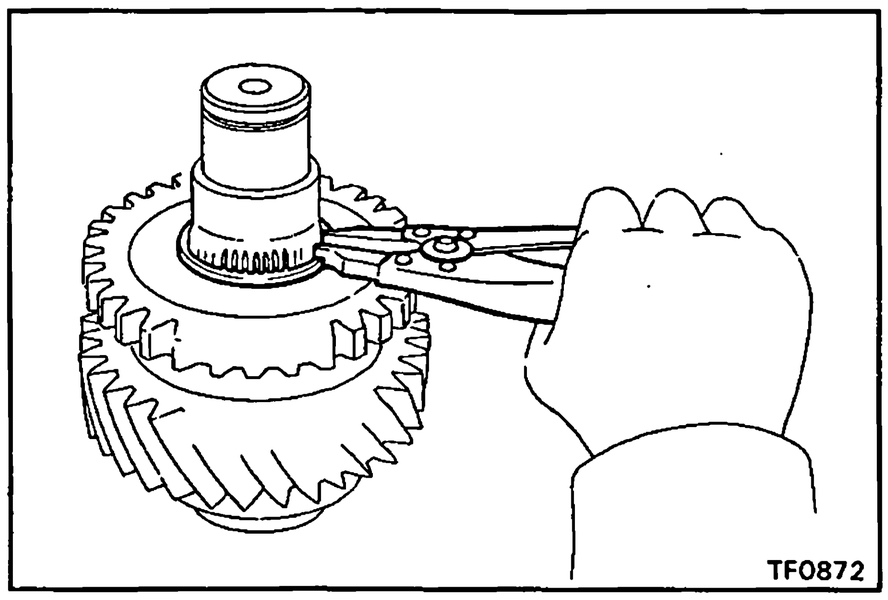

## 3. (w/ POWER TAKE-OFF) INSTALL POWER TAKE-OFF GEAR

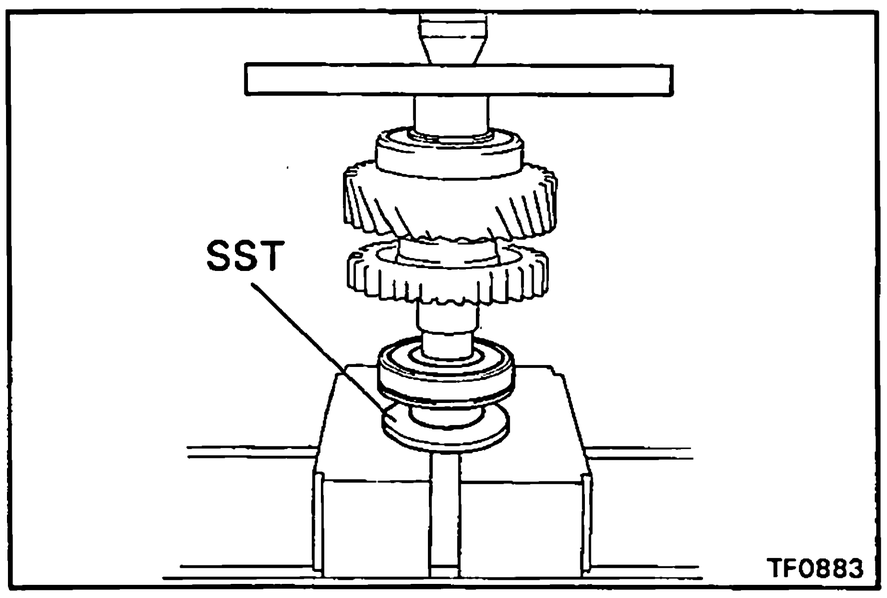
(a) Using a press, install the power take-off gear.


TF0878

(b) Select a snap ring that will allow minimum axial play and install it on the shaft.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.0 (0.0787) |
| B | 2.1 (0.0827) |
| C | 2.2 (0.0866) |
| D | 2.3 (0.0906) |
| E | 2.4 (0.0945) |
| F | 2.5 (0.0984) |
| G | 2.6 (0.1024) |
| H | 2.7 (0.1063) |
| J | 2.8 (0.1102) |

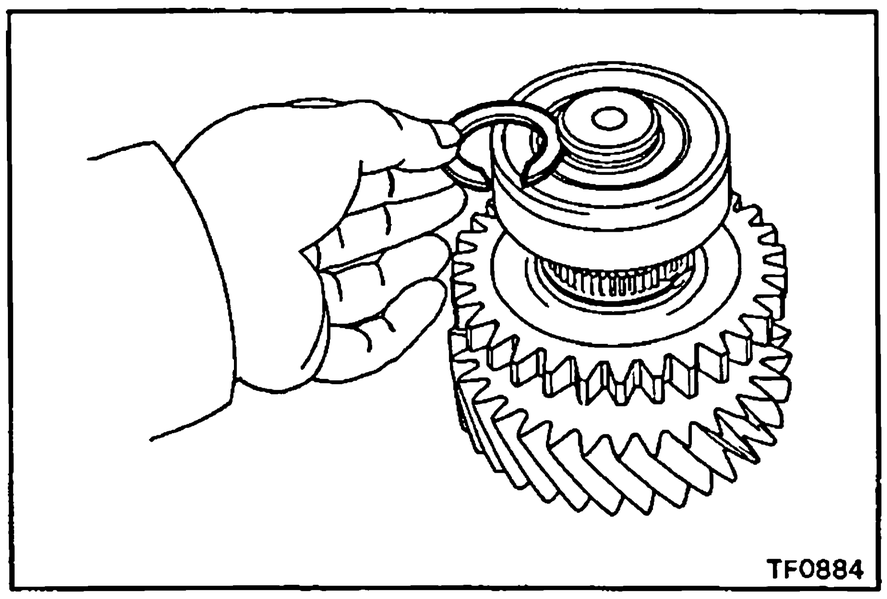

TF0872



TF0883

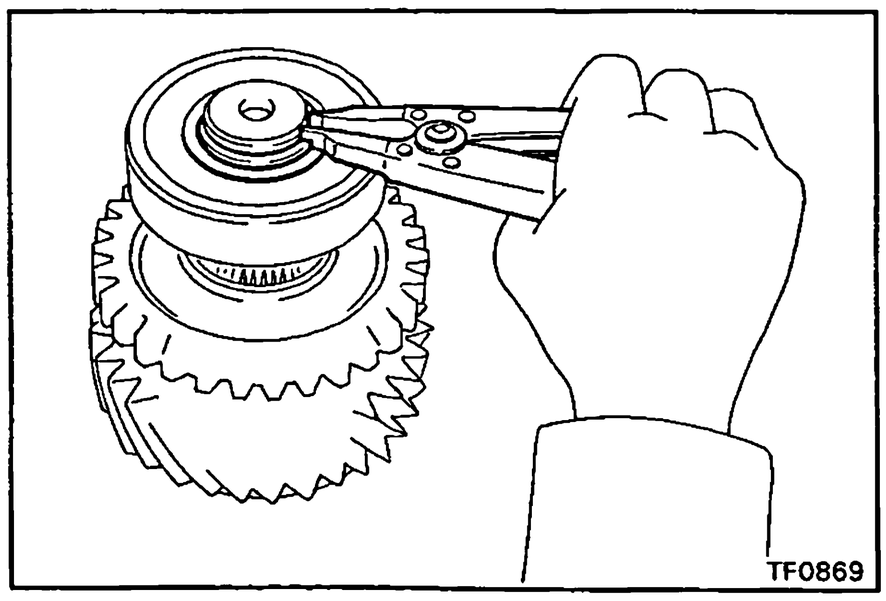
## 4. INSTALL REAR BALL BEARING

(a) Using SST and a press, install the rear ball bearing.
SST 09316-60010 (09316-00030)


TF0884

(b) Select a snap ring that will allow minimum axial play.

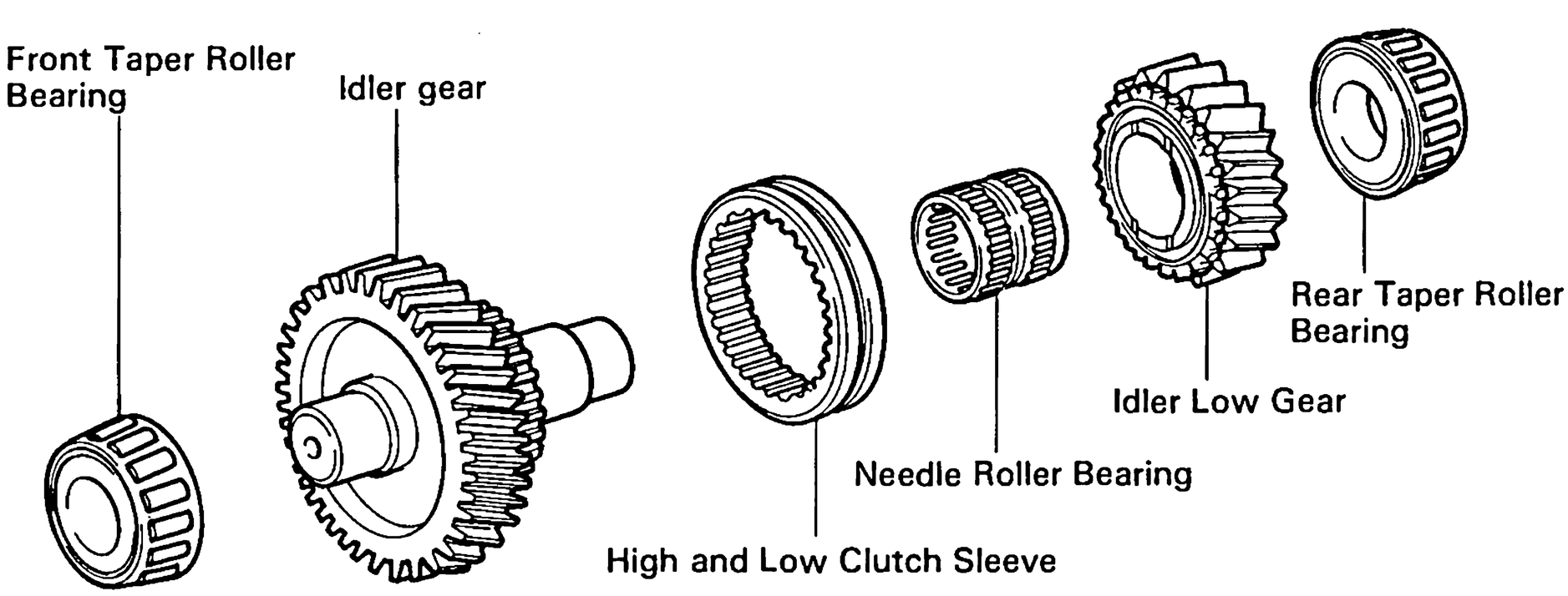
| Mark | Thickness mm (in.) |
|---|---|
| A | 2.0 (0.0787) |
| B | 2.1 (0.0827) |
| C | 2.2 (0.0866) |
| D | 2.3 (0.0906) |
| E | 2.4 (0.0945) |


TF0869

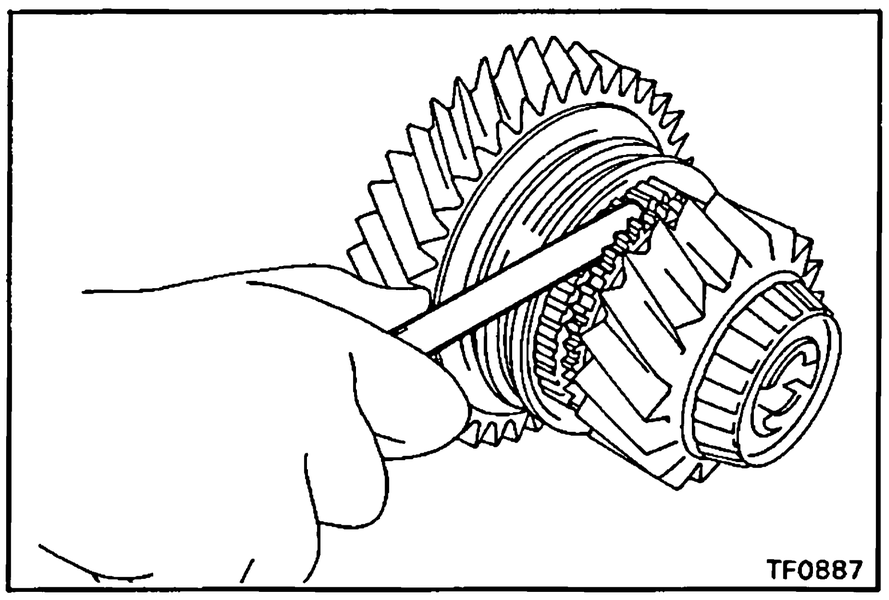
(c) Using snap ring pliers, install the snap ring.

# Idler Gear Assembly

## COMPONENTS




TF0886



TF0887

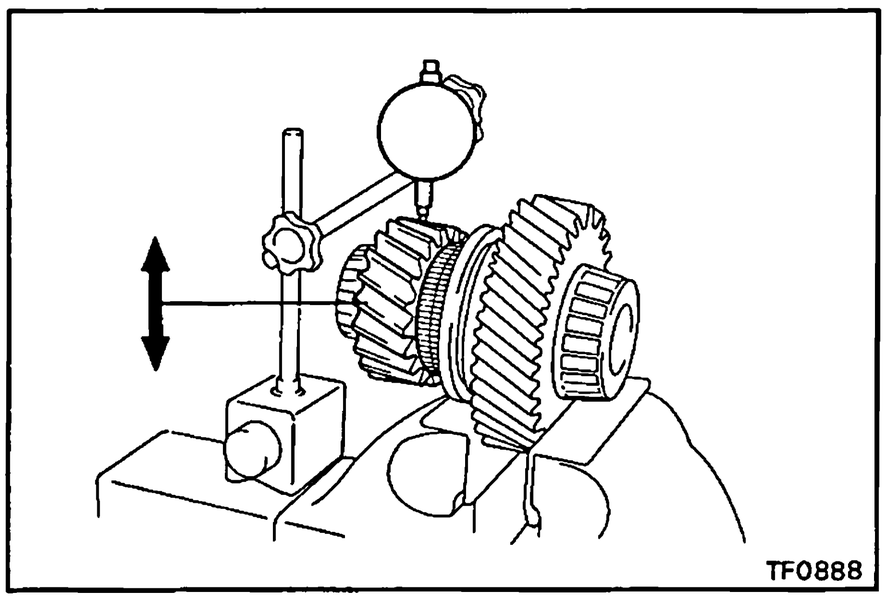
## DISASSEMBLY OF IDLER GEAR ASSEMBLY

1. **CHECK OIL CLEARANCE AND THRUST CLEARANCE OF IDLER LOW GEAR**

(a) Using a feeler gauge, measure the idler low gear thrust clearance.

**Standard clearance:** **0.125 — 0.275 mm (0.0049 — 0.0108 in.)**

**Maximum clearance:** **0.275 mm (0.0108 in.)**

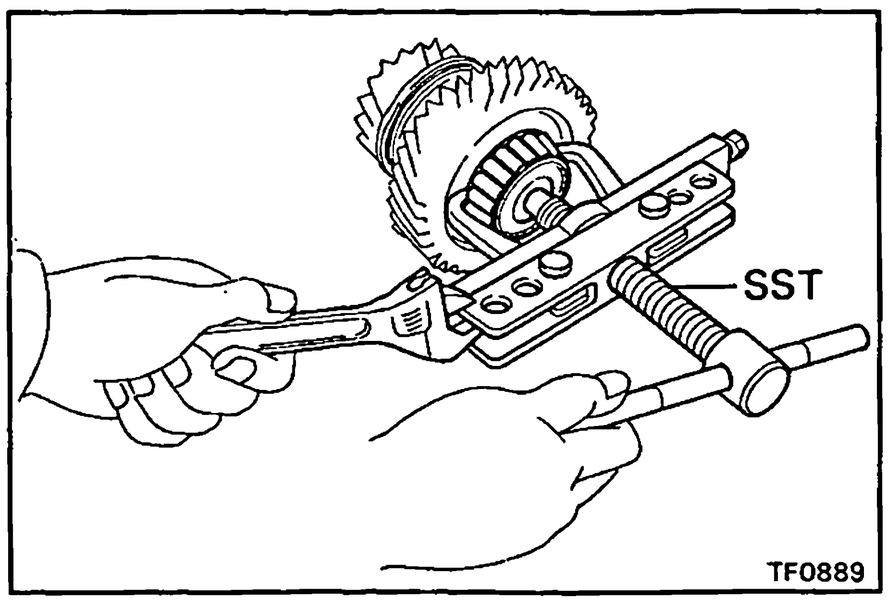


TF0888

(b) Using a dial indicator, measure the idler low gear oil clearance.

**Standard clearance:** **0.015 — 0.068 mm (0.0006 — 0.0027 in.)**

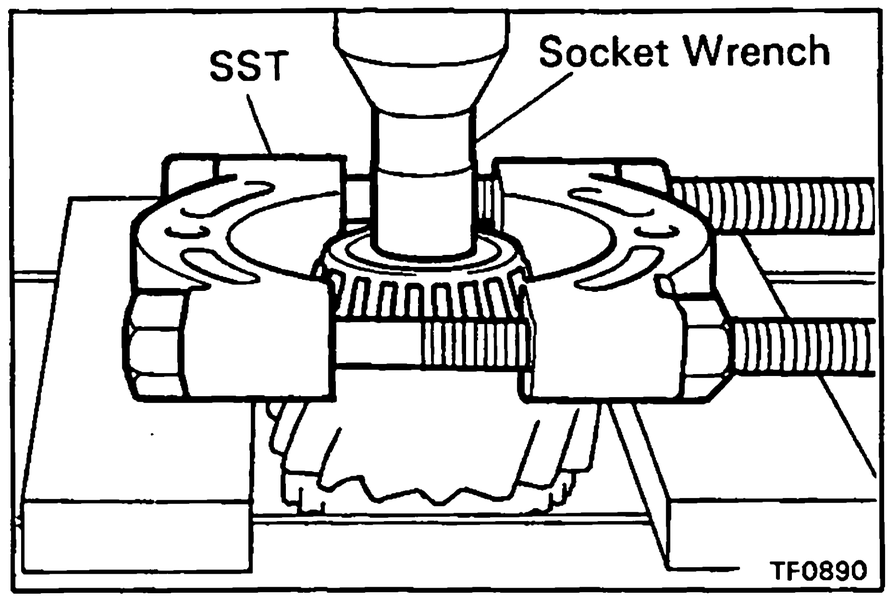
**Maximum clearance:** **0.068 mm (0.0027 in.)**




**2. REMOVE FRONT TAPER ROLLER BEARING**

Using SST, remove the front taper roller bearing.

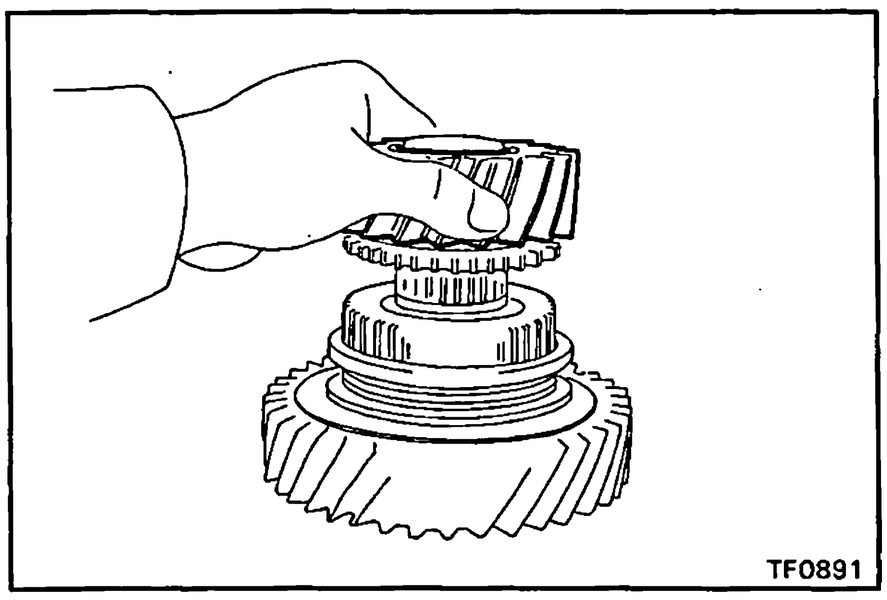
SST 09950-20017



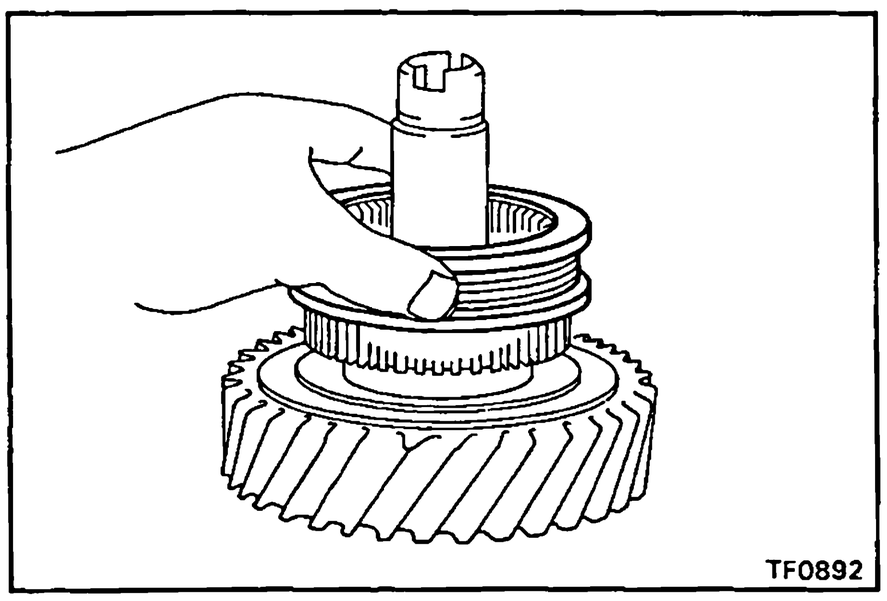

**3. REMOVE REAR TAPER ROLLER BEARING**

Using SST, press and socket wrench, remove the rear taper roller bearing.

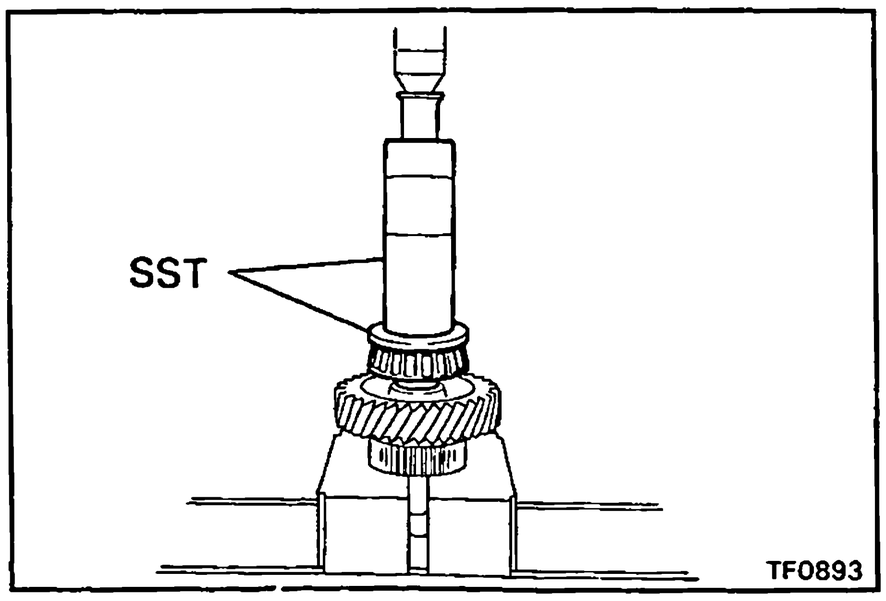
SST 09950-00020




**4. REMOVE IDLER LOW GEAR AND NEEDLE ROLLER BEARING**




**5. REMOVE HIGH AND LOW CLUTCH SLEEVE**

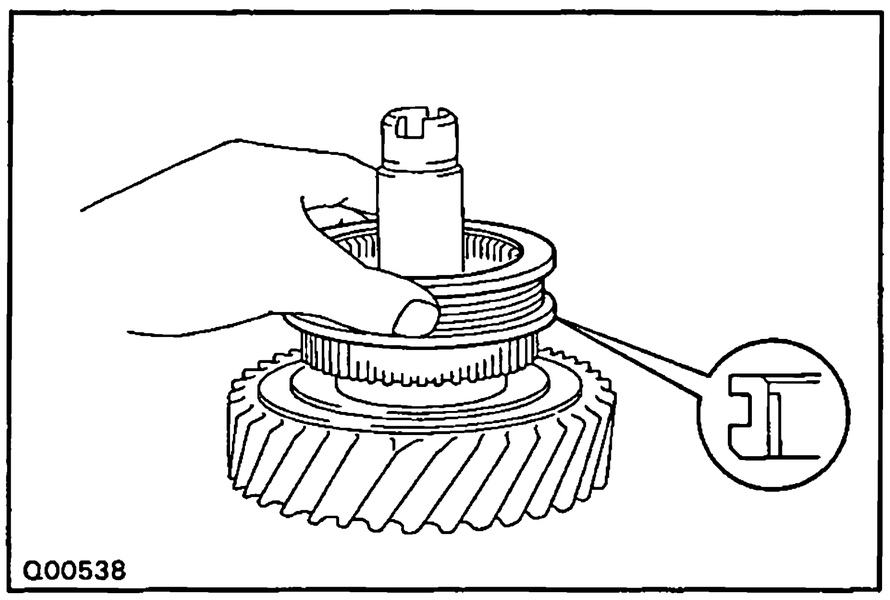



## ASSEMBLY OF IDLER GEAR ASSEMBLY

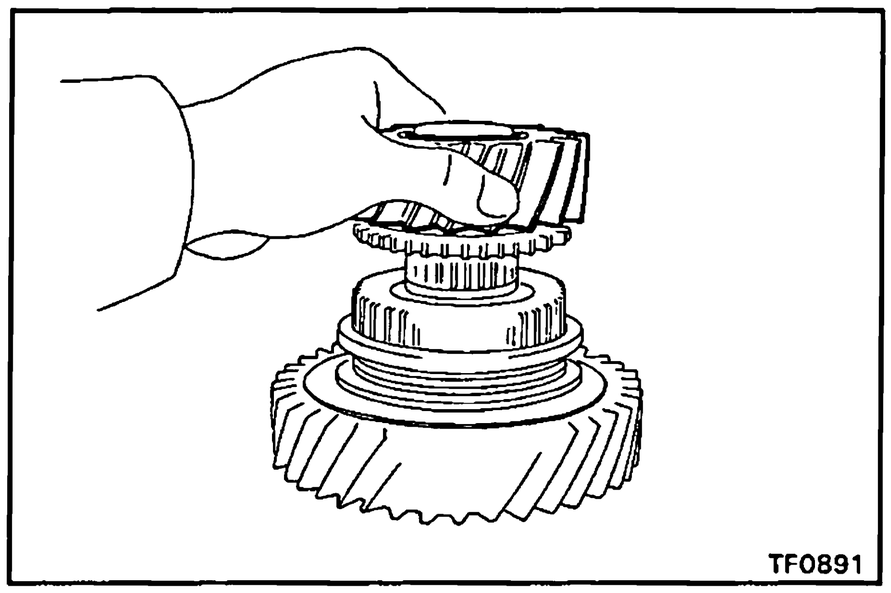
**1. INSTALL FRONT TAPER ROLLER BEARING**

Using SST and a press, install the front taper roller bearing.

SST 09316-60010 (09316-00010, 09316-00030)



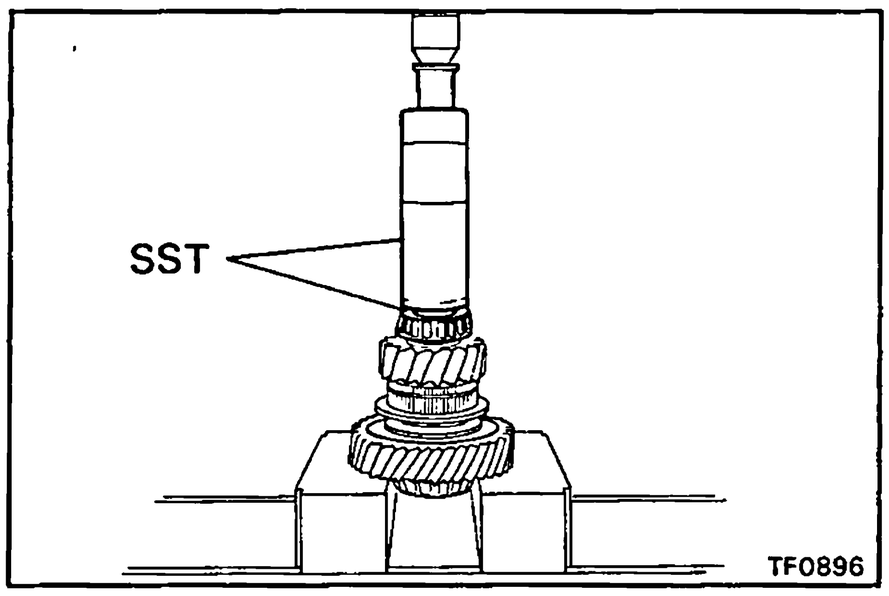

**2. INSTALL HIGH AND LOW CLUTCH SLEEVE**




**3. INSTALL NEEDLE ROLLER BEARING AND IDLER LOW GEAR**

(a) Apply gear oil to the needle roller bearing.

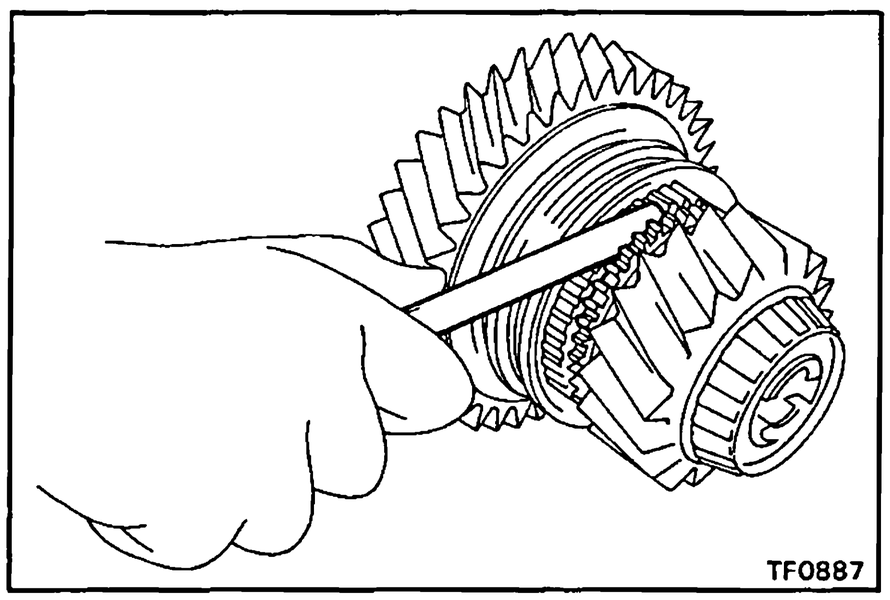
(b) Install the needle roller bearing and idler low gear.




**4. INSTALL REAR TAPER ROLLER BEARING**

Using SST and a press, install the rear taper roller bearing.

SST 09316-60010 (09316-00010, 09316-00070)

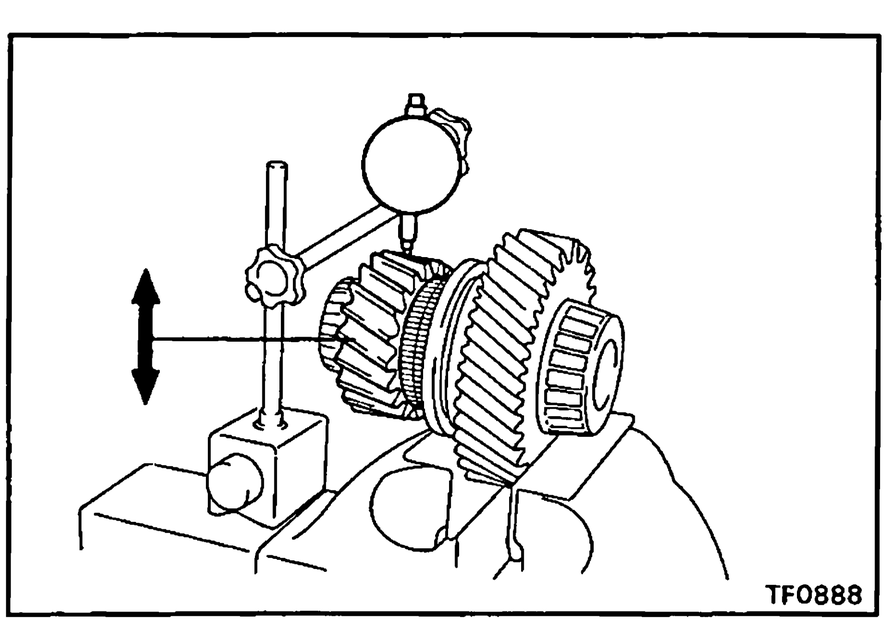



**5. MEASURE OIL CLEARANCE AND THRUST CLEARANCE OF IDLE LOW GEAR**

(a) Using a feeler gauge, measure the idler low gear thrust clearance.

**Standard clearance: 0.125 — 0.275 mm (0.0049 — 0.0108 in.)**

**Maximum clearance: 0.275 mm (0.0108 in.)**



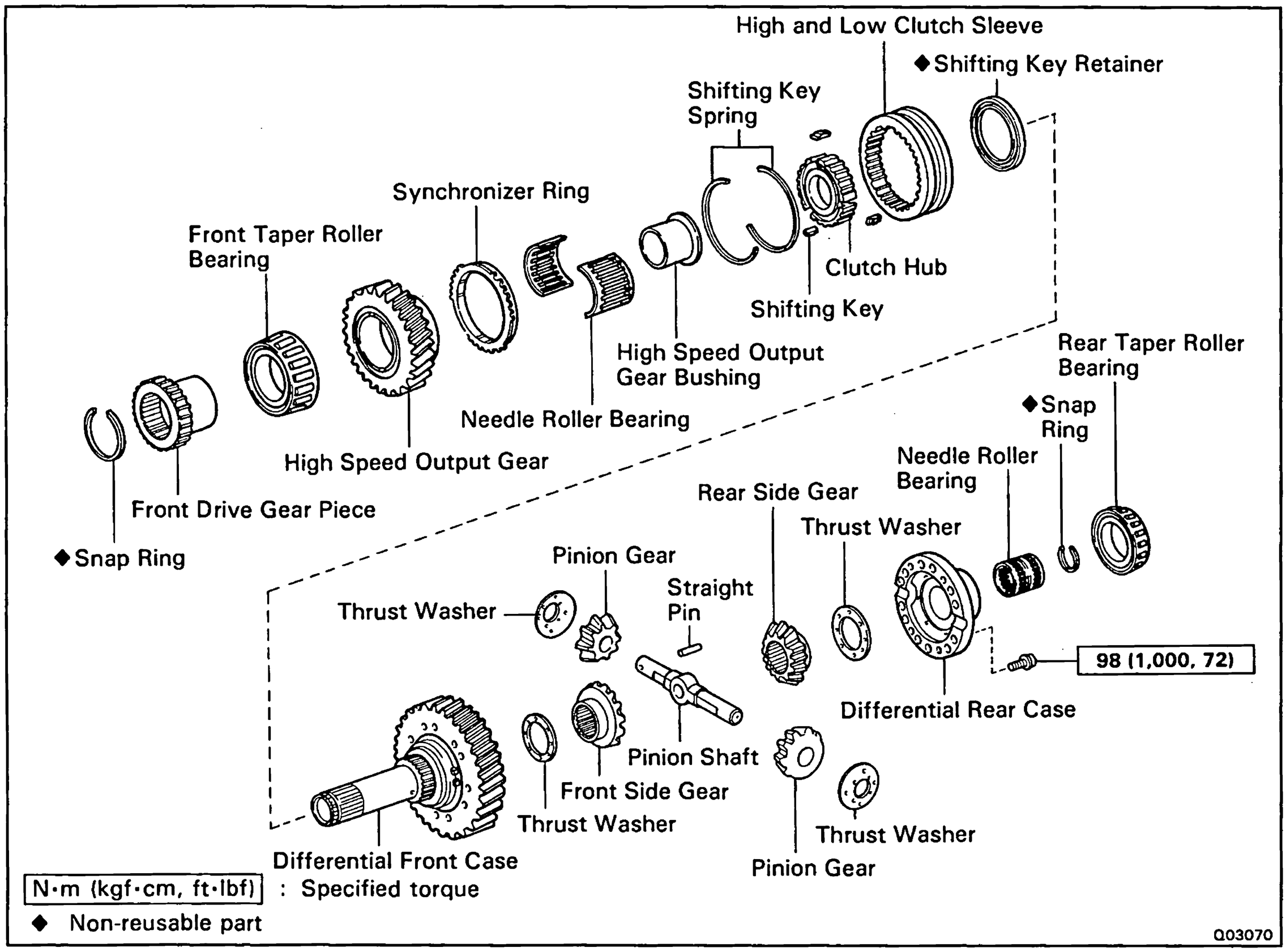

(b) Using a dial indicator, measure the idler low gear oil clearance.

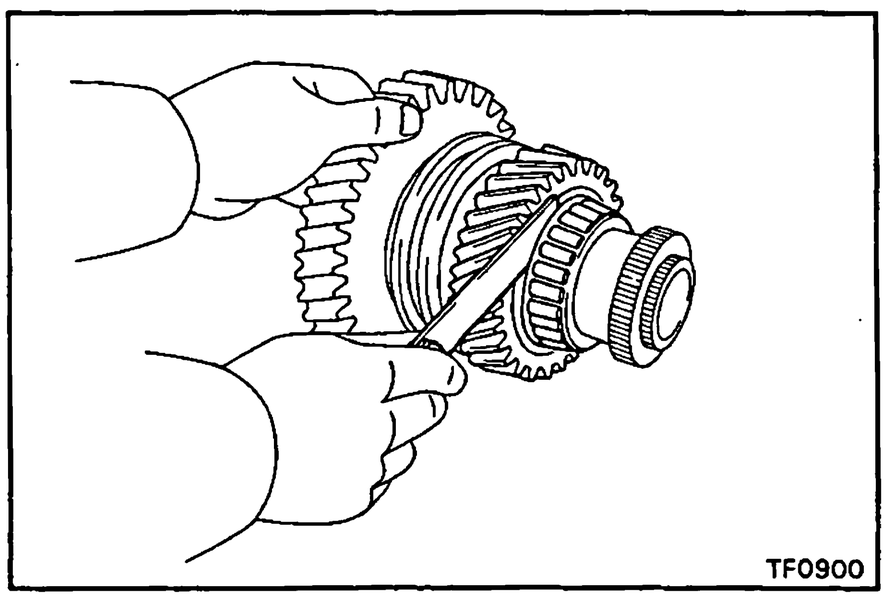
**Standard clearance: 0.015 — 0.068 mm (0.0006 — 0.0027 in.)**

**Maximum clearance: 0.068 mm (0.0027 in.)**

# Center Differential Assembly

## COMPONENTS



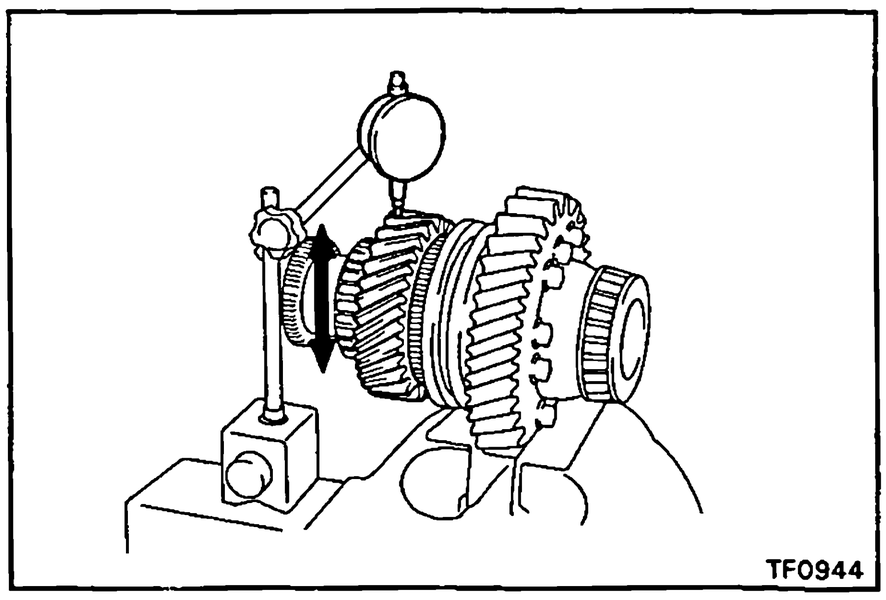

## DISASSEMBLY OF CENTER DIFFERENTIAL ASSEMBLY

### 1. CHECK OIL CLEARANCE AND THRUST CLEARANCE OF HIGH SPEED GEAR

(a) Using a feeler gauge, measure the high speed gear thrust clearance.

**Standard clearance:** **0.10 — 0.25 mm (0.0039 — 0.0098 in.)**

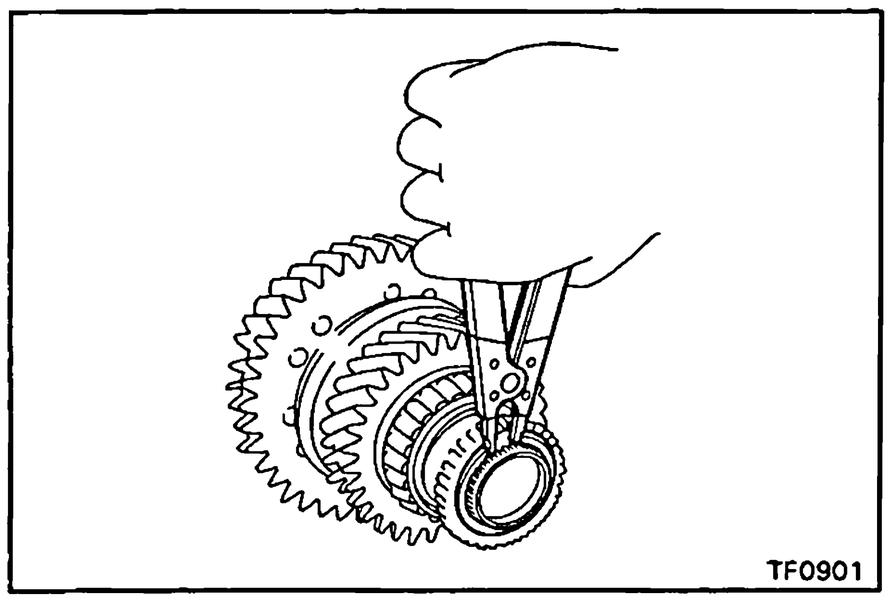
**Maximum clearance:** **0.25 mm (0.0098 in.)**




(b) Using a dial indicator, measure the high speed gear oil clearance.

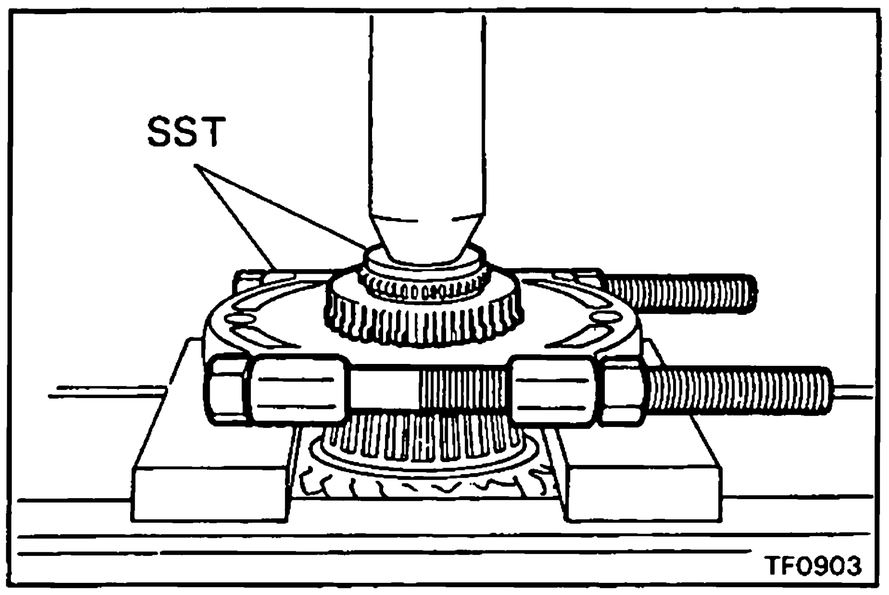
**Standard clearance:** **0.015 — 0.071 mm (0.0006 — 0.0028 in.)**

**Maximum clearance:** **0.071 mm (0.0028 in.)**




**2. REMOVE FRONT DRIVE GEAR PIECE**

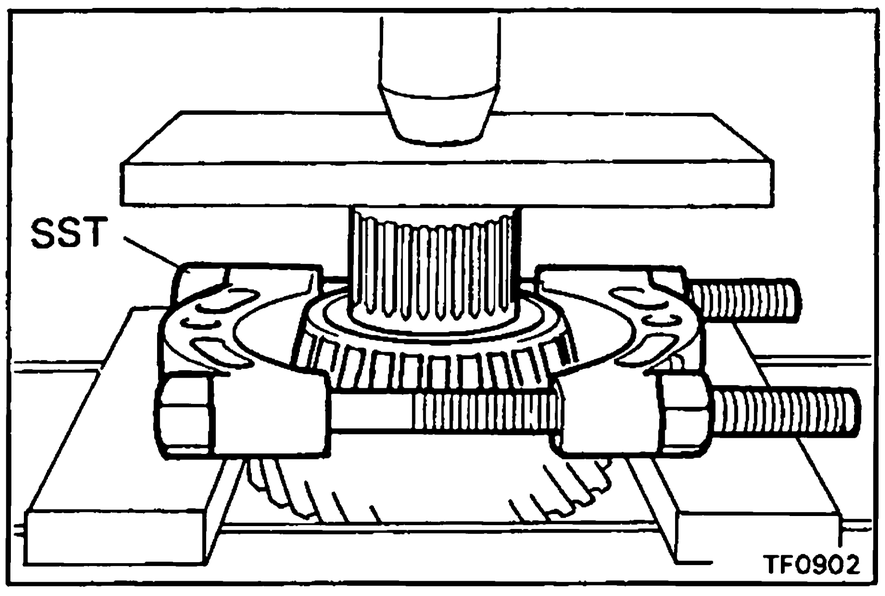
(a) Using snap ring pliers, remove the snap ring.




(b) Using SST and a press, remove the front drive gear piece.

SST 09950-20017, 09950-00020

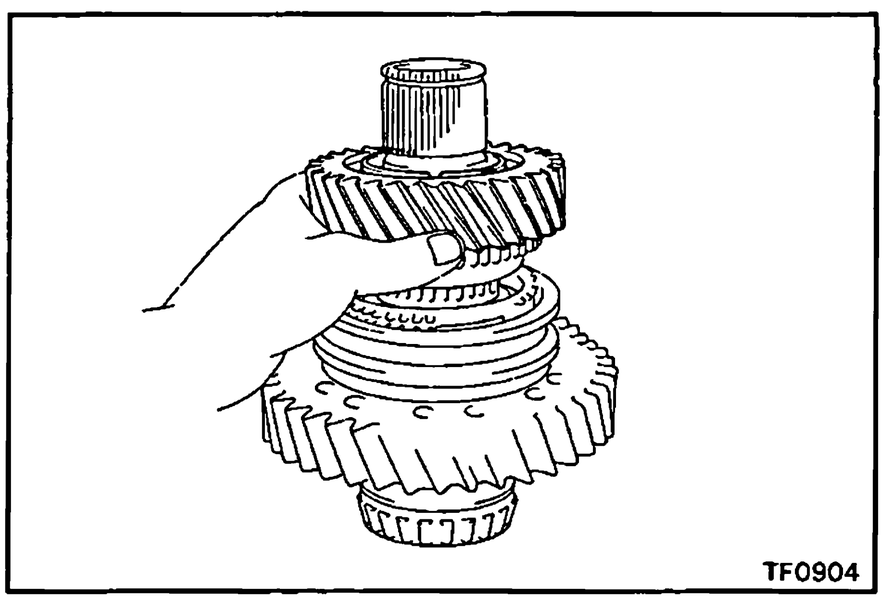
**NOTICE: Be careful do not drop the center differential assembly.**



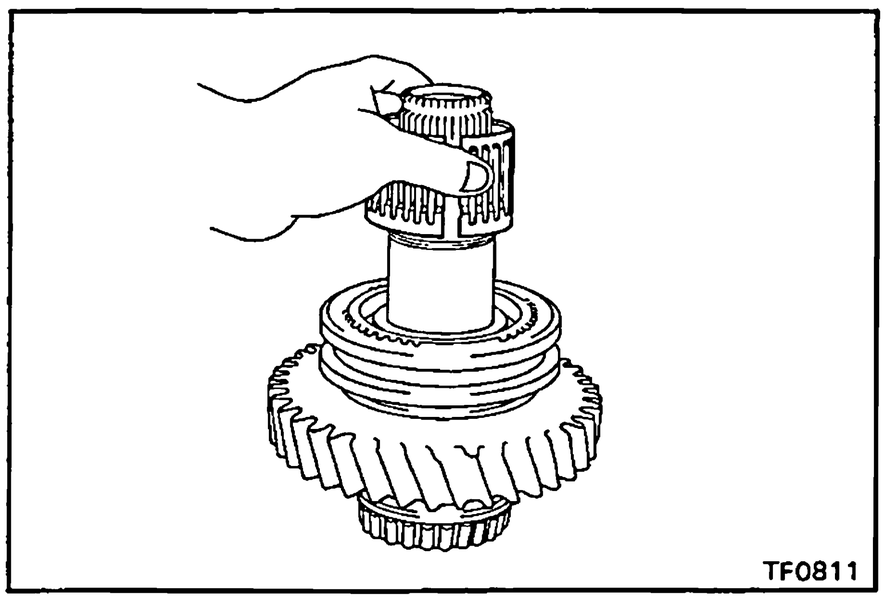

**3. REMOVE FRONT TAPER ROLLER BEARING**

Using SST and a press, remove the front taper roller bearing.

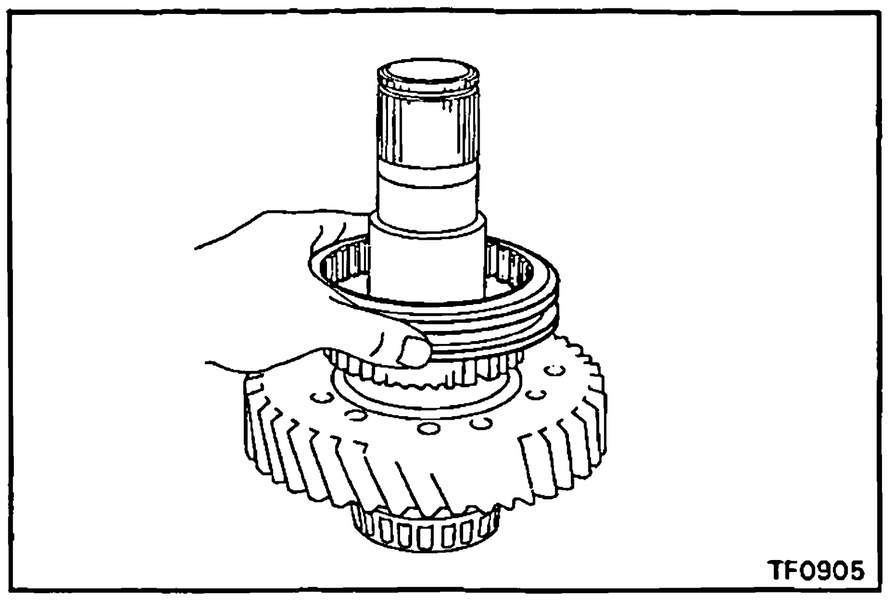
SST 09950-00020



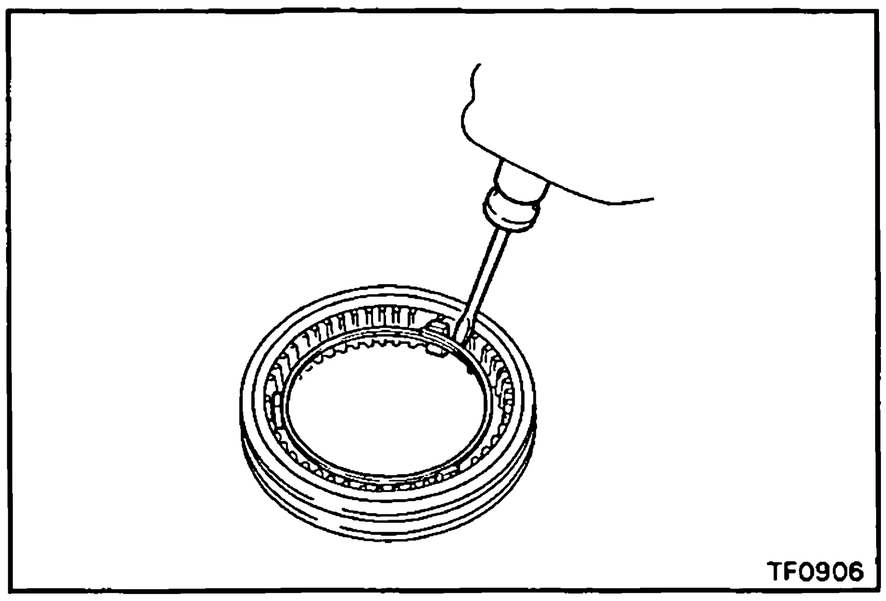

**4. REMOVE HIGH SPEED OUTPUT GEAR AND SYNCHRONIZER RING**




**5. REMOVE NEEDLE ROLLER BEARING**

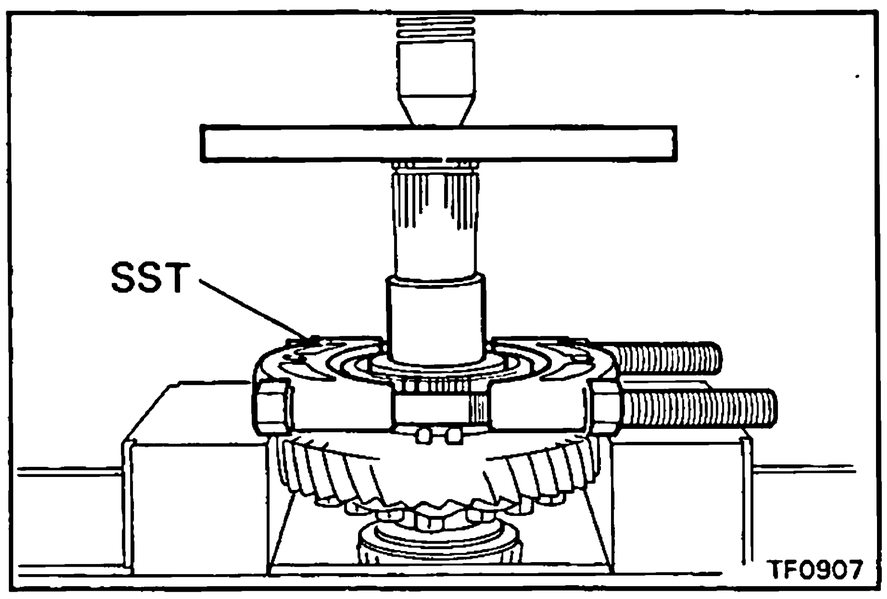



**6. REMOVE HIGH AND LOW CLUTCH SLEEVE ASSEMBLY**




**7. REMOVE HIGH AND LOW CLUTCH SLEEVE SHIFTING KEYS AND SPRINGS**

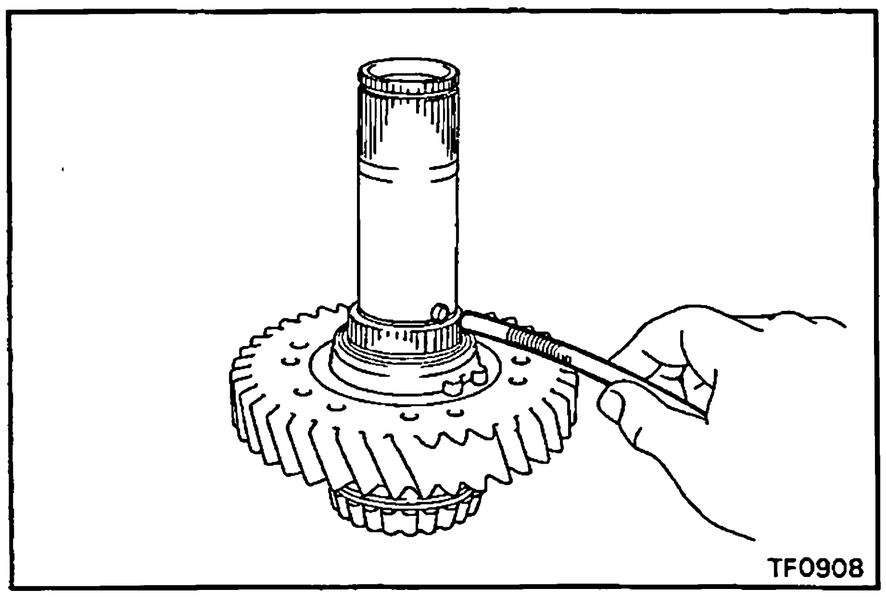
Using a screwdriver, remove the two shifting key springs and shifting keys.



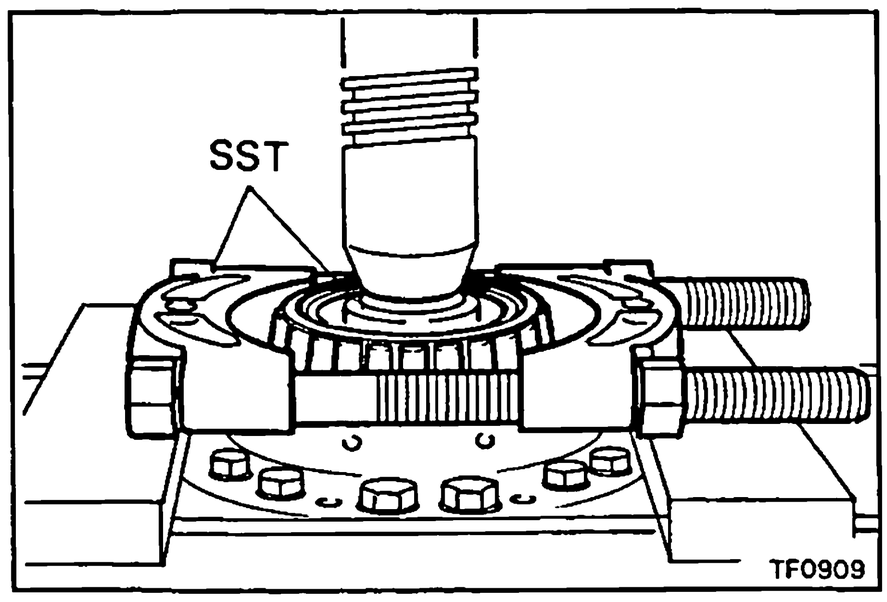

**8. REMOVE HIGH SPEED OUTPUT GEAR BUSHING, CLUTCH HUB AND SHIFTING KEY RETAINER**

(a) Using SST and a press, remove the high speed output gear bushing, clutch hub and shifting key retainer.

SST 09555-55010




(b) Using a magnetic finger, remove the two straight pins.

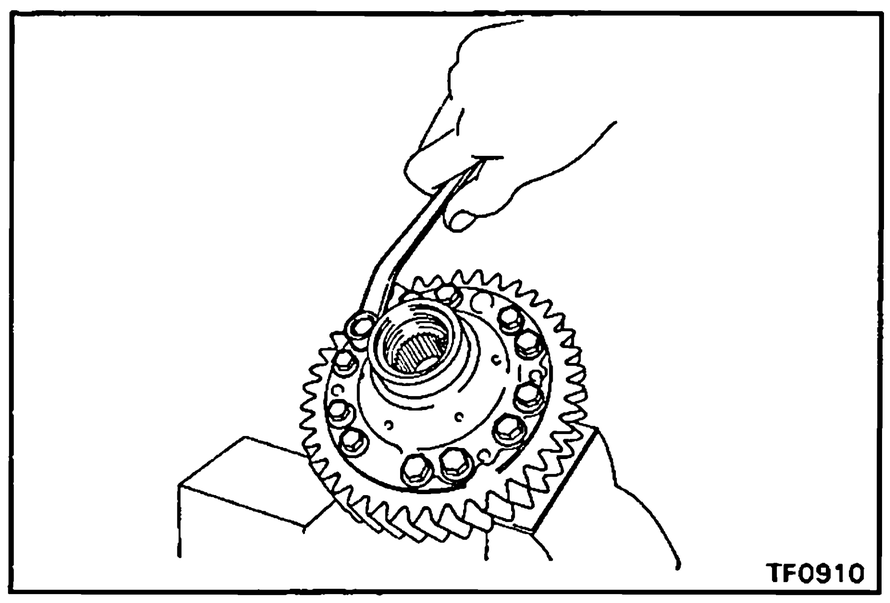



**9. REMOVE REAR TAPER ROLLER BEARING**

Using SST and a press, remove the rear taper roller bearing.

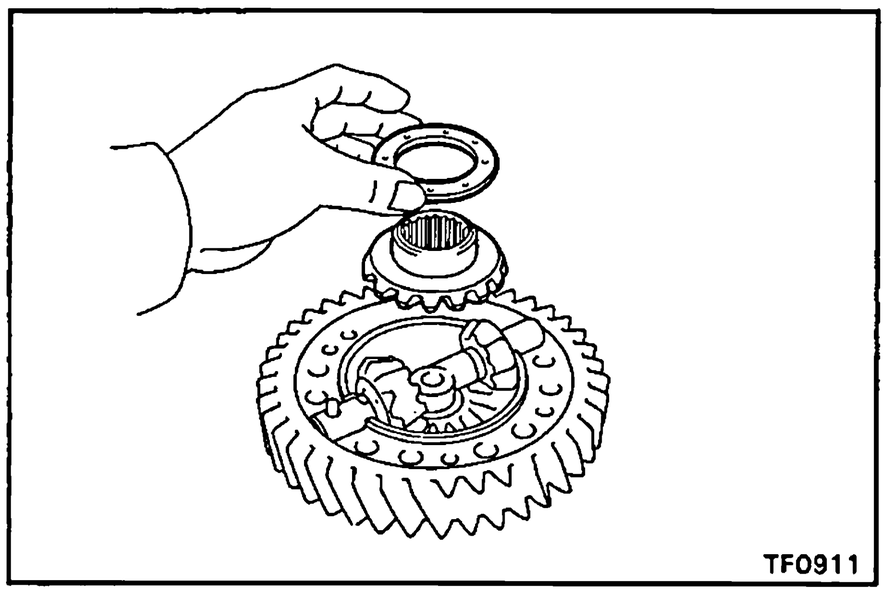
SST 09950-00020, 09950-20017 (09958-30010)

**10. REMOVE SNAP RING AND NEEDLE ROLLER BEARING**

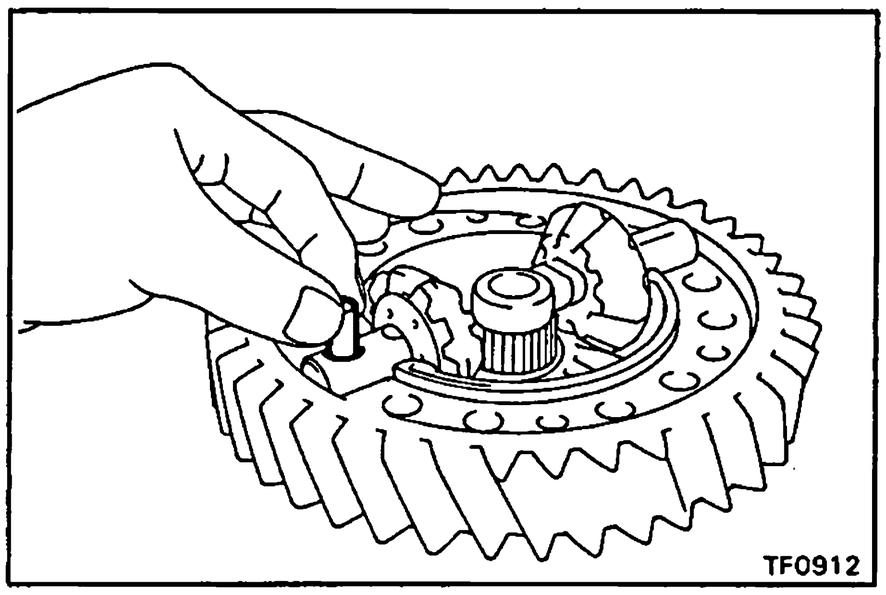



**11. REMOVE DIFFERENTIAL REAR CASE**

Remove the twelve bolts and differential rear case.

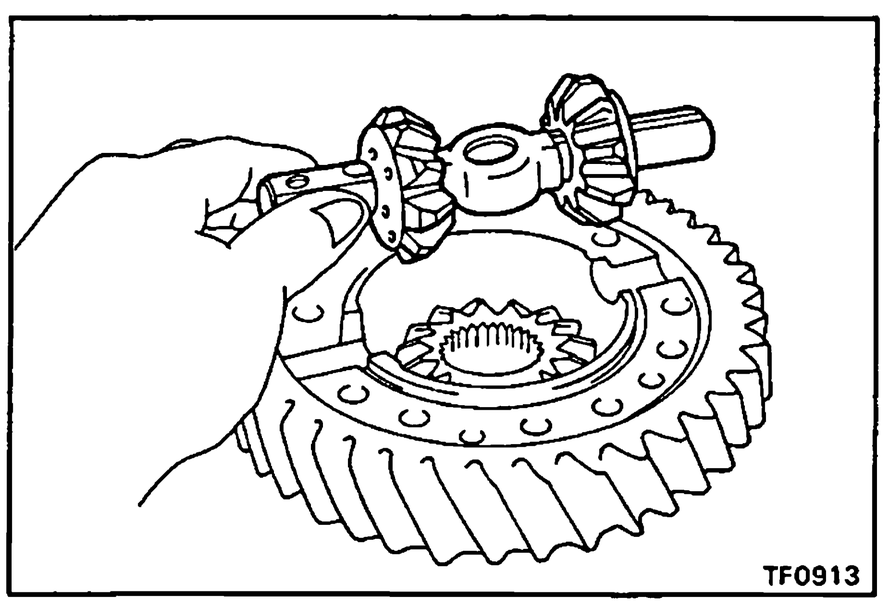



**12. REMOVE REAR SIDE GEAR AND THRUST WASHER**

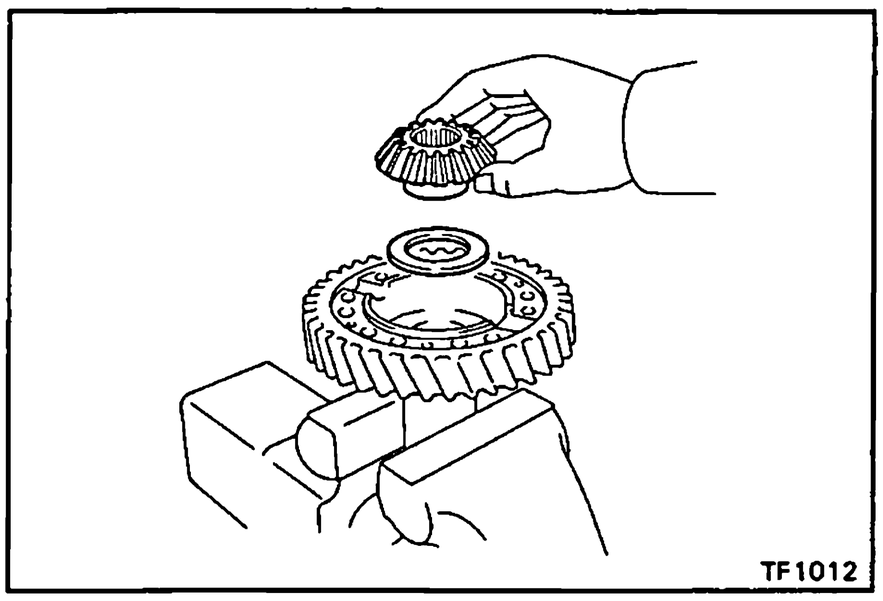



**13. REMOVE PINION SHAFT, PINION GEAR AND THRUST WASHER**

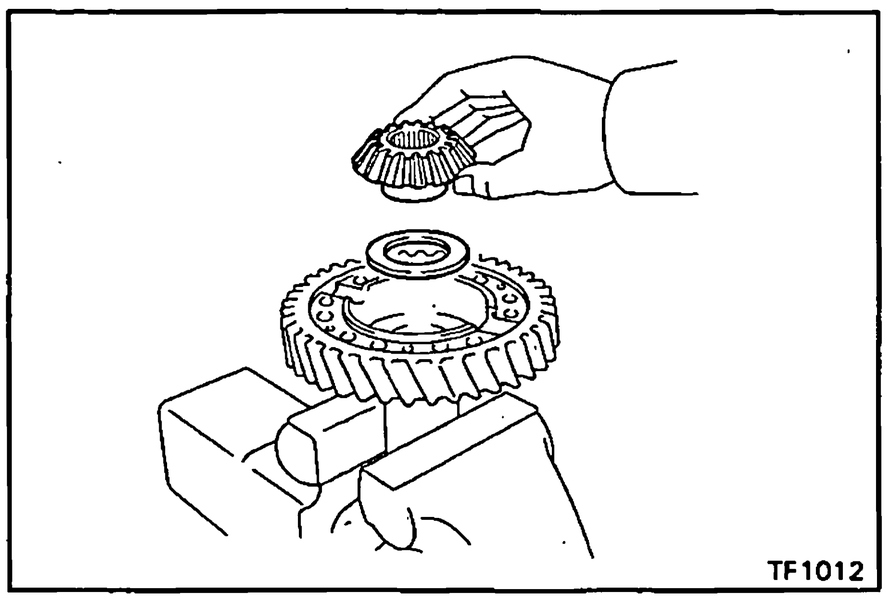
(a) Remove the straight pin.




(b) Remove the pinion shaft, pinion gear and thrust washer.




(c) Remove the front side gear and thrust washer.

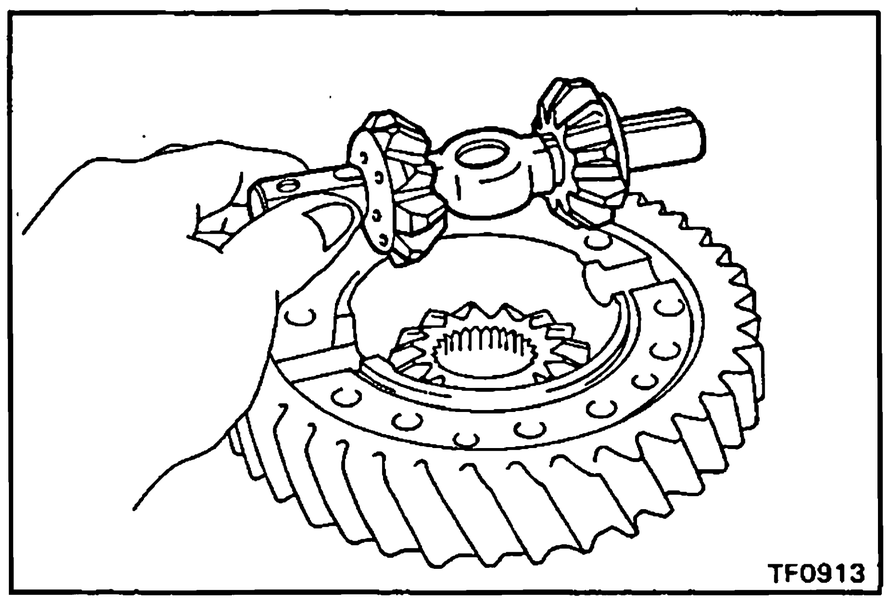

TF1012

# ASSEMBLY OF CENTER DIFFERENTIAL ASSEMBLY

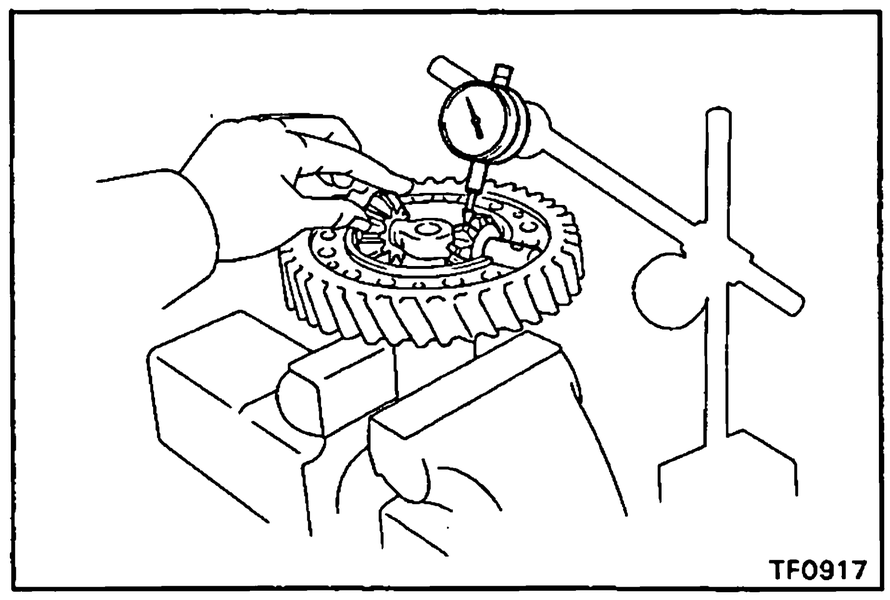
## 1. INSTALL PINION SHAFT, PINION GEAR AND THRUST WASHER

HINT: Coat all of the sliding and rotating surface with gear oil before assembly.

(a) Install the front side gear and thrust washer to the differential front case.


TF0913

(b) Install the two pinion gears and thrust washers to the differential front case.


TF0917

(c) Using a dial indicator, measure the front case backlash.

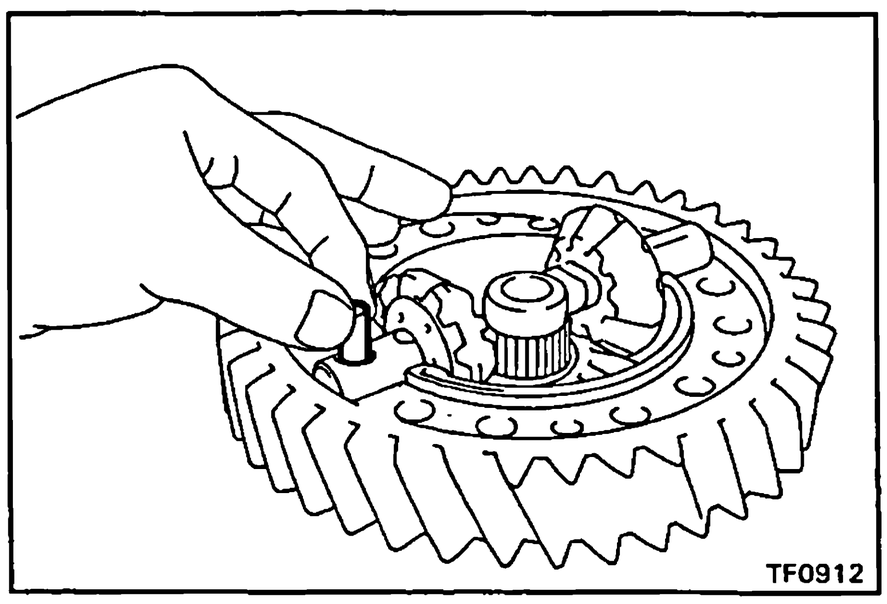
HINT: Push the pinion shaft.

**Minimum backlash: 0.05 mm (0.0020 in.)**

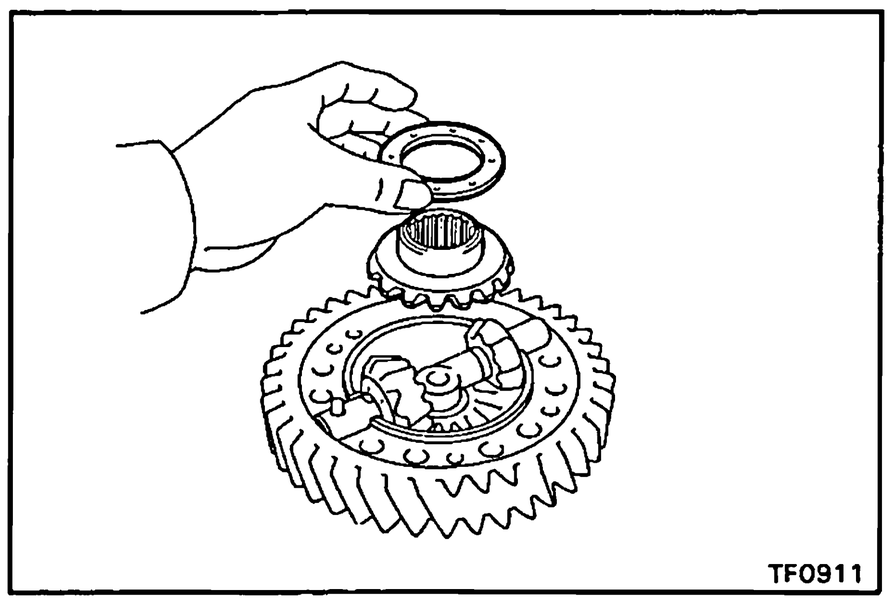
If the backlash is not within specification, replace the thrust washer with one of the correct size and reinstall the thrust washer.

| Thickness mm (in.) |
|---|
| 1.70 (0.0669) |
| 1.85 (0.0728) |
| 2.00 (0.0787) |
| 2.15 (0.0846) |
| 2.30 (0.0906) |
| 2.45 (0.0965) |
| 2.60 (0.1024) |
| 2.75 (0.1083) |
| 2.90 (0.1142) |
| 3.05 (0.1201) |

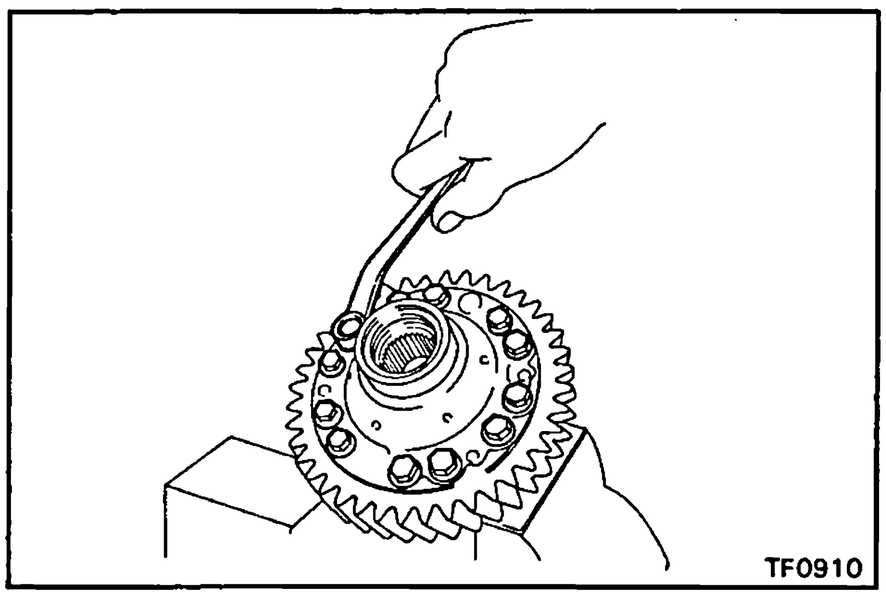
(d) Measure the rear case backlash.
**(See steps (a) to (c))**


TF0912

## 2. INSTALL STRAIGHT PIN

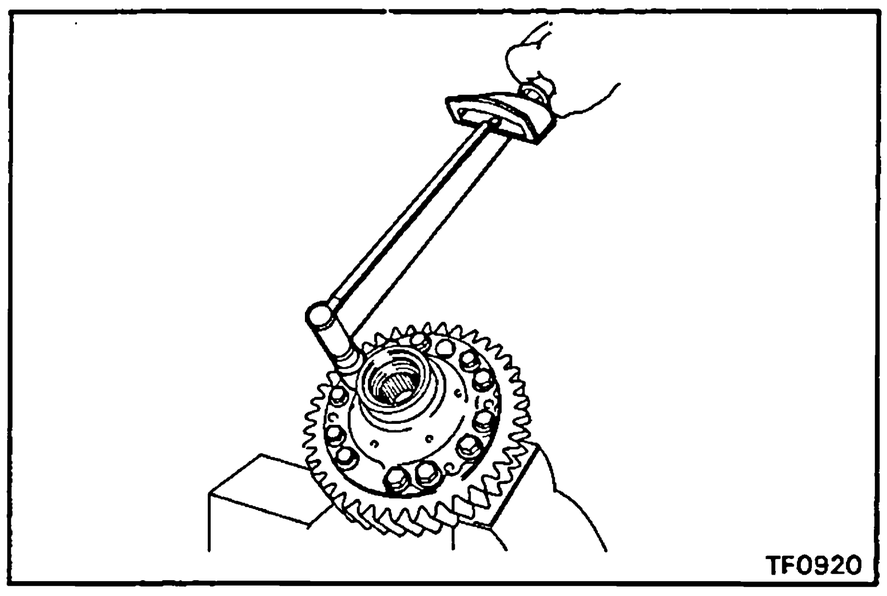



### 3. INSTALL REAR SIDE GEAR AND THRUST WASHER




### 4. INSTALL DIFFERENTIAL REAR CASE

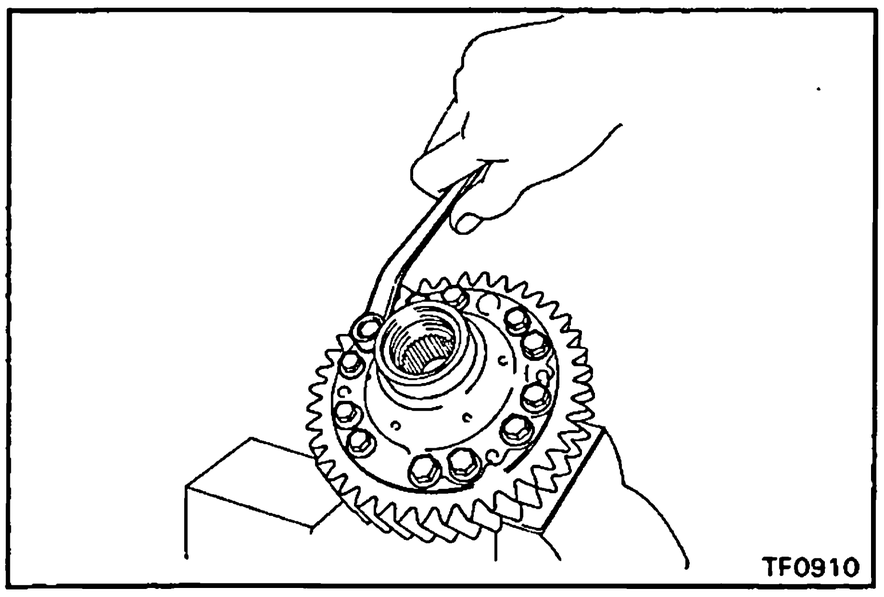
Temporary install the differential rear case and set bolts.



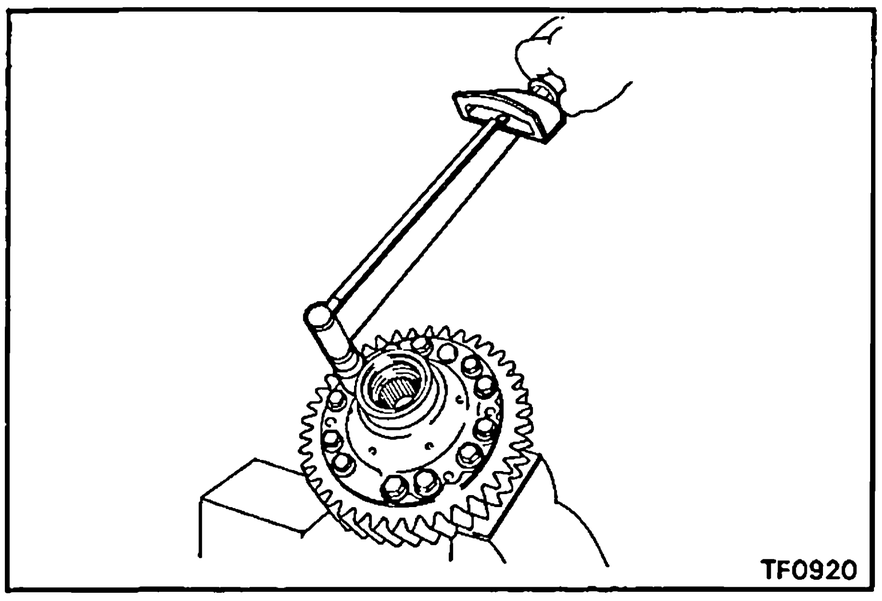

### 5. TORQUE REAR CASE SET BOLTS

(a) Torque the rear case set bolts.

**Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)**



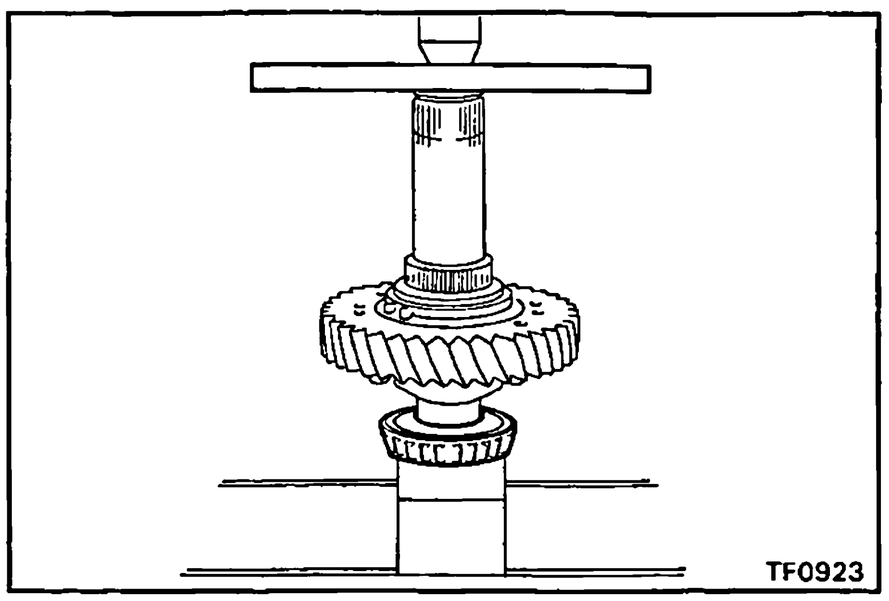

(b) Loosen the rear case set bolts.




(c) Retorque the rear case set bolts.

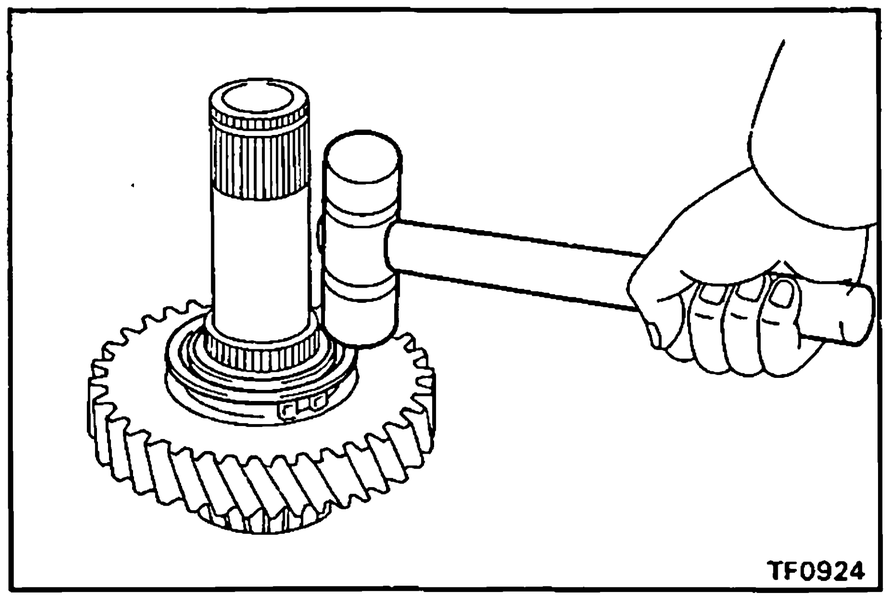
**Torque: 98 N·m (1000 kgf·cm, 72 ft·lbf)**

### 6. INSTALL NEEDLE ROLLER BEARING AND SNAP RING



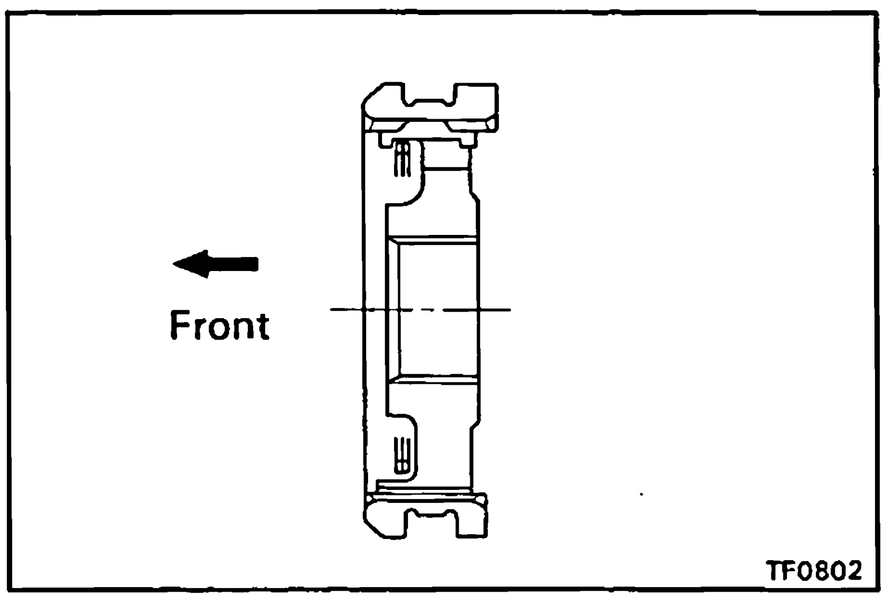

**7. INSTALL REAR TAPER ROLLER BEARING**

Using a press, install the rear taper roller bearing.




**8. INSTALL SHIFTING KEY RETAINER**

Using a plastic hammer, tap in the shifting key retainer.

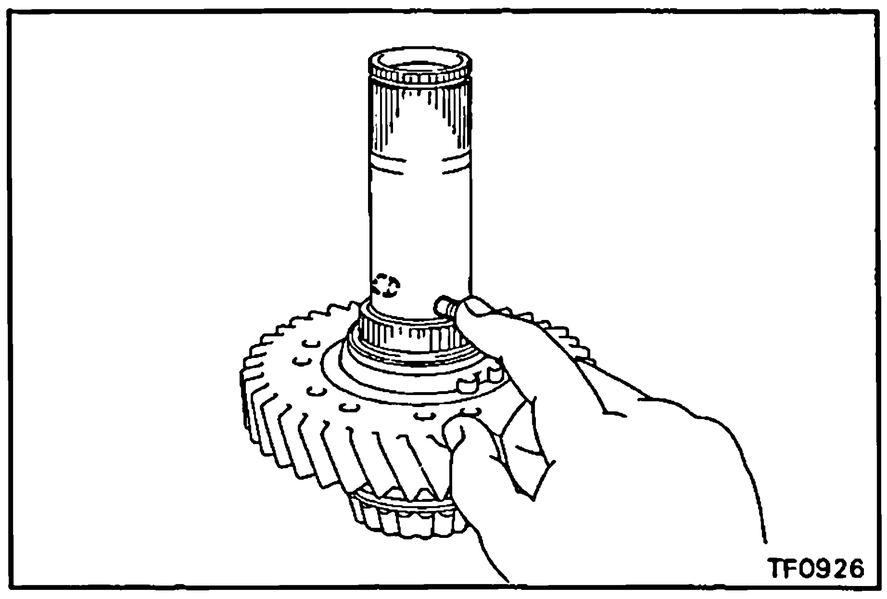



**9. INSERT CLUTCH HUB INTO HIGH AND LOW CLUTCH SLEEVE**

(a) Install the clutch hub and shifting keys to the high and low clutch sleeve.

(b) Install the shifting key springs.

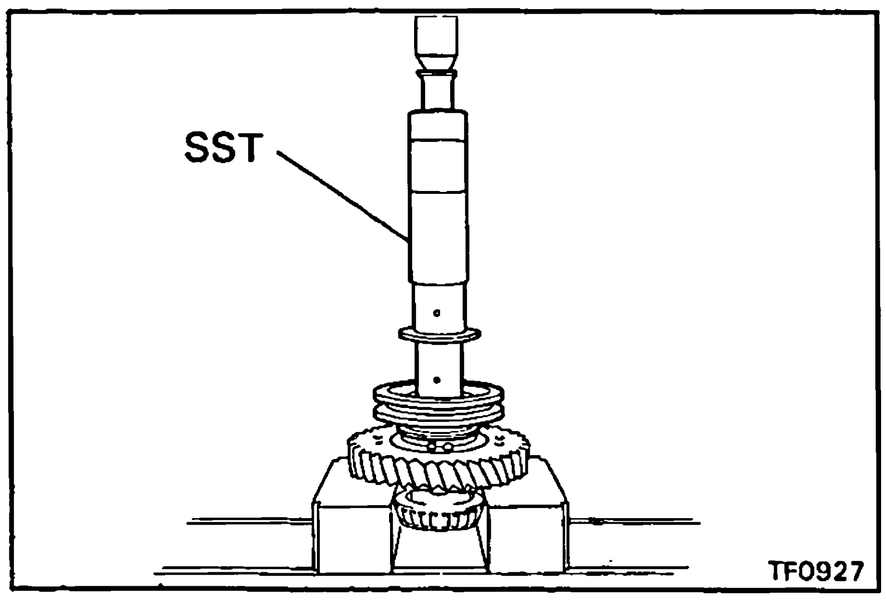
**NOTICE: Install the key springs positioned so that their end gaps are not in line.**




**10. INSTALL HIGH AND LOW CLUTCH SLEEVE ASSEMBLY AND HIGH SPEED OUTPUT GEAR BUSHING**

(a) Apply MP grease to the straight pin.

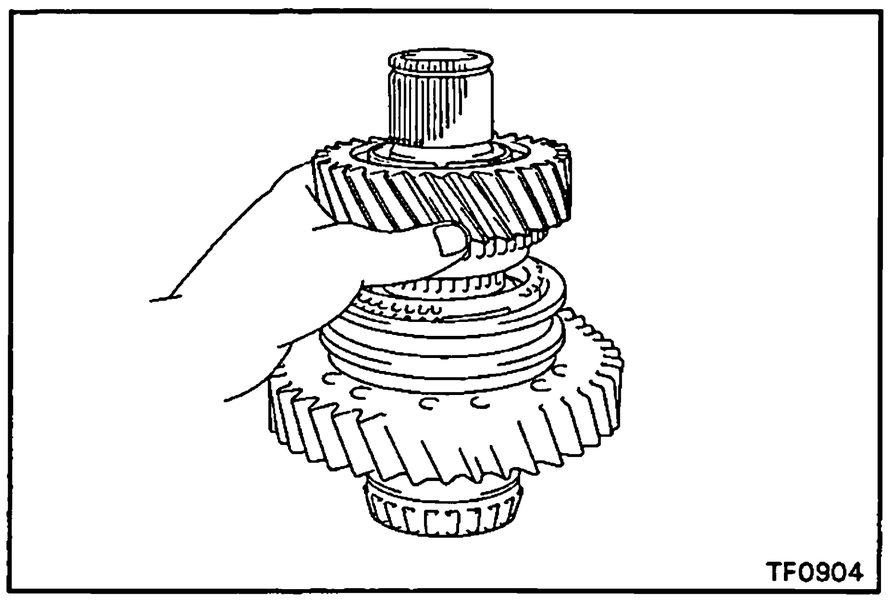
(b) Install the two straight pins.




(c) Using SST and a press, install the clutch sleeve assembly and high speed output gear bushing.

SST 09316-60010 (09316-00010)

**NOTICE: Before pressing, align the holes on the bushing and shaft so that the pin on the shaft aligned with the cutting portion of the bushing.**

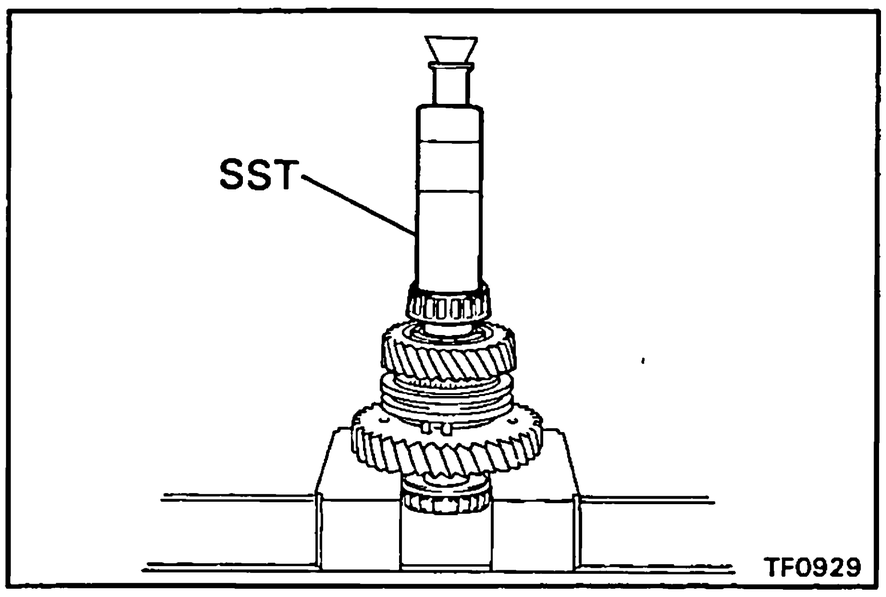

TF0904

**11. INSTALL HIGH SPEED OUTPUT GEAR AND NEEDLE ROLLER BEARING**

(a) Apply gear oil to the needle roller bearing.

(b) Place the synchronizer ring on the gear and install the high speed output gear and needle roller bearing.

**NOTICE: Align the ring slots with the shifting keys.**

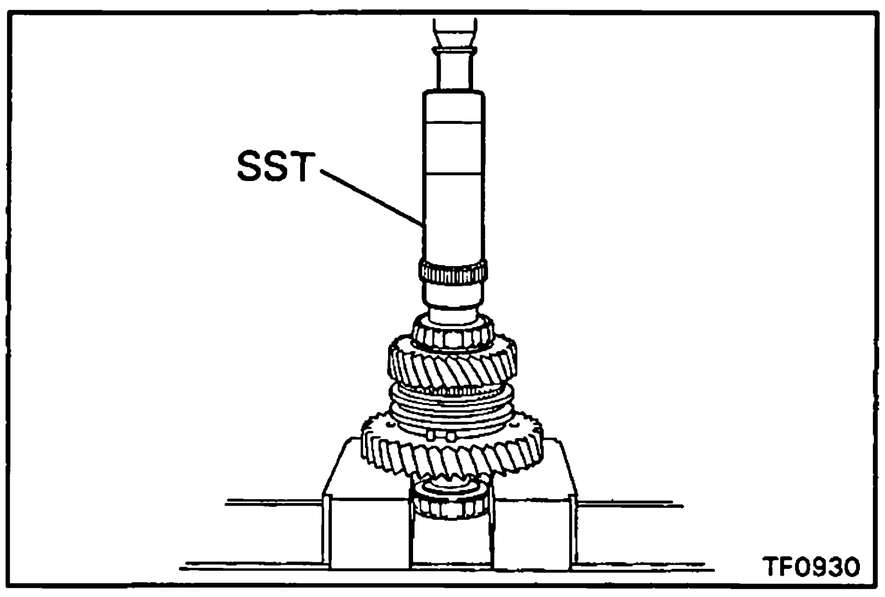


TF0929

**12. INSTALL FRONT TAPER ROLLER BEARING**

Using SST and a press, install the front taper roller bearing.

SST 09316-60010 (09316-00010)

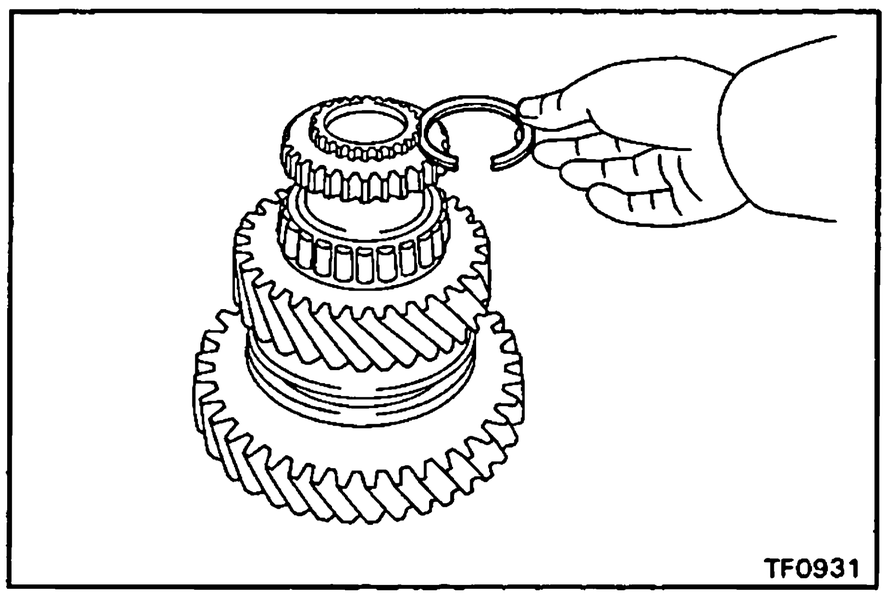


TF0930

**13. INSTALL FRONT DRIVE GEAR PIECE**

Using SST and a press, install the front drive gear piece.

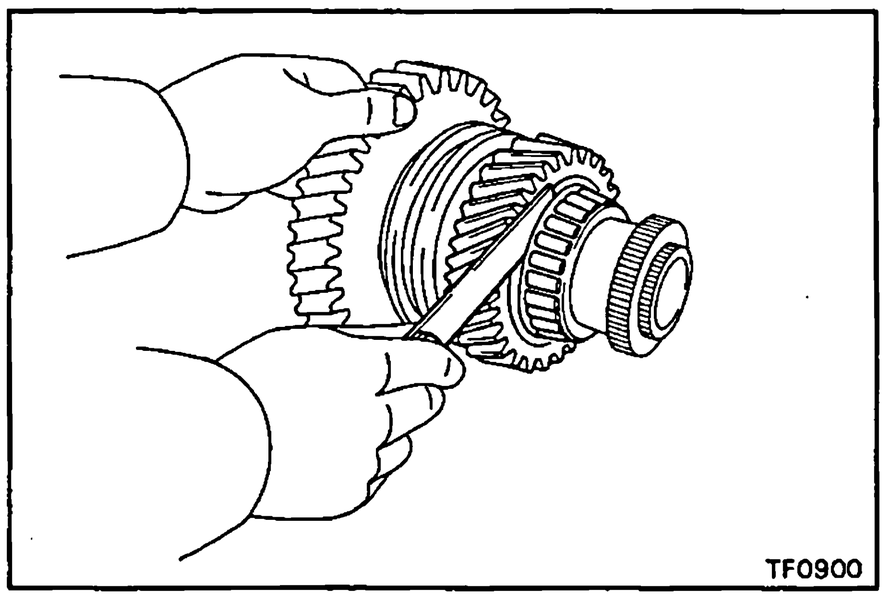
SST 09316-60010 (09316-00010)

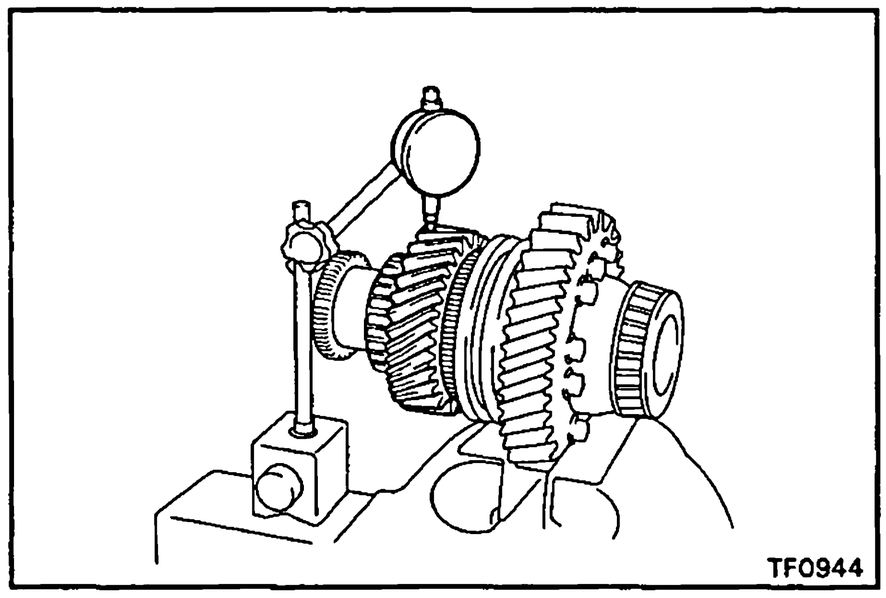

TF0931

**14. INSTALL SNAP RING**

Select a snap ring that will allow minimum axial play and install it on the shaft.

| Mark | Thickness mm (in.) |
|---|---|
| A | 2.00 (0.0787) |
| B | 2.10 (0.0827) |
| C | 2.20 (0.0866) |
| D | 2.30 (0.0906) |
| E | 2.40 (0.0945) |
| F | 2.50 (0.0984) |
| G | 2.60 (0.1024) |
| H | 2.70 (0.1063) |
| J | 2.80 (0.1102) |
| K | 1.80 (0.0709) |
| L | 1.90 (0.0748) |


TF0900


TF0944

**15. MEASURE OIL CLEARANCE AND THRUST CLEARANCE OF HIGH SPEED OUTPUT GEAR THRUST CLEARANCE**

(a) Using a feeler gauge, measure the high speed gear thrust clearance.

**Standard clearance:** **0.10 — 0.25 mm (0.0039 — 0.0098 in.)**

**Maximum clearance:** **0.25 mm (0.0098 in.)**

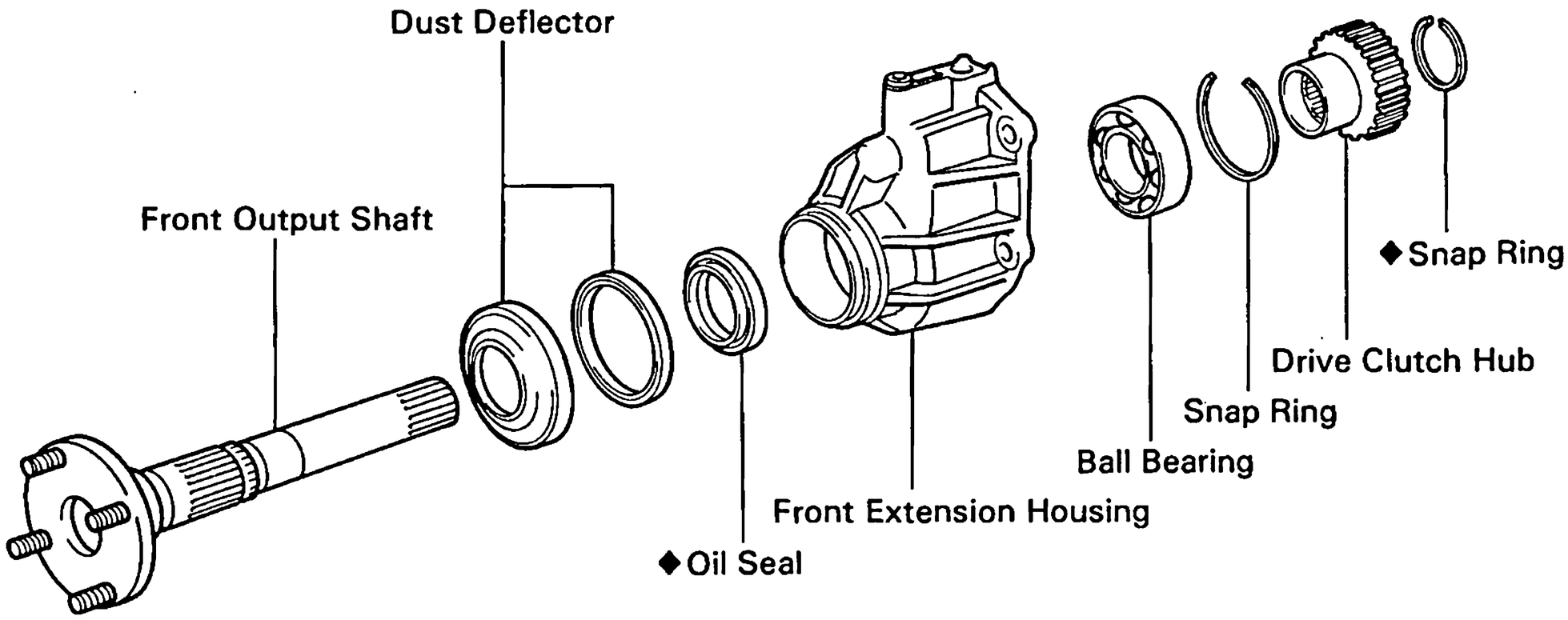
(b) Using a dial indicator, measure the high speed gear oil clearance.

**Standard clearance:** **0.015 — 0.071 mm (0.0006 — 0.0028 in.)**

**Maximum clearance:** **0.071 mm (0.0028 in.)**

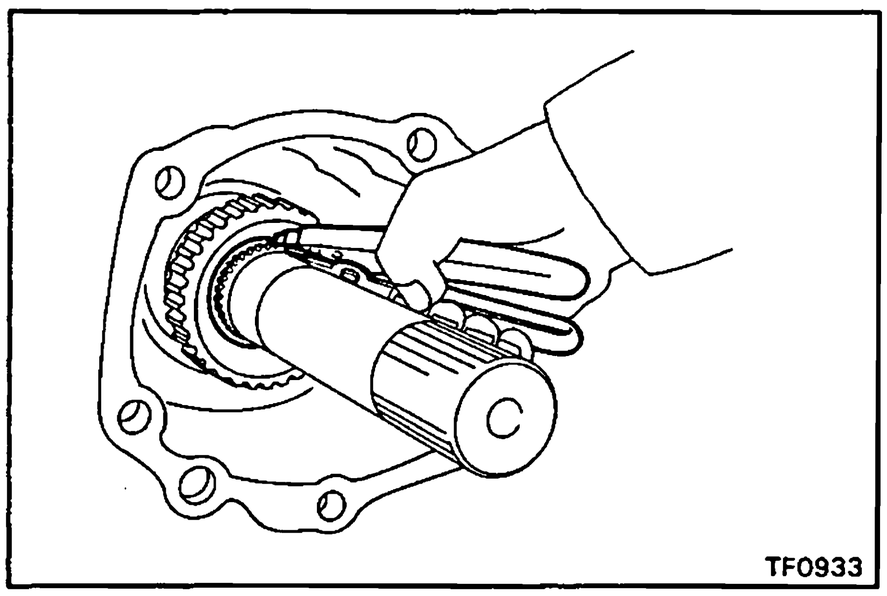
# Front Extension Housing Assembly

## COMPONENTS




◆ Non-reusable part

TF0932

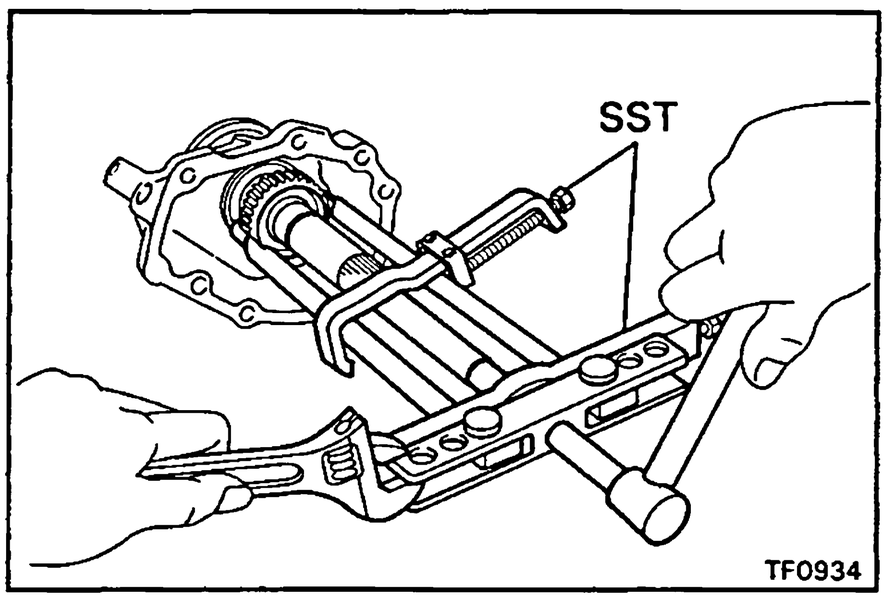


TF0933

## DISASSEMBLY OF FRONT EXTENSION HOUSING ASSEMBLY

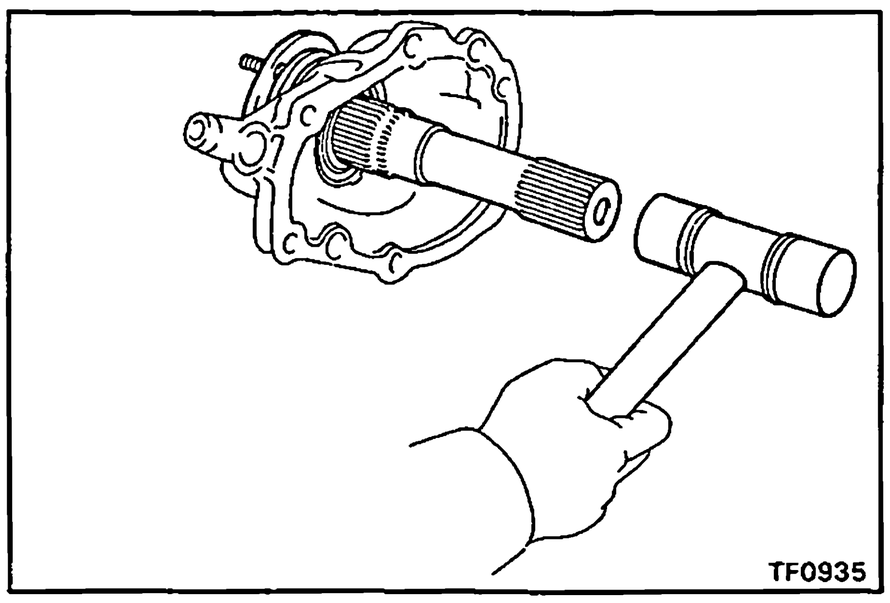
### 1. REMOVE DRIVE CLUTCH HUB

(a) Using snap ring pliers, remove the snap ring.



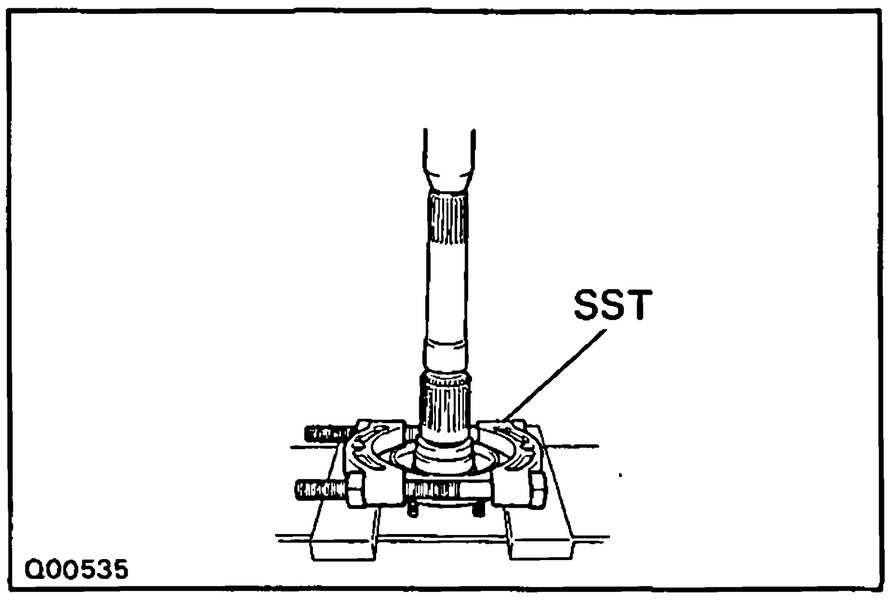

TF0934

(b) Using SST, remove the drive clutch hub.
SST 09950-20017




**2. REMOVE FRONT OUTPUT SHAFT**

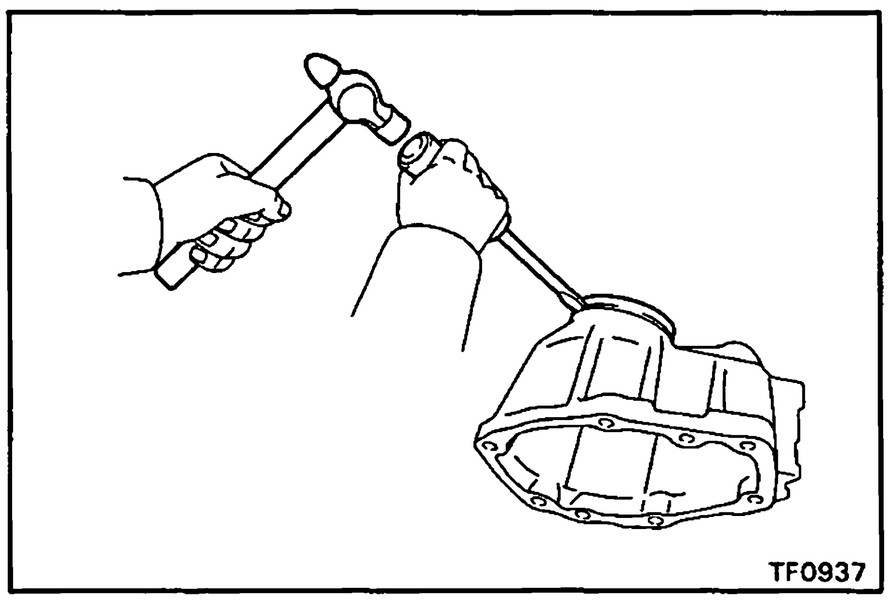
Using a plastic hammer, drive out the front output shaft.



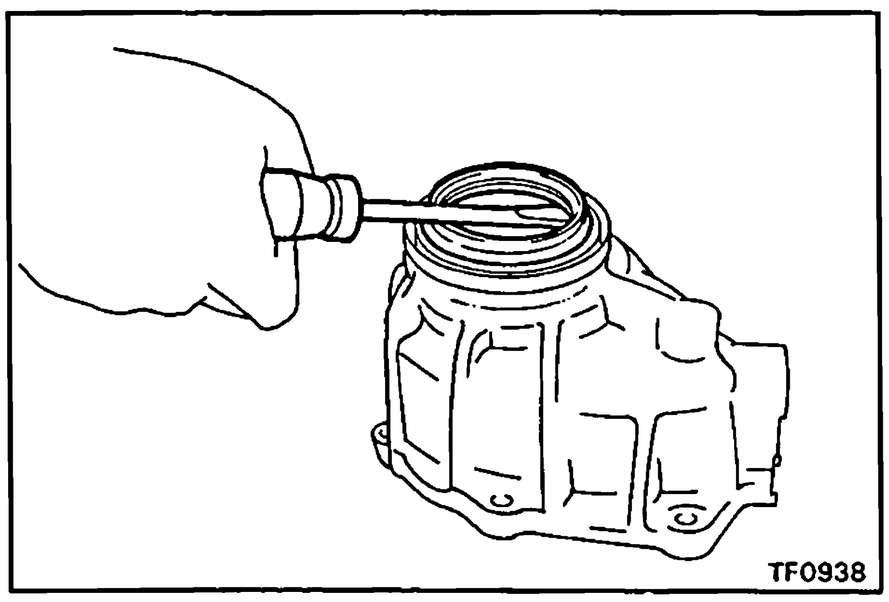

**3. REMOVE DUST DEFLECTORS**

(a) Using SST and a press, remove the dust deflector.

SST 09950-00020

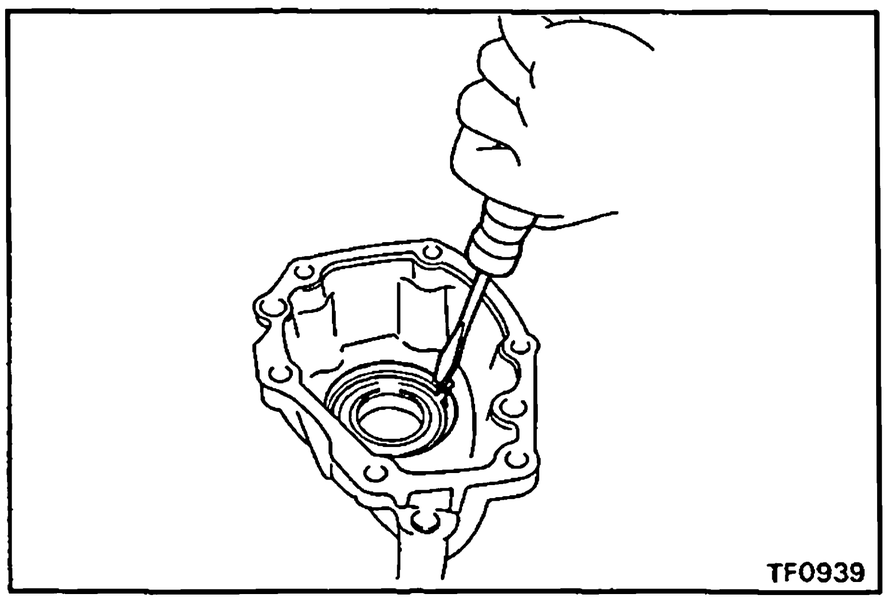



(b) Using a screwdriver and hammer, tap the dust deflector and remove it.



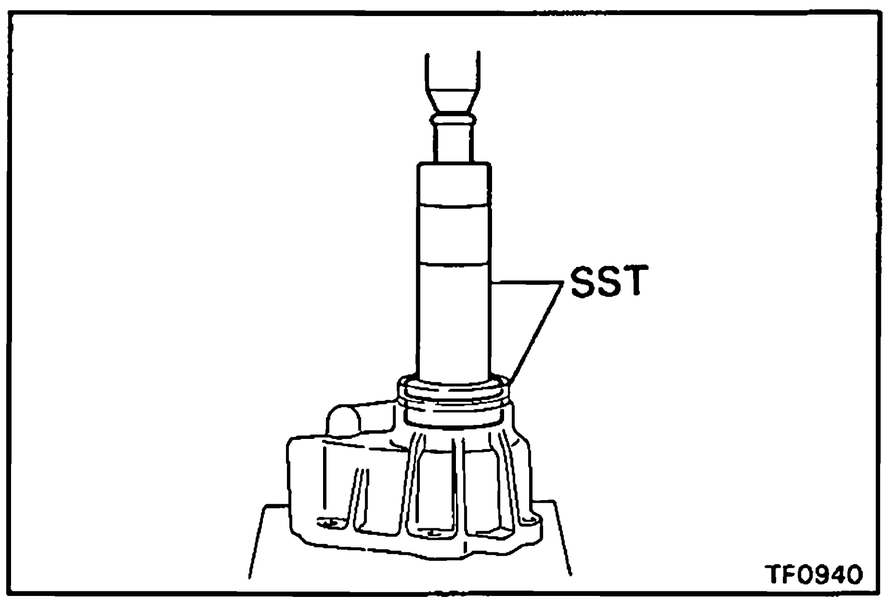

**4. REMOVE OIL SEAL**

Using a screwdriver, pry out the oil seal.

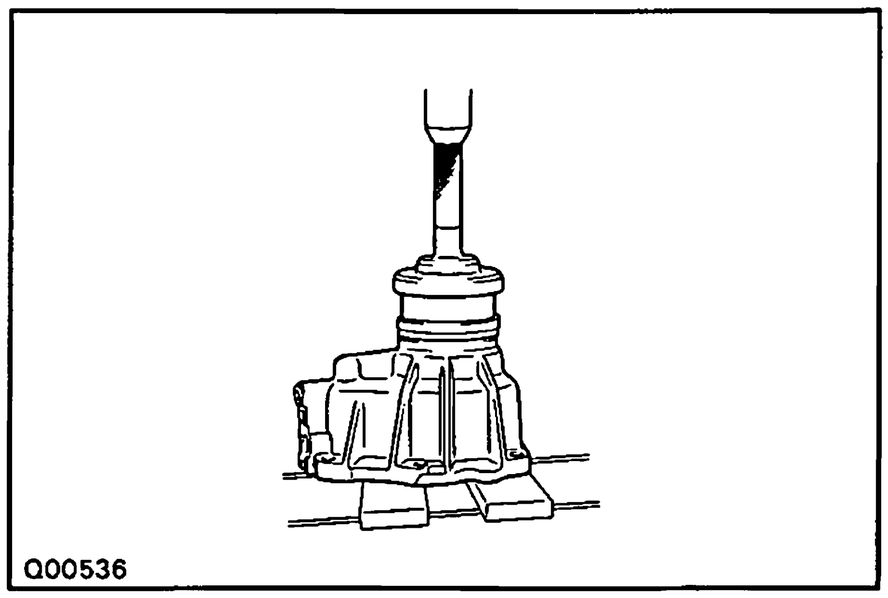



**5. REMOVE BALL BEARING**

(a) Using a screwdriver, remove the snap ring.



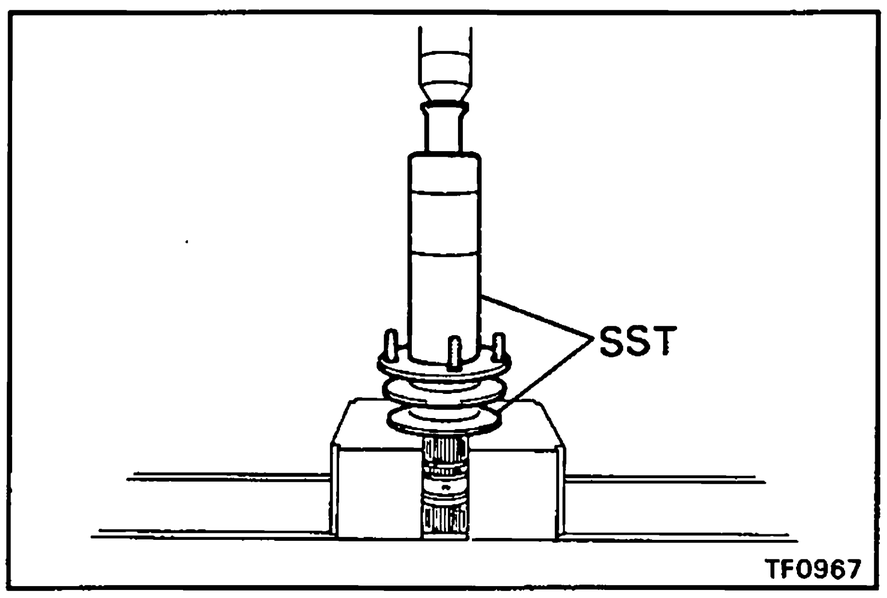

(b) Using SST and a press, remove the ball bearing.
SST 09316-60010 (09316-00010, 09316-00070)



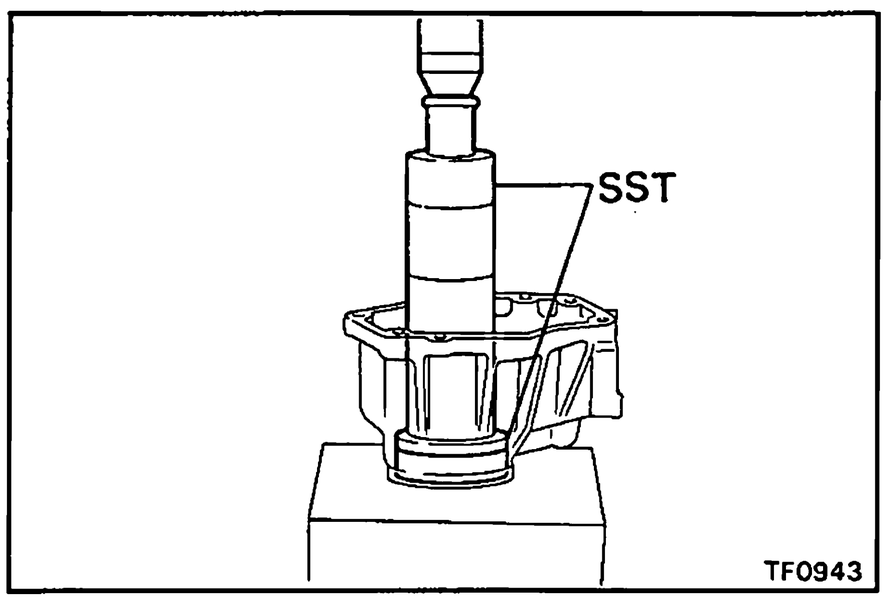

## ASSEMBLY OF FRONT EXTENSION HOUSING ASSEMBLY

### 1. INSTALL DUST DEFLECTORS

(a) Using SST and a press, install the dust deflector.
SST 09223-41020, 09223-15020

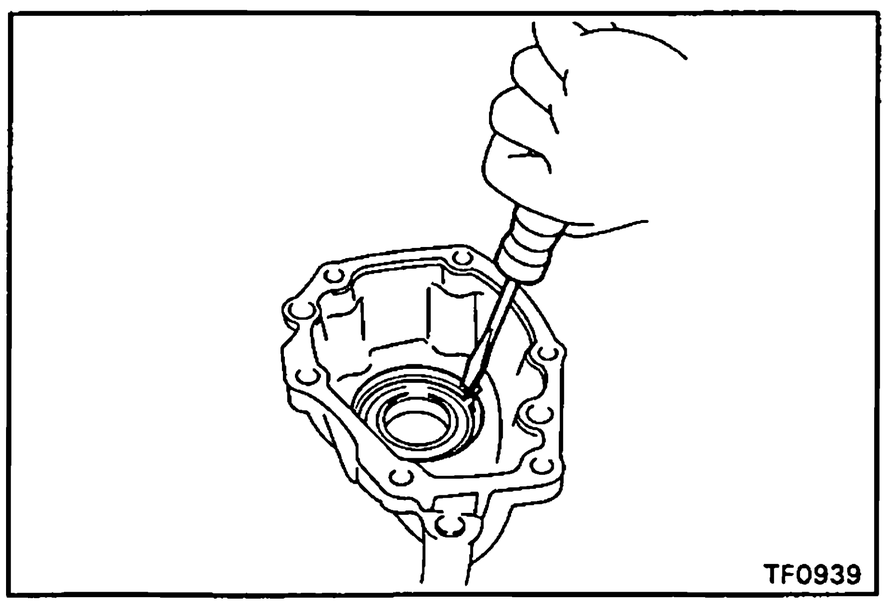



(b) Using SST and a press, install the dust deflector.
SST 09316-60010 (09316-00010),
09316-20011

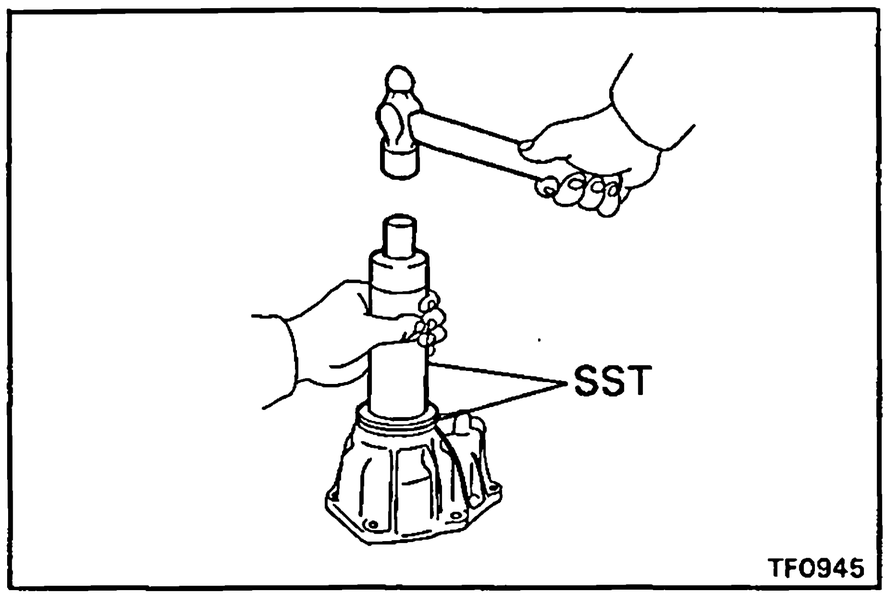



### 2. INSTALL BALL BEARING

(a) Using SST and a press, install the ball bearing.
SST 09316-60010 (09316-00010, 09316-00030)



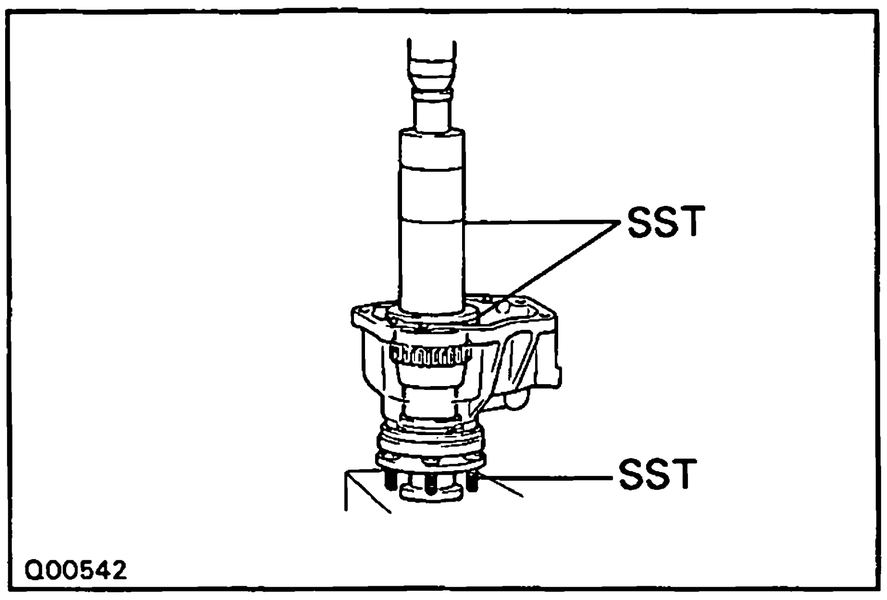

(b) Using a screwdriver, install the snap ring.




**3. INSTALL OIL SEAL**

Using SST and a hammer, drive in a new oil seal.

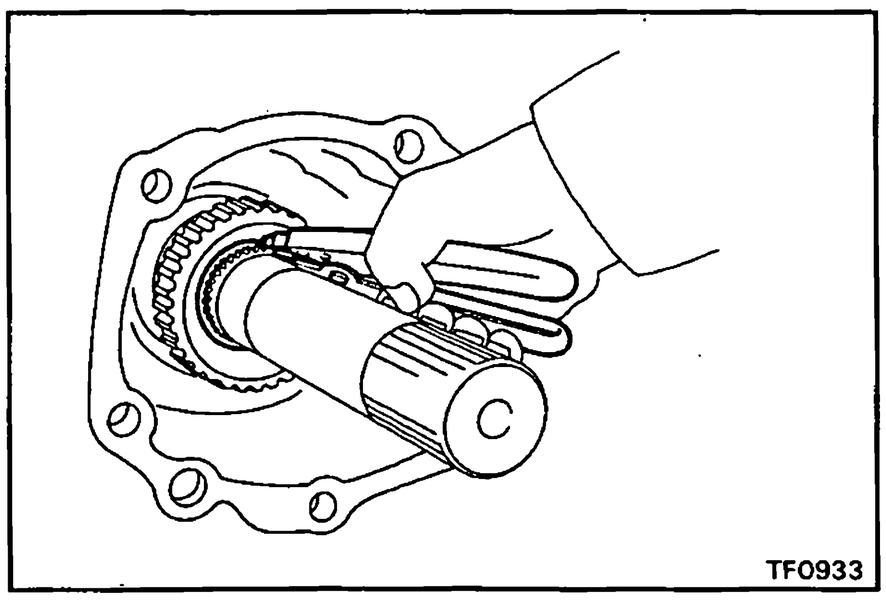
SST 09316-60010 (09316-00010, 09316-00060)




**4. INSTALL FRONT OUTPUT SHAFT AND DRIVE CLUTCH HUB**

(a) Using SST and press, install the front output shaft and drive clutch hub.

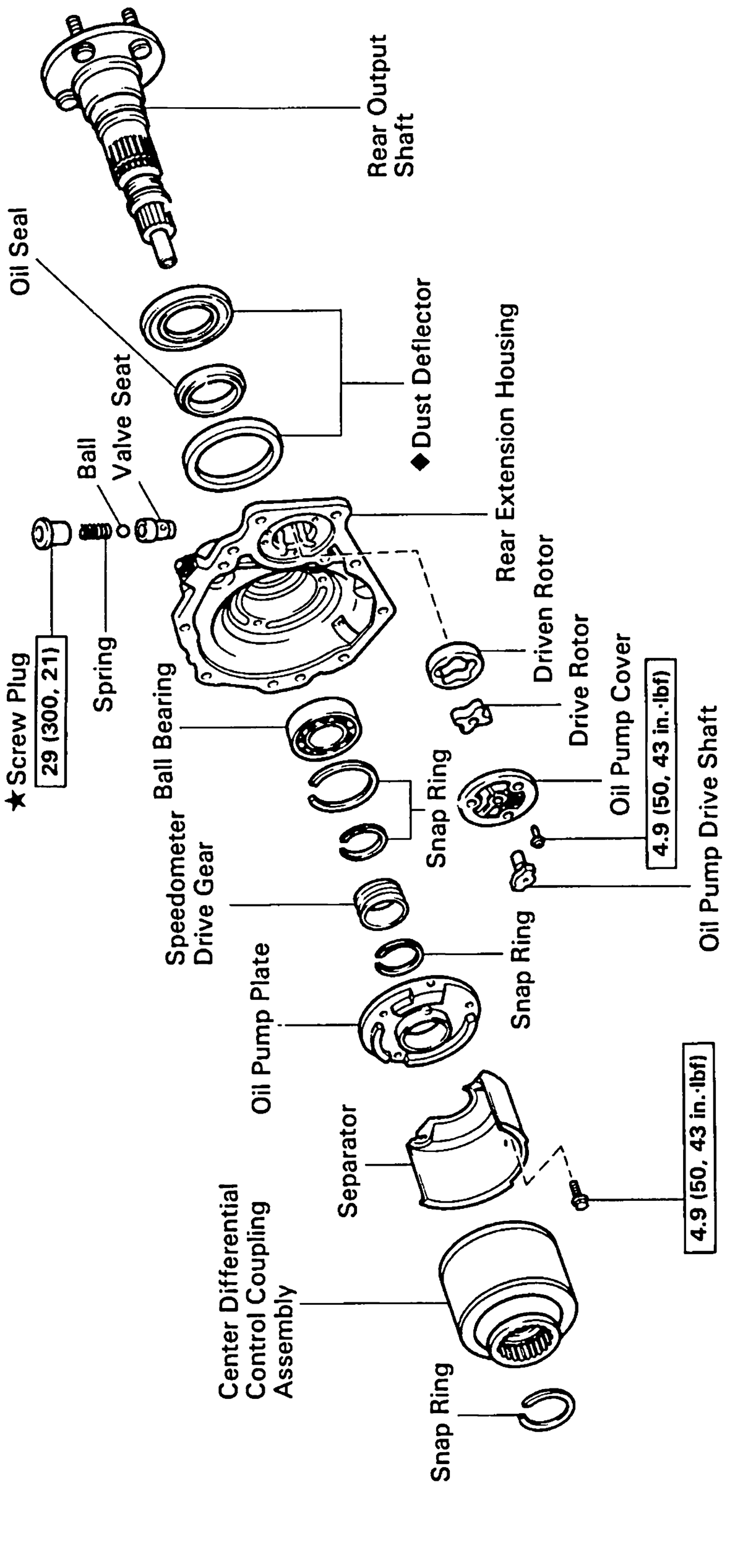
SST 09316-20011, 09316-60010 (09316-00010, 09316-00040, 09316-00070)



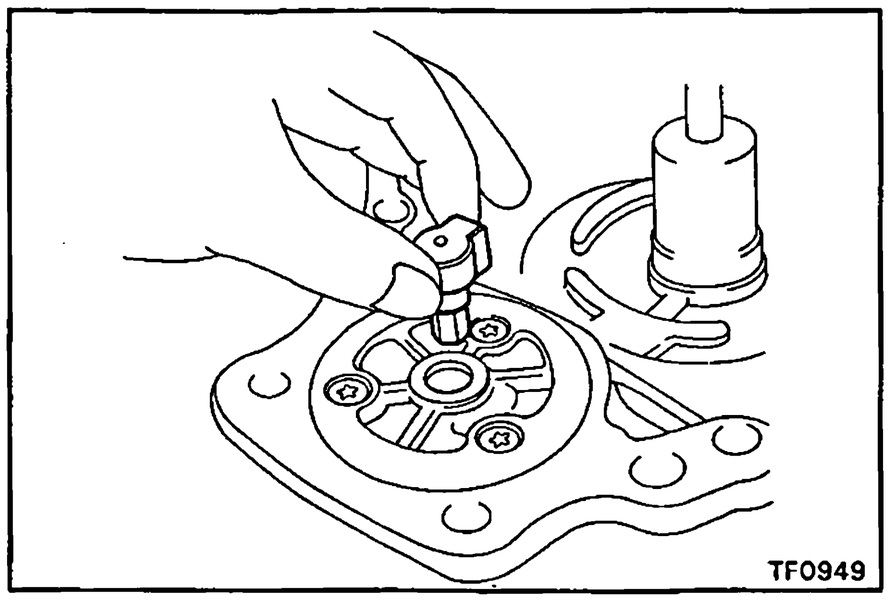

(b) Using snap ring pliers, install the new snap ring.

# Rear Extension Housing Assembly

## COMPONENTS

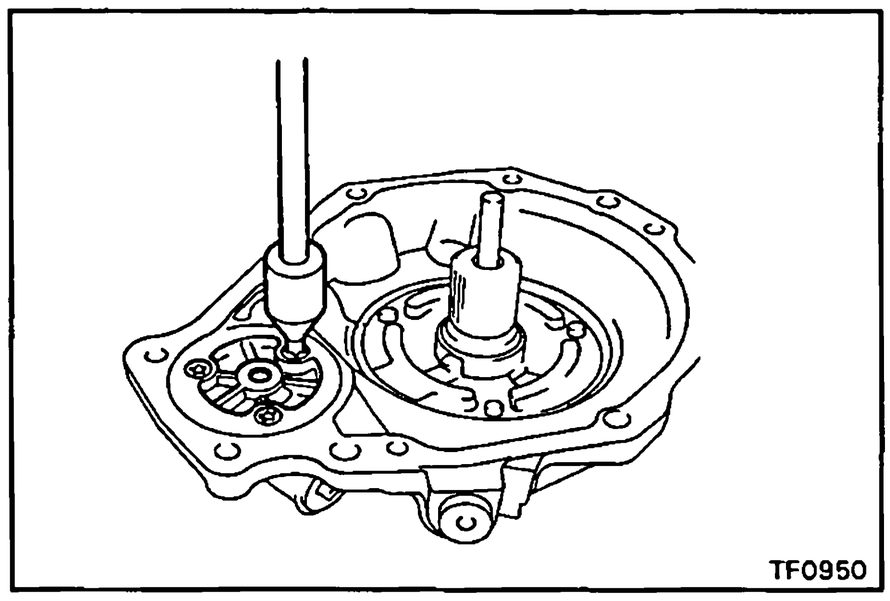



Q02546



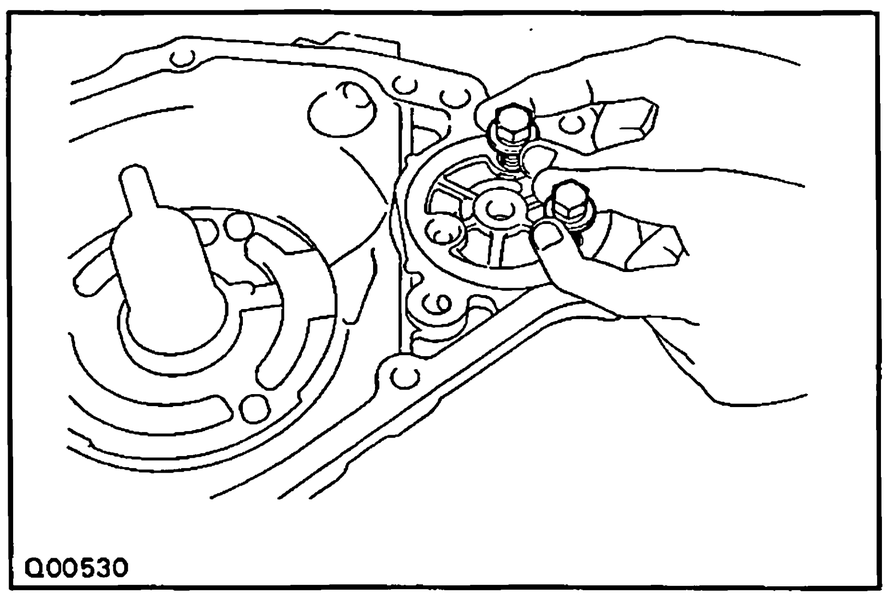

# DISASSEMBLY OF REAR EXTENSION HOUSING ASSEMBLY

## 1. REMOVE OIL PUMP DRIVE SHAFT



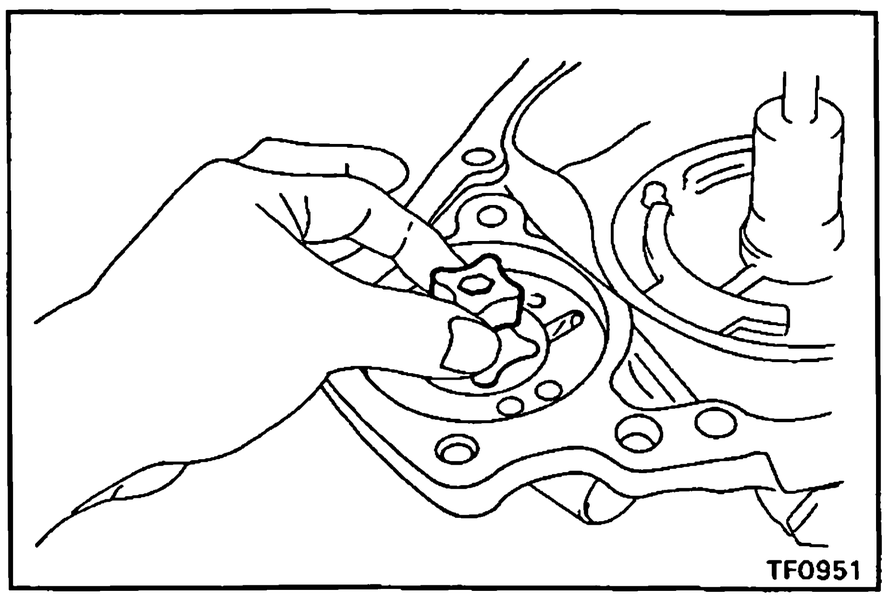

## 2. REMOVE OIL PUMP COVER

(a) Using a torx socket wrench, remove the three screws.
(Torx socket wrench T30 09042-00010)

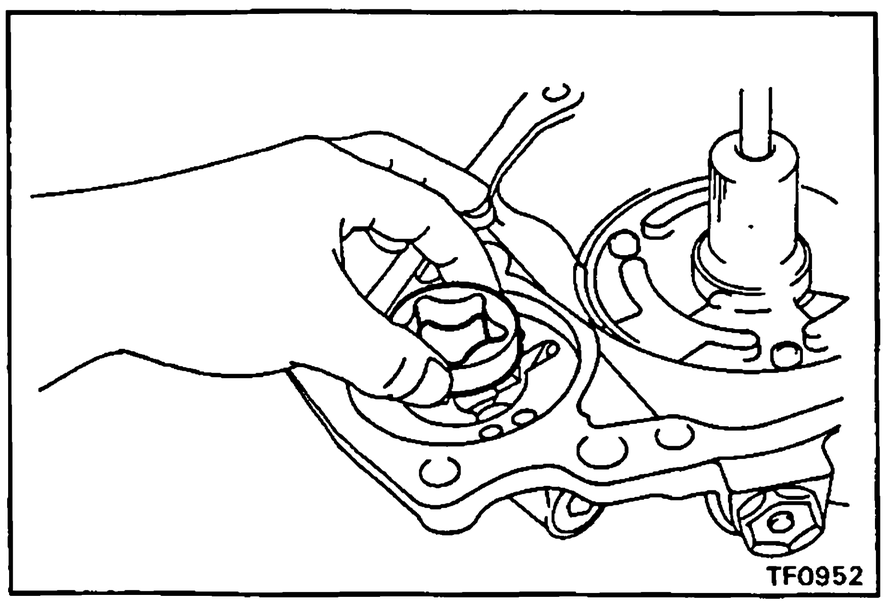



(b) Install two suitable bolts to the pump cover.

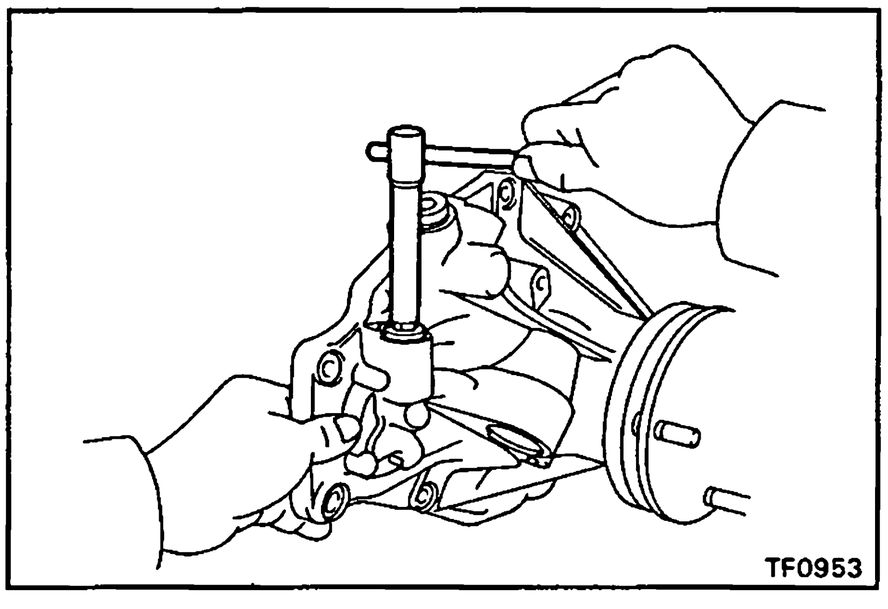
(c) Remove the pump cover from rear extension housing.




## 3. REMOVE DRIVE ROTOR

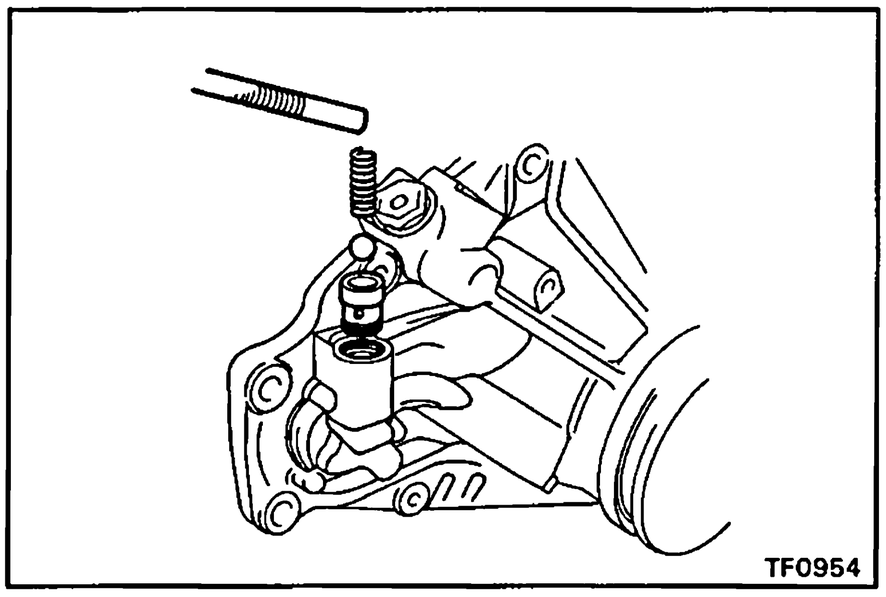



## 4. REMOVE DRIVEN ROTOR

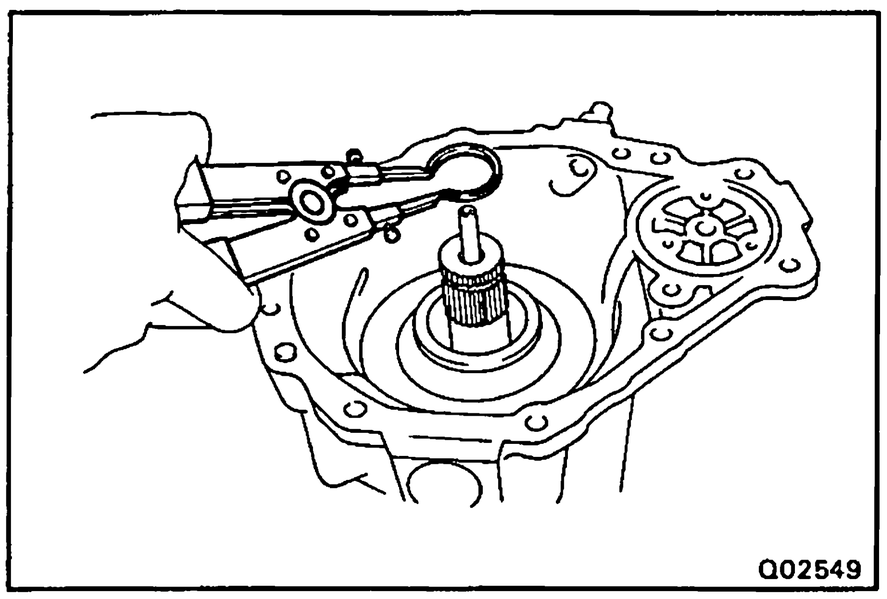



**5. REMOVE SCREW PLUG, SPRING, BALL AND VALVE SEAT**

(a) Using a hexagon wrench, remove the screw plug.



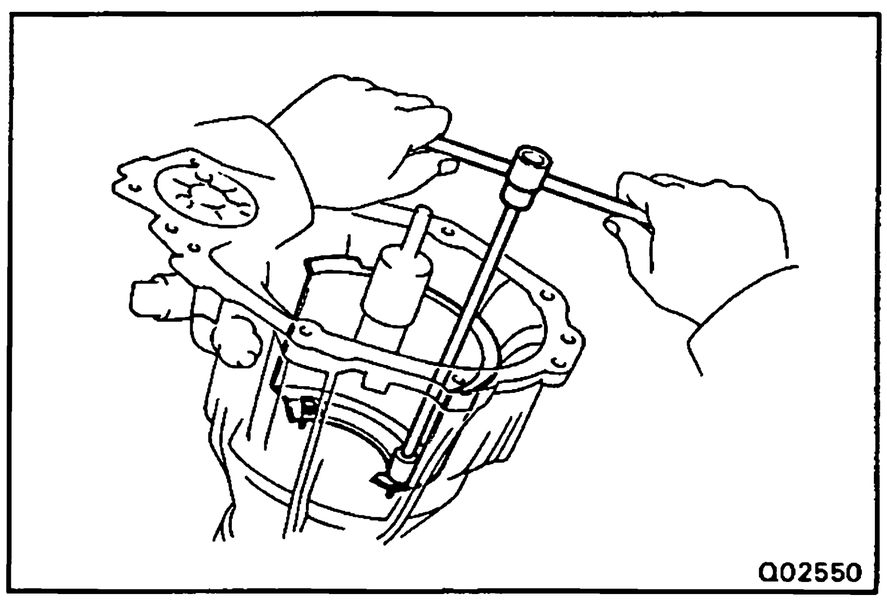

(b) Using a magnetic finger, remove the spring, ball and valve seat.




**6. REMOVE CENTER DIFFERENTIAL CONTROL COUPLING ASSEMBLY**

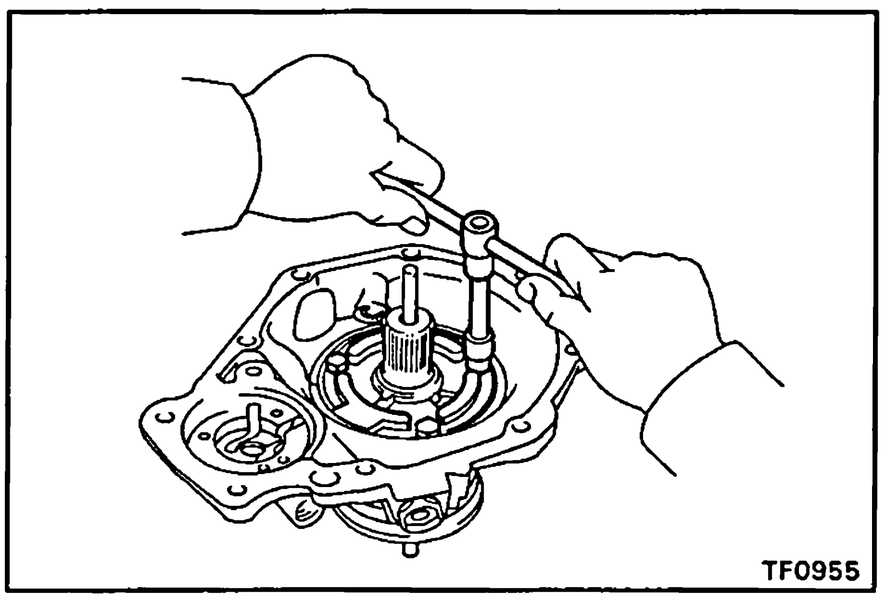
(a) Using snap ring pliers, remove the snap ring.

(b) Remove the coupling assembly.



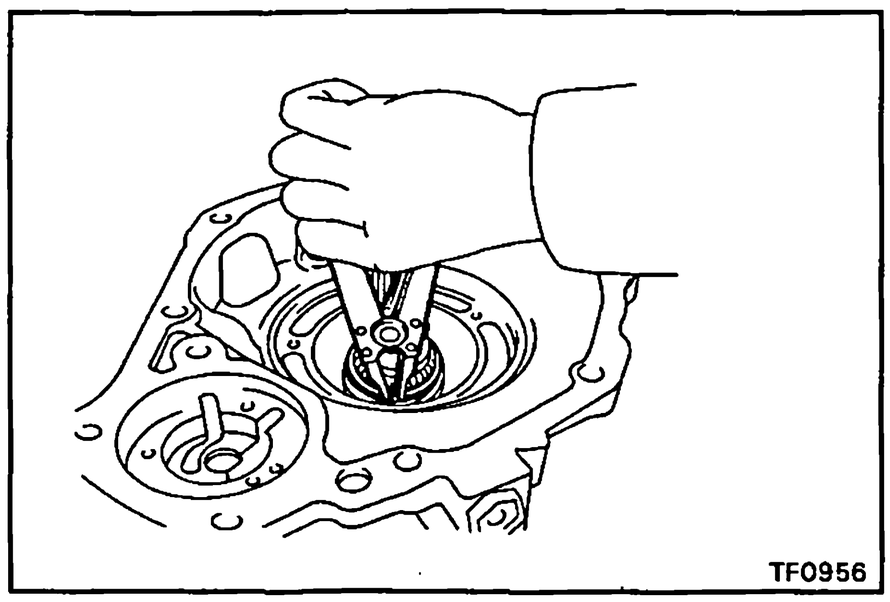

**7. REMOVE SEPARATOR**

Remove the two bolts and the separator.



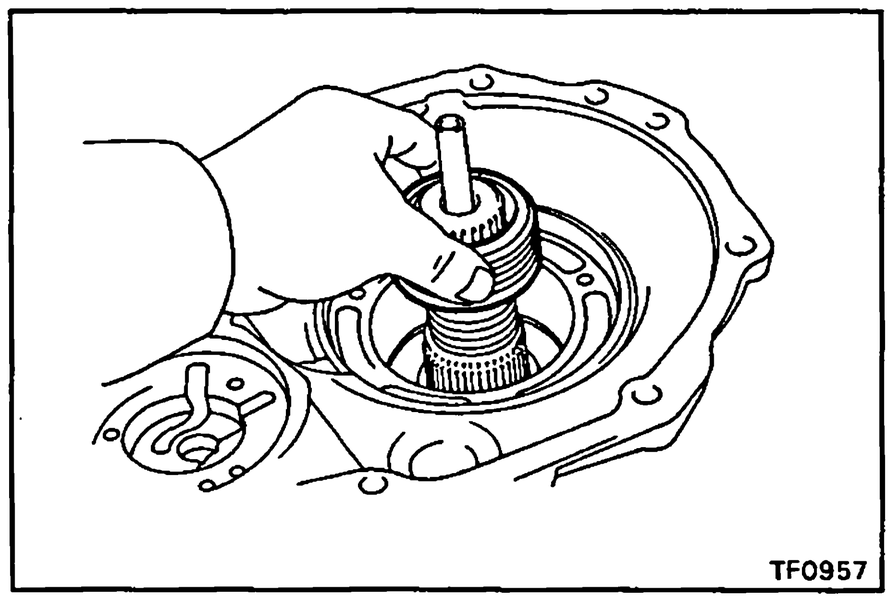

**8. REMOVE OIL PUMP PLATE**

Remove the bolt and the oil pump plate.

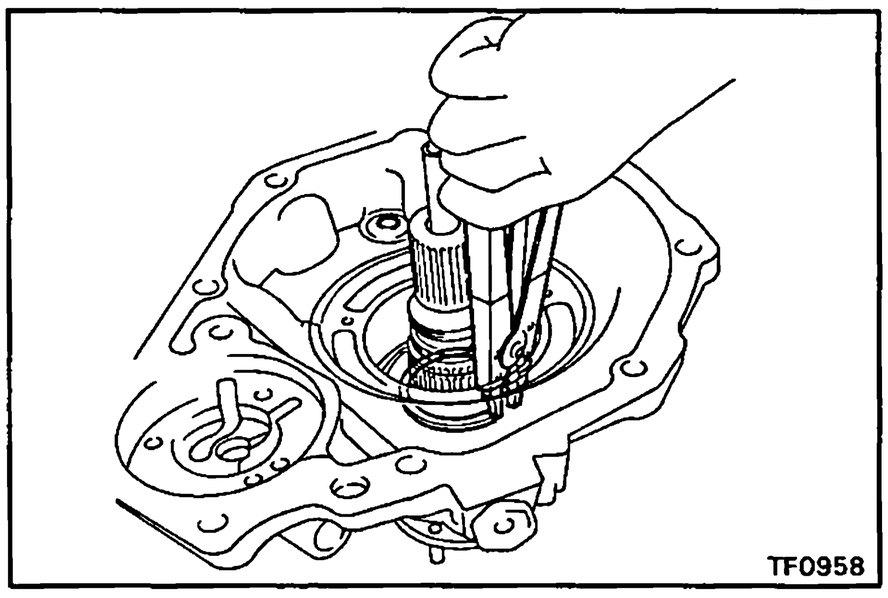

TF0956

**9. REMOVE SPEED METER DRIVE GEAR**

(a) Using snap ring pliers, remove the snap ring.

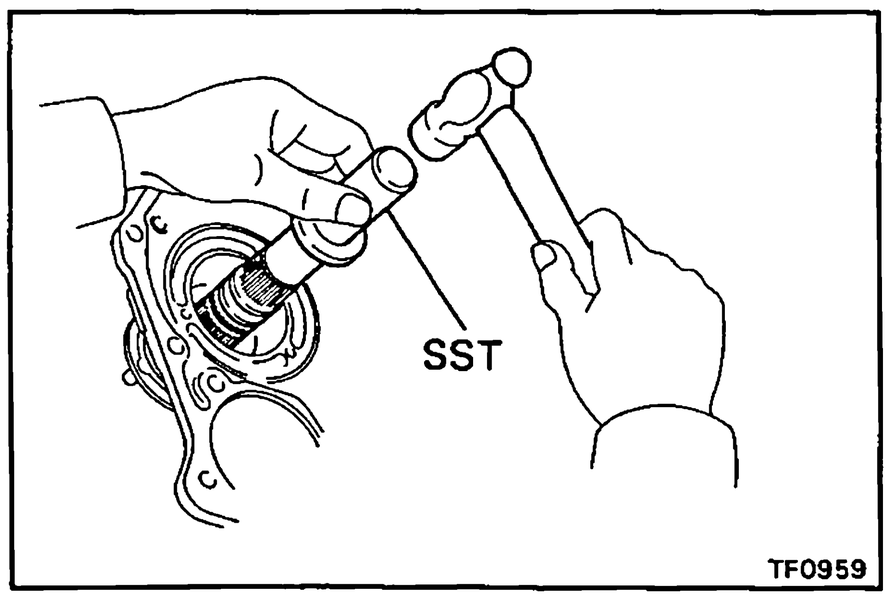

TF0957

(b) Remove the speedometer drive gear.


TF0958

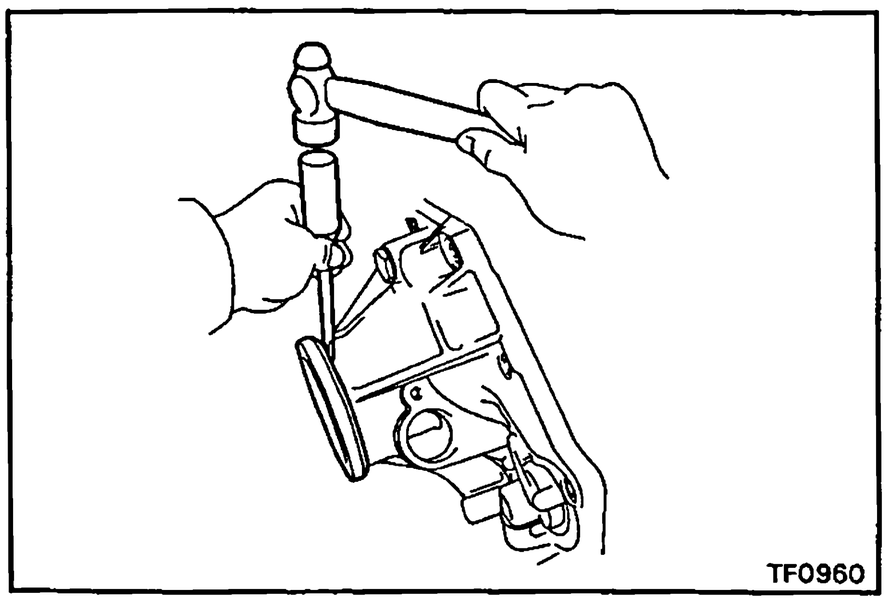
**10. REMOVE REAR OUTPUT SHAFT**

(a) Using snap ring pliers, remove the snap ring.



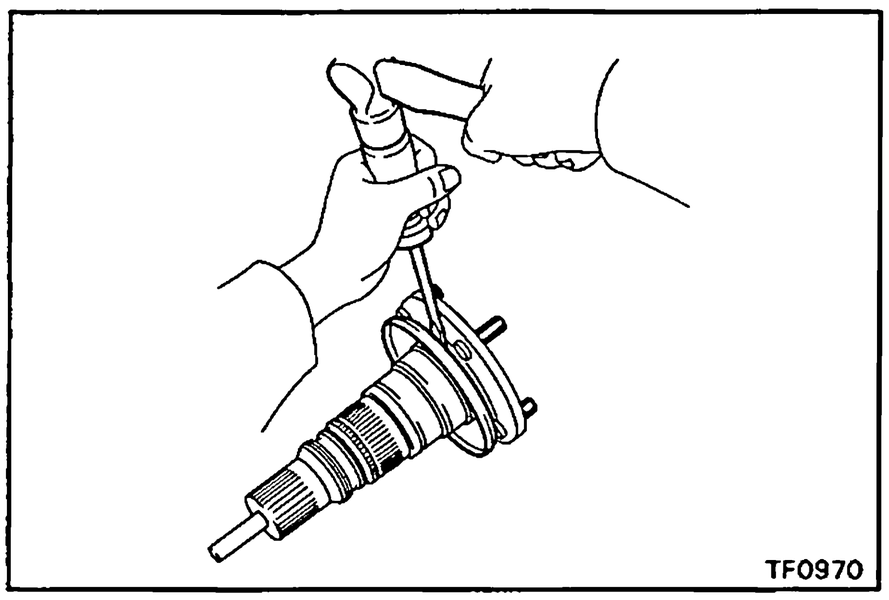
TF0959

(b) Using SST and a hammer, remove the rear output shaft.
SST 09325-12010

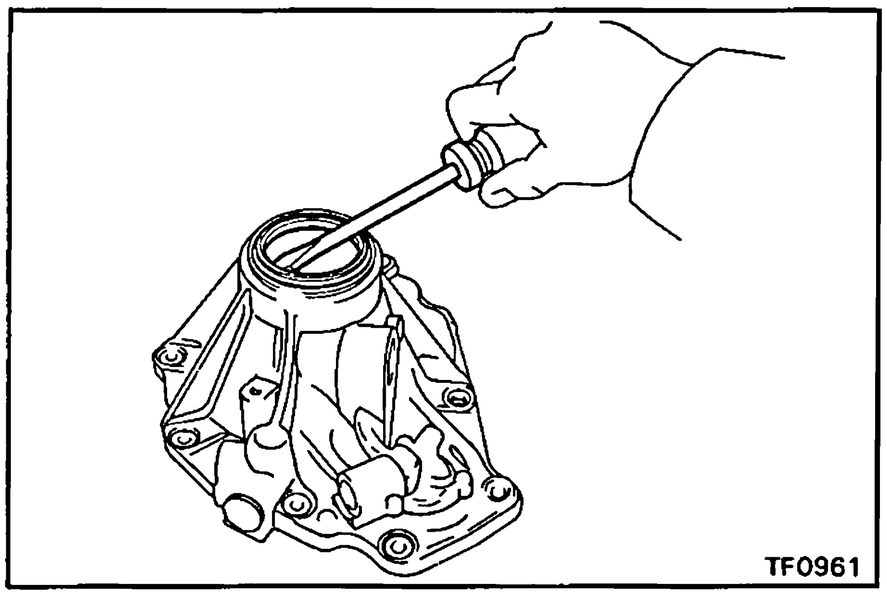

TF0960

**11. REMOVE DUST DEFLECTORS**

(a) Using a screwdriver and hammer, remove the rear extension housing dust deflectors.

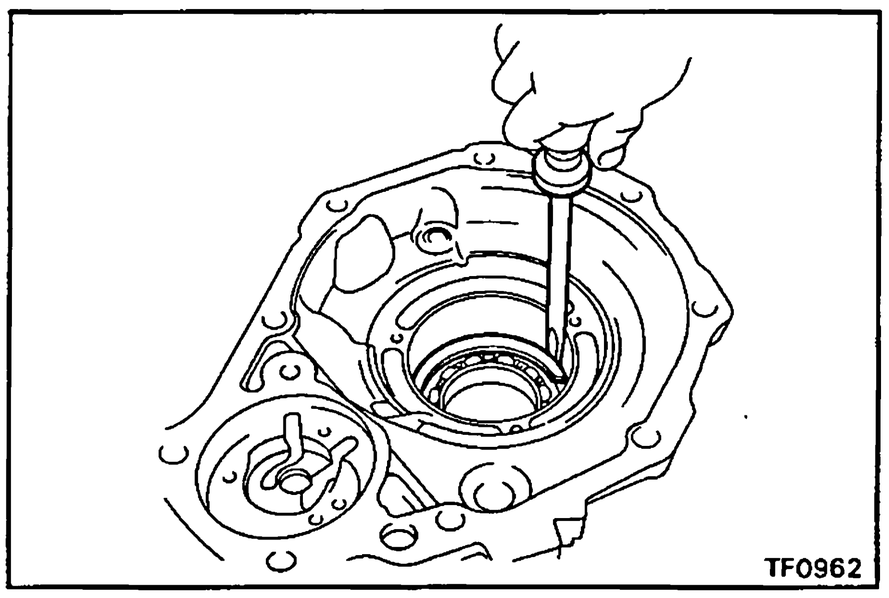



(b) Using a screwdriver and hammer, remove the rear output shaft dust deflector.



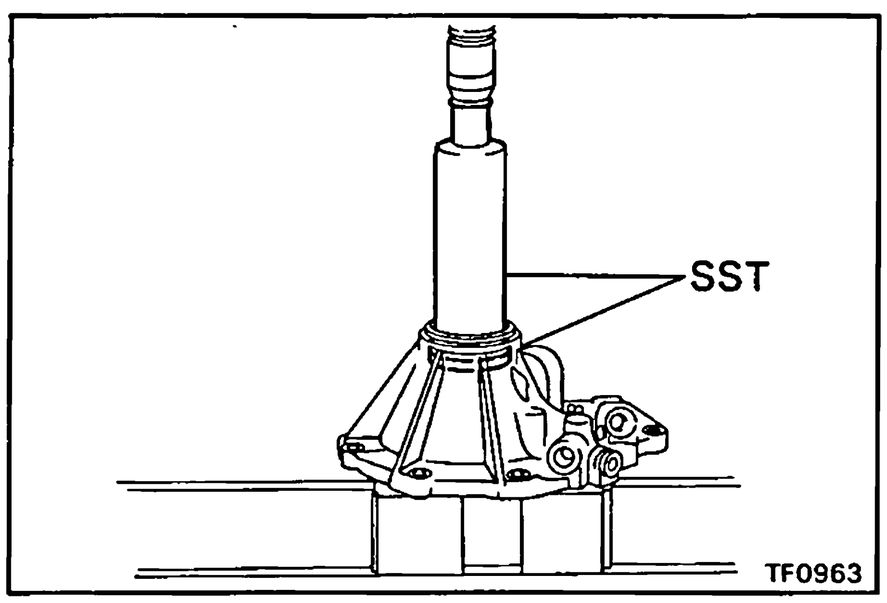

**12. REMOVE OIL SEAL**

Using a screwdriver, pry out the oil seal.

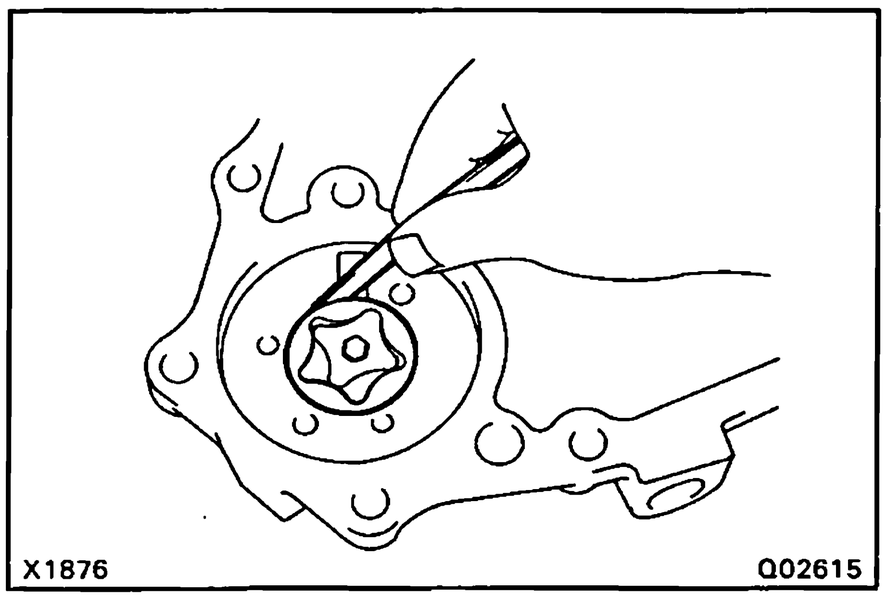



**13. REMOVE BALL BEARING**

(a) Using a screwdriver, remove the snap ring.




(b) Using SST and a press, remove the ball bearing.
SST 09316-60010 (09316-00010, 09316-00020)




## INSPECTION OF OIL PUMP

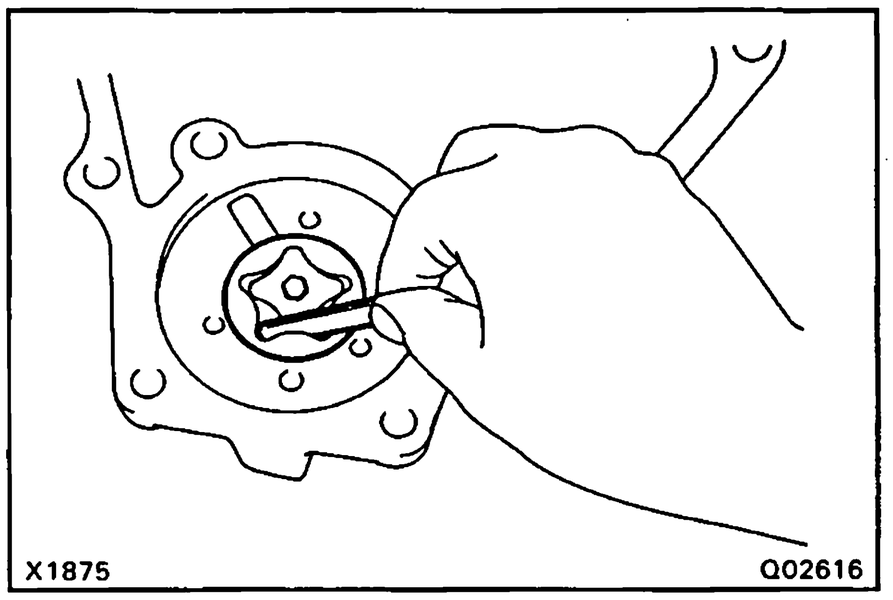
**1. CHECK BODY CLEARANCE OF DRIVEN ROTOR**

Install the drive rotor to the driven rotor.
Using a feeler gauge, measure body clearance between drive rotor and extension housing.

**Standard body clearance:** **0.08 — 0.17 mm (0.0031 — 0.0067 in.)**

**Maximum body clearance:** **0.17 mm (0.0067 in.)**

If the body clearance is greater than the maximum, replace the drive rotor or driven rotor.



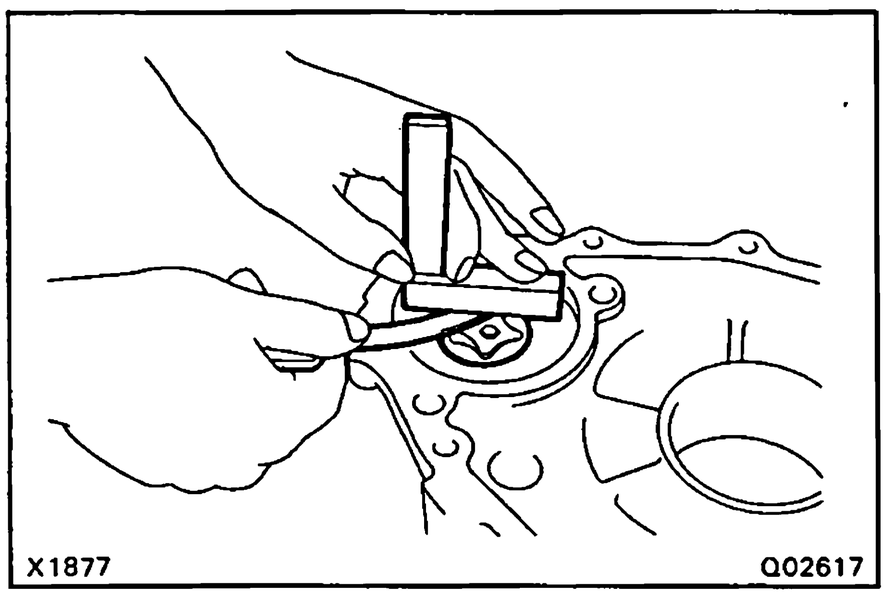

### 2. CHECK TIP CLEARANCE OF DRIVEN ROTOR

Using a feeler gauge, measure tip clearance between drive rotor and driven rotor.

**Standard tip clearance:** **0.05 — 0.15 mm (0.0020 — 0.0059 in.)**

**Maximum tip clearance:** **0.15 mm (0.0059 in.)**

If the tip clearance is greater than the maximum, replace the drive rotor or driven rotor.



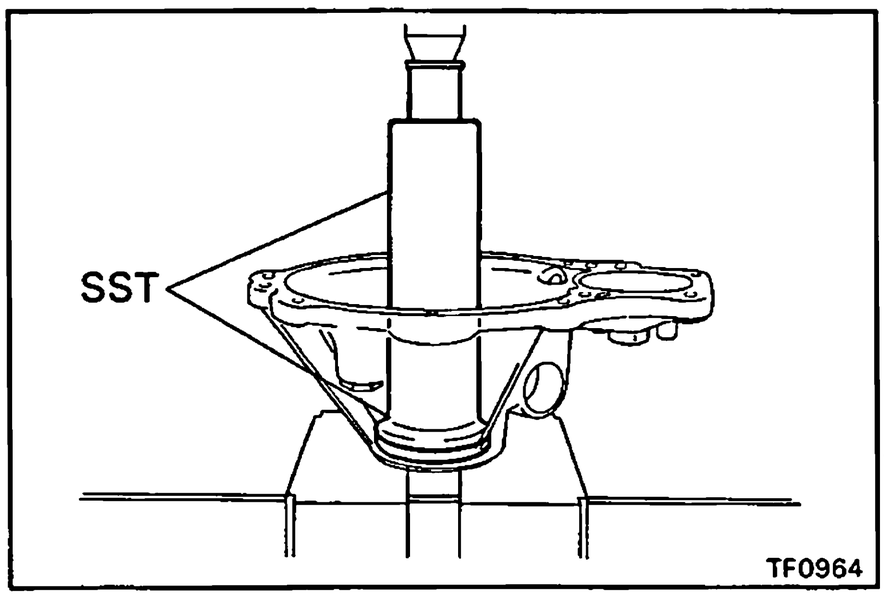

### 3. CHECK SIDE CLEARANCE OF OIL PUMP

Using a steel straight edge and a feeler gauge, measure the side clearance of oil pump.

**Standard side clearance:** **0.03 — 0.10 mm (0.0012 — 0.0039 in.)**

**Maximum side clearance:** **0.10 mm (0.0039 in.)**

If the side clearance greater than the maximum, replace the drive rotor or driven rotor.

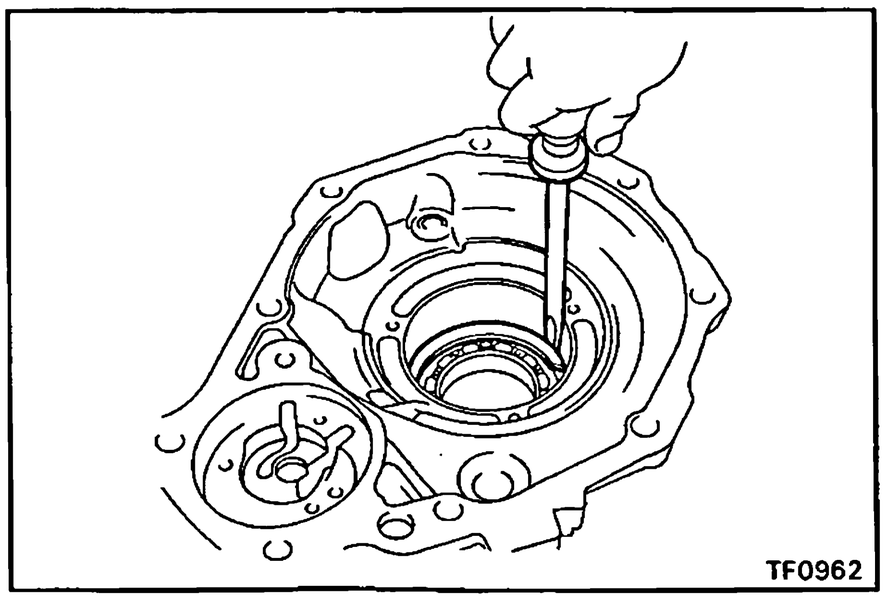



## ASSEMBLY OF REAR EXTENSION HOUSING ASSEMBLY

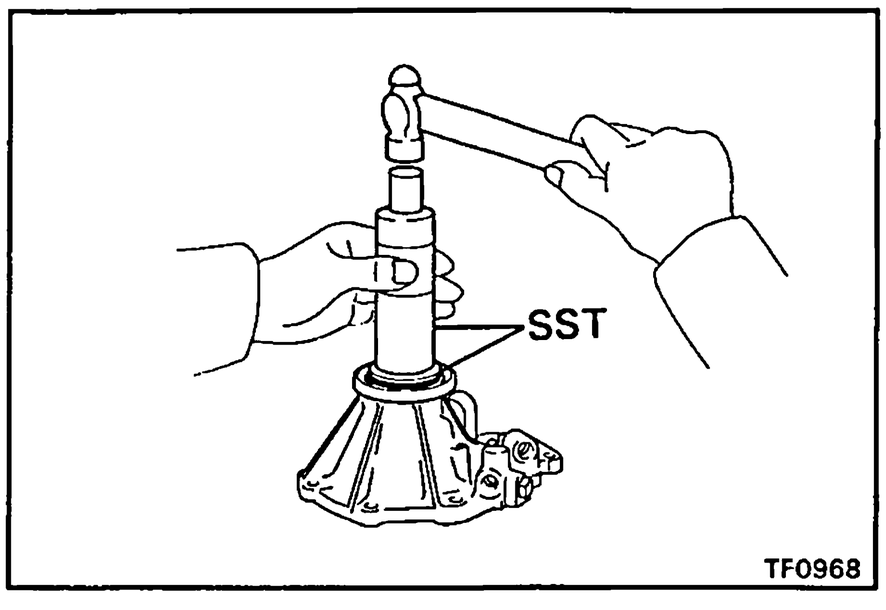
### 1. INSTALL BALL BEARING

(a) Using SST and a press, install the ball bearing.

SST 09316-60010 (09316-00010, 09316-00030)



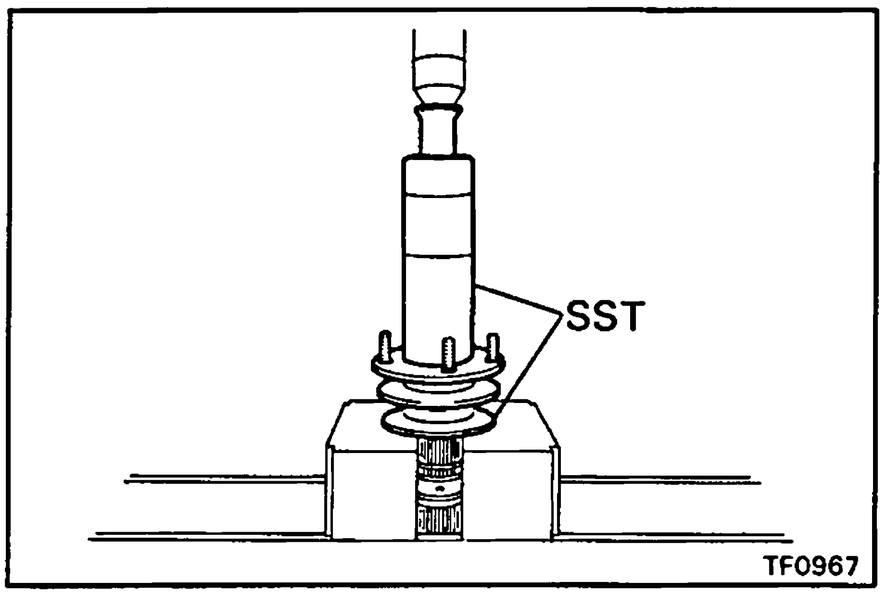

(b) Using a screwdriver, install the snap ring.




**2. INSTALL DUST DEFLECTORS**

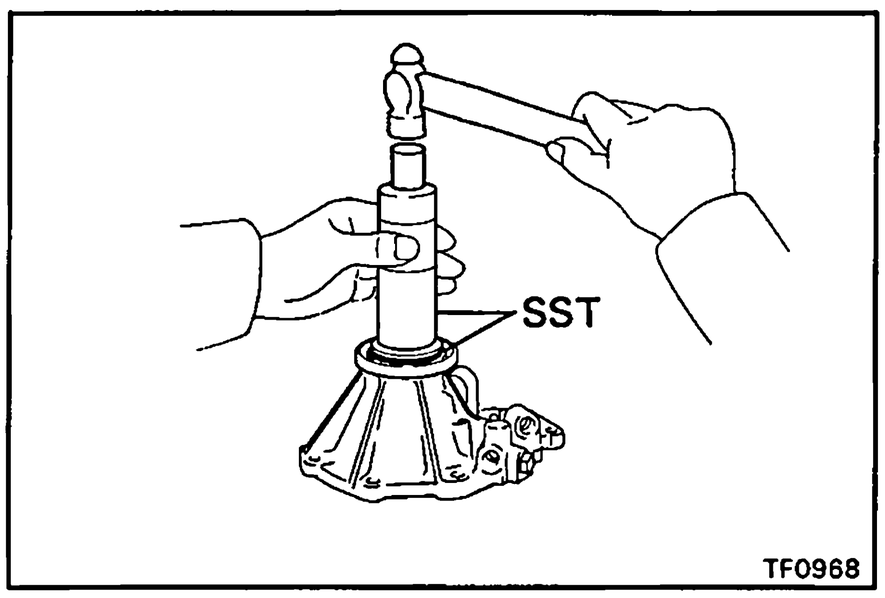
(a) Using SST and a hammer, install a new rear extension housing dust deflector.

SST 09316-60010 (09316-00010, 09316-00040)




(b) Using SST and a press, install a new rear extension housing dust deflector.

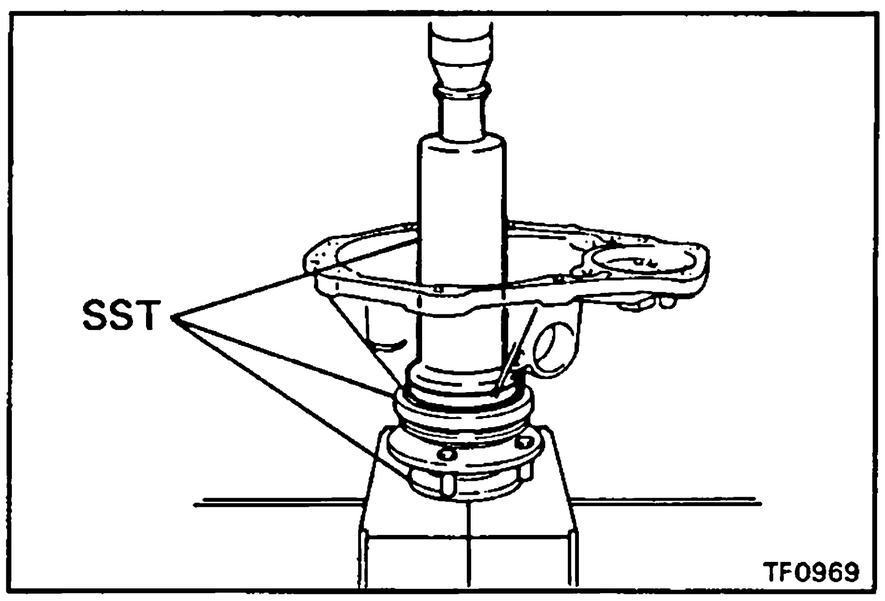
SST 09316-20011, 09316-60010,
(09316-00010)




**3. INSTALL OIL SEAL**

Using SST and a hammer, drive in a new oil seal.

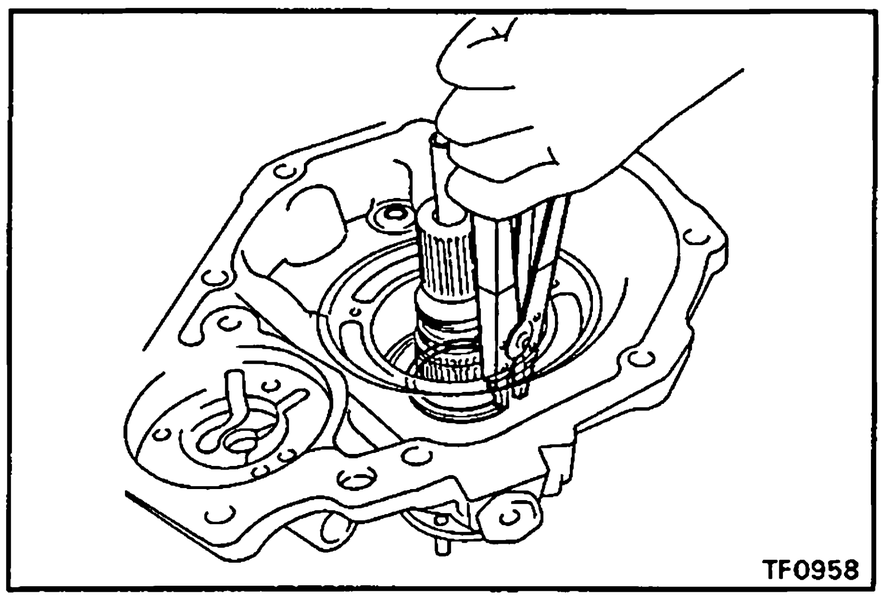
SST 09316-60010 (09316-00010, 09316-00030)



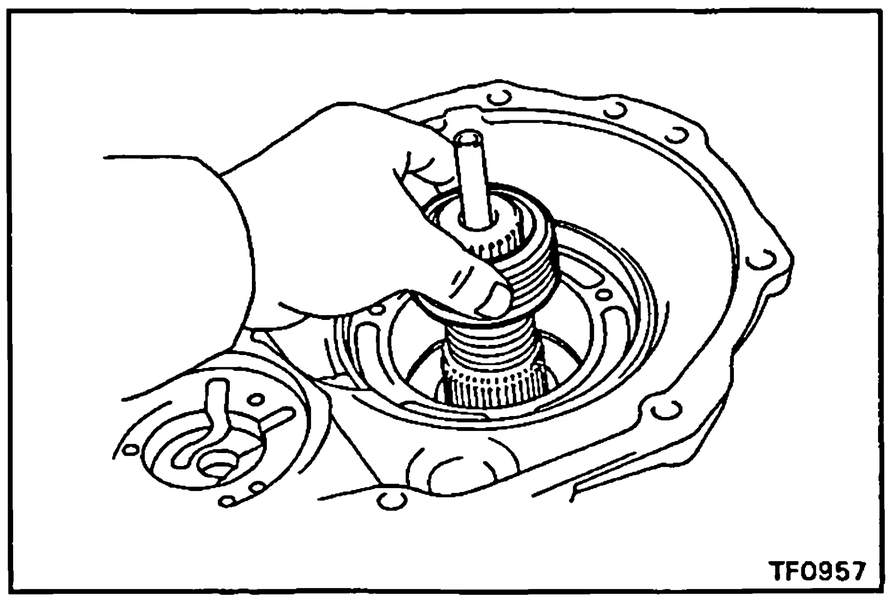

**4. INSTALL REAR OUTPUT SHAFT**

(a) Using SST and a press, install the rear output shaft.

SST 09316-60010 (09316-00010, 09316-00030)
09316-20011

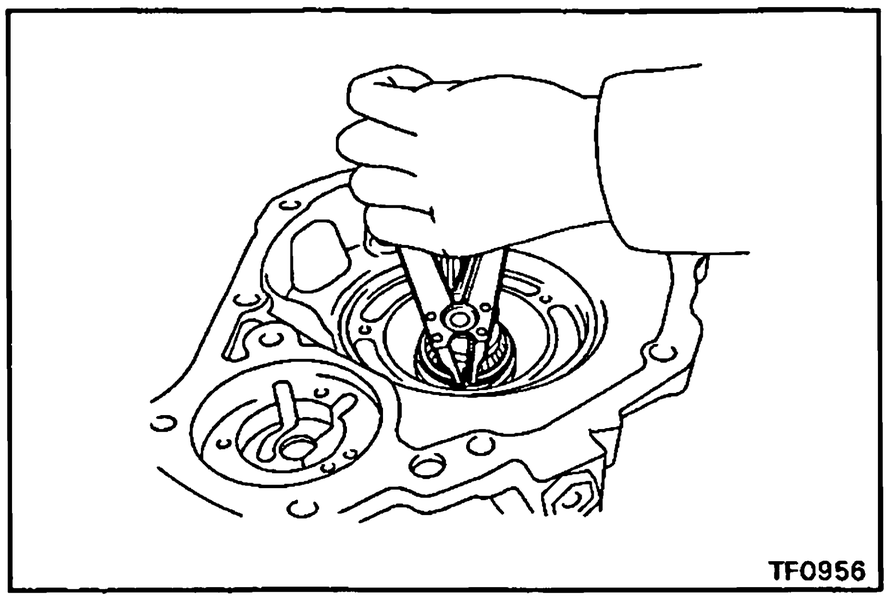



(b) Using snap ring pliers, install the snap ring.

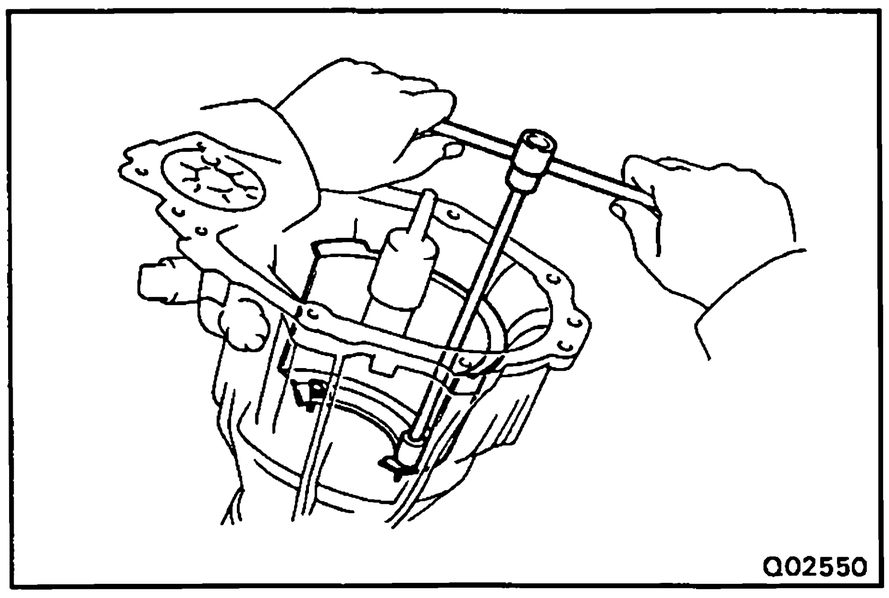



**5. INSTALL SPEEDOMETER DRIVE GEAR**

(a) Install the speedometer drive gear.




(b) Using snap ring pliers, install the snap ring.



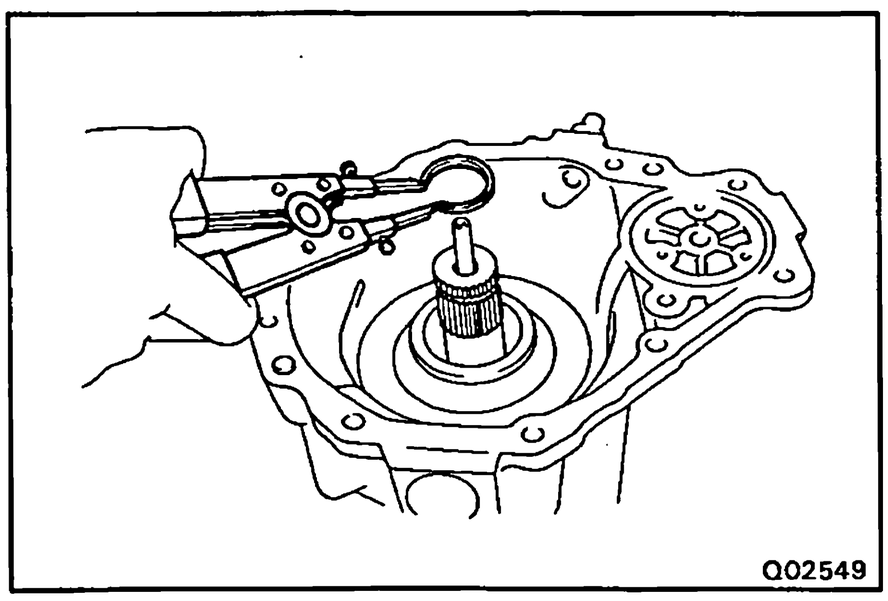

**6. INSTALL OIL PUMP PLATE SEPARATOR**

(a) Install the oil pump plate.

(b) Install the separator.

(c) Install and torque the three bolts.

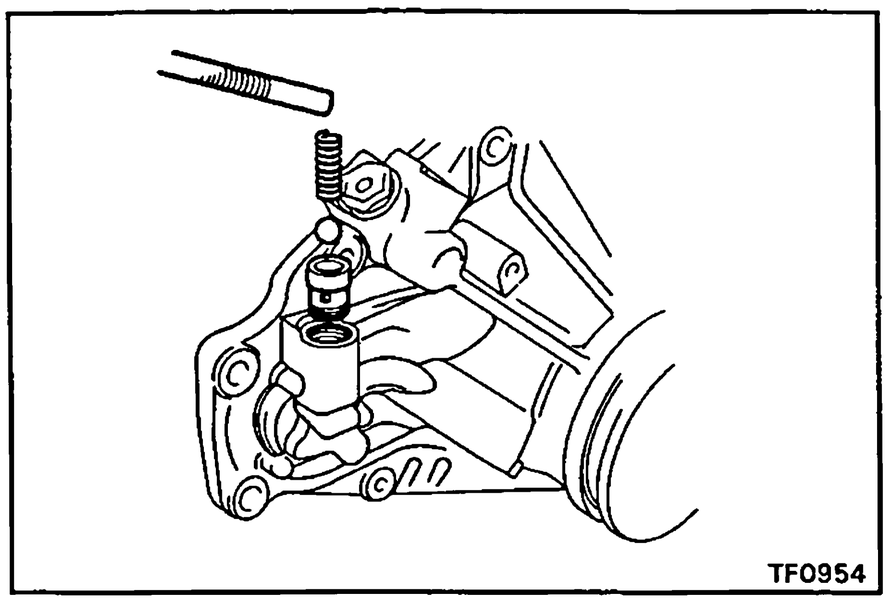
**Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)**




**7. INSTALL CENTER DIFFERENTIAL CONTROL COUPLING ASSEMBLY**

(a) Install the coupling assembly.

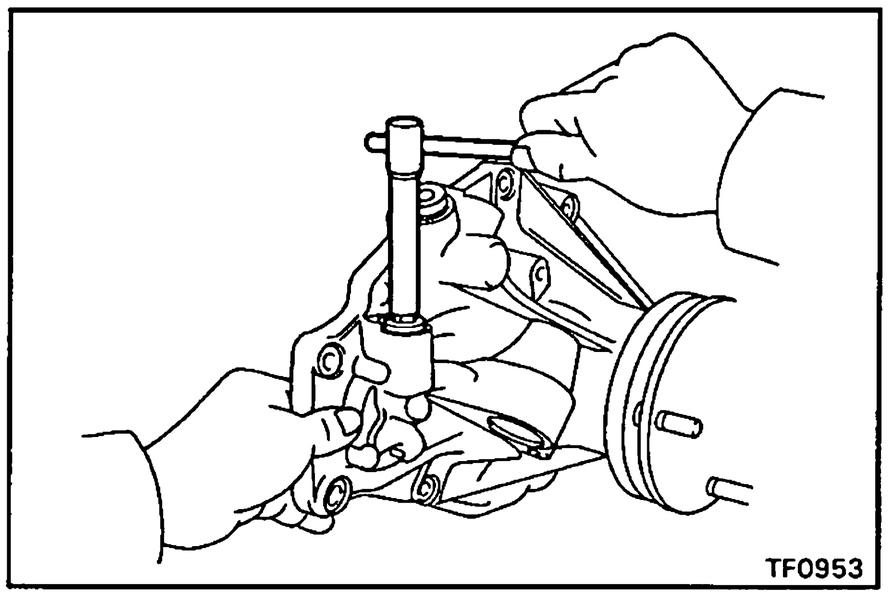
(b) Using snap ring pliers, install the snap ring.




**8. INSTALL VALVE SEAT, BALL, SPRING AND SCREW PLUG**

(a) Apply gear oil to the ball.

(b) Install the valve seat, ball and spring.

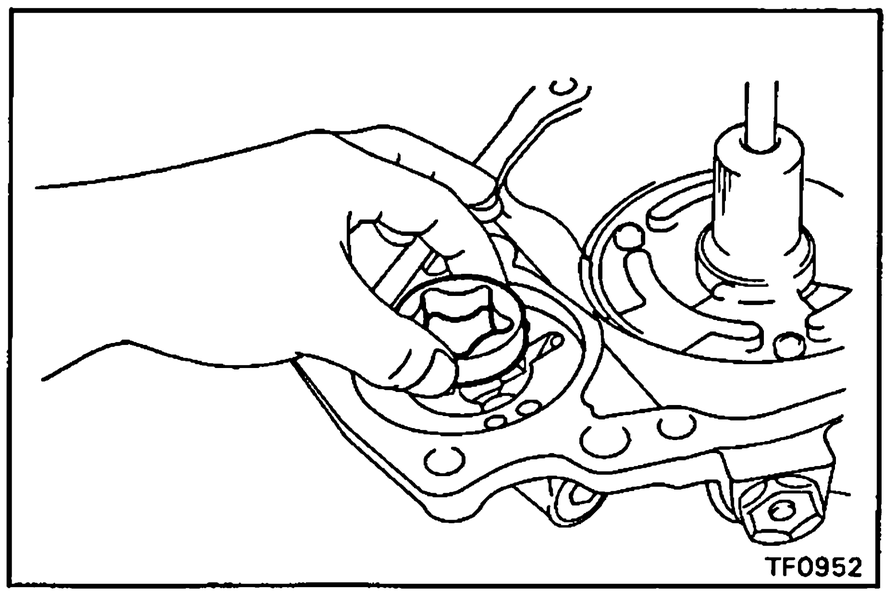



(c) Apply liquid sealer to the screw plug.

**Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(d) Using a hexagon wrench, install and torque the screw plug.

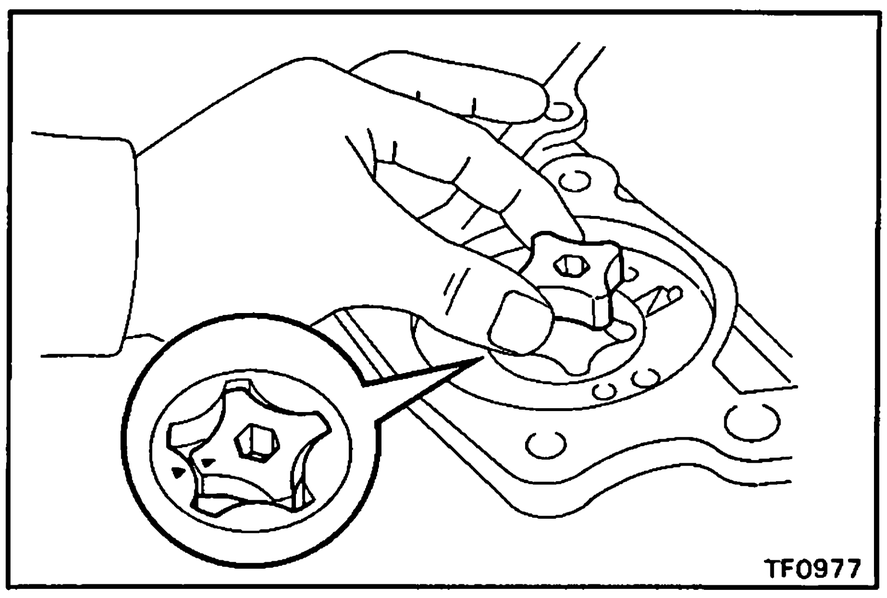
**Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)**




## 9. INSTALL DRIVEN ROTOR

(a) Apply gear oil to the driven rotor.

(b) Install the driven rotor.

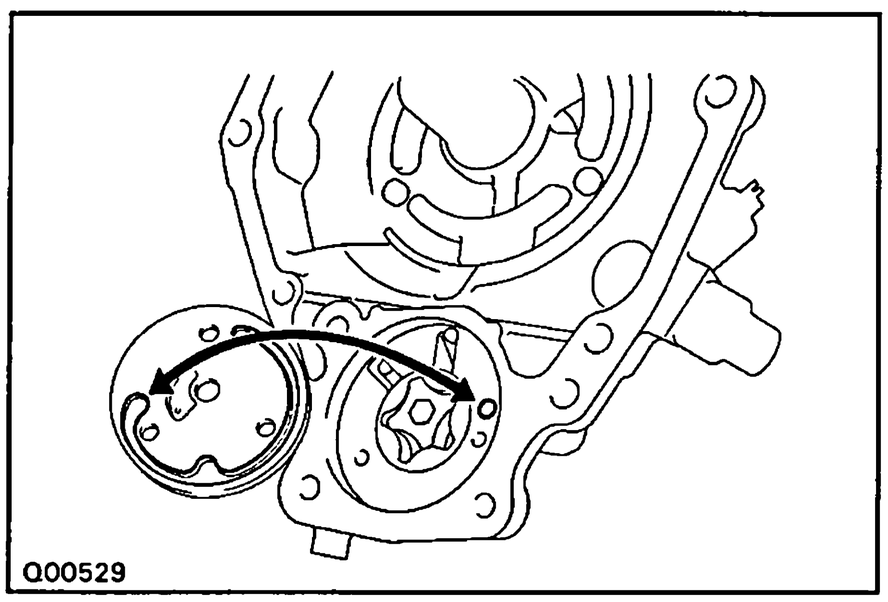



## 10. INSTALL DRIVE ROTOR

(a) Apply gear oil to the drive rotor.

(b) Install the drive rotor.

HINT: Align the alignment marks.




## 11. INSTALL OIL PUMP COVER

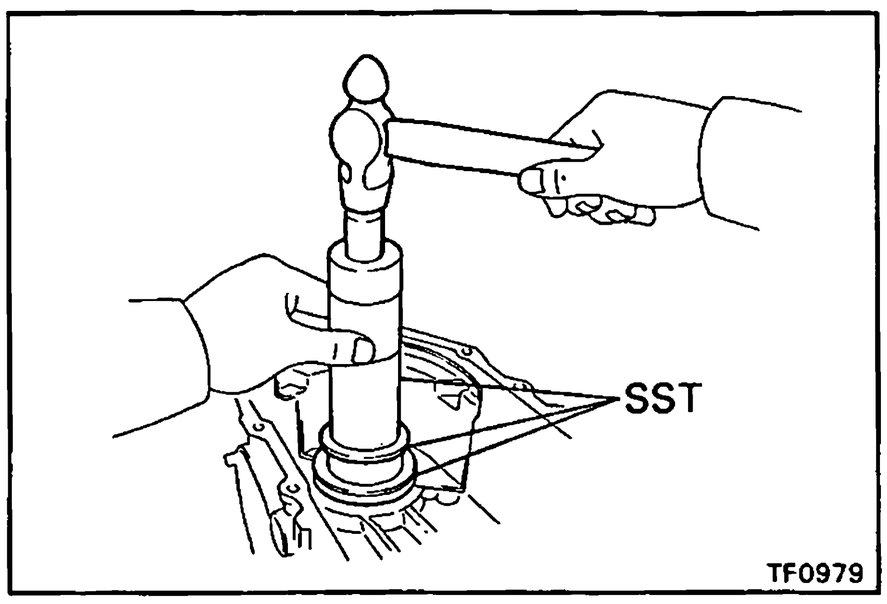
(a) Install the oil pump cover.

(b) Using a torx socket wrench, install and torque the three screws.

(Torx socket wrench T30 09042-00010)

**Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)**

**NOTICE: Align the oil hole of the rear extension housing and oil groove end of the oil pump cover.**

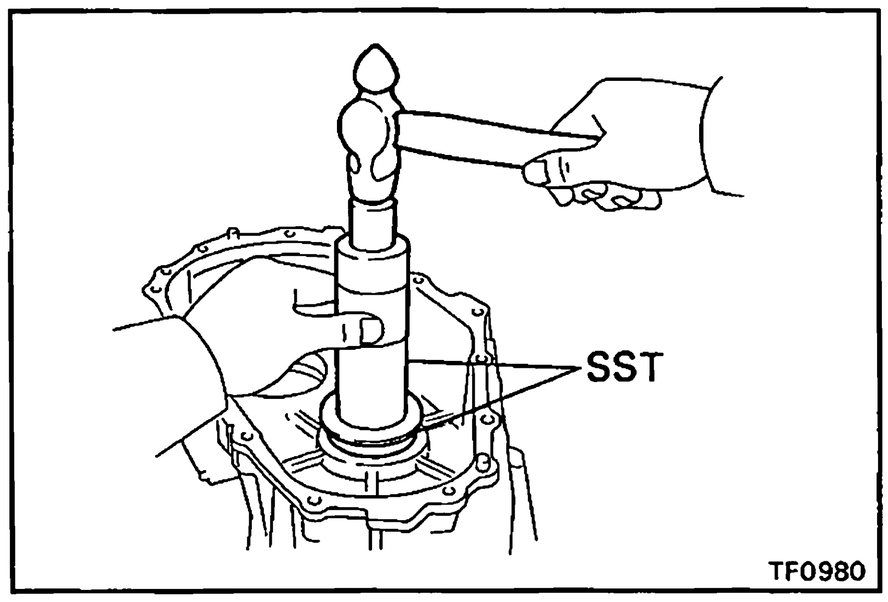



# TRANSFER ASSEMBLY

**1. INSTALL TWO BEARING RACES TO FRONT CASE**

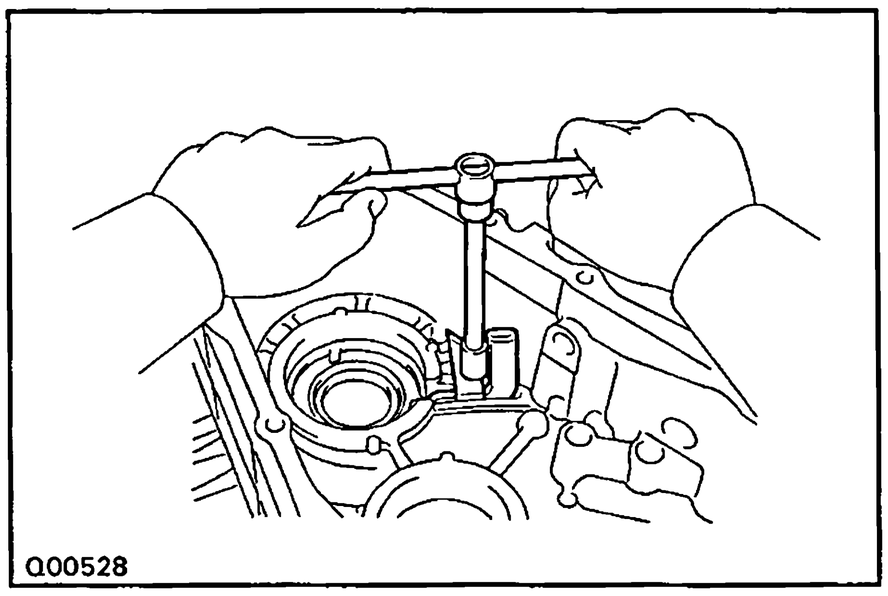
(a) Using SST and a hammer, install the center differential bearing race.

SST 09316-60010 (09316-00010, 09316-00030)
09316-20011




(b) Using SST and a hammer, install the idle gear bearing race.

SST 09316-60010 (09316-00010, 09316-00040)

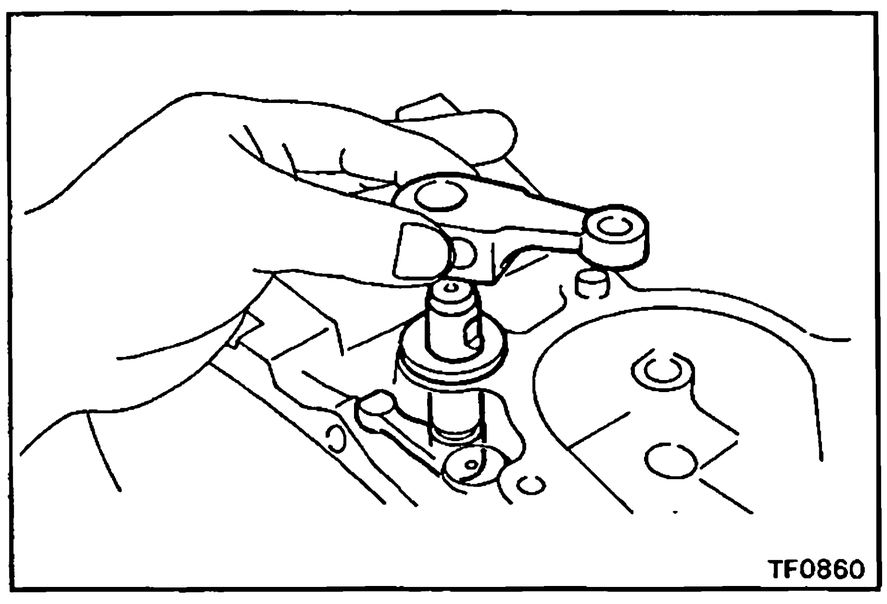

Q00528

**2. INSTALL OIL RECEIVER TO FRONT CASE**

(a) Install the oil receiver.

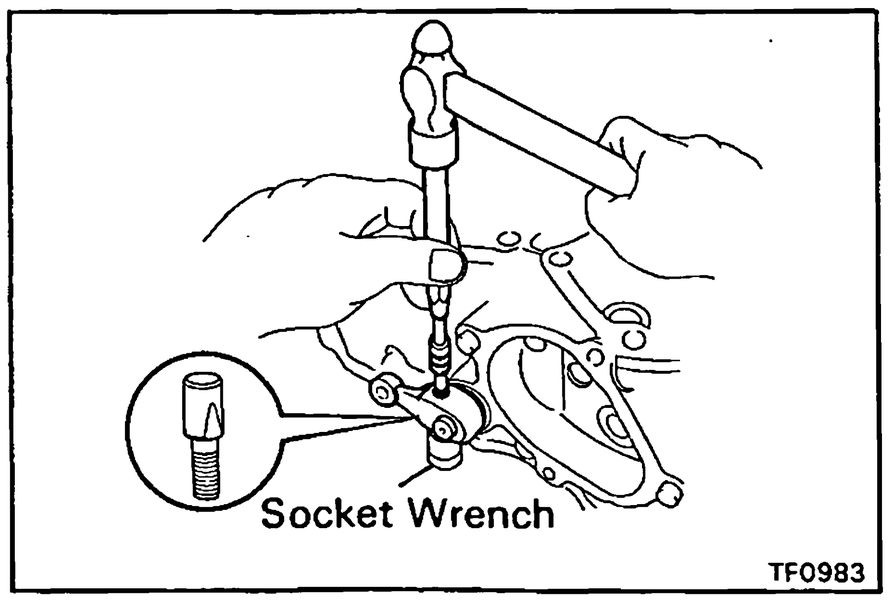
(b) Install and torque the bolt.

**Torque: 11.7 N·m (120 kgf·cm, 8.6 ft·lbf)**

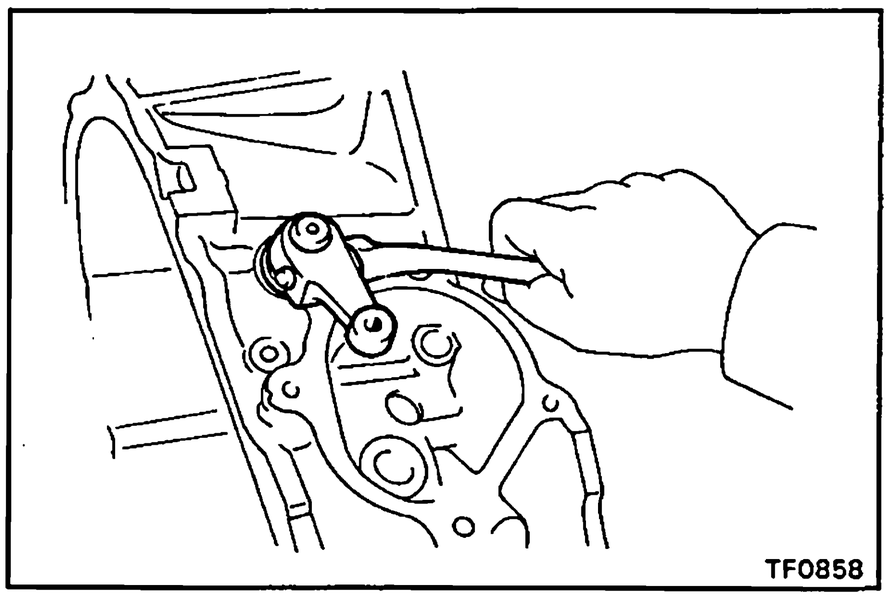

TF0860

**3. INSTALL SHIFT OUTER LEVER AND INNER LEVER**

(a) Install the shift outer lever and inner lever.

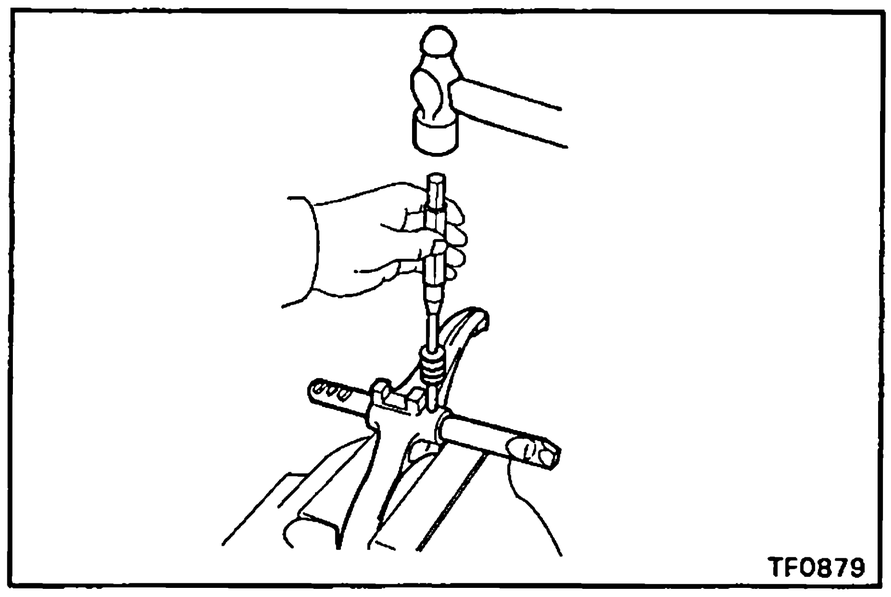



(b) Using a pin punch, hammer and socket wrench, install the lever lock pin.



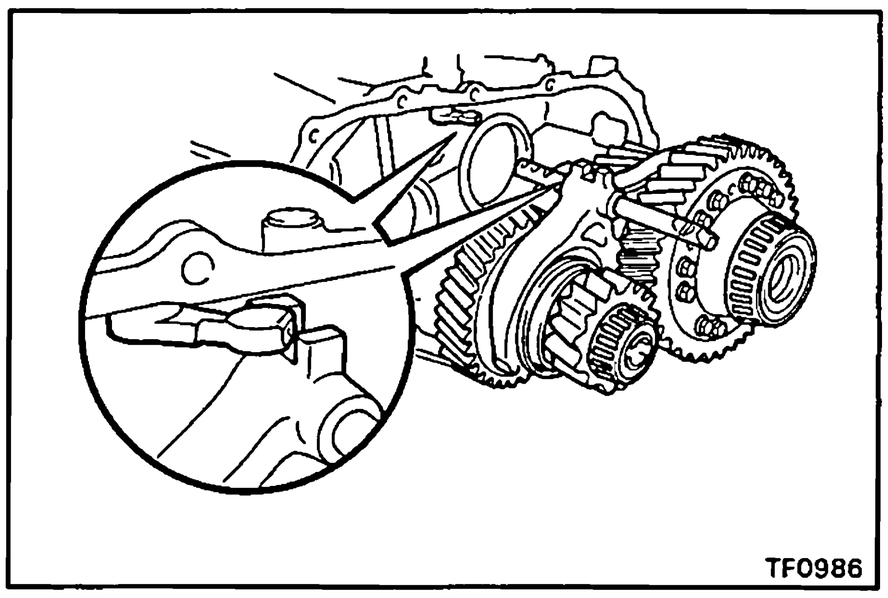

(c) Install the washer and nut.

**Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)**

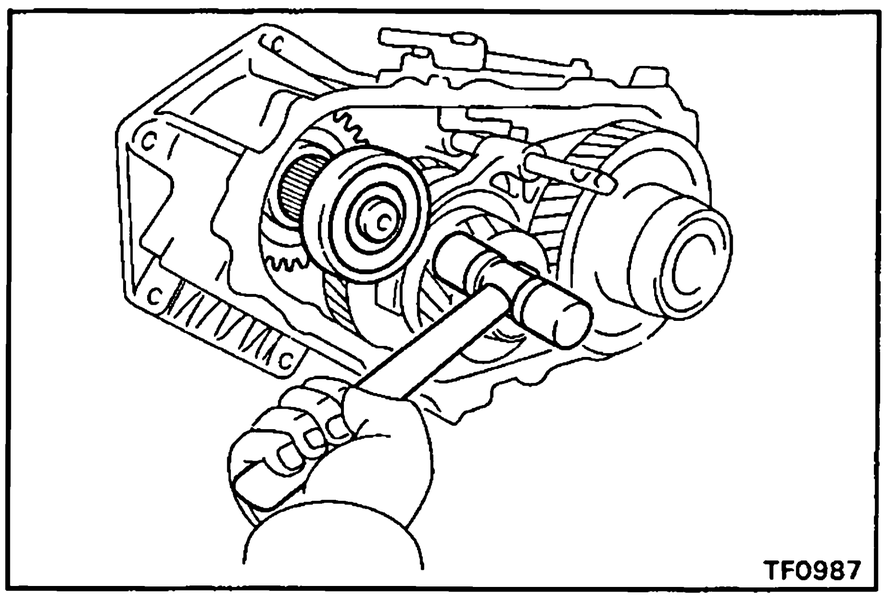



**4. ASSEMBLE SHIFT FORK NO.1 AND FORK SHAFT**

Using a pin punch and a hammer, drive in the slotted spring pin.

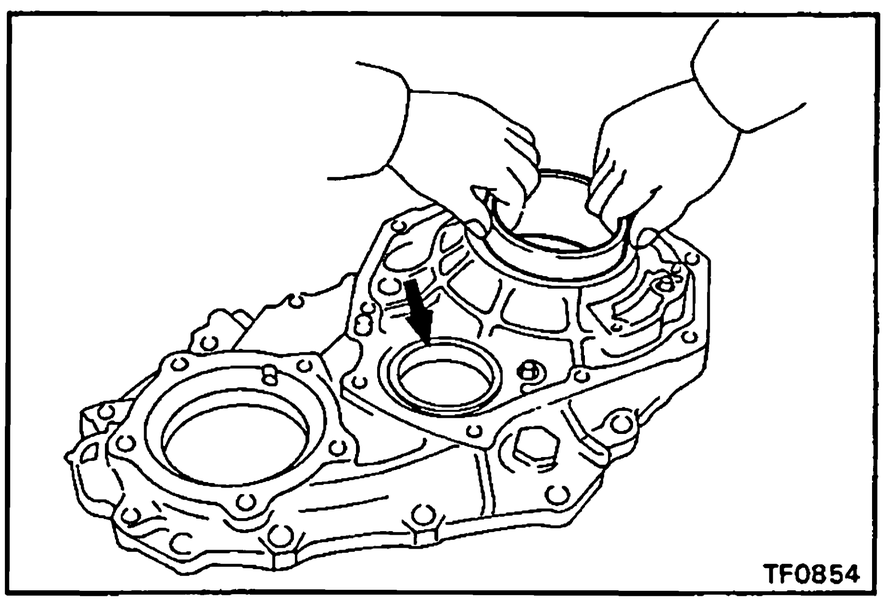



**5. INSTALL IDLE GEAR ASSEMBLY, CENTER DIFFERENTIAL ASSEMBLY AND HIGH AND LOW SHIFT FORK ASSEMBLY TO FRONT CASE**

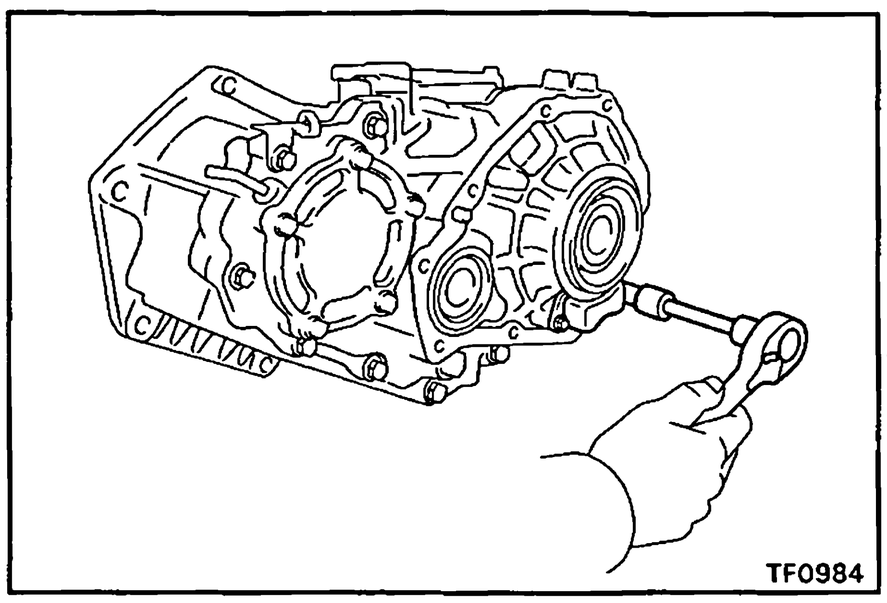



**6. INSTALL INPUT SHAFT ASSEMBLY**

Using a plastic hammer, tap in the input shaft.




**7. INSTALL TWO BEARING RACES TO REAR CASE**

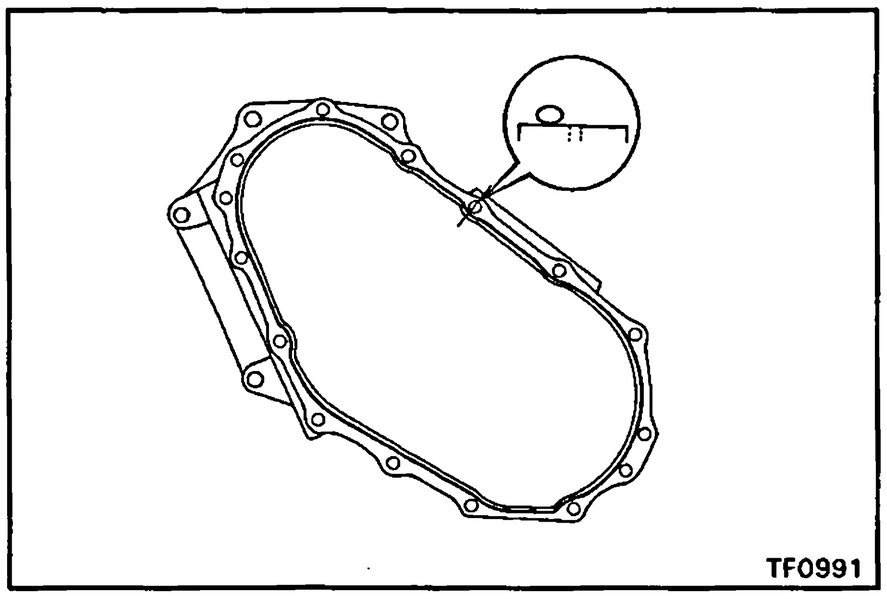

TF0984

**8. INSTALL OIL STRAINER TO REAR CASE**

(a) Install the oil strainer.

(b) Install and torque the bolts.

**Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)**


TF0991

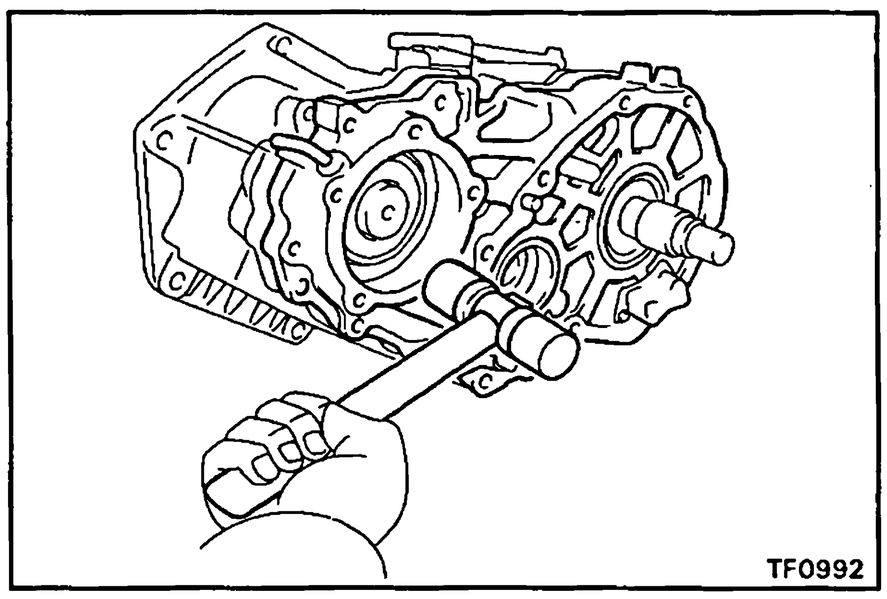
**9. ASSEMBLE FRONT CASE AND REAR CASE**

(a) Remove any packing material and be careful not to drop oil on the contacting surfaces of the front case.

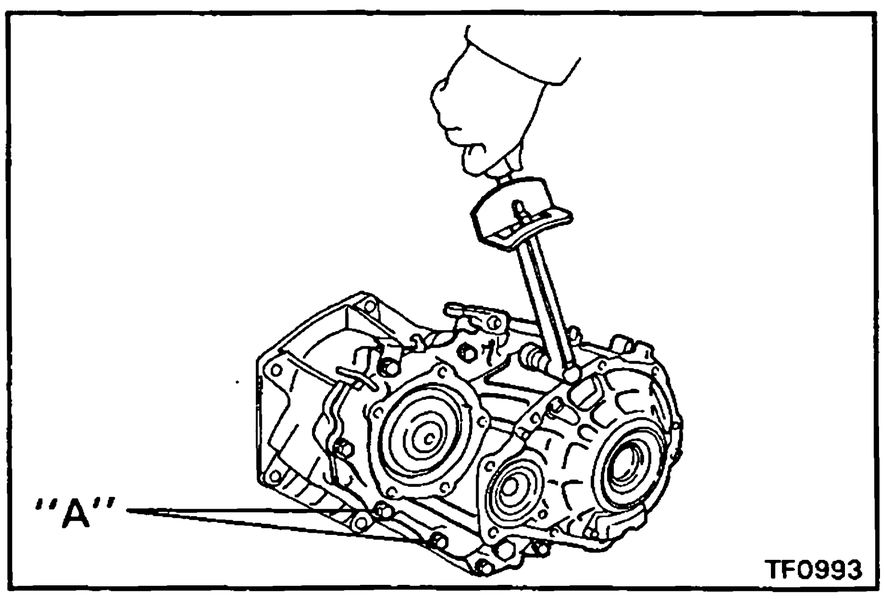
(b) Apply seal packing to the front case as shown.

**Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent**

HINT: Install the rear case as soon as the seal packing is applied.


TF0992

(c) Using a plastic hammer, tap the rear case and assemble it.



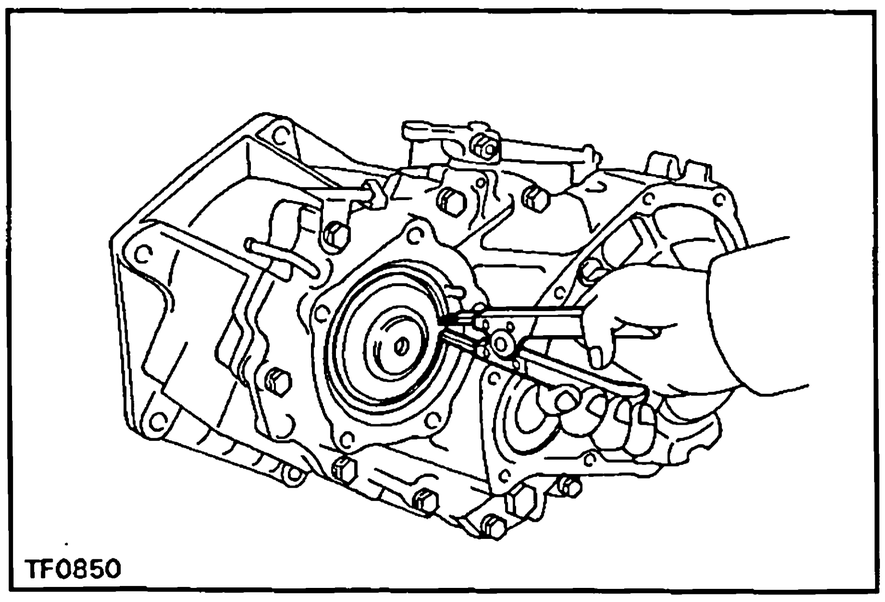
TF0993

(d) Apply liquid sealer to the "A" bolt threads.

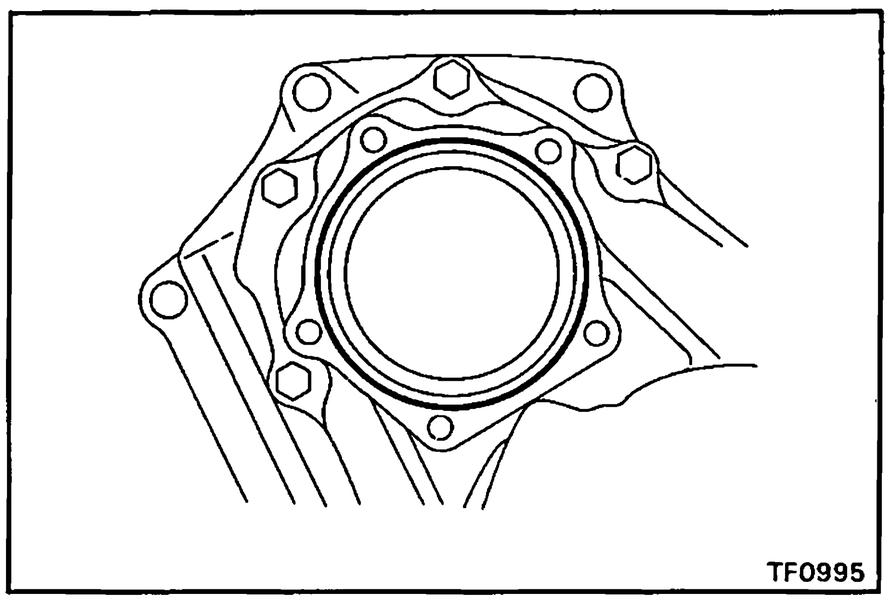
**Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(e) Install and torque the eight bolts.

**Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)**


TF0850

(f) Using snap ring pliers, install the snap ring.


TF0995

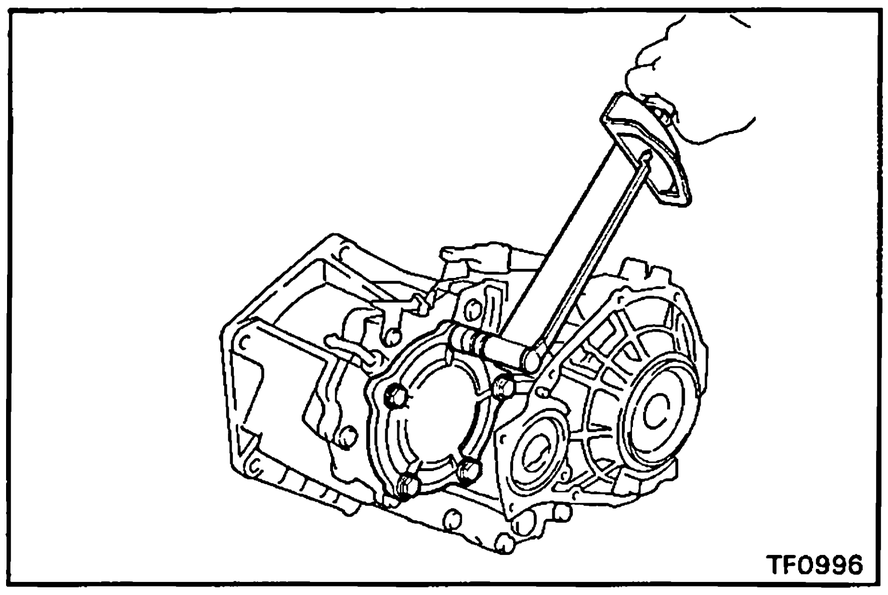
## 10. INSTALL CASE COVER

(a) Remove any packing material and be careful not to drop oil on the contacting surfaces of the rear case.

(b) Apply seal packing to the rear case as shown.

**Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent**

HINT: Install the case cover as soon as the seal packing is applied.


TF0996

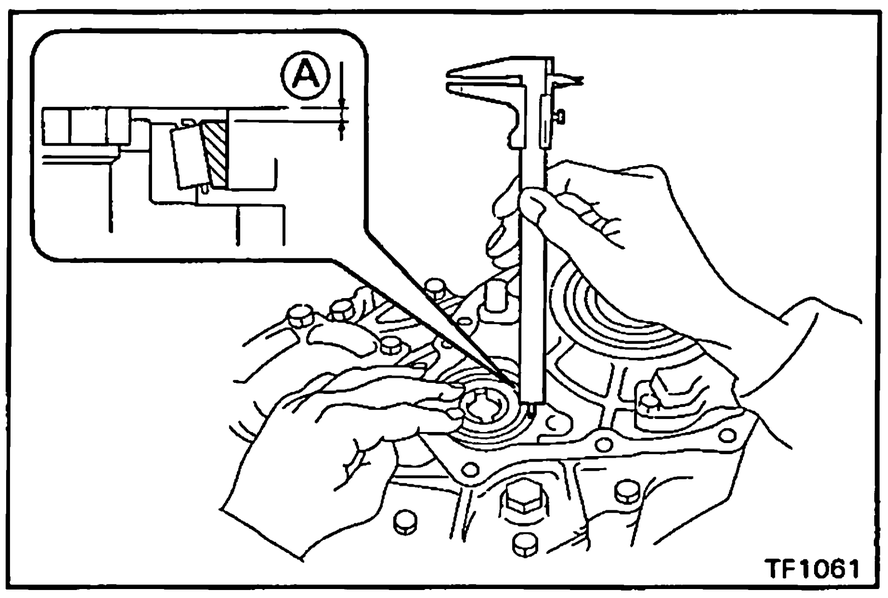
(c) Install the case cover.

(d) Apply liquid sealer to the bolt threads.

**Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(e) Install and torque the five bolts.

**Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)**



TF1061

## 11. SELECT ADJUSTING SHIMS FOR IDLER GEAR REAR TAPER ROLLER BEARING

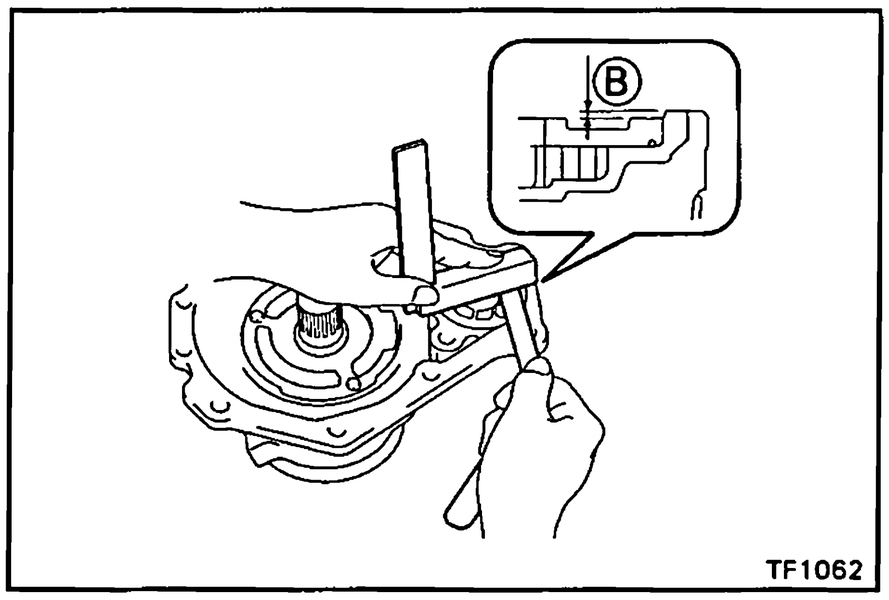
(a) Using a vernier calipers, measure dimension Ⓐ .

HINT: Lightly hold down the bearing outer race in the thrust direction to eliminate any looseness before making the measurement.

(b) Using a steel straight edge and feeler gauge, measure the clearance of dimension Ⓑ .

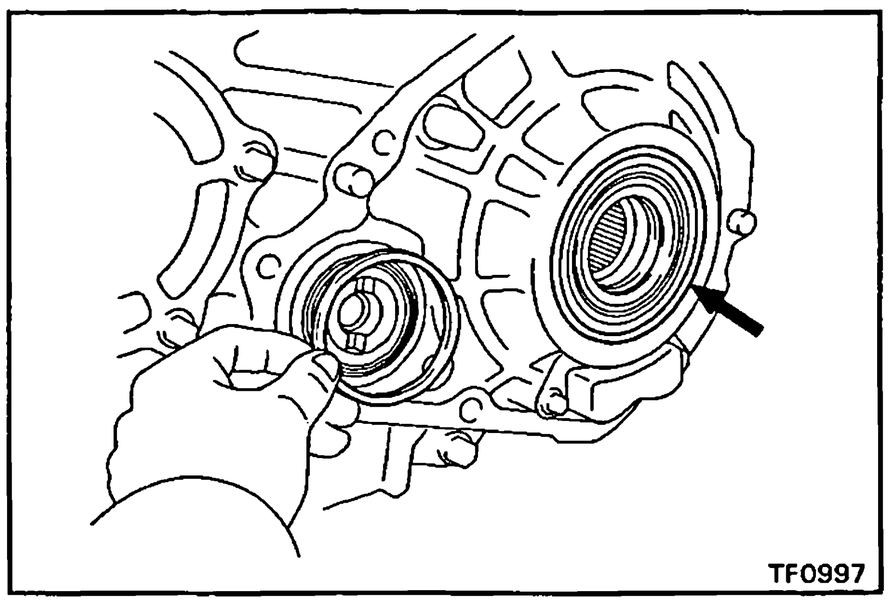
(c) Calculate the required thickness of the adjusting shim. Thickness: Dimension Ⓐ + Dimension Ⓑ + (0.03 — 0.08 mm)

(d) From the following table, select a shim with a thickness fitting within the range of the calculation in (c).



TF1062

| Mark | Thickness mm (in.) | Mark | Thickness mm (in.) |
|---|---|---|---|
| 2 | 0.30 (0.0118) | 8 | 3.20 (0.1260) |
| 3 | 0.45 (0.0177) | 9 | 3.40 (0.1339) |
| 4 | 2.40 (0.0945) | 10 | 3.60 (0.1417) |
| 5 | 2.60 (0.1024) | 11 | 3.80 (0.1496) |
| 6 | 2.80 (0.1102) | 12 | 4.00 (0.1575) |
| 7 | 3.00 (0.1181) | 13 | 0.55 (0.0216) |

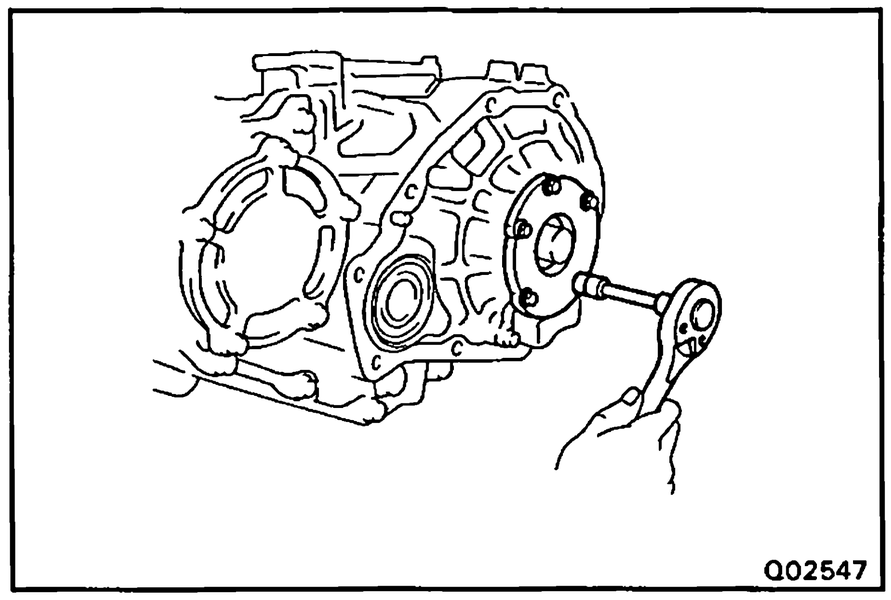



**12. INSTALL ADJUSTING SHIMS TO IDLER GEAR AND OUTPUT SHAFT TAPER ROLLER BEARINGS**

(a) Apply MP grease to the adjusting shims.

(b) Install the adjusting shims to bearing outer races.

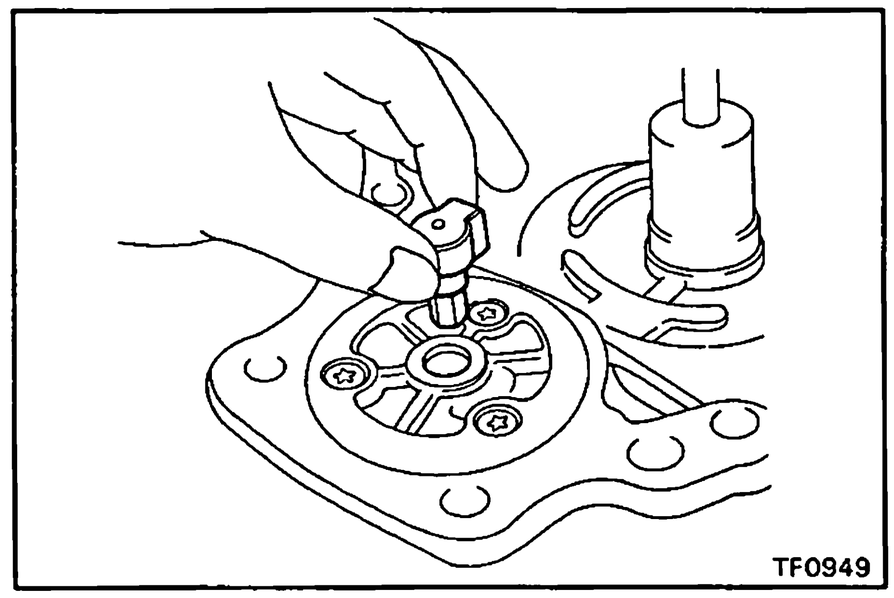
HINT: Install the thinner shim on the bearing outer race side.




**13. INSTALL RETAINER**

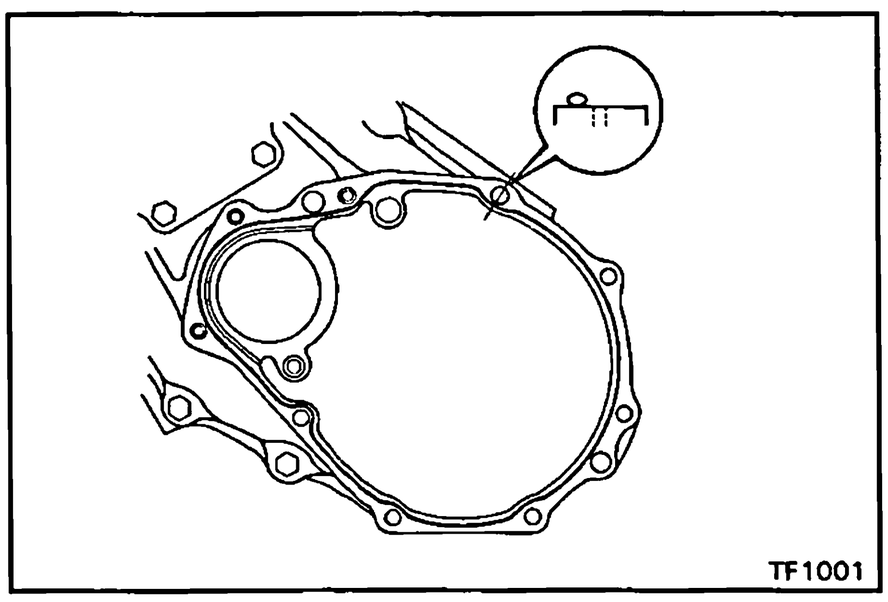
Install the retainer with the five bolts.

**Torque: 39.2 N·m (400 kgf·cm, 28 ft·lbf)**




**14. INSTALL REAR EXTENSION HOUSING**

(a) Install the oil pump drive shaft.

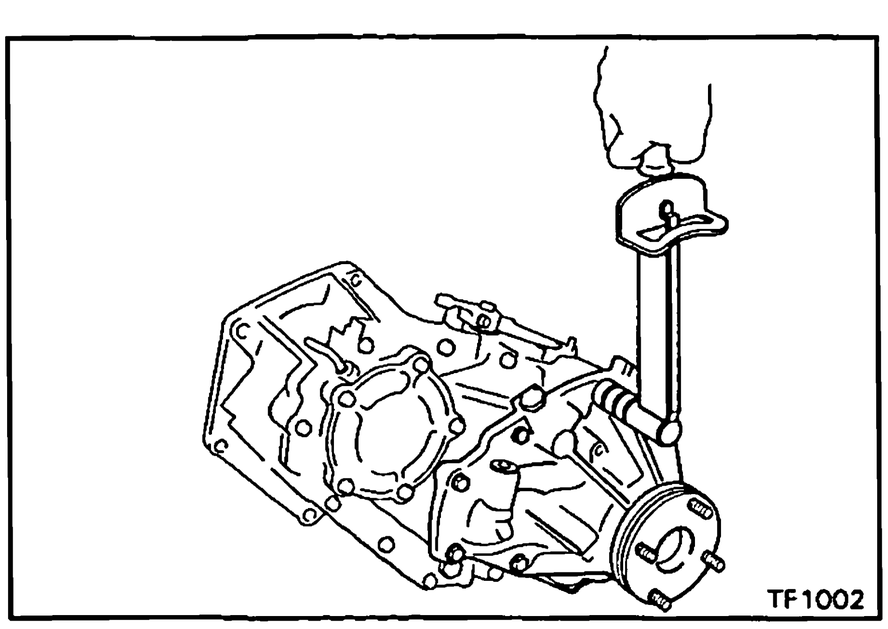



(b) Remove any packing material and be careful not drop oil on the contacting surfaces of the rear case.

(c) Apply seal packing to the rear case as shown.

**Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent**

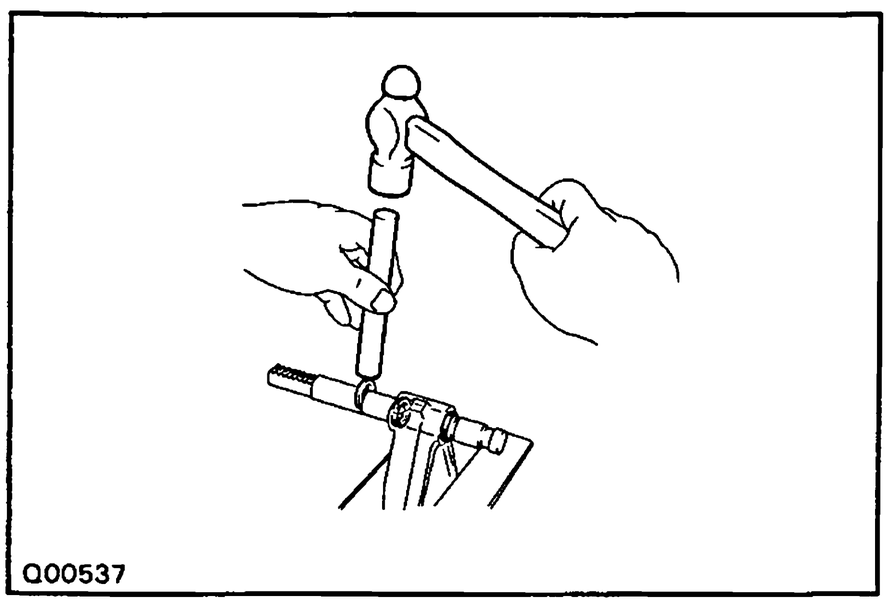
HINT: Install the rear extension housing as soon as the seal packing is applied.




(d) Install the rear extension housing.

(e) Install and torque the nine bolts.

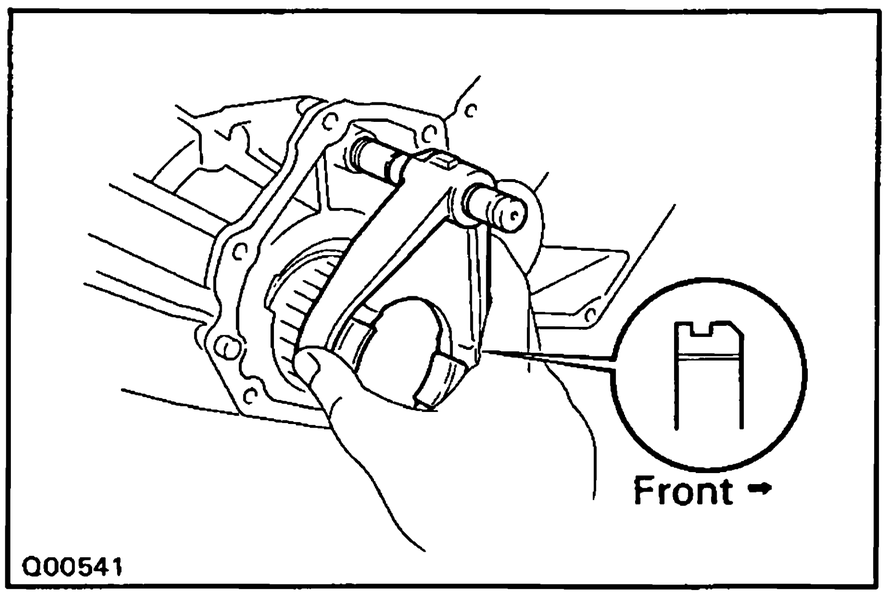
**Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)**


Q00537

**15. ASSEMBLE SHIFT FORK NO.2 AND FORK SHAFT**

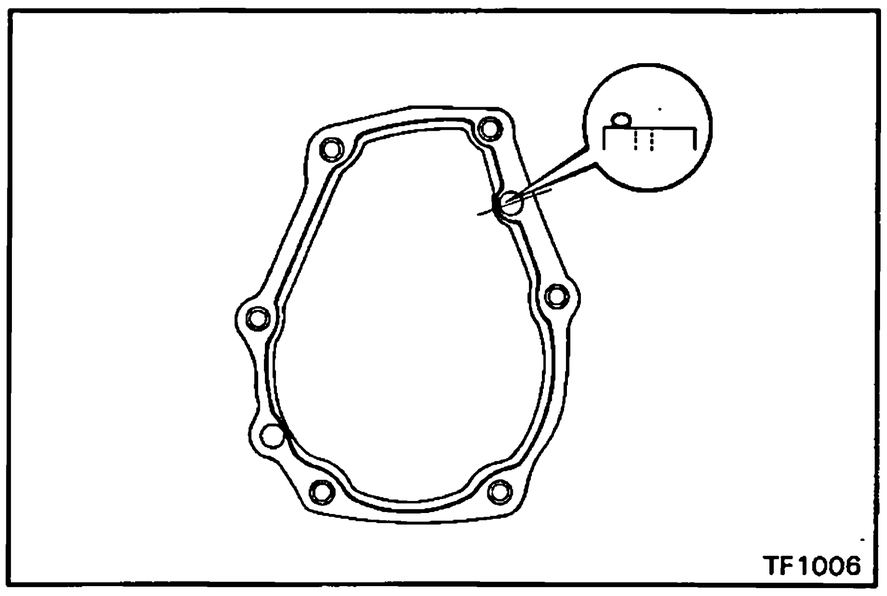
(a) Assemble the shift fork No.2 and fork shaft.

(b) Using a brass bar and hammer, tap in the snap rings.



Q00541

**16. INSTALL CLUTCH SLEEVE, SHIFT FORK NO.2 AND FORK SHAFT**


TF1006

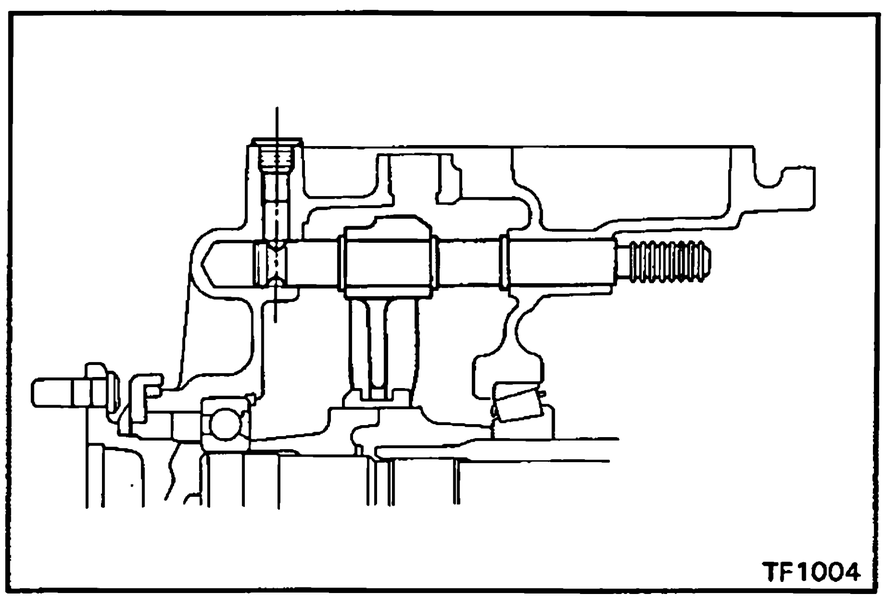
**17. INSTALL FRONT EXTENSION HOUSING**

(a) Remove any packing material and be careful not to drop oil on the contacting surfaces of the front case.

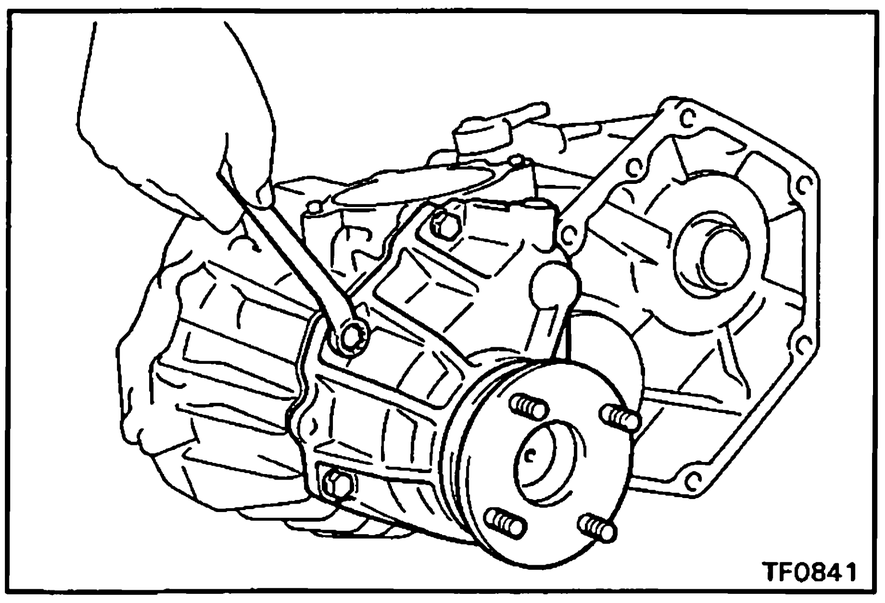
(b) Apply seal packing to the front case as shown.

**Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent**

HINT: Install the front extension housing as soon as the seal packing is applied.

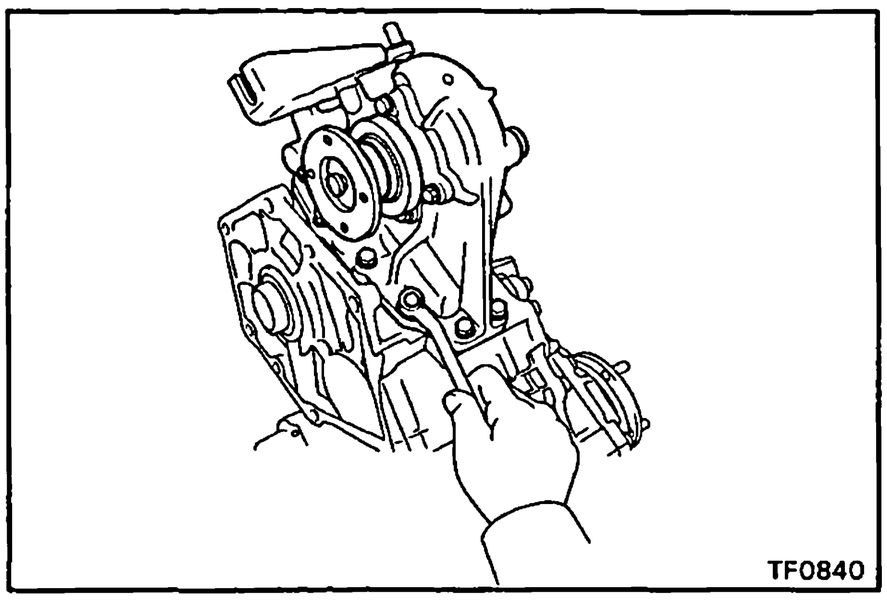

TF1004

(c) Set the clutch sleeve in 4WD condition in differential lock condition, install the front extension housing.


TF0841

(d) Install and torque the six bolts.

**Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)**




**18. (w/ POWER TAKE-OFF)**
**INSTALL POWER TAKE-OFF CASE**

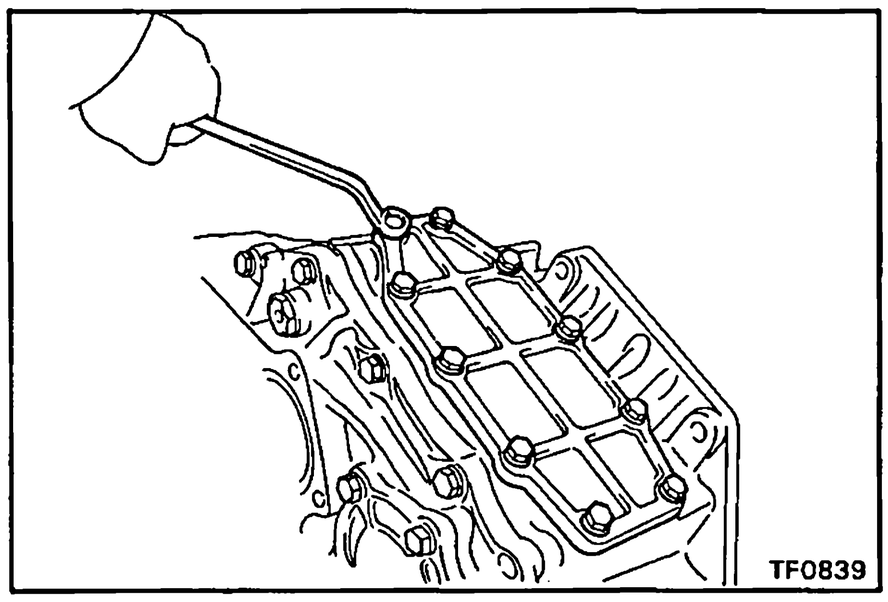
(a) Install the power take-off case and a new gasket.

(b) Apply liquid sealer to the bolt threads.

**Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(c) Install and torque the ten bolts.

**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**




**19. (w/o POWER TAKE-OFF)**
**INSTALL POWER TAKE-OFF COVER**

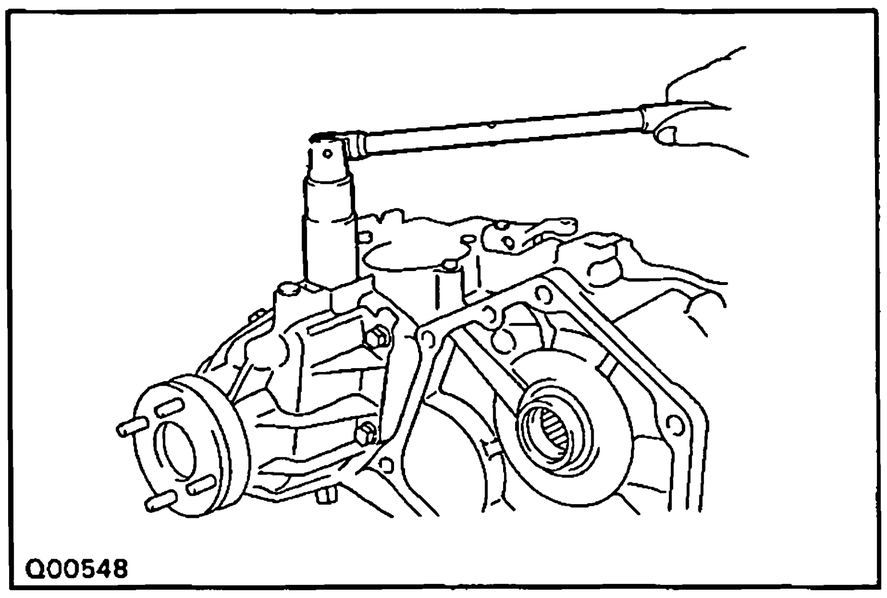
(a) Install the power take-off cover and a new gasket.

(b) Apply liquid sealer to the bolt threads.

**Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(c) Install and torque the ten bolts.

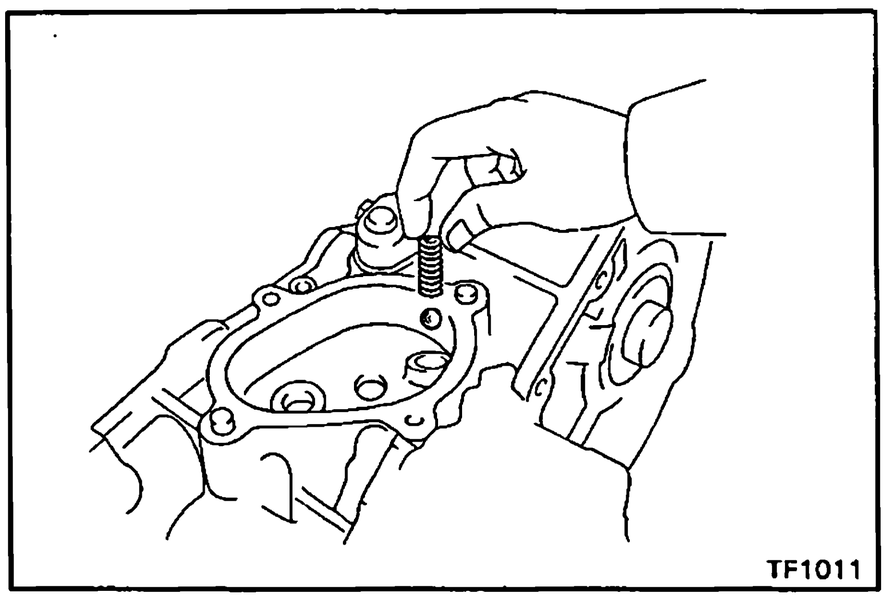
**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**




**20. INSTALL TRANSFER INDICATOR SWITCHES**

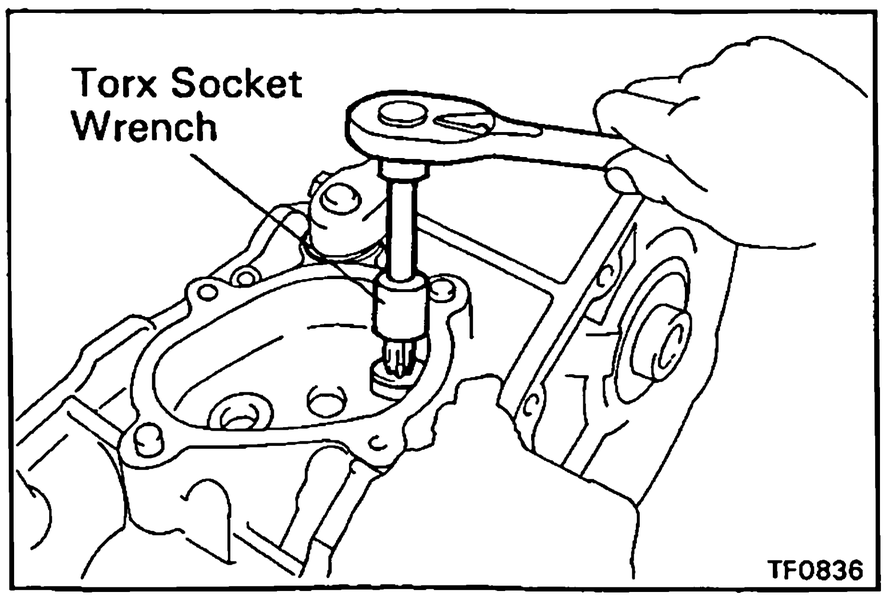
Install and torque the Center Diff Lock indicator switch, L4 position switch and neutral position switch.

**Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)**




**21. INSTALL BALL, SPRING AND SCREW PLUG**

(a) Install the ball and spring.



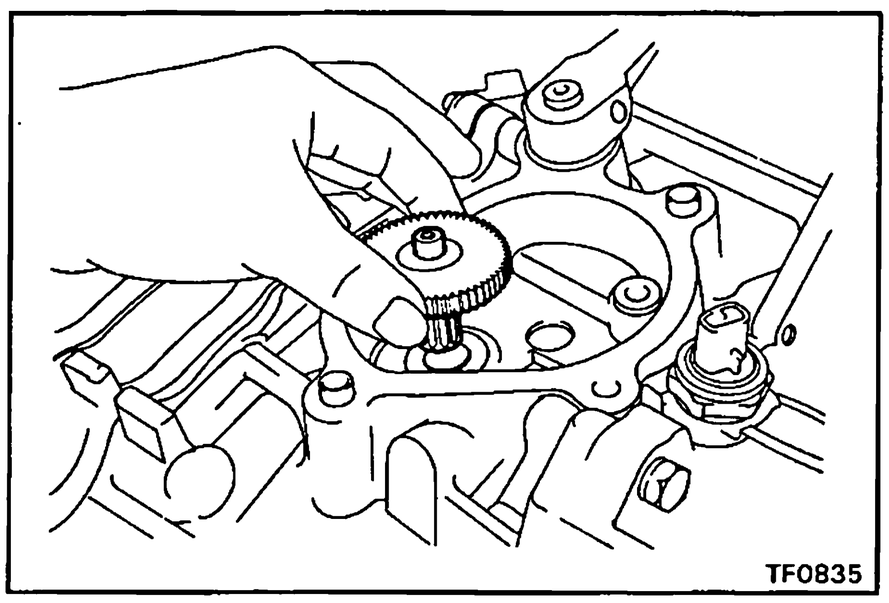

(b) Apply liquid sealer to the screw plug.

**Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

(c) Install and torque the screw plug.

(Torx socket wrench T40 09042-00020)

**Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)**

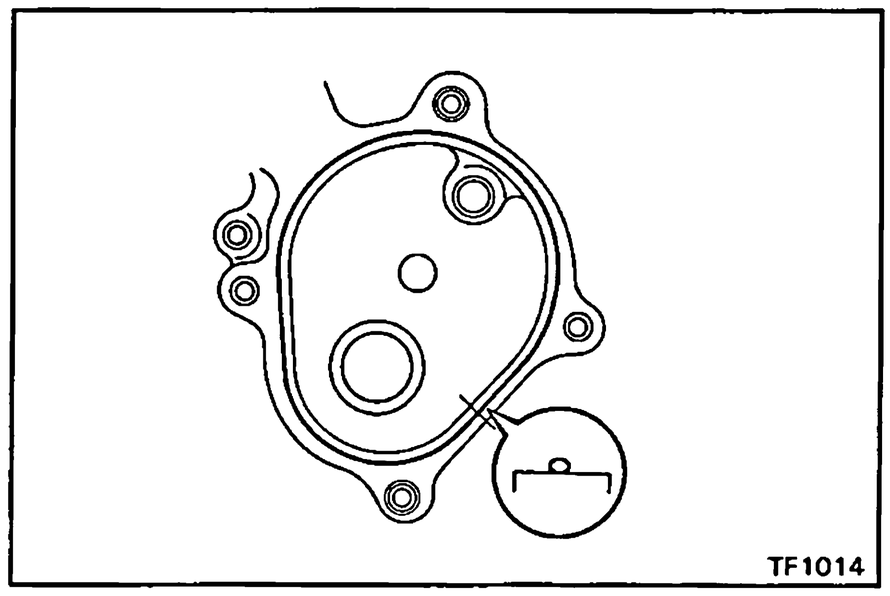



**22. INSTALL OUTPUT GEAR**

(a) Apply gear oil to the output gear.

(b) Install the output gear.

**NOTICE: Do not turn the output gear.**



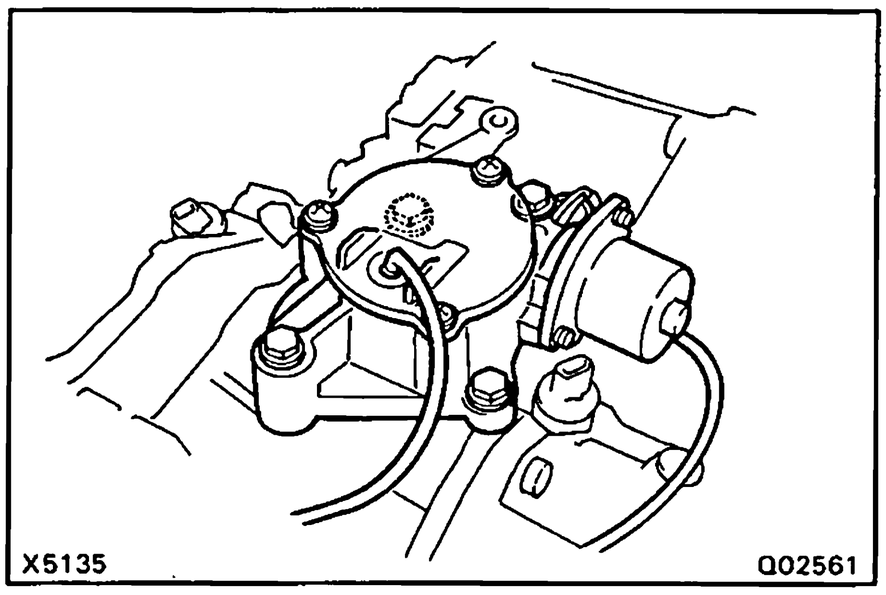

**23. INSTALL MOTOR ACTUATOR**

(a) Remove any packing material and be careful not to drop oil on the contacting surfaces of the front case.

(b) Apply seal packing to the front case as shown.

**Seal packing: Part No. 08826-00090, THREE BOND 1281 or equivalent**

HINT: Install the motor actuator as soon as the seal packing is applied.

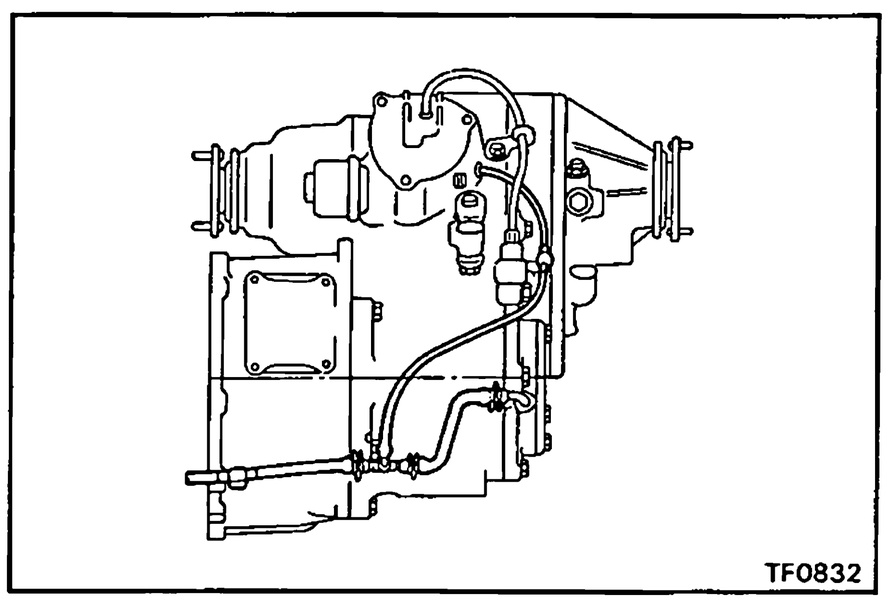



(c) Install the motor actuator.

HINT: Set the motor actuator in differential lock condition.

(d) Install and torque the four bolts.

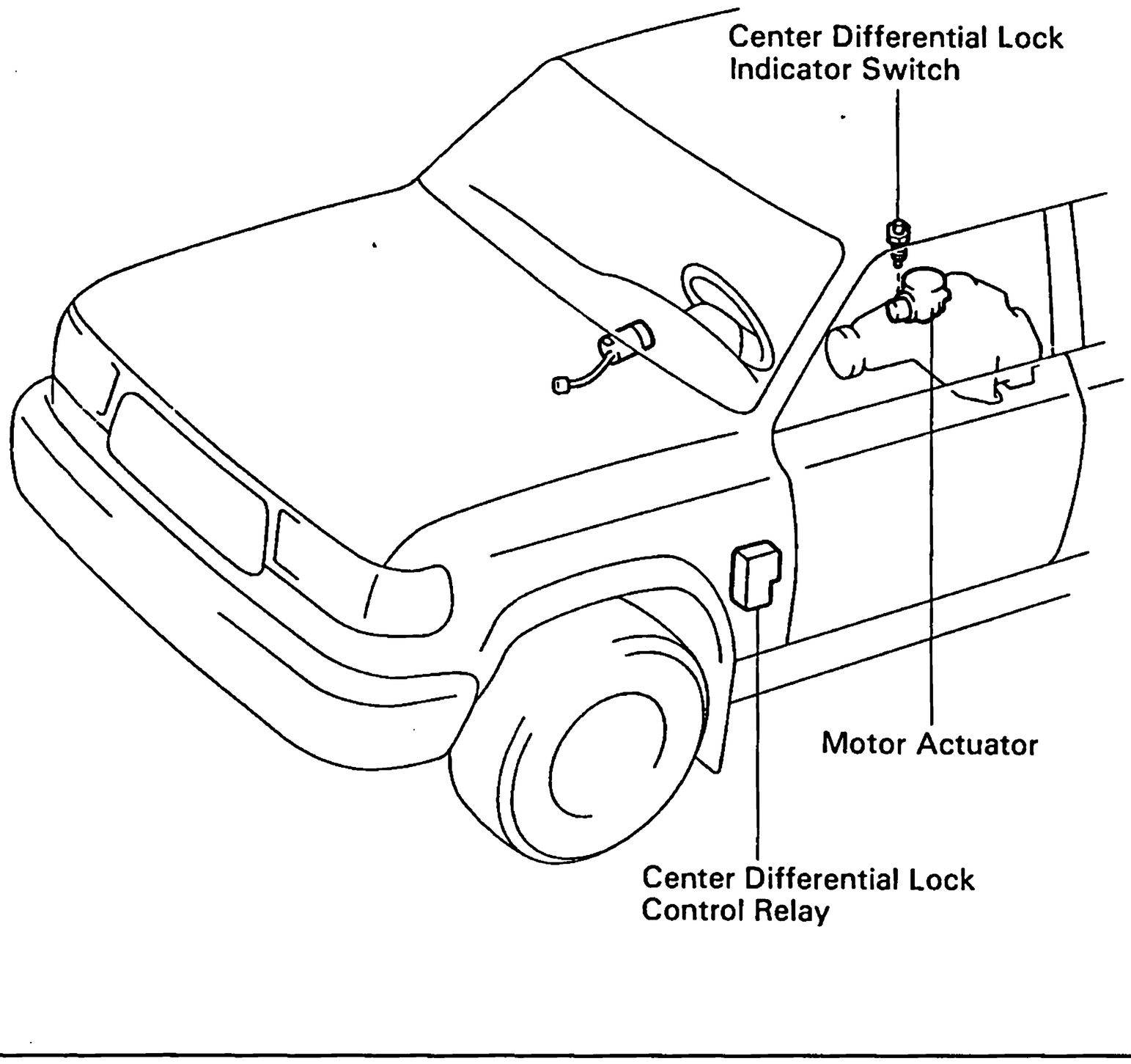
**Torque: 18.1 N·m (185 kgf·cm, 13.3 ft·lbf)**



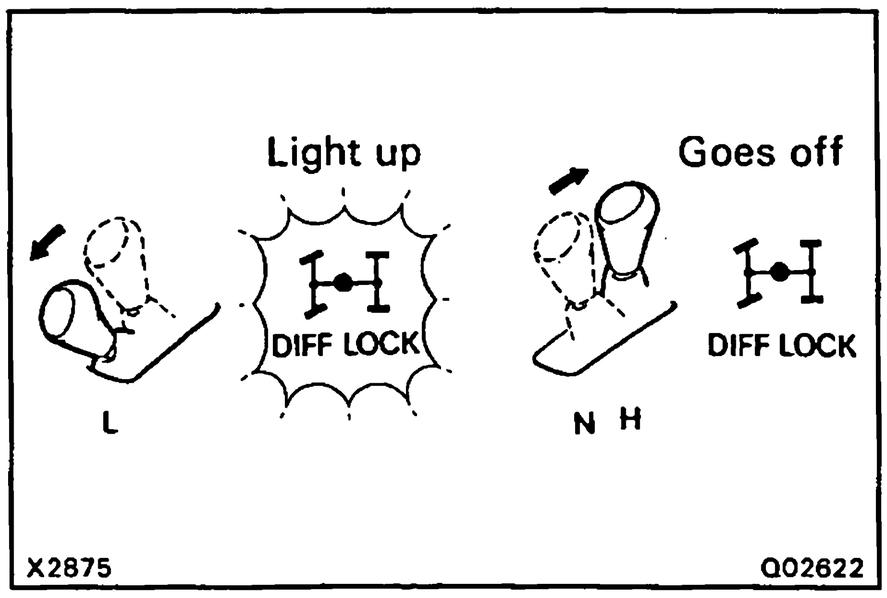

**24. INSTALL BREATHER HOSE**

# MOTOR SHIFT CONTROL SYSTEM

## PARTS LOCATION




Q02841



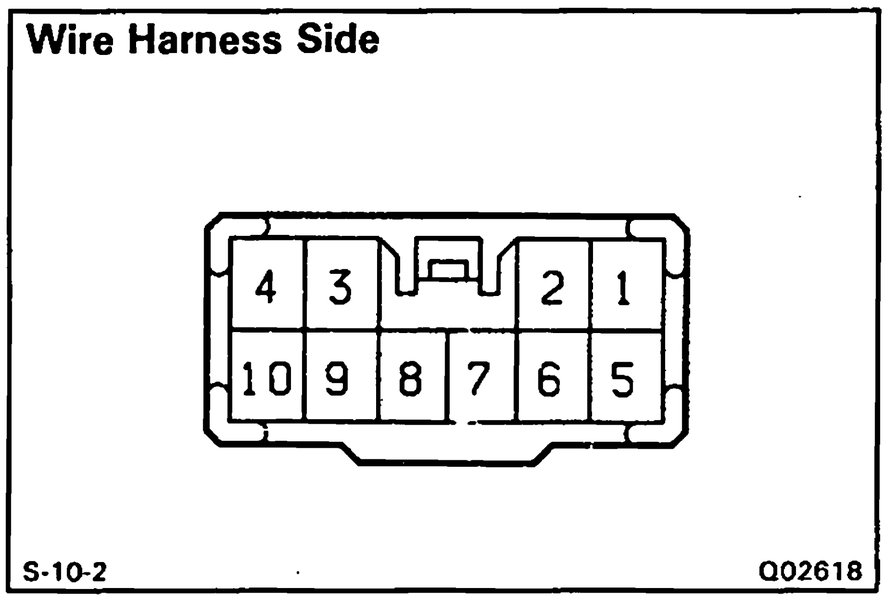

X2875 Q02622

## SYSTEM INSPECTION

### INSPECT SHIFT LEVER POSITION

(a) Start the engine, and center differential lock switch turned to OFF.

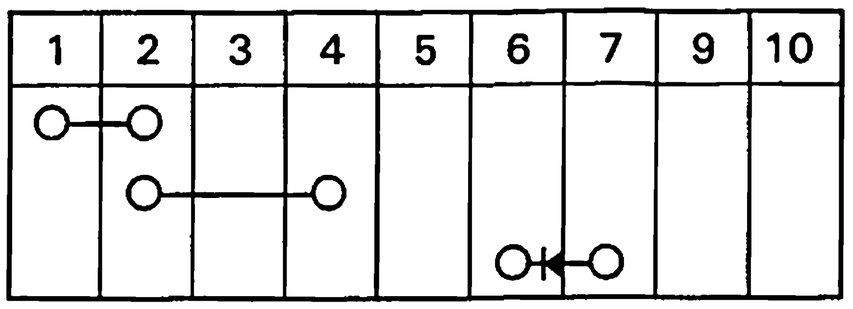
(b) Check that the center differential indicator light comes on when the transfer shift lever shifted to L position. Check that the light goes off when the lever is shifted to N or H position.




# PARTS INSPECTION

## 1. INSPECT CENTER DIFFERENTIAL LOCK CONTROL RELAY

(a) Check that there is continuity between terminals as shown in the chart.




HINT: There is a diode between terminals 6 and 7. If the circuit shown no continuity, change the positive (+) and negative (−) probes and recheck the circuit.

(b) Apply battery voltage between terminals and check that there is continuity between terminals as shown in the chart.

| Terminal: Battery voltage ⊕ | Terminal: Battery voltage ⊖ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 5 | ○—○ | ○—○ | ○—○ | | | | | | | |
| | | ○—✕—○ | | | | | | | | | |
| 7 | 2 | | | | | | | | | ○—✕—○ | |
| 9 | 10 | | ○—✕—○ | ○—○ | ○—○ | | | | | | |

○—○ : Continuity
○—✕—○ : No continuity

If continuity is not as specified, replace the relay.




## 2. INSPECT MOTOR ACTUATOR

(a) Using an ohmmeter, measure the resistance between terminals 2 and 3.

**Standard resistance: 0.3 — 100 Ω**

(b) Using an ohmmeter, measure the resistance between terminals 2 or 3 and body ground.

**Standard resistance: More than 0.5 Ω**

If resistance value is not as specified, replace the motor actuator.

# SERVICE SPECIFICATIONS

## SERVICE DATA

| | | | |
|---|---|---|---|
| Input gear snap ring | Mark | | |
| | A | 2.00 mm | 0.0787 in. |
| | B | 2.10 mm | 0.0827 in. |
| | C | 2.20 mm | 0.0866 in. |
| | D | 2.30 mm | 0.0906 in. |
| | E | 2.40 mm | 0.0945 in. |
| | F | 2.50 mm | 0.0984 in. |
| | G | 2.60 mm | 0.1024 in. |
| | H | 2.70 mm | 0.1063 in. |
| | J | 2.80 mm | 0.1102 in. |
| Input shaft rear ball bearing snap ring | Mark | | |
| | A | 2.00 mm | 0.0787 in. |
| | B | 2.10 mm | 0.0827 in. |
| | C | 2.20 mm | 0.0866 in. |
| | D | 2.30 mm | 0.0906 in. |
| | E | 2.40 mm | 0.0945 in. |
| Idle low gear thrust clearance | STD | 0.125 — 0.275 mm | 0.0049 — 0.0108 in. |
| | Limit | 0.275 mm | 0.0108 in. |
| Idle low gear oil clearance | STD | 0.015 — 0.068 mm | 0.0006 — 0.0027 in. |
| | Limit | 0.068 mm | 0.0027 in. |
| High speed gear thrust clearance | STD | 0.10 — 0.25 mm | 0.0039 — 0.0098 in. |
| | Limit | 0.25 mm | 0.0098 in. |
| High speed gear oil clearance | STD | 0.015 — 0.071 mm | 0.0006 — 0.0028 in. |
| | Limit | 0.071 mm | 0.0028 in. |
| Center differential backlash adjusting shim | | 1.70 mm | 0.0669 in. |
| | | 1.85 mm | 0.0728 in. |
| | | 2.00 mm | 0.0787 in. |
| | | 2.15 mm | 0.0846 in. |
| | | 2.30 mm | 0.0906 in. |
| | | 2.45 mm | 0.0965 in. |
| | | 2.60 mm | 0.1024 in. |
| | | 2.75 mm | 0.1083 in. |
| | | 2.90 mm | 0.1142 in. |
| | | 3.05 mm | 0.1201 in. |
| Center differential backlash | Limit | 0.05 mm | 0.0020 in. |
| Oil pump driven rotor body clearance | STD | 0.08 — 0.17 mm | 0.0031 — 0.0067 in. |
| | Limit | 0.17 mm | 0.0067 in. |
| Oil pump driven rotor body tip clearance | STD | 0.05 — 0.15 mm | 0.0020 — 0.0059 in. |
| | Limit | 0.15 mm | 0.0059 in. |
| Oil pump side clearance | STD | 0.03 — 0.1 mm | 0.0012 — 0.0039 in. |
| | Limit | 0.10 mm | 0.0039 in. |
| Front drive gear piece snap ring | Mark | | |
| | A | 2.00 mm | 0.0787 in. |
| | B | 2.10 mm | 0.0827 in. |
| | C | 2.20 mm | 0.0866 in. |
| | D | 2.30 mm | 0.0906 in. |

| | | | |
|---|---|---|---|
| | E | 2.40 mm | 0.0945 in. |
| | F | 2.50 mm | 0.0984 in. |
| | G | 2.60 mm | 0.1024 in. |
| | H | 2.70 mm | 0.1063 in. |
| | J | 2.80 mm | 0.1102 in. |
| | K | 1.80 mm | 0.0709 in. |
| | L | 1.90 mm | 0.0748 in. |
| Rear output shaft adjusting shim | | | |
| Idler gear side | Mark | | |
| | 2 | 0.30 mm | 0.0118 in. |
| | 3 | 0.45 mm | 0.0177 in. |
| | 4 | 2.40 mm | 0.0945 in. |
| | 5 | 2.60 mm | 0.1024 in. |
| | 6 | 2.80 mm | 0.1102 in. |
| | 7 | 3.00 mm | 0.1181 in. |
| | 8 | 3.20 mm | 0.1260 in. |
| | 9 | 3.40 mm | 0.1339 in. |
| | 10 | 3.60 mm | 0.1417 in. |
| | 11 | 3.80 mm | 0.1496 in. |
| | 12 | 4.00 mm | 0.1575 in. |
| | 13 | 0.55 mm | 0.0216 in. |

## TORQUE SPECIFICATIONS

| Part tightened | N·m | kgf·cm | ft·lbf |
|---|---|---|---|
| Oil pump plate × Rear extension housing | 4.9 | 50 | 43 in.·lbf |
| Screw plug × Rear extension housing | 29 | 300 | 22 |
| Oil pump cover × Rear extension housing | 4.9 | 50 | 43 in.·lbf |
| Lever lock pin | 12 | 120 | 9 |
| Oil strainer × Rear case | 4.9 | 50 | 43 in.·lbf |
| Case cover × Rear case | 37 | 380 | 27 |
| Rear extension housing × Rear case | 37 | 380 | 27 |
| Front extension housing × Front case | 37 | 380 | 27 |
| Center Diff Lock Indicator switch × Front extension housing | 37 | 380 | 27 |
| Screw plug × Front case | 19 | 190 | 14 |
| Motor actuator × Front case | 18.1 | 185 | 13.3 |
| Differential front case × Differential rear case | 98 | 1,000 | 72 |
| (temporarily tighten) | 88 | 900 | 65 |
| Front case × Rear case | 37 | 380 | 27 |
| Rear case × Bearing retainer | 39.2 | 400 | 28 |

# PROPELLER SHAFT

**REFER TO LAND CRUISER (STATION WAGON) REPAIR MANUAL FOR CHASSIS AND BODY (Pub. No. RM184E)**

NOTE: The following pages contain only the points which differ from the above listed manual.

**(STATION WAGON)**

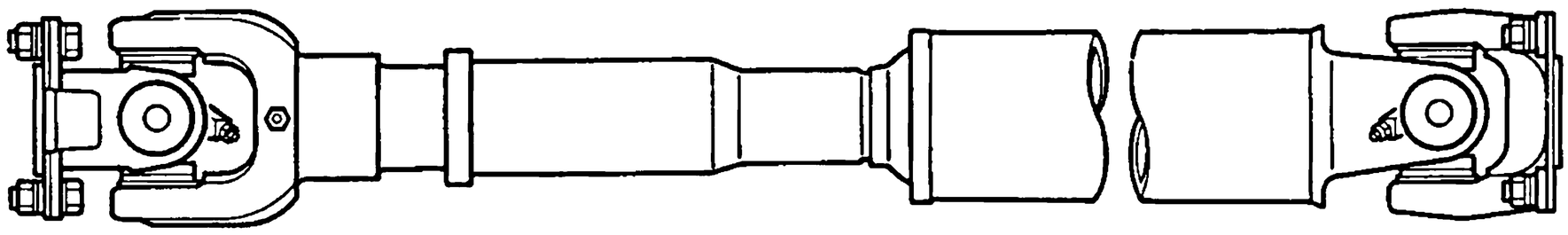
DESCRIPTION ..... PR-2
PROPELLER SHAFT ..... PR-3

# DESCRIPTION

## DESCRIPTION

The propeller shaft is connected to the front differential and the transfer via two joints.

**Front Propeller Shaft**

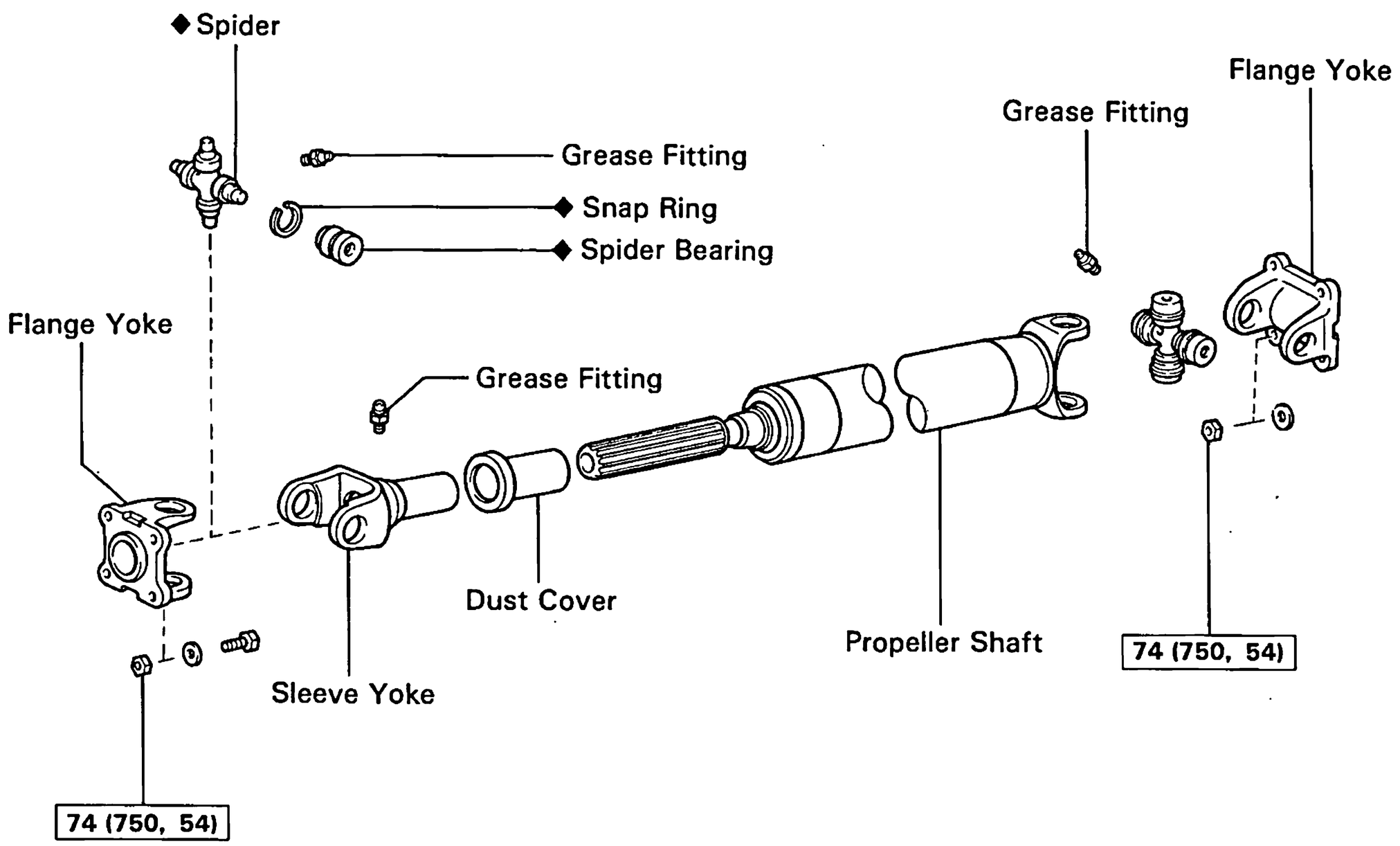


R05260

# PROPELLER SHAFT

## COMPONENTS

- **Front Propeller Shaft**




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

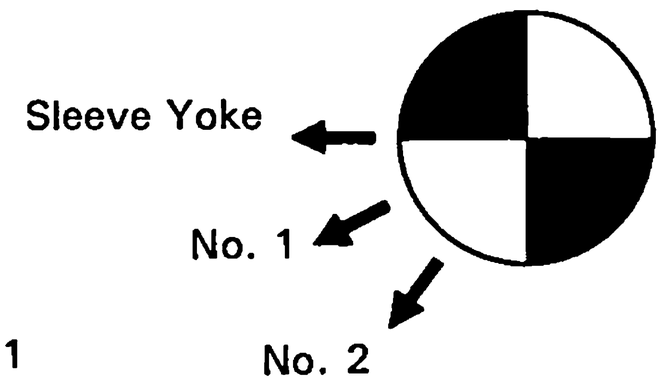
R05333

# PROPELLER SHAFT ASSEMBLY

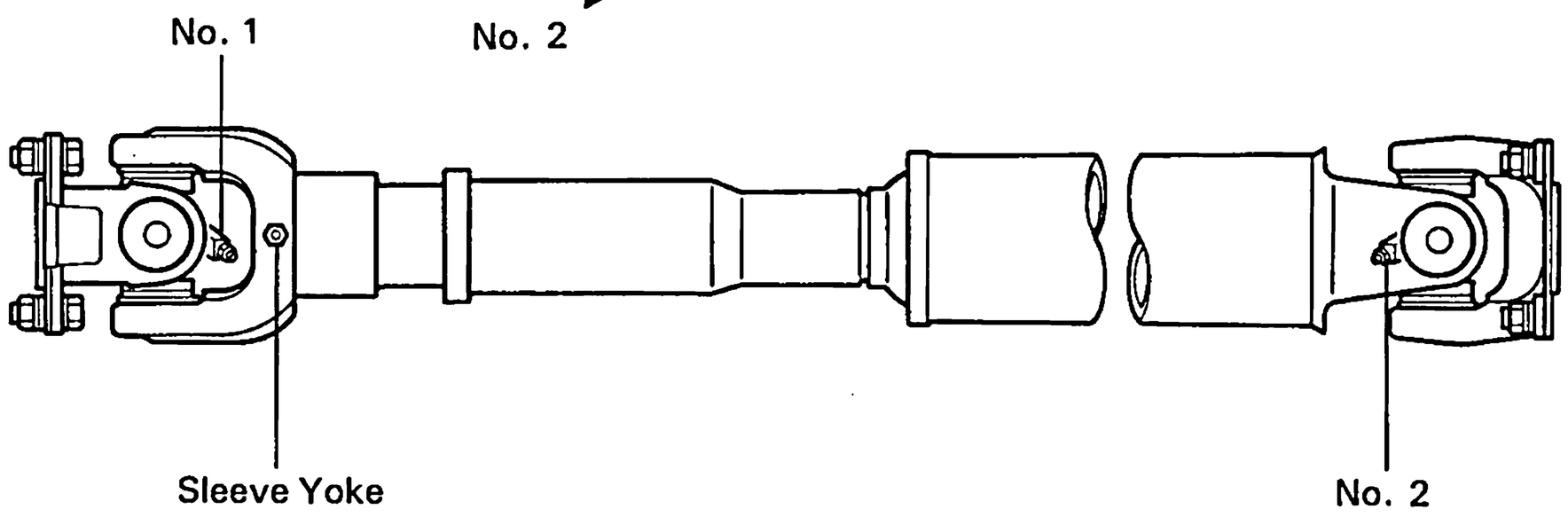
HINT: When replacing the spider, be sure that the grease fitting assembly hole is facing in the direction shown in the illustration.

**SPIDER GREASE FITTING ASSEMBLY DIRECTION**

**Front Propeller Shaft**




The figure at left shows the locations of the grease fittings as seen from the rear.




R05259

# SUSPENSION AND AXLE

**REFER TO FOLLOWING REPAIR MANUALS:**

| Manual Name | Pub. No. |
|---|---|
| • Land Cruiser (Hardtop and Canvas Top) Chassis and Body Repair Manual | RM183E |
| • Land Cruiser (Station Wagon) Chassis and Body Repair Manual | RM184E |
| • Land Cruiser (Hardtop, Canvas Top and Station Wagon) Chassis and Body Repair Manual Supplement | RM290E |

NOTE: The following pages contain only the points which differ from the above listed manuals.

SA

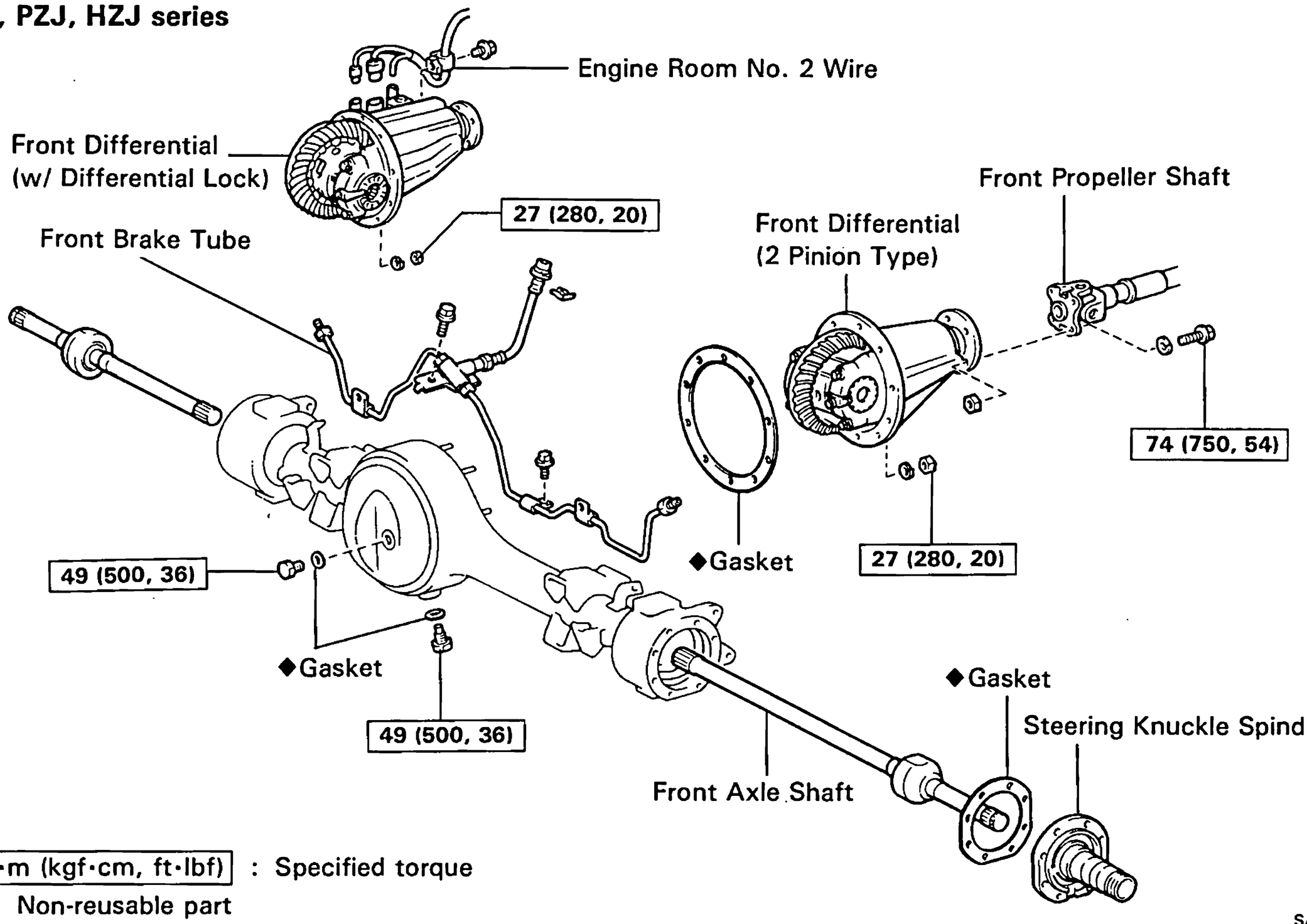
**(HARDTOP & CANVAS TOP)**
FRONT DIFFERENTIAL ..... SA-2
ASSEMBLY REMOVAL AND INSTALLATION ..... SA-2
**(STATION WAGON)**
WHEEL ALIGNMENT ..... SA-3
PRIMARY INSPECTION ..... SA-3
FRONT WHEEL ALIGNMENT ..... SA-4
FRONT DIFFERENTIAL ..... SA-6
ASSEMBLY REMOVAL AND INSTALLATION ..... SA-6
SERVICE SPECIFICATIONS ..... SA-7

# FRONT DIFFERENTIAL

## ASSEMBLY REMOVAL AND INSTALLATION

### COMPONENTS

**FJ, PZJ, HZJ series**




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

SA2874

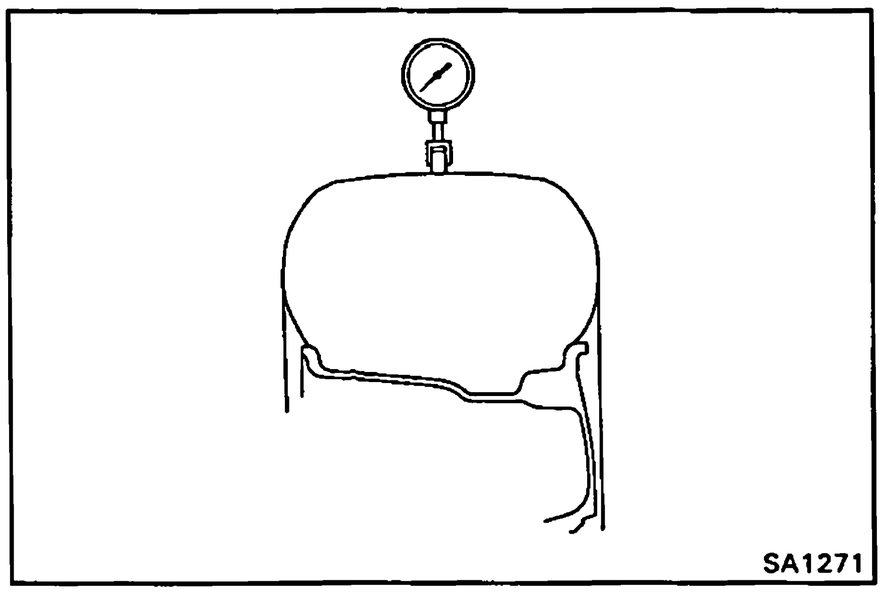
# WHEEL ALIGNMENT

## PRIMARY INSPECTION

**1. MAKE FOLLOW CHECKS AND CORRECT ANY PROBLEMS**

(a) Check the tires for wear and proper inflation.

**Cold tire inflation pressure:**
**See page SA-7**


SA1271

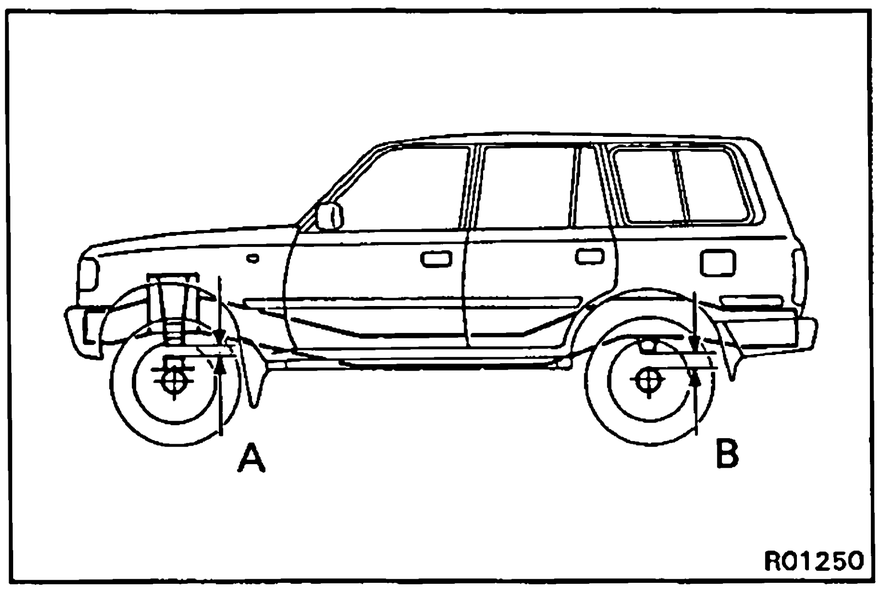
(b) Check the tire runout.
**Tire runout:**
**3.0 mm (0.118 in.) or less**

(c) Check the wheel bearings for looseness.

(d) Check the suspension for looseness.

(e) Check the steering linkage for looseness.

(f) Check that the absorbers work properly by using the standard bounce test.



R01250

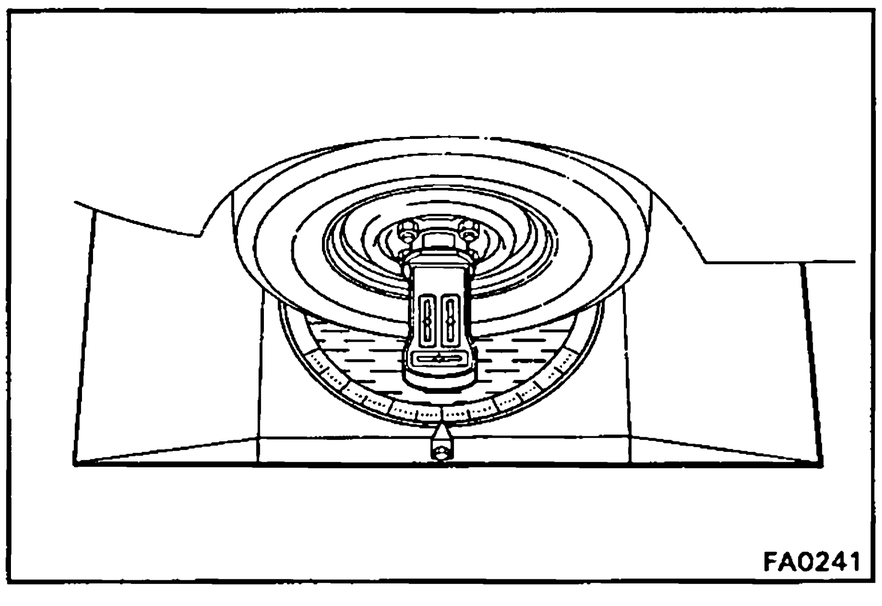
**2. MEASURE FOLLOW SPRING CLEARANCE AND BUMPER STOPPER CLEARANCE**

**A: Follow spring clearance (Front)**
**B: Bumper stopper clearance (Rear)**

| | A | B |
|---|---|---|
| For Europe | 39 mm (1.54 in.) | 117 mm (4.61 in.) |
| For Australia* | 52 mm (2.01 in.) | 105 mm (4.13 in.) |
| For Middle East | 38 mm (1.50 in.) | 92 mm (3.62 in.) |
| Others | 38 mm (1.50 in.) | 118 mm (4.66 in.) |

*: w/o Australia option

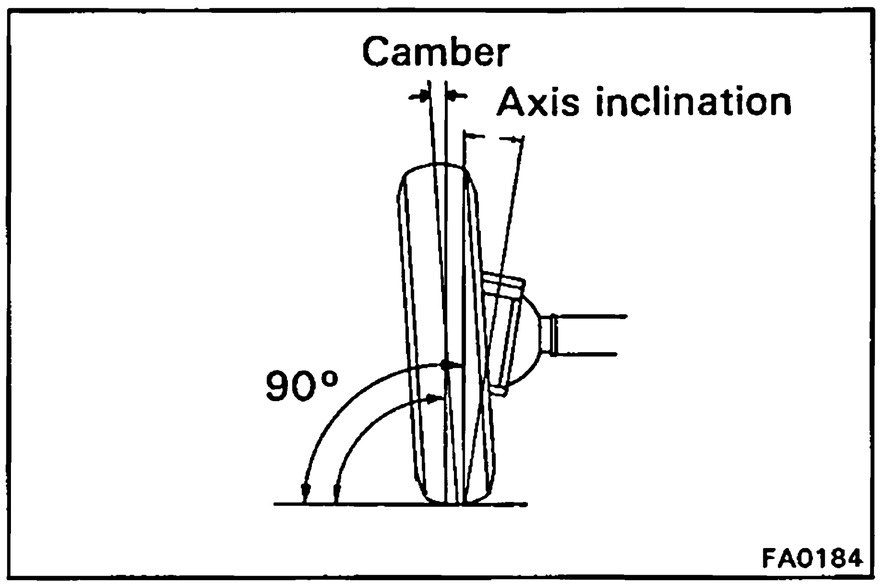
If the clearance of the vehicle is not standard, try to level the vehicle by rocking it down.


FA0241

# FRONT WHEEL ALIGNMENT

**1. INSTALL WHEEL ALIGNMENT EQUIPMENT**

Follow the specific instructions of the equipment manufacturer.

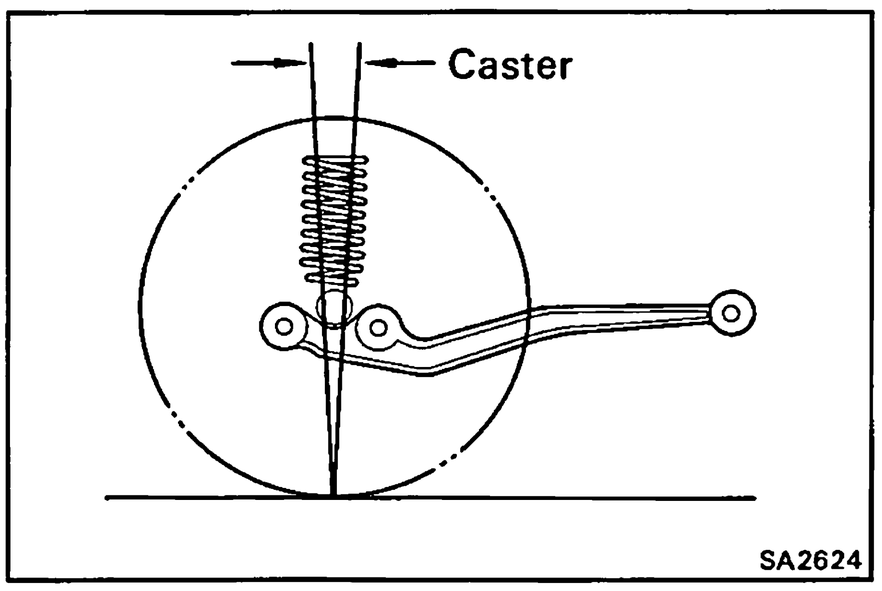


FA0184

**2. INSPECT CAMBER AND STEERING AXIS INCLINATION**

**Camber:**
**1°00′ ± 45′**
**Cross camber:**
**30′ or less**
**Steering axis inclination:**
**13°00′ ± 45′**

If the steering axis inclination is not as specified after camber have been correctly adjusted, recheck the steering knuckle and front wheel for bending or looseness.

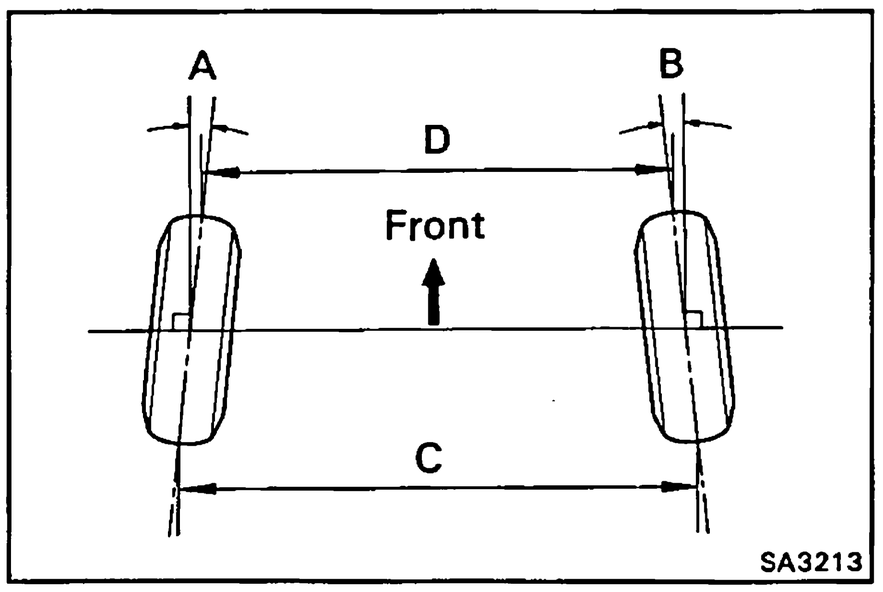


SA2624

**3. INSPECT CASTER**

**Caster:**
**3°00′ ± 60′**

If caster is not as specified, inspect and replace damaged or worn parts.



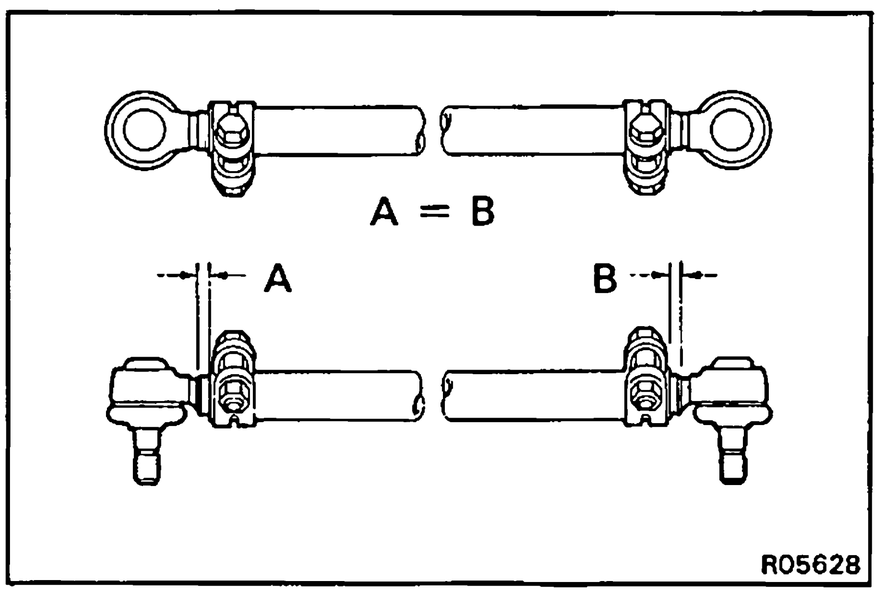
SA3213

**4. INSPECT TOE-IN**

**Toe-in (total):**

| Tire type | A + B | C − D |
|---|---|---|
| Bias tire | 0.4° ± 0.2° | 4 ± 2 mm (0.16 ± 0.08 in.) |
| Radial tire | 0.2° ± 0.2° | 2 ± 2 mm (0.08 ± 0.08 in.) |

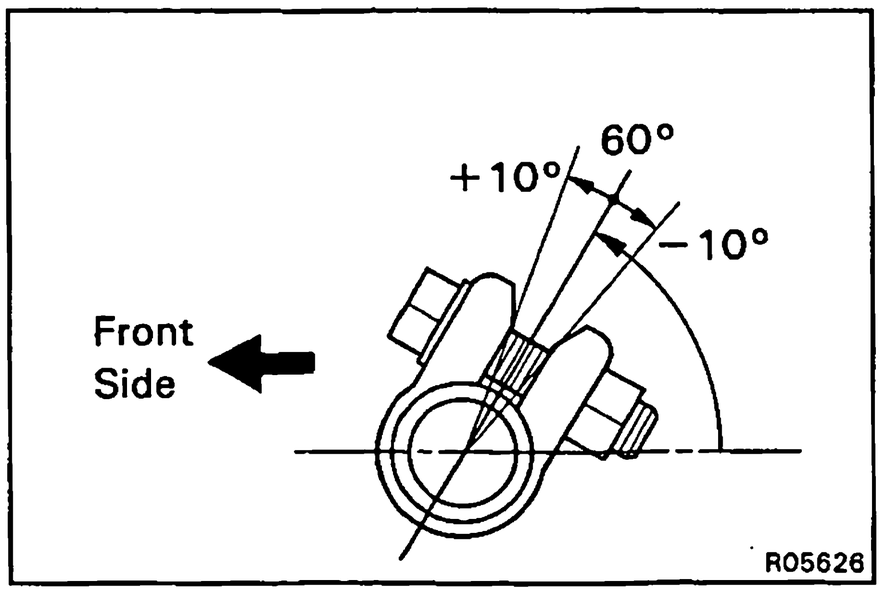
If toe-in is not specification, adjust by tie rod.



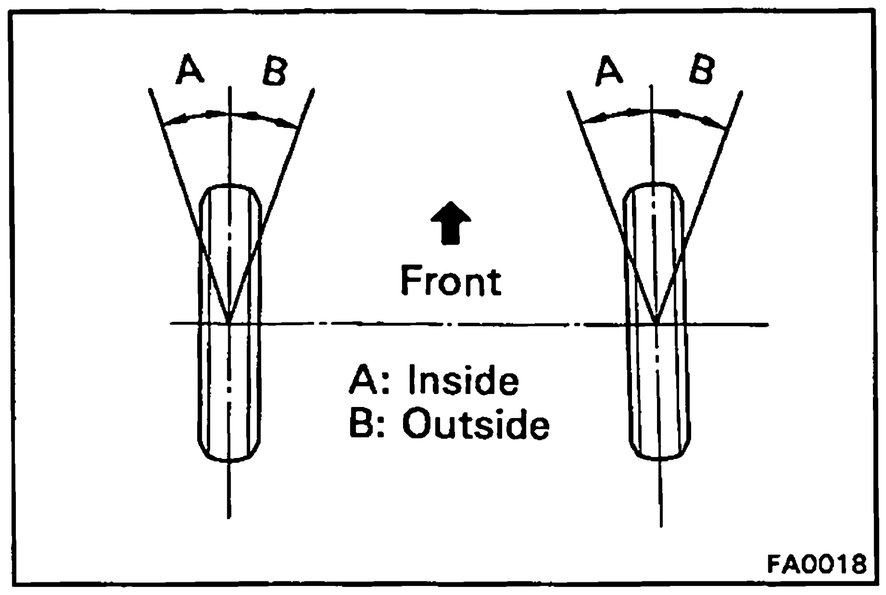
R05628

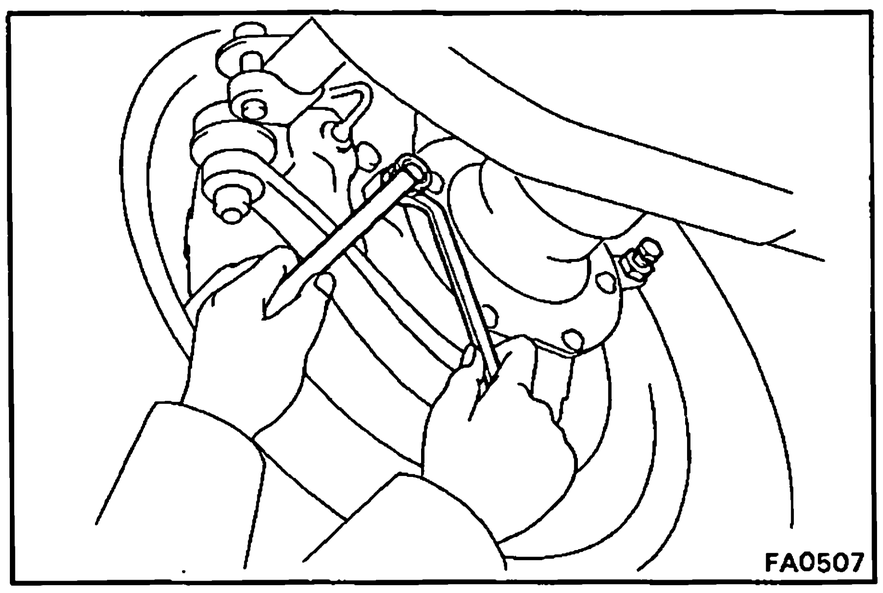
**5. ADJUST TOE-IN**

(a) Loosen the clamp bolts and nuts.
(b) Adjust toe-in to the correct value by turning the tie rod.
(c) Insure that the lengths of the tie rod ends are the same.
(d) Torque the tie rod clamp bolts and nuts.
**Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)**




HINT: The clamps opening must be positioned at the rear of the tie rod and and face within 60° ± 10° from the verticle axis.




**6. INSPECT WHEEL ANGLE**

Remove the caps of the knuckle stopper bolts and check the steering angles.

**Wheel angle:**

| Wheel angle (Max.) | | |
|---|---|---|
| Inside wheel | w/ Power steering | 35° $^{+0°}_{-3°}$ |
| | w/o Power steering | 32° $^{+0°}_{-3°}$ |
| Outside wheel (reference) | w/ Power steering | 31° |
| | w/ Power steering | 29° |

HINT: When the steering wheel is fully turned, make sure that the wheel is not touching the body or brake flexible hose.

If maximum steering angles differ from the standard value, adjust the wheel angle with the knuckle stopped bolts.

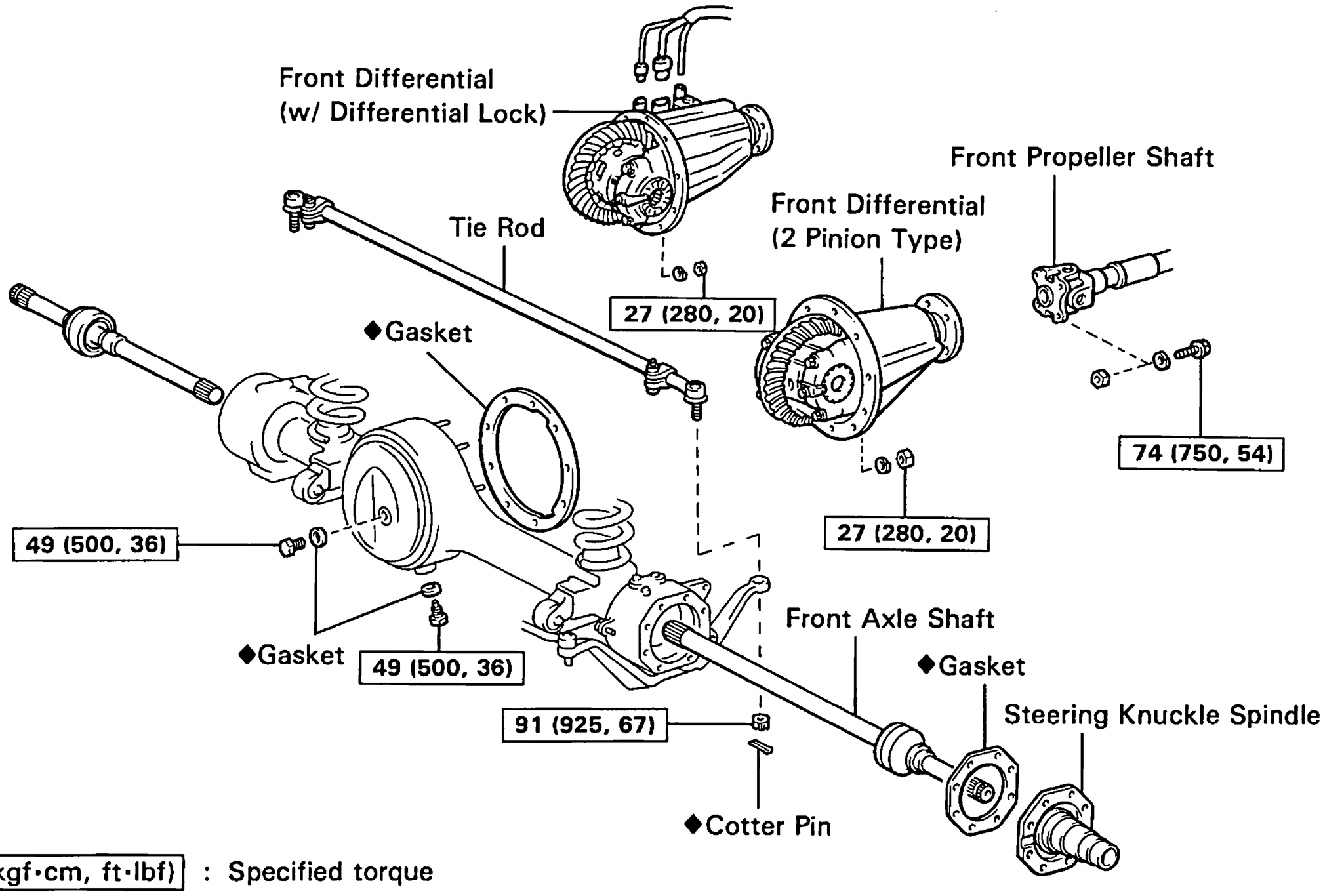
**Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)**

If the wheel angle still cannot be adjusted within limits, inspect and replace damaged or worn steering parts.

# FRONT DIFFERENTIAL

## ASSEMBLY REMOVAL AND INSTALLATION

### COMPONENTS




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

SA2387

# SERVICE SPECIFICATIONS

## SERVICE DATA (STATION WAGON)

| | | | | | |
|---|---|---|---|---|---|
| Cold tire inflation pressure (For Europe) | Moving condition | Tire size | Engine (Grade) | Pressure kPa (kgf/cm² or bar, psi) Front | Rear |
| | For all roads including full rated loads | 215/80R16 | 1HZ, 1HD-T (All grade) | 240 (2.4, 35) | 300 (3.0, 44) |
| | | 275/70R16 | 1FZ, 1HD-T (GX, VX) | 220 (2.2, 32) | 220 (2.2, 32) |
| | Optional inflation for reduced loads (2 front passengers + 2 rear passengers + 200 kg [440 lb.]) | 215/80R16 | 1HZ (Standard) | 210 (2.1, 30) | 220 (2.2, 32) |
| | | | 1HZ (GX) | 220 (2.2, 32) | 240 (2.4, 35) |
| | | | 1HD-T (GX, VX) | 230 (2.3, 33) | 240 (2.4, 35) |
| | | 275/70R16 | 1FZ, 1HD-T (GX, VX) | 220 (2.2, 32) | 220 (2.2, 32) |

| | | | | |
|---|---|---|---|---|
| Cold tire inflation pressure (For Australia) | Moving condition | Tire size | Pressure kPa (kgf/cm² or bar, psi) Front | Rear |
| | For all roads including full rated loads | 7.50R16-6PRLT | 260 (2.6, 38) | 350 (3.5, 51) |
| | | 275/70R16 | 220 (2.2, 32) | 220 (2.2, 32) |
| | Optional inflation for reduced loads (2 front passengers + 2 rear passengers + 200 kg [440 lb.]) | 7.50R16-6PRLT | 240 (2.4, 35) | 320 (3.2, 46) |
| | | 275/70R16 | 220 (2.2, 32) | 220 (2.2, 32) |

| | | | |
|---|---|---|---|
| Cold tire inflation pressure (Others) | Tire size | Pressure kPa (kgf/cm² or bar, psi) Front | Rear |
| | 7.50-16-6PRLT | 200 (2.0, 29) | 300 (3.0, 44) |
| | 7.50R16-6PRLT | 250 (2.5, 36) | 325 (3.25, 47) |
| | 245/85R16 | 210 (2.1, 30) | 260 (2.6, 38) |
| | 275/70R16 | 220 (2.2, 32) | 220 (2.2, 32) |

| | | | | |
|---|---|---|---|---|
| Follow spring and bumper stopper clearance | A: Follow spring clearance (Front)<br>B: Bumper stopper clearance (Rear)<br>*: w/o Australia option | | A | B |
| | | For Europe | 39 mm (1.54 in.) | 117 mm (4.61 in.) |
| | | For Australia* | 52 mm (2.01 in.) | 105 mm (4.13 in.) |
| | | For Middle East | 38 mm (1.50 in.) | 92 mm (3.62 in.) |
| | | Others | 38 mm (1.50 in.) | 118 mm (4.66 in.) |

| | | | | |
|---|---|---|---|---|
| Front wheel alignment | Camber | Inspection standard | 1°00 ± 45′ | |
| | | Left-right error | 30′ or less | |
| | Steering axis inclination | Inspection standard | 13°00′ ± 45′ | |
| | | Left-right error | 30′ or less | |
| | Caster | Inspection standard | 3°00′ ± 60′ | |
| | | Left-right error | 30′ or less | |
| | Toe-in | Bias tire | 0.4° ± 0.2° (4 mm ± 2 mm, 0.16 in. ± 0.08 in.) | |
| | | Radial tire | 0.2° ± 0.2° (2 mm ± 2 mm, 0.08 in. ± 0.08 in.) | |
| | Wheel angle (Max) | | Inside wheel | Outside wheel |
| | | w/ Power steering | 35°00′ $^{+0°}_{-3°}$ | 31° (reference) |
| | | w/o Power steering | 32°00′ $^{+0°}_{-3°}$ | 29°00′ (reference) |

# TORQUE SPECIFICATIONS (HARDTOP & CANVAS TOP)

| Part tightened | N·m | kgf·cm | ft·lbf |
|---|---|---|---|
| Front differential × Front axle housing | 27 | 280 | 20 |
| Front differential × Front propeller shaft | 74 | 750 | 50 |
| Front differential filler plug | 49 | 500 | 36 |
| Front differential drain plug | 49 | 500 | 36 |

# (STATION WAGON)

| Part tightened | N·m | kgf·cm | ft·lbf |
|---|---|---|---|
| Tie rod end clamp bolt | 37 | 375 | 27 |
| Steering knuckle stopper bolt lock nut | 44 | 450 | 33 |
| Front differential × Front axle housing | 27 | 280 | 20 |
| Front differential × Front propeller shaft | 74 | 750 | 50 |
| Front differential filler plug | 49 | 500 | 36 |
| Front differential drain plug | 49 | 500 | 36 |

# BRAKE SYSTEM

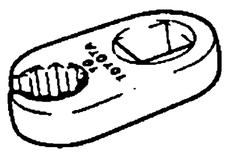
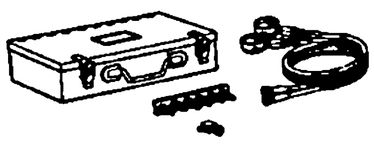
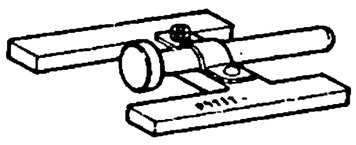
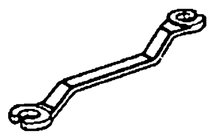
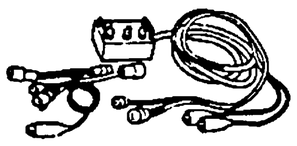
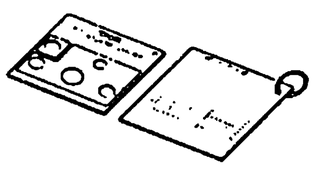
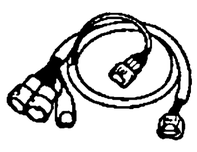
**REFER TO LAND CRUISER (STATION WAGON) REPAIR MANUAL FOR CHASSIS AND BODY (Pub. No. RM184E)**

NOTE: The following pages contain only the points which differ from the above listed manual.

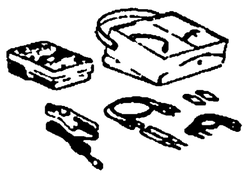
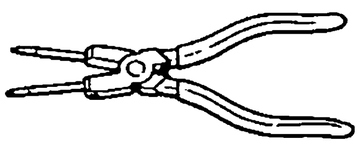
**(STATION WAGON)**
PREPARATION ..... BR- 2
CHECK AND ADJUSTMENT ..... BR- 4
MASTER CYLINDER ..... BR- 6
LOAD SENSING PROPORTIONING AND BY-PASS VALVE (LSP & BV) ..... BR-13
ANTI-LOCK BRAKE SYSTEM (ABS) ..... BR-20
DESCRIPTION ..... BR-20
DIAGNOSIS SYSTEM ..... BR-24
SPEED SENSOR AND DECELERATION SENSOR DIAGNOSIS SYSTEM ..... BR-34
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CONTROL RELAY ..... BR-45
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ANTI-LOCK BRAKE SYSTEM CIRCUIT ..... BR-55
SERVICE SPECIFICATIONS ..... BR-57

# PREPARATION

## SST (SPECIAL SERVICE TOOLS)

| | | |
|---|---|---|
|  | **09023-00100** Union Nut Wrench 10 mm | |
|  | **09709-29017** LSPV Gauge Set | |
|  | **09737-00010** Brake Booster Push Rod Gauge | |
|  | **09751-36011** Brake Tube Union Nut 10 x 12 mm Wrench | |
|  | **09843-18020** Diagnosis Check Wire | w/ ABS |
|  | **09990-00150** ABS Actuator Checker and Sub-harness | w/ ABS |
|  | **09990-00163** ABS Actuator Checker Sheet "A" | w/ ABS |
|  | **09990-00200** ABS Actuator Checker Sub-harness "C" | w/ ABS |
|  | **09990-00210** ABS Actuator Checker Sub-harness "E" | w/ ABS |

## RECOMMENDED TOOLS

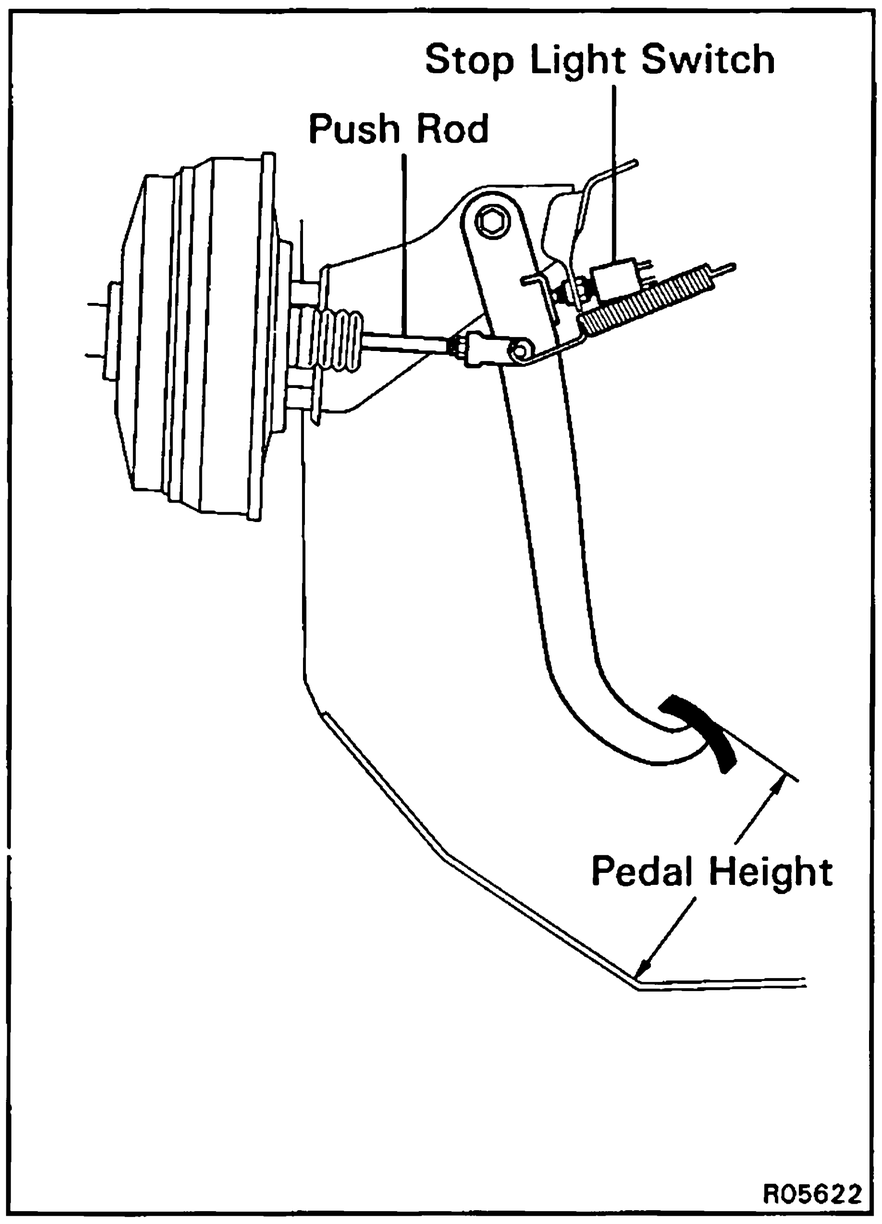
| | | |
|---|---|---|
|  | **09082-00015** TOYOTA Electrical Tester | |
|  | **09905-00013** Snap Ring Pillers | |

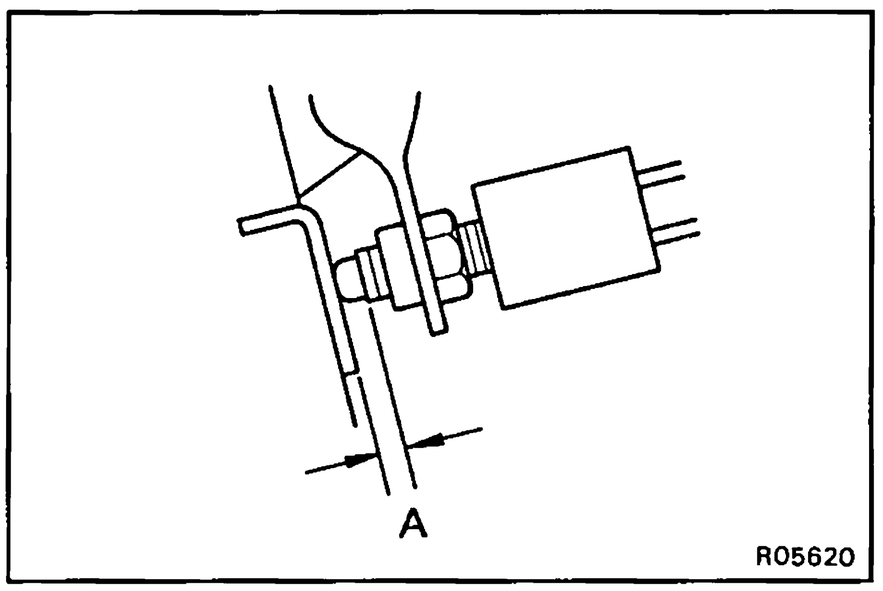
## EQUIPMENT

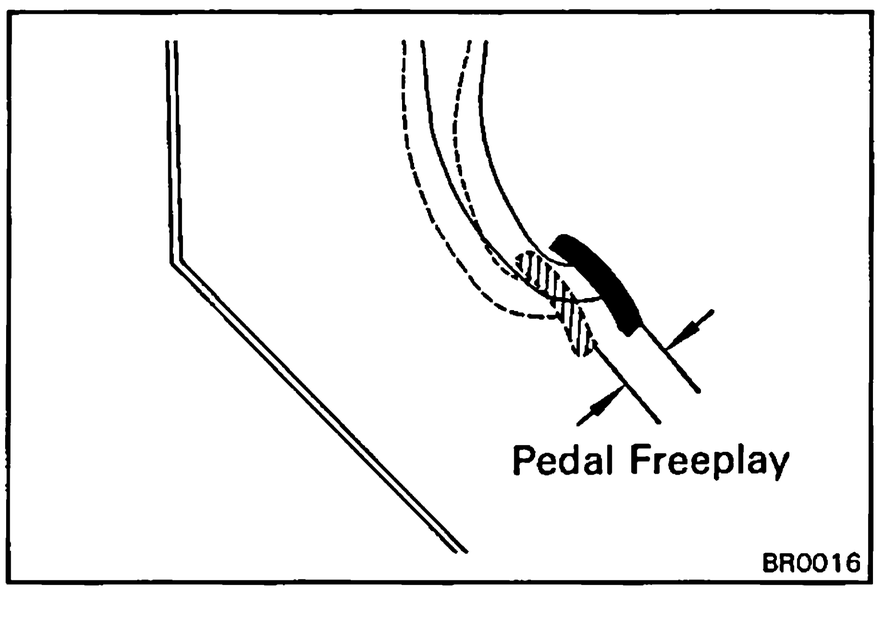
| | |
|---|---|
| Torque wrench | |

# LUBRICANT

| Item | Capacity | Classification |
|---|---|---|
| Brake fluid | — | SAE J1703 or FMVSS No.116 DOT 3 |




# CHECK AND ADJUSTMENT

## BRAKE PEDAL CHECK AND ADJUSTMENT

**1. CHECK THAT PEDAL HEIGHT IS CORRECT, AS SHOWN**

**Pedal height from asphalt sheet:**
**167.5 — 177.5 mm (6.59 — 6.99 in.)**

If the pedal height is incorrect, adjust it.

**2. IF NECESSARY, ADJUST PEDAL HEIGHT**

(a) Disconnect the connector from the stop light switch.

(b) Loosen the stop light switch lock nut and remove the stop light switch.

(c) Loosen the push rod lock nut.

(d) Adjust the pedal height by turning the pedal push rod.

(e) Tighten the push rod lock nut.

**Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)**

(f) Install the stop light switch and turn it until it lightly contacts the pedal stopper.

(g) Return the stop light switch one turn.

(h) Check clearance (A) between the stop light switch and pedal.

**Clearance:**
**0.5 — 2.4 mm (0.02 — 0.09 in.)**

(i) Tighten the stop light switch lock nut.

(j) Connect the connector to the stop light switch.

(k) Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

(l) After adjusting the pedal height, check the pedal freeplay.

HINT: If clearance (A) between the stop light switch and the brake pedal stopper has been adjusted correctly, the pedal freeplay will meet the specifications.

**3. CHECK THAT PEDAL FREEPLAY IS CORRECT, AS SHOWN**

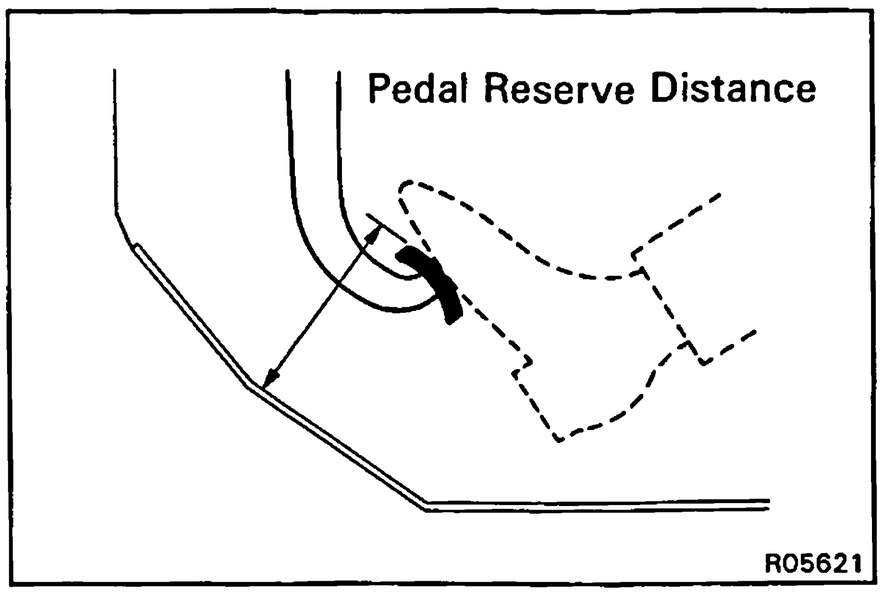
(a) Stop the engine and depress the brake pedal several times until there is no more vacuum left in the booster.

(b) Push in the pedal by hand until the beginning of the resistance is felt, then measure the distance, as shown.

**Pedal freeplay:**
**3 — 6 mm (0.12 — 0.24 in.)**

HINT: The freeplay to the first point of resistance is due to the play between the clevis and pin. It is 3 — 6 mm (0.12 — 0.24 in.) on the pedal.

If incorrect, check the stop light switch clearance. And if the clearance is OK, then troubleshoot the brake system.




**4. CHECK THAT PEDAL RESERVE DISTANCE IS CORRECT, AS SHOWN**

Release the parking brake.

With the engine running, depress the pedal and measure the pedal reserve distance, as shown.

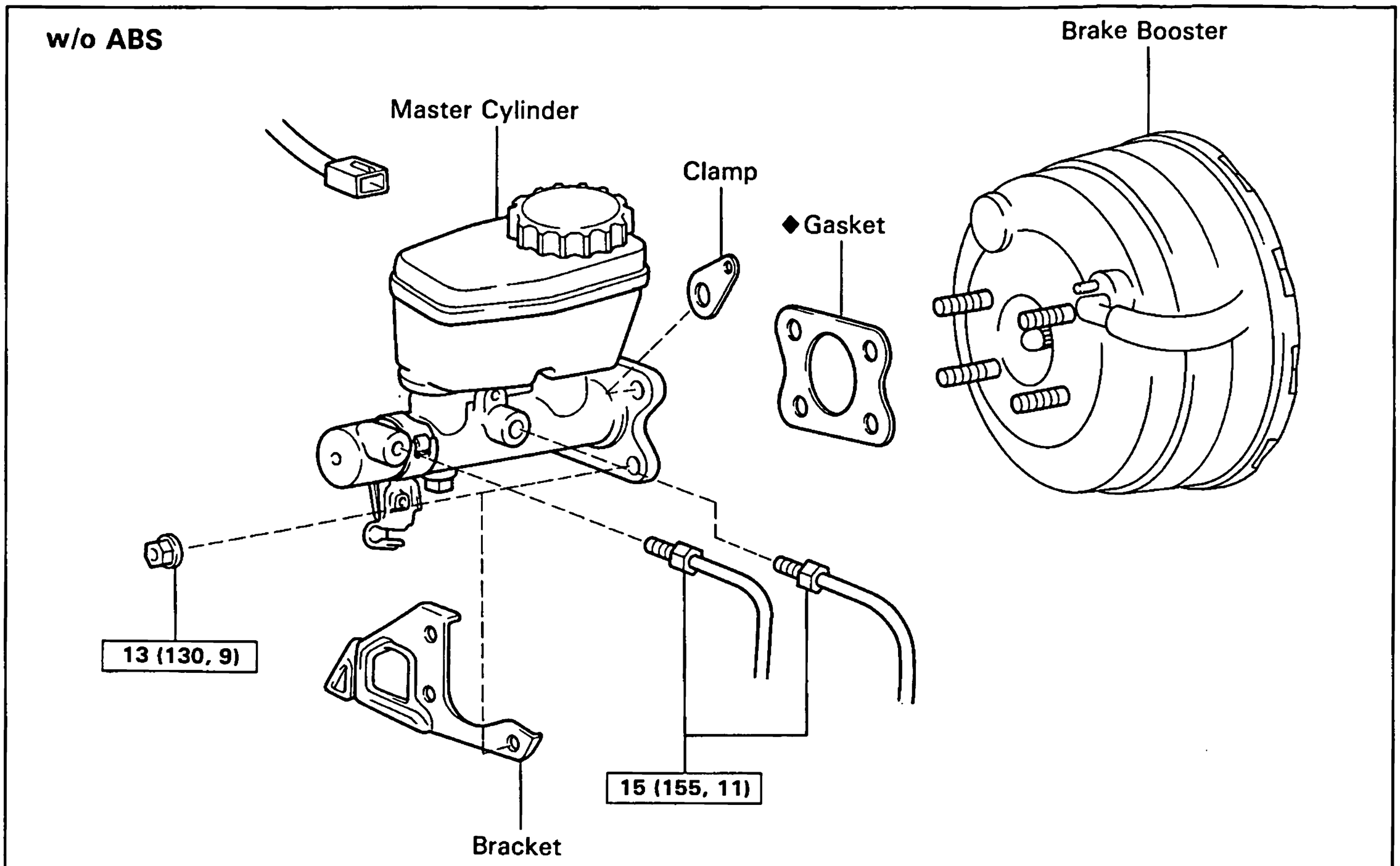
**Pedal reserve distance from asphalt sheet at 490 N (50 kgf, 110.2 lbf):**

**More than 68 mm (2.68 in.)**

If the reserve distance is incorrect, troubleshoot the brake system.

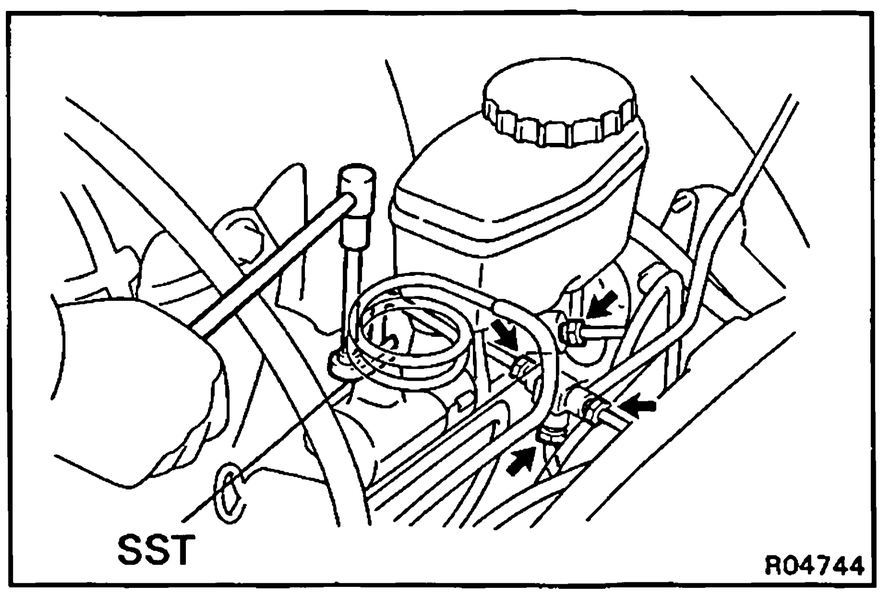
# MASTER CYLINDER

## MASTER CYLINDER REMOVAL




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part



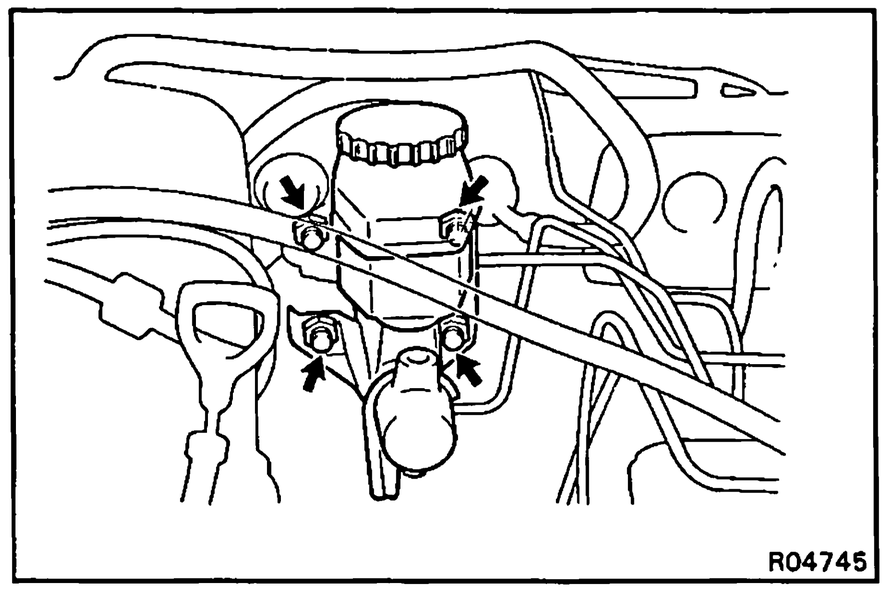

**1. DISCONNECT LEVEL WARNING SWITCH CONNECTOR**

**2. TAKE OUT FLUID WITH SYRINGE**

**NOTICE: Do not let brake fluid remain on a painted surface. Wash it off immediately.**

**3. DISCONNECT BRAKE LINES**

Using SST, disconnect brake lines from the master cylinder.
SST 09023-00100




**4. REMOVE MASTER CYLINDER**

(a) Remove the mounting nuts.

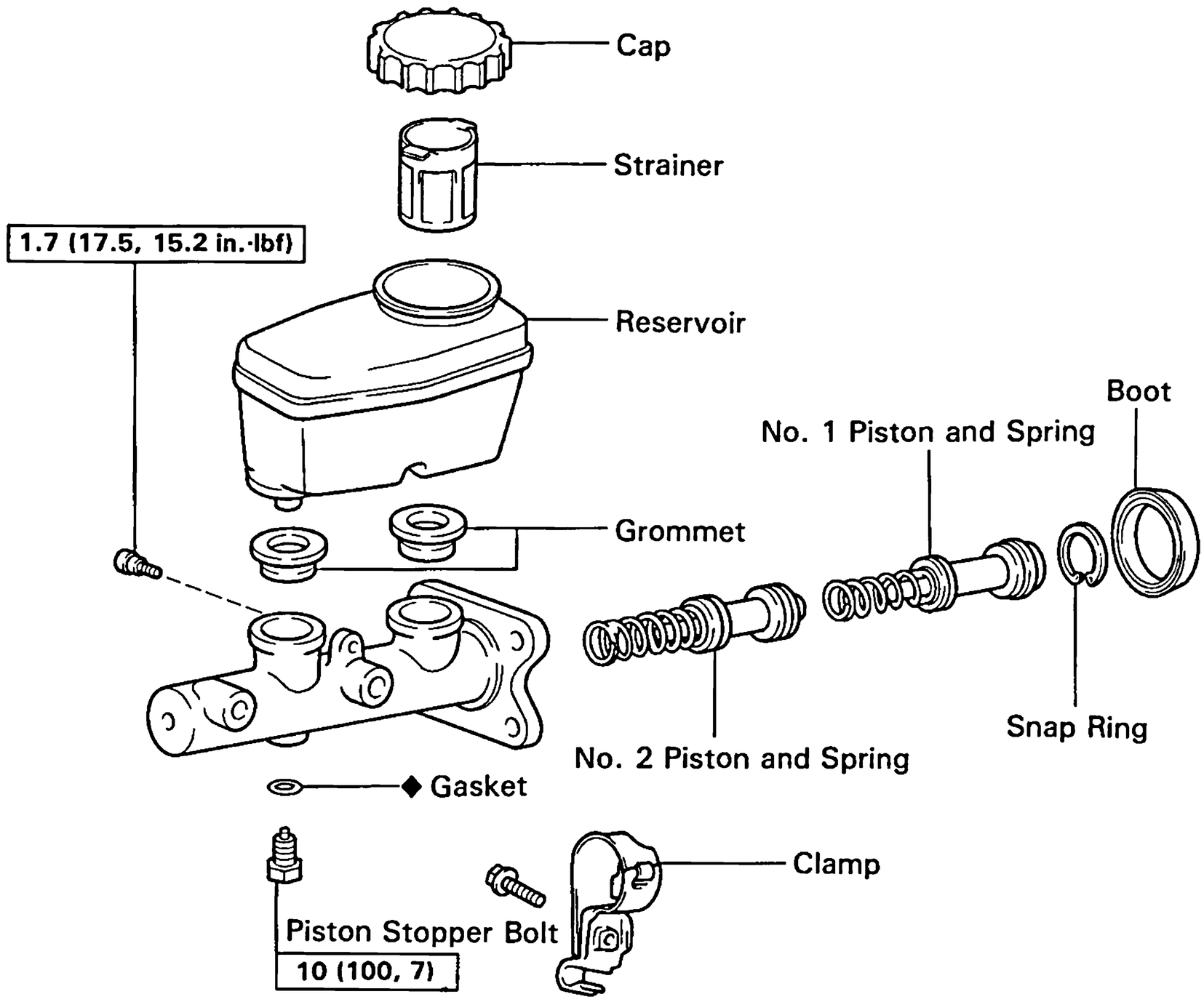
(b) (w/ ABS)
Remove the 3-way, clamp and the bracket.

(w/o ABS)
Remove the clamp and the bracket.

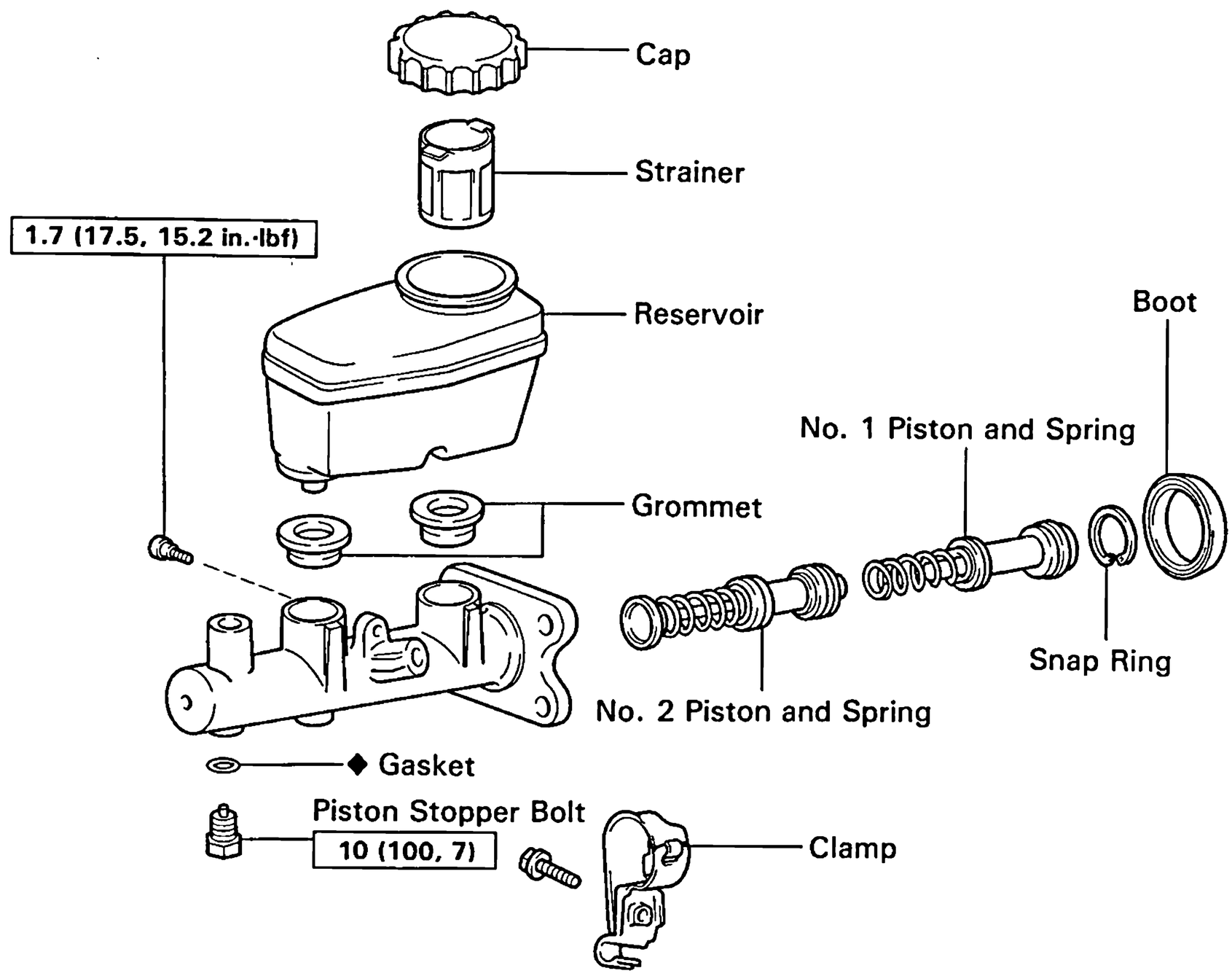
(c) Pull out the master cylinder and gasket.

# COMPONENTS

**w/o ABS**



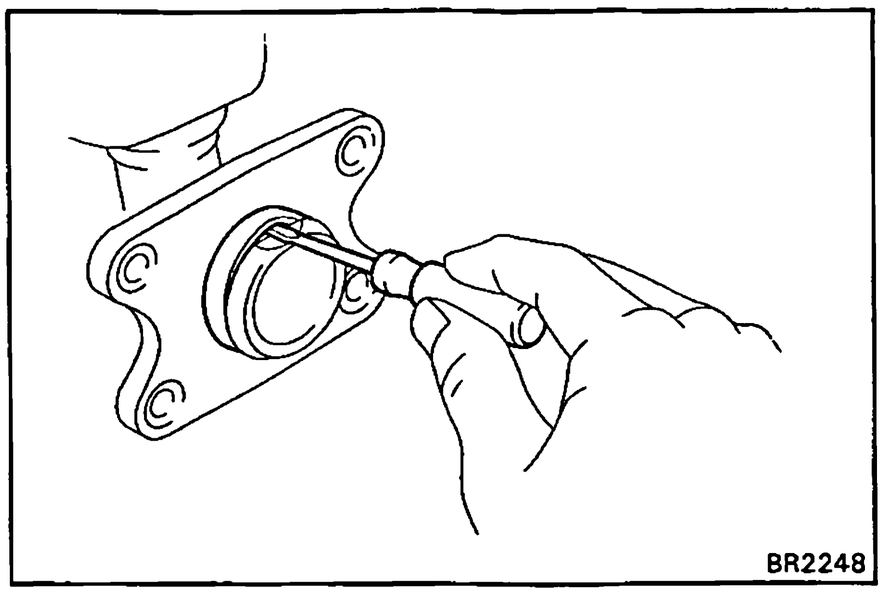

**w/ ABS**




R04763
R04764

N·m (kgf·cm, ft·lbf) : Specified torque

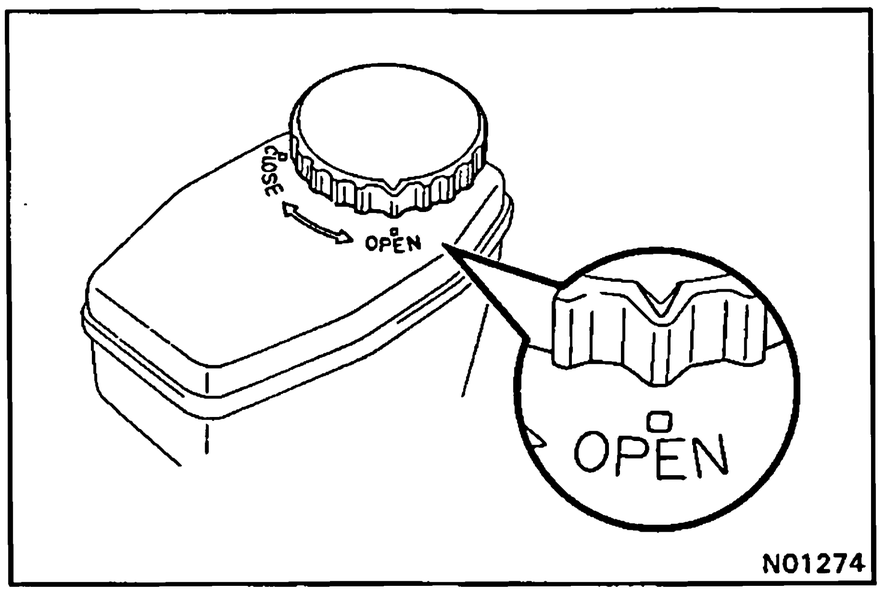
◆ Non-reusable part




# MASTER CYLINDER DISASSEMBLY

## 1. REMOVE MASTER CYLINDER BOOT

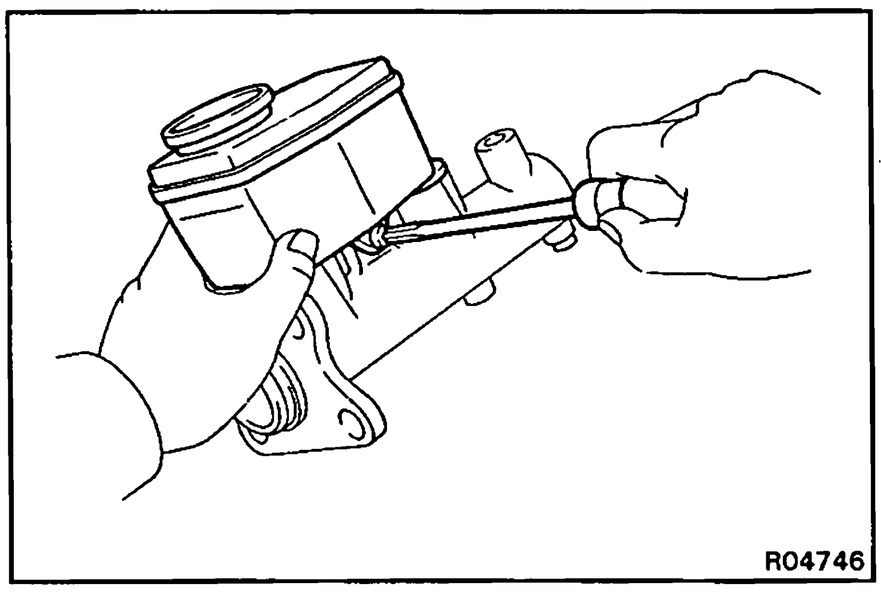
Using a screwdriver, remove the master cylinder boot.




## 2. REMOVE RESERVOIR CAP AND STRAINER

(a) Turn the reservoir cap to the "open" side and remove it.

(b) Remove the strainer.

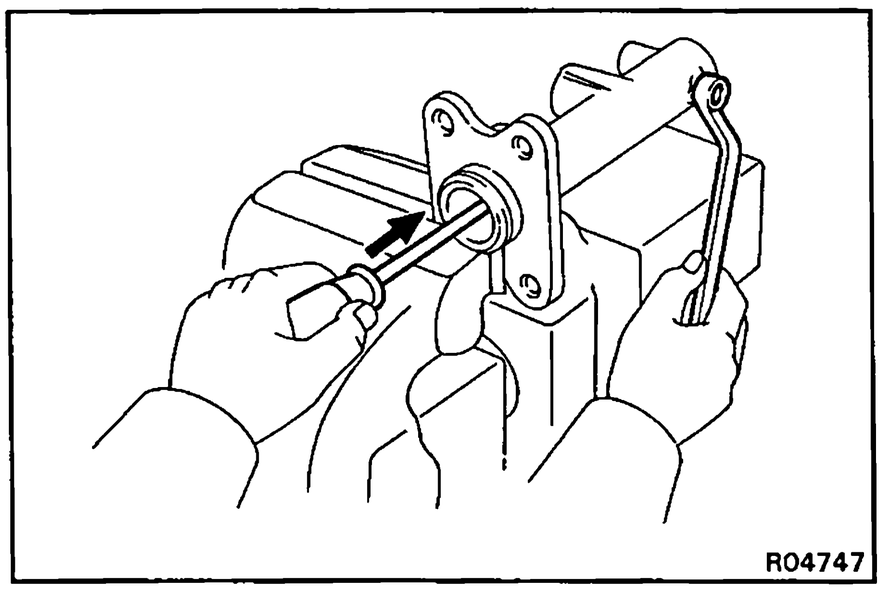



## 3. REMOVE RESERVOIR

Remove the set screw and pull out the reservoir.

## 4. REMOVE TWO GROMMETS

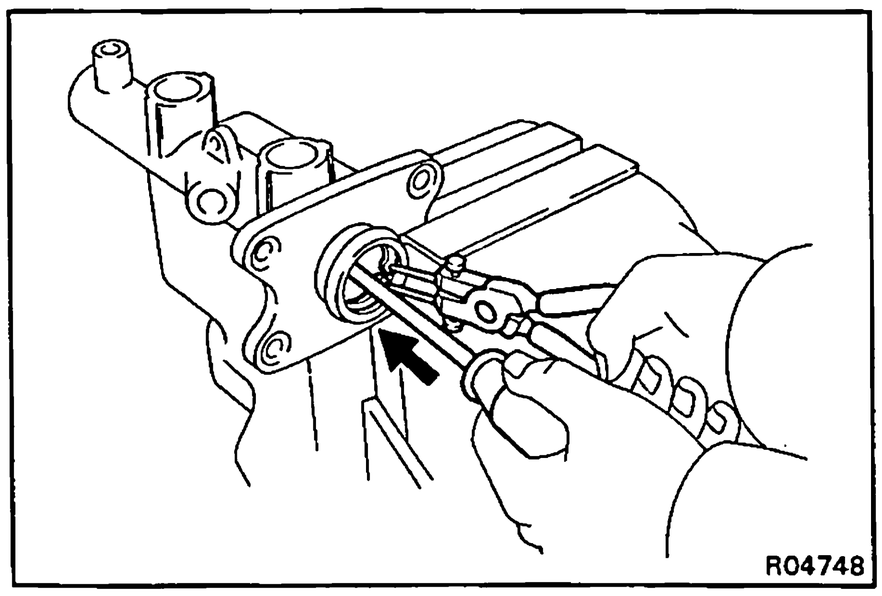
## 5. PLACE CYLINDER IN VISE




## 6. REMOVE NO.2 PISTON STOPPER BOLT

Using a screwdriver, push the pistons in all the way and remove the No.2 piston stopper bolt and gasket.

HINT: Tape the screwdriver tip before use.

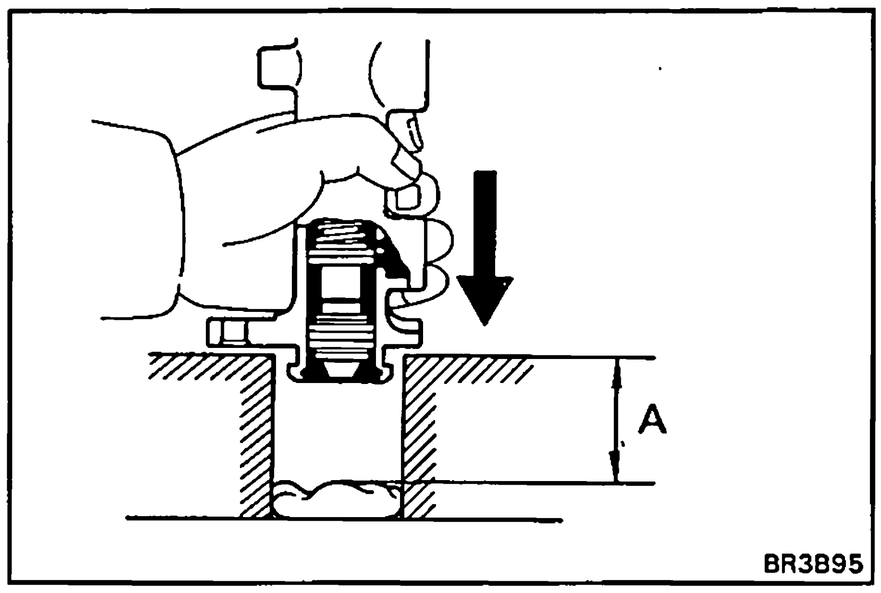



## 7. REMOVE TWO PISTONS

(a) Push in the piston with a screwdriver and remove the snap ring with snap ring pliers.

(b) Remove the No.1 piston and spring by hand, pulling straight out, not at an angle.

**NOTICE: If pulled out at an angle, there is a possibility that the cylinder bore could be damaged.**




(c) Place a rag and two wooden blocks on the work table and lightly tap the cylinder flange against the blocks until the piston drops out of the cylinder.

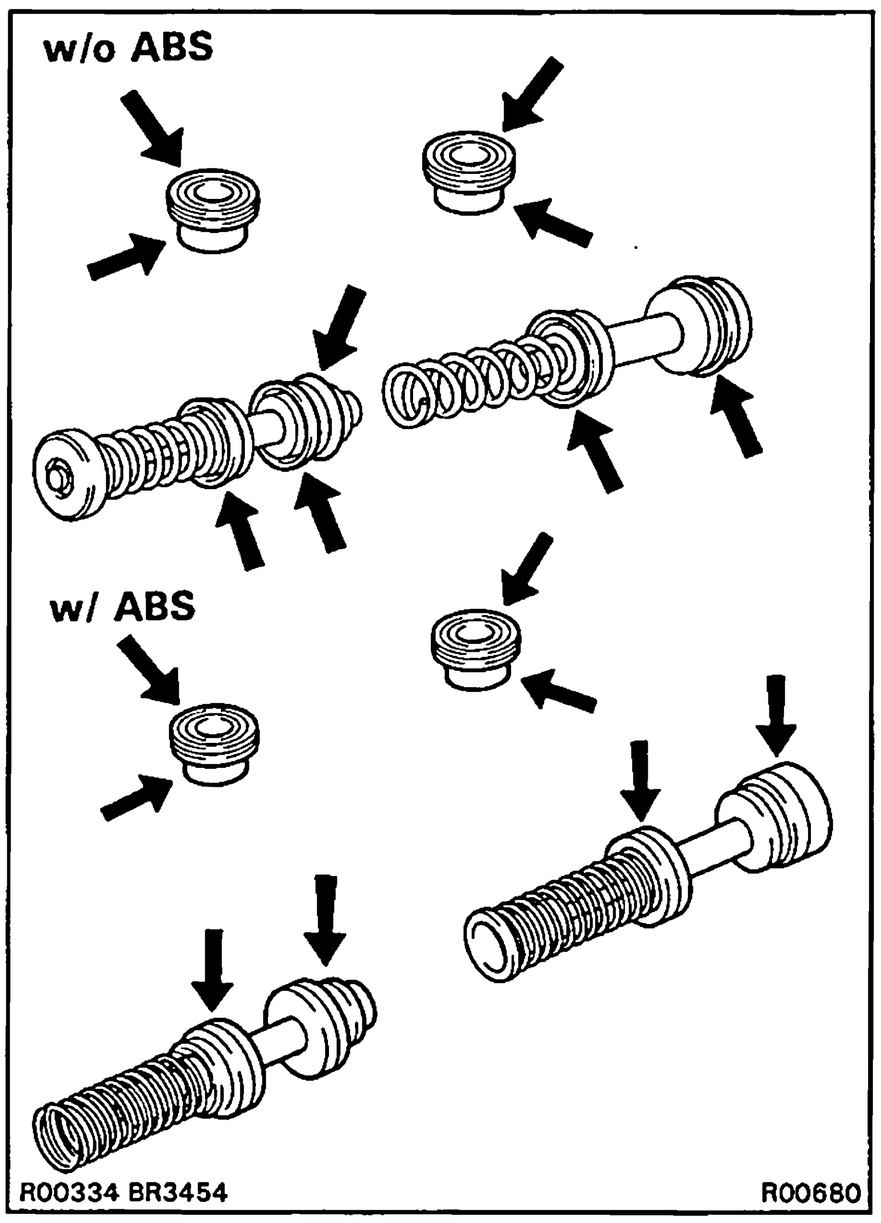
HINT: Make sure the distance (A) from the rag to the top of the blocks is at least 100 mm (3.94 in.).

## MASTER CYLINDER INSPECTION

HINT: Clean the disassembled parts with compressed air.

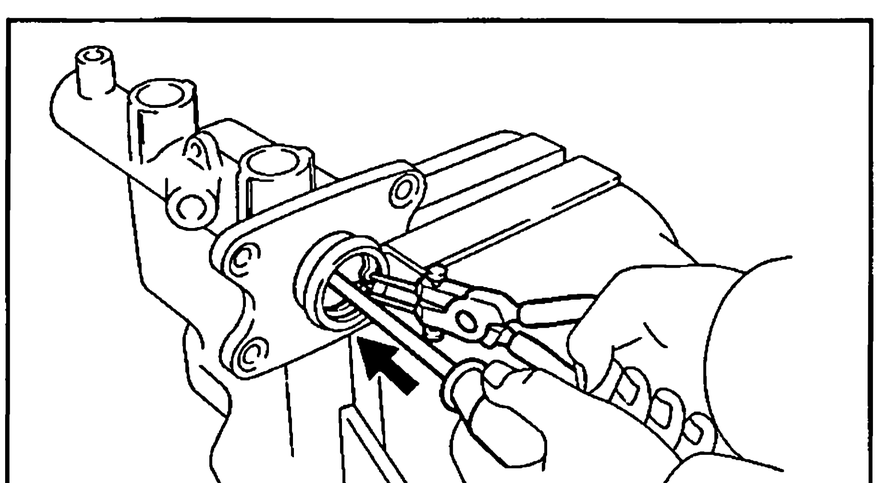
1. **INSPECT CYLINDER BORE FOR RUST OR SCORING**
2. **INSPECT CYLINDER FOR WEAR OR DAMAGE**

If necessary, clean or replace the cylinder.




## MASTER CYLINDER ASSEMBLY

1. **APPLY LITHIUM SOAP BASE GLYCOL GREASE TO RUBBER PARTS INDICATED BY ARROWS**




2. **INSTALL TWO PISTONS**

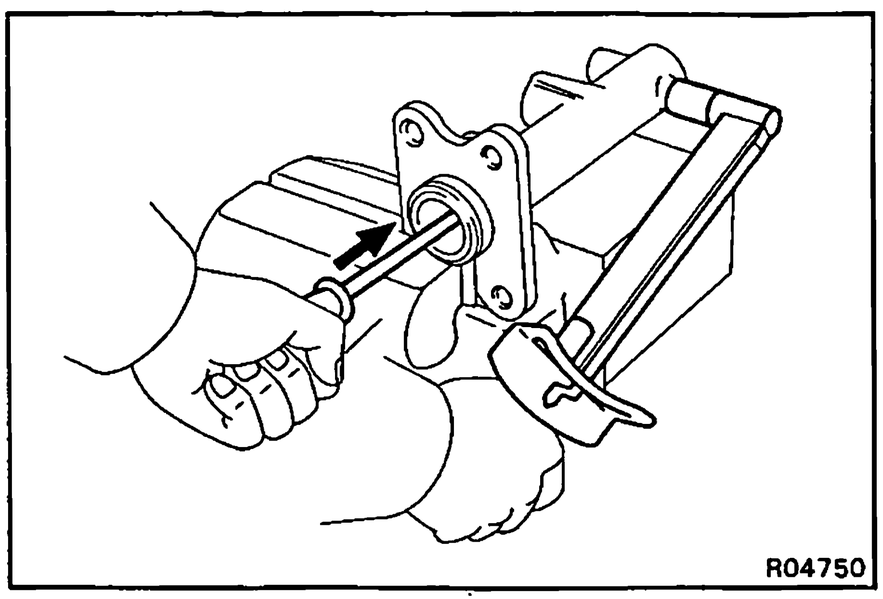
**NOTICE: Be careful not to damage the rubber lips on the pistons.**

(a) Install the two springs and pistons straight in, not at an angle.

**NOTICE: If insert at an angle, there is a possibility of damaging the cylinder bore.**

(b) Push in the piston with a screwdriver and install the snap ring with snap ring pliers.

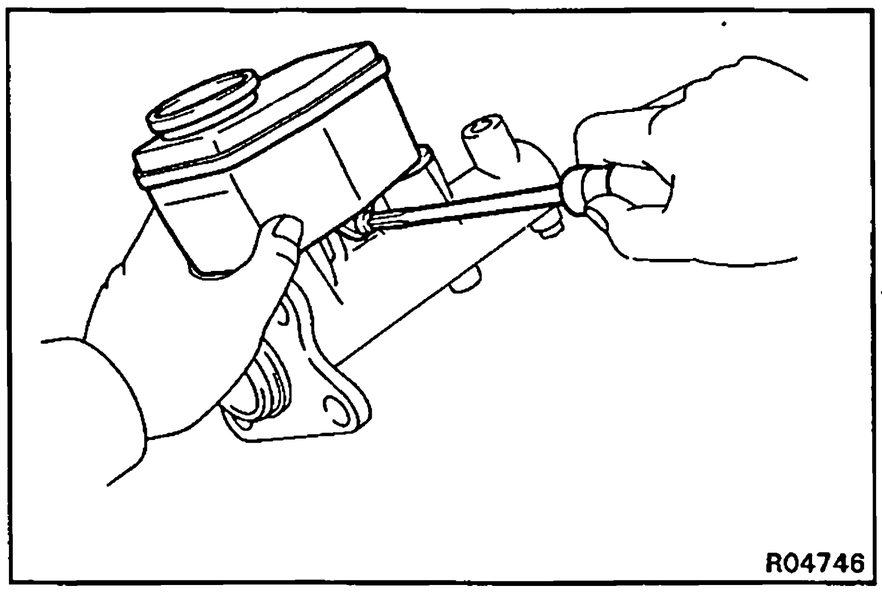
HINT: Tape the screwdriver tip before use.




### 3. INSTALL NO.2 PISTON STOPPER BOLT

Using a screwdriver, push the piston in all the way and install the No.2 piston stopper bolt over a new gasket.

**Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)**




### 4. INSTALL TWO GROMMETS

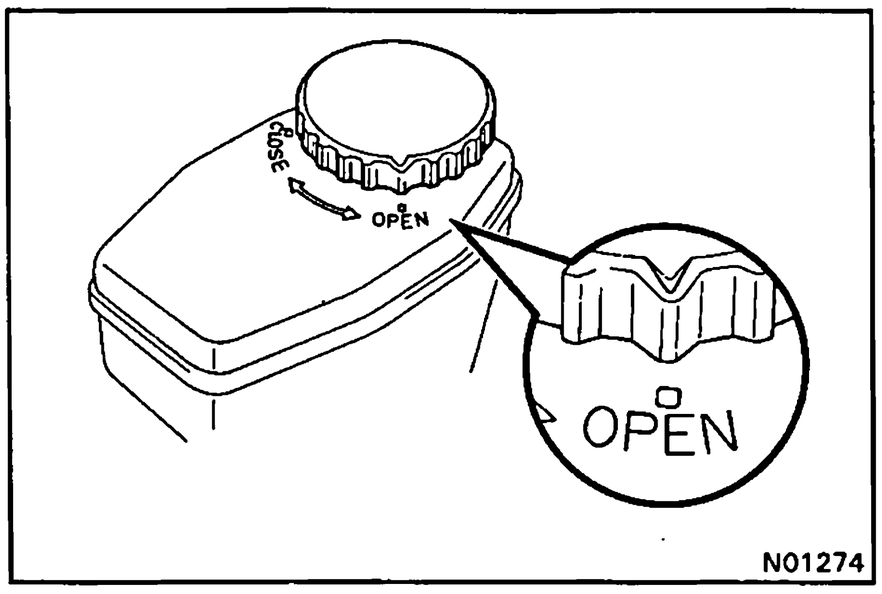
### 5. INSTALL RESERVOIR

(a) Install the strainer to the reservoir.

(b) Push the reservoir onto the cylinder.

(c) Install the set screw while pushing on the reservoir.

**Torque: 1.7 N·m (17.5 kgf·cm, 15.2 in.·lbf)**

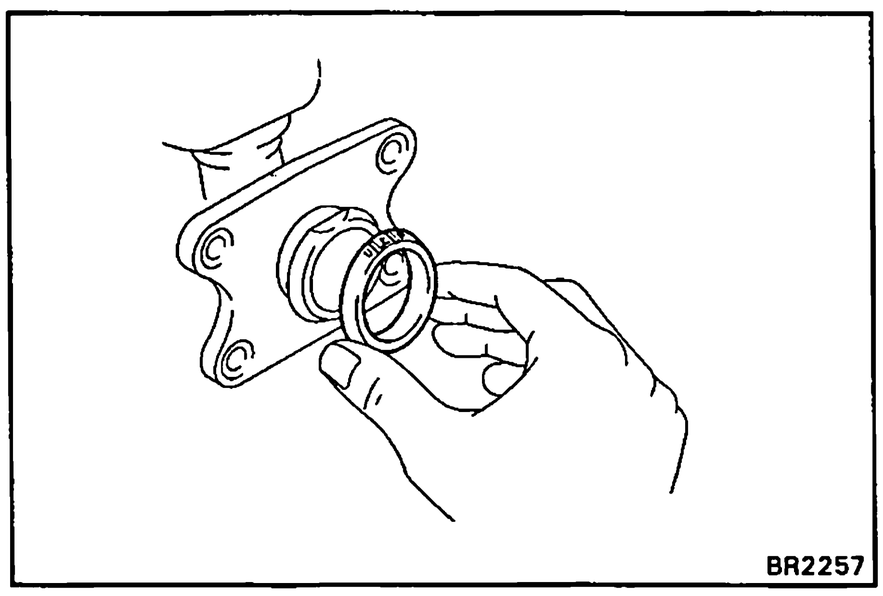



### 6. INSTALL RESERVOIR CAP

(a) Align the matchmark on the reservoir cap with the matchmark on the "open" side of reservoir.

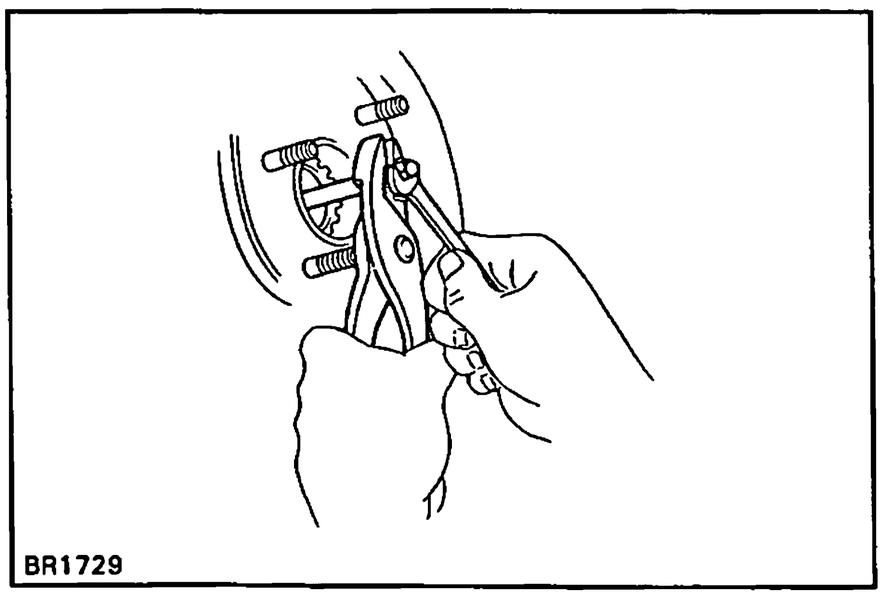
(b) Push down on the reservoir cap and turn it clockwise until it locks.

(c) Check that the matchmark on the reservoir cap is now aligned with the matchmark on the "close" side of the reservoir.




### 7. INSTALL MASTER CYLINDER BOOT

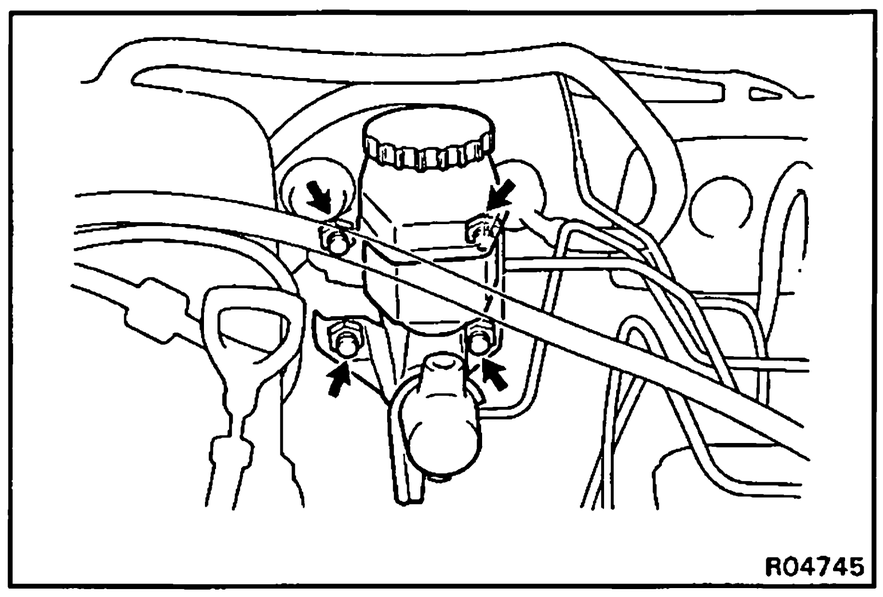
With the UP mark on the master cylinder boot facing upwards, install the cylinder boot on the master cylinder.




## MASTER CYLINDER INSTALLATION

### 1. ADJUST LENGTH OF BRAKE BOOSTER PUSH ROD BEFORE INSTALLING MASTER CYLINDER

(See pub. No. RM184E, page BR-26)



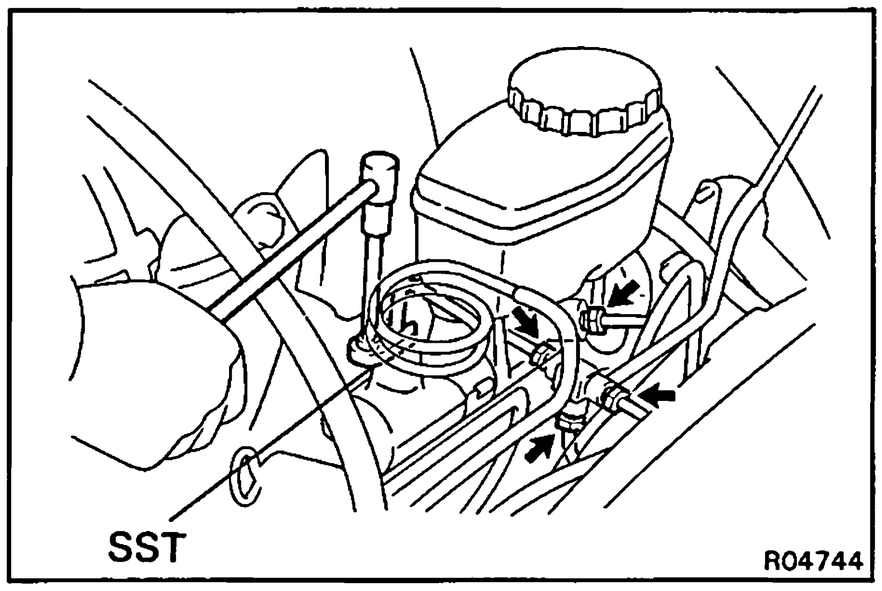

**2. INSTALL MASTER CYLINDER**

(a) (w/ ABS)
Install the master cylinder, gasket, 3-way, clamp and bracket on the brake booster with the four nuts.

(w/o ABS)
Install the master cylinder, gasket, clamp and bracket on the brake booster with the four nuts.

(b) Tighten the mounting nuts.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**




**3. CONNECT BRAKE LINES**

Using SST, connect the brake lines to the master cylinder. Torque the union nuts.

SST 09023-00100

**Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)**

**4. CONNECT LEVEL WARNING SWITCH CONNECTOR**

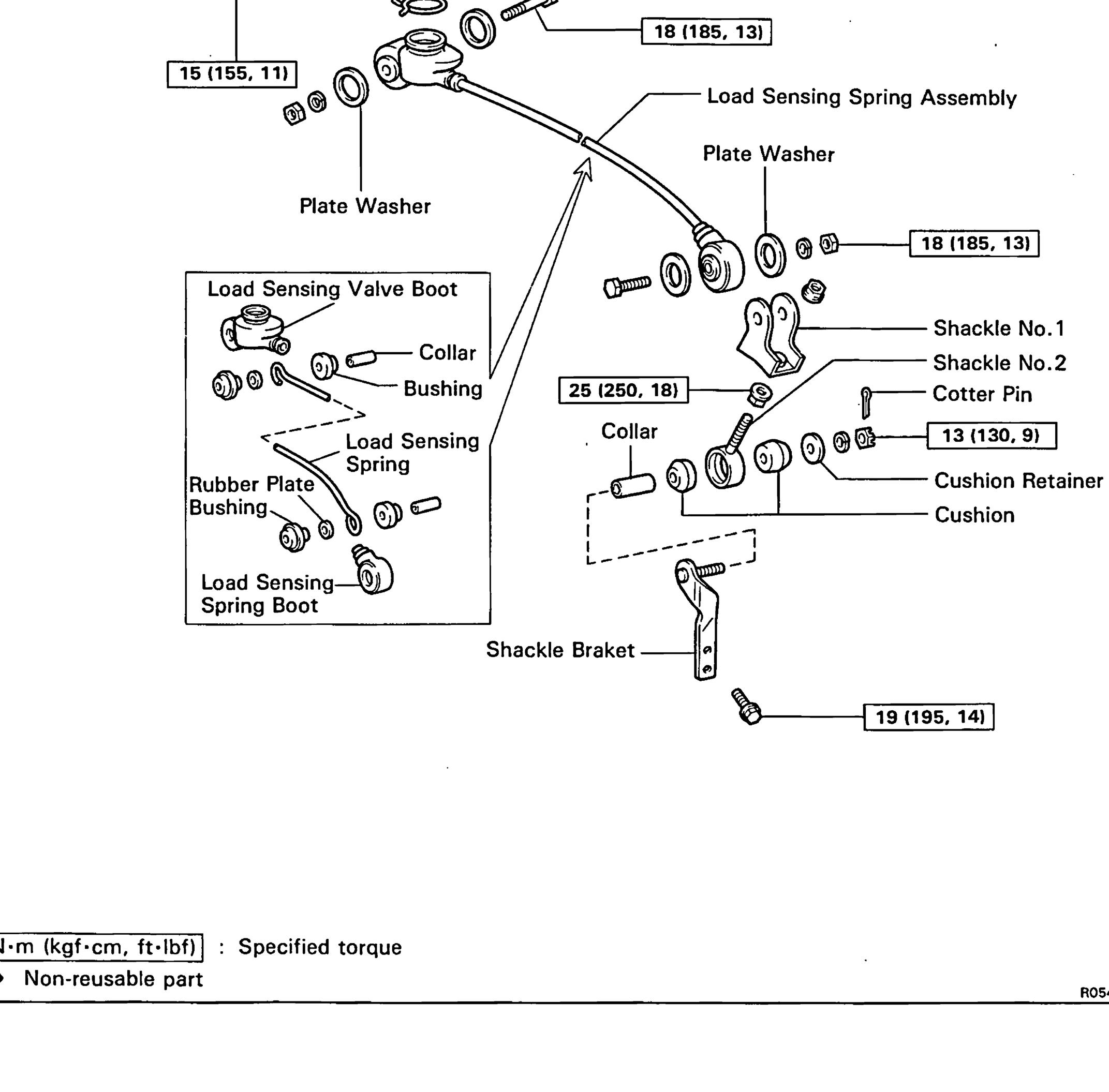
**5. FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM**
**(See pub No. RM184E, page BR-7)**

**6. CHECK FOR LEAKS**

**7. CHECK AND ADJUST BRAKE PEDAL**
**(See page BR-4)**

# LOAD SENSING PROPORTIONING AND BY-PASS VALVE (LSP & BV)

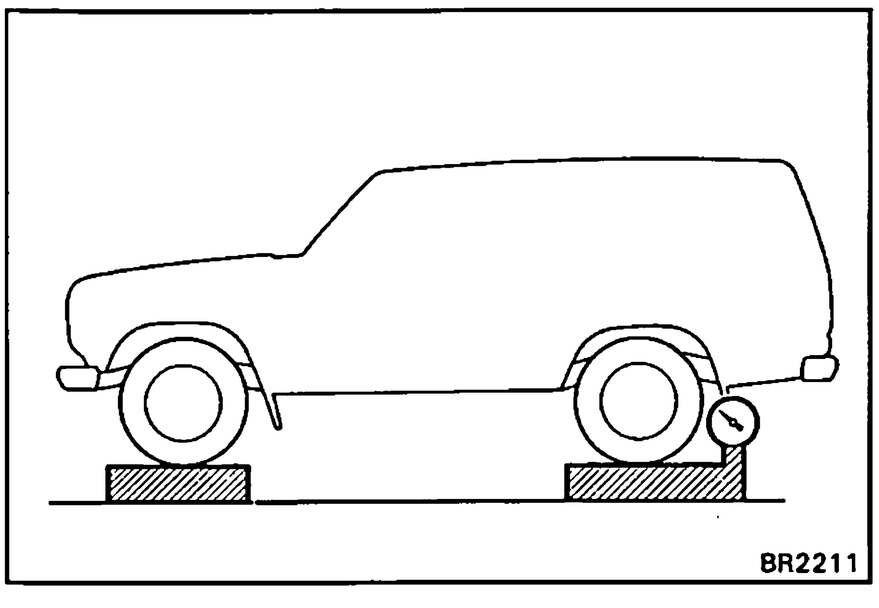
## COMPONENTS




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

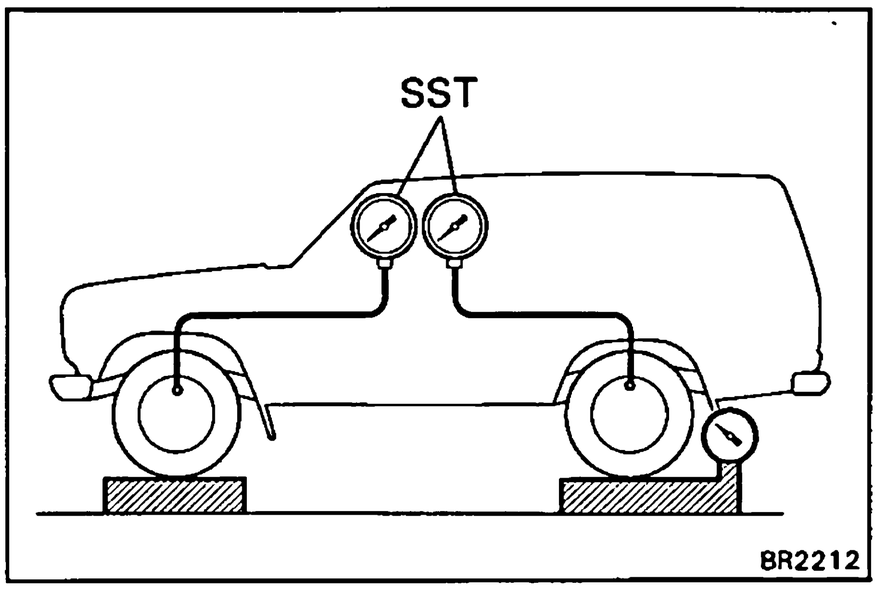
R05496


BR2211

# FLUID PRESSURE CHECK AND ADJUSTMENT

**1. SET REAR AXLE LOAD**

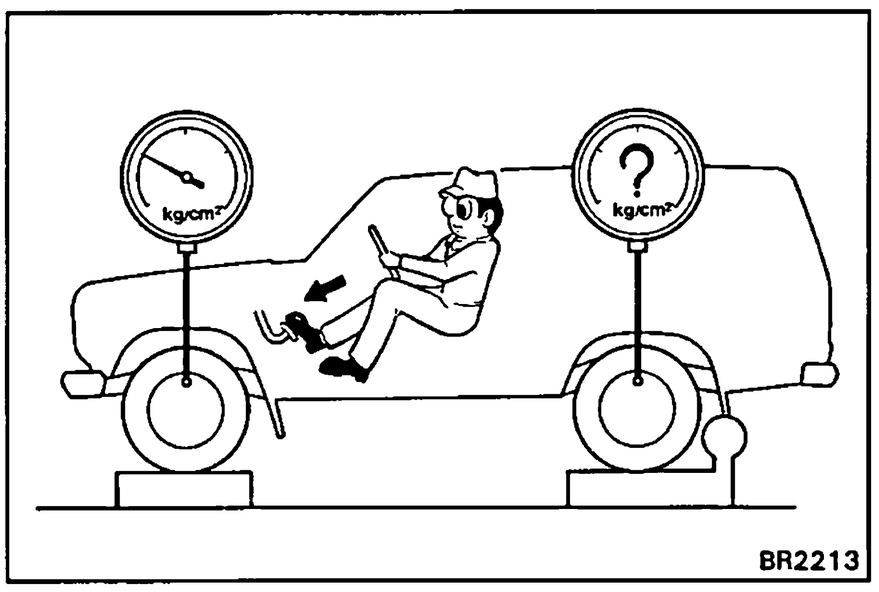
**Rear axle load (include vehicle weight):**
**1,330 kg (2,932 lb)**



BR2212

**2. INSTALL LSPV GAUGE (SST) AND BLEED AIR**

SST 09709-29017

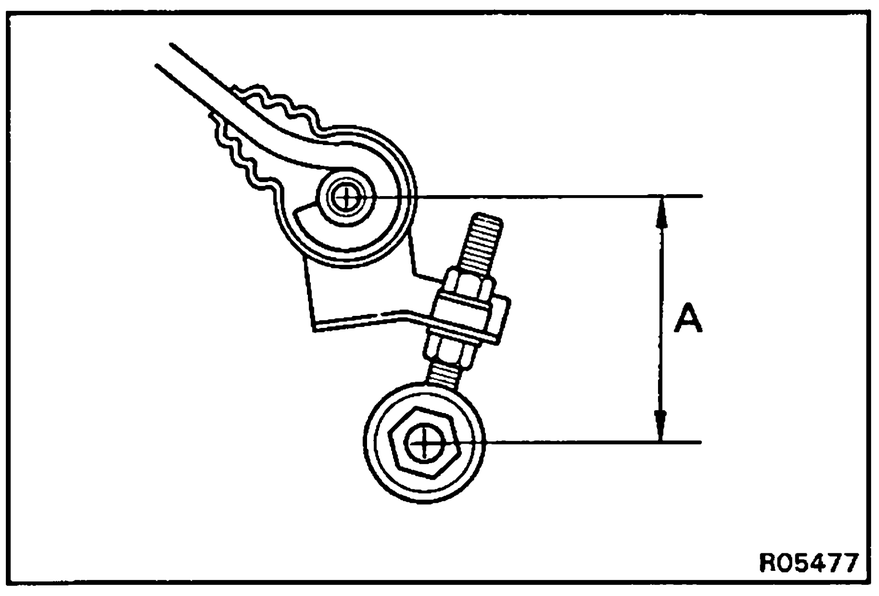


BR2213

**3. RAISE FRONT BRAKE PRESSURE TO 7,845 kPa (80 kgf/cm², 1,138 psi) AND CHECK REAR BRAKE PRESSURE**

**Rear brake pressure:**
**5,984 ± 589 kPa (61 ± 6 kgf/cm², 869 ± 86 psi)**

HINT: The brake pedal should not be depressed twice and/or returned while setting to the specified pressure. Read the value of rear pressure two seconds after adjusting the specified fluid pressure.



R05477

**4. IF NECESSARY, ADJUST FLUID PRESSURE**

(a) Disconnect the No.2 shackle from the shackle bracket.

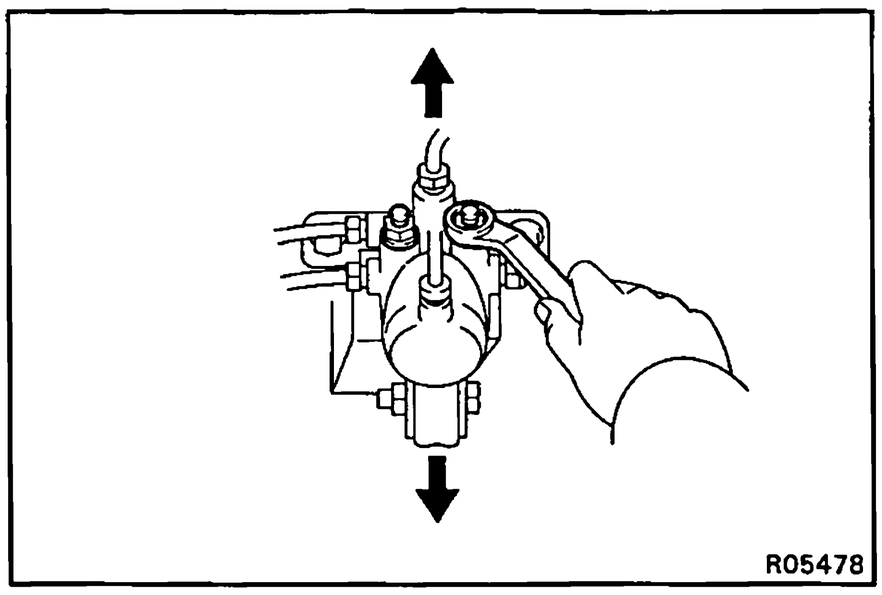
(b) Adjust the length of the No.2 shackle turning it.

Low pressure — Lengthen A
High pressure — Shorten A

**Initial set:**
**90 mm (3.54 in.)**

**Adjusting range:**
**84 — 96 mm (3.31 — 3.78 in.)**

HINT: One turn of the No.2 shackle changes the fluid pressure about following specification.
98.1 kPa (1.0 kgf/cm², 14.2 psi)




(c) In event the pressure cannot be adjusted by No.2 shackle, raise or lower the valve body.

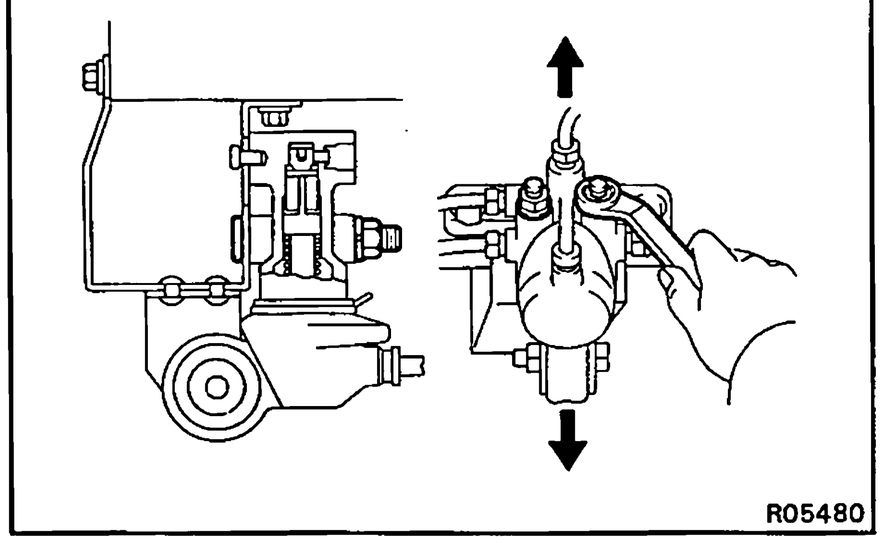
Low pressure — Lower
High pressure — Raise

(d) Torque the nuts.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

(e) Adjust the length of the No.2 shackle again.

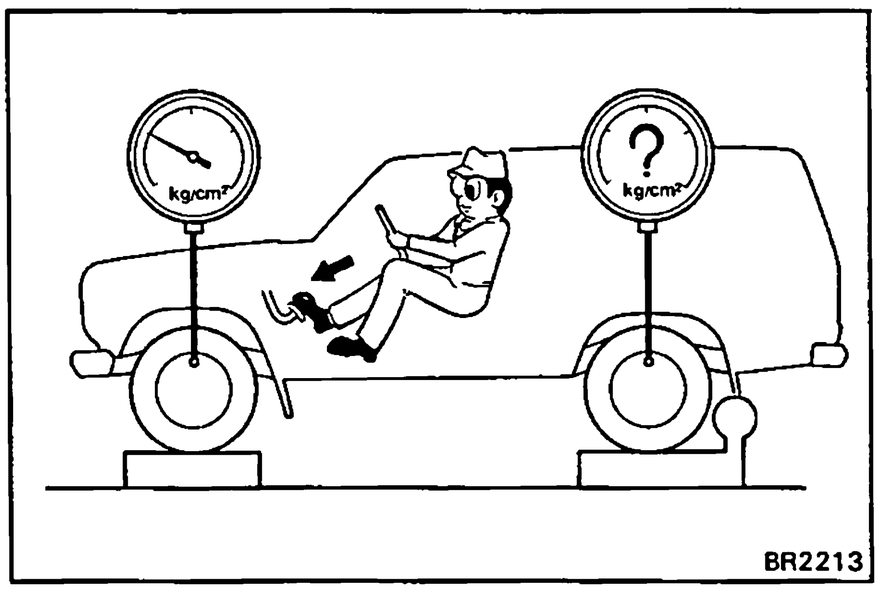
If it cannot be adjusted, inspect the valve housing.




### 5. IF NECESSARY, CHECK VALVE BODY

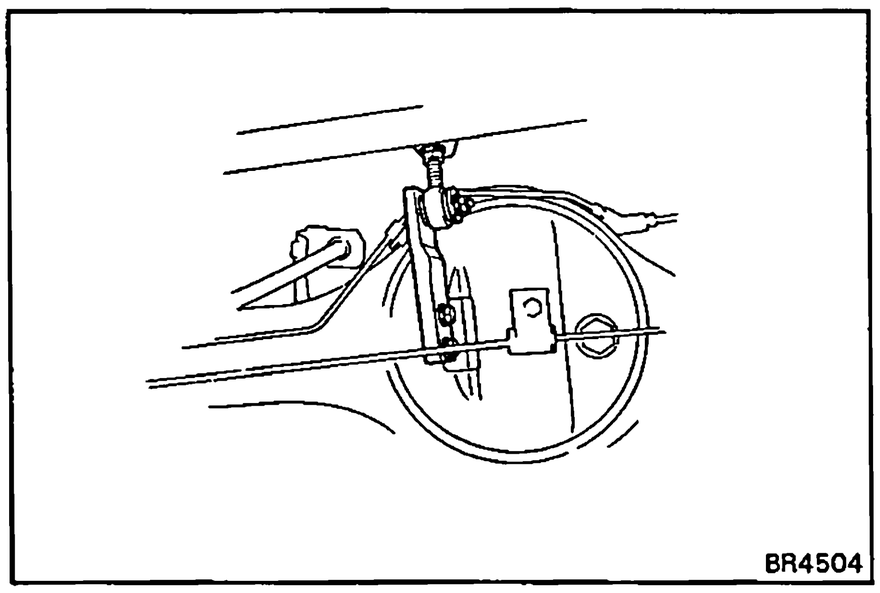
(a) Assemble the valve body in the uppermost position.

HINT: When the brakes are applied, the piston will move down about 1 mm (0.039 in.). Even at this time, the piston should not make contact with or move the load sensing spring.




(b) In this position, check the rear brake pressure.

| Front brake pressure kPa (kgf/cm², psi) | Rear brake pressure kPa (kgf/cm², psi) |
|---|---|
| 3,434 (35, 498) | 3,434 (35, 498) |
| 5,396 (55, 783) | 3,630 – 4,218 (37 – 43, 527 – 612) |
| 9,810 (100, 1,424) | 4,513 – 5,494 (46 – 56, 655 – 797) |



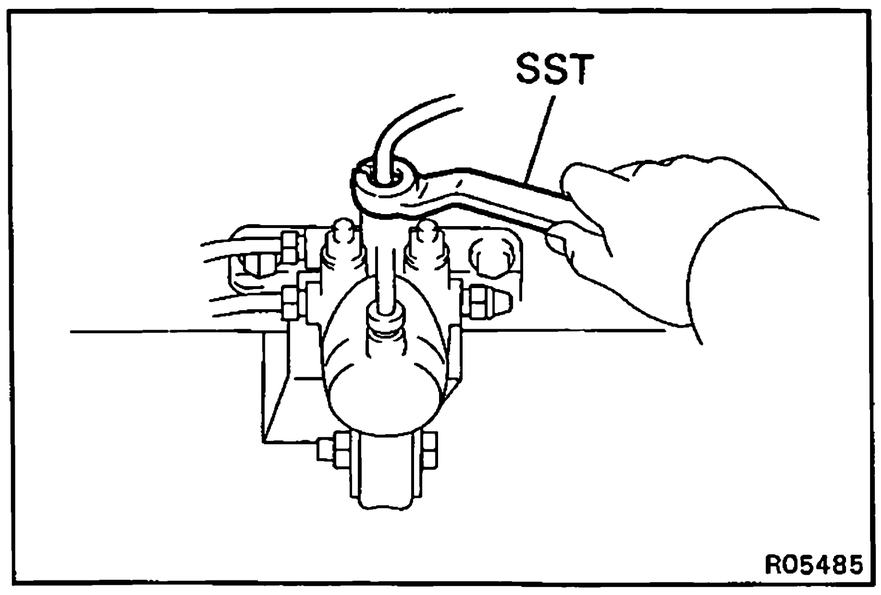

## LSP & BV REMOVAL

### 1. DISCONNECT SHACKLE NO.2 FROM BRACKET

(a) Remove the cotter pin.

(b) Remove the nut and disconnect the shackle No.2 from the bracket.

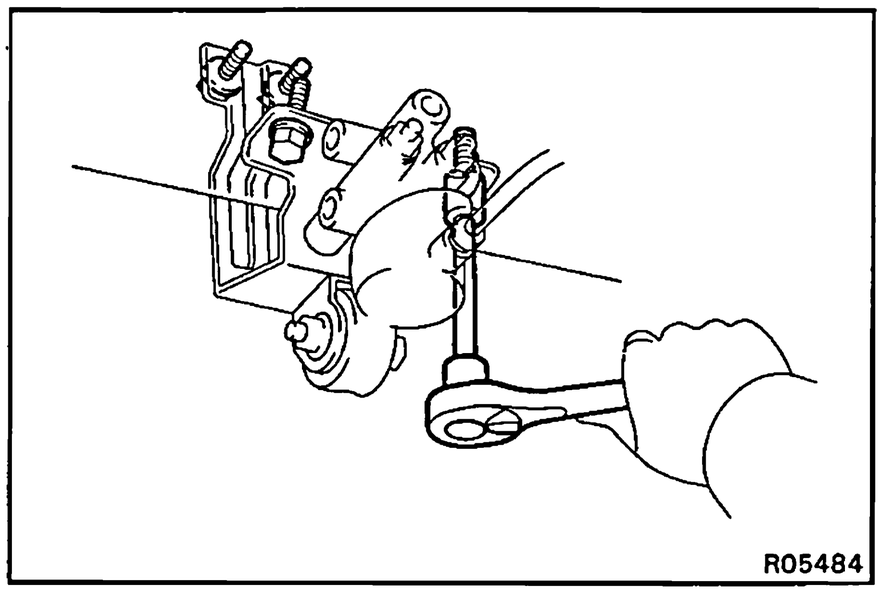
(c) Remove the retainer, two cushions and collar.




### 2. REMOVE LSP & BV ASSEMBLY

(a) Using SST, disconnect the brake lines from the valve body.

SST 09751-36011



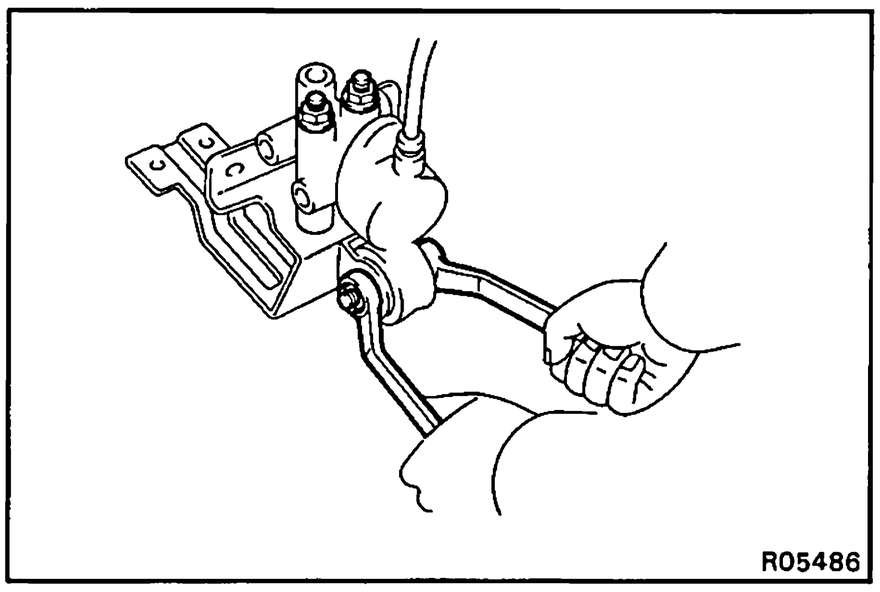

(b) Remove the valve bracket and mounting bolts, then remove the LSP & BV assembly.

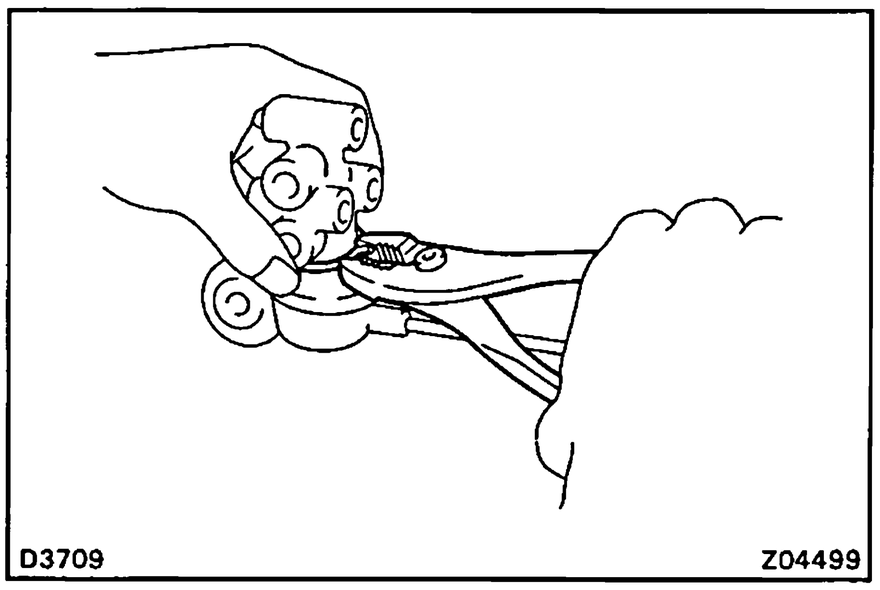
## LSP & BV ASSEMBLY DISASSEMBLY

### 1. REMOVE VALVE BRACKET

(a) Remove the nut and bolt as shown.

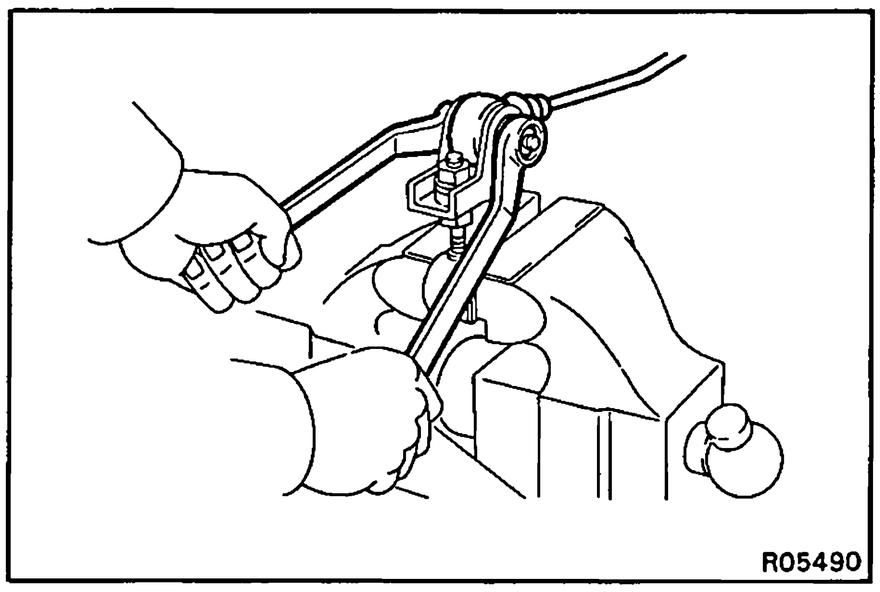
(b) Remove the two nuts, and remove the bracket and two bolts from the valve body.




### 2. DISCONNECT SPRING FROM VALVE

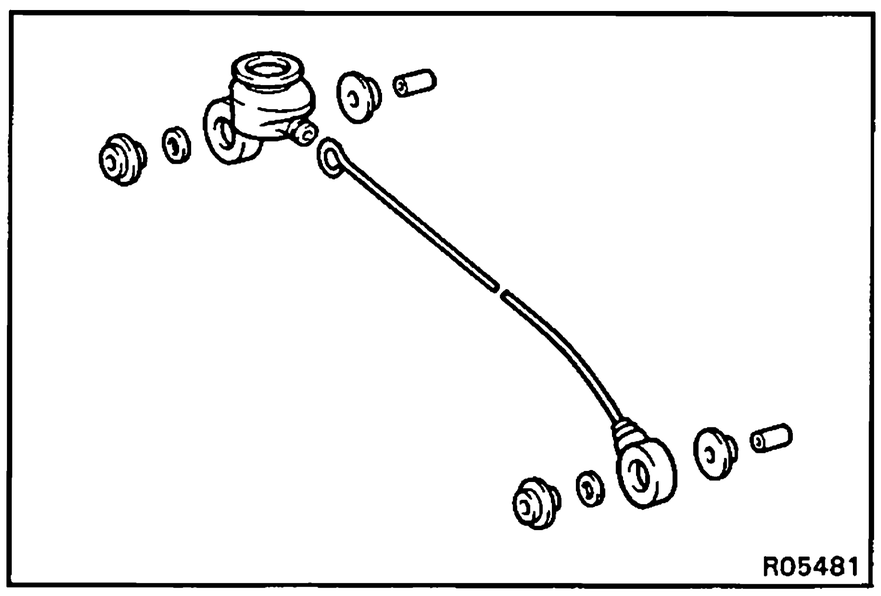
Using pliers, remove the clip, and remove the spring from the valve.




### 3. REMOVE SHACKLE NO.1 AND NO.2

(a) Remove the bolt and nut, then remove the following parts:
- Load sensing spring
- Two plate washers

(b) Loosen the two nuts, and remove the shackle No.1 from the shackle No.2.




### 4. DISASSEMBLY LOAD SENSING SPRING

Disassembly the following parts:

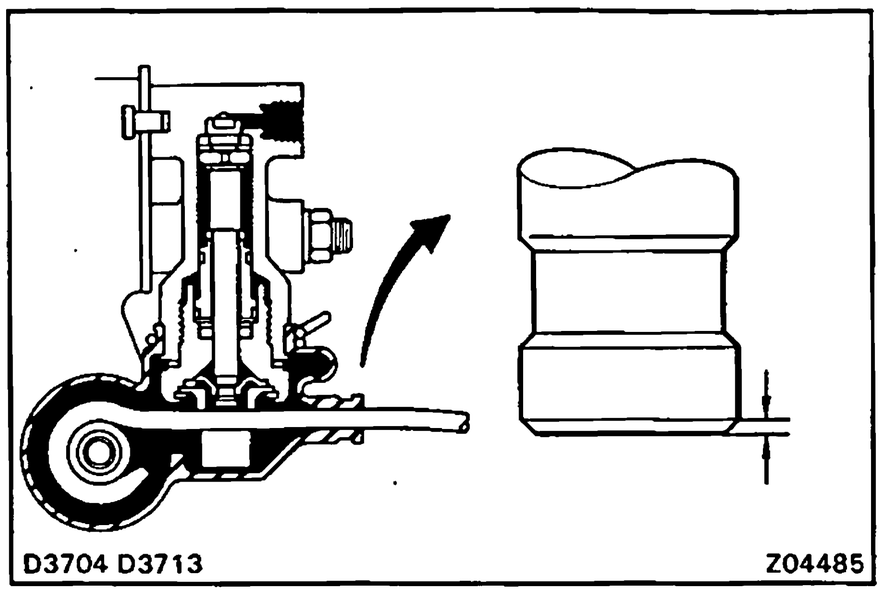
(a) Bushings

(b) Collars

(c) Rubber plates

(d) Load sensing valve boot

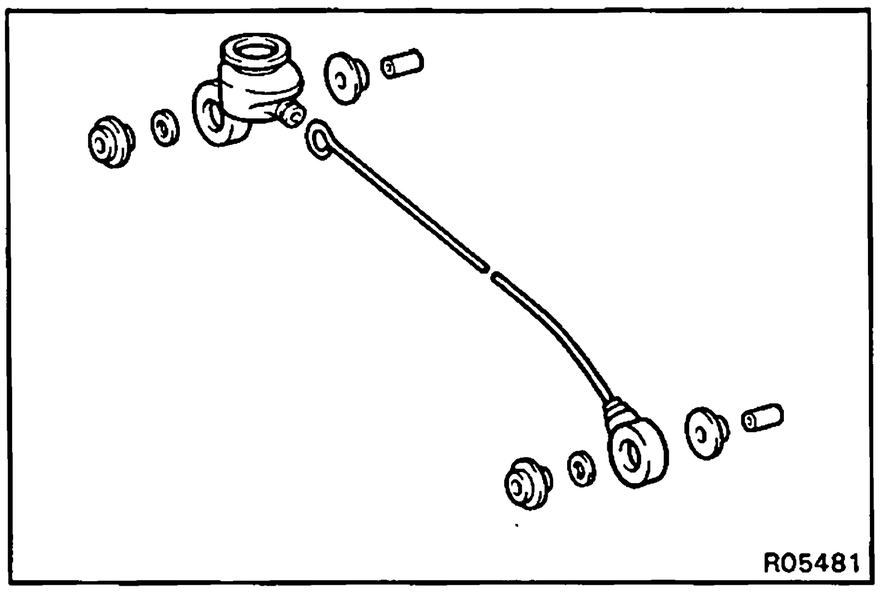
(e) Load sensing spring boot


D3704 D3713 Z04485

## LSP & BV INSPECTION

**INSPECT VALVE PISTON PIN AND LOAD SENSING SPRING CONTACT SURFACE FOR WEAR**

**Wear limit:**
**0.7 mm (0.028 in.)**


R05481

## LSP & BV ASSEMBLY

**1. ASSEMBLE FOLLOWING PARTS TO LOAD SENSING SPRING:**

(a) Load sensing valve boot

(b) Load sensing spring boot

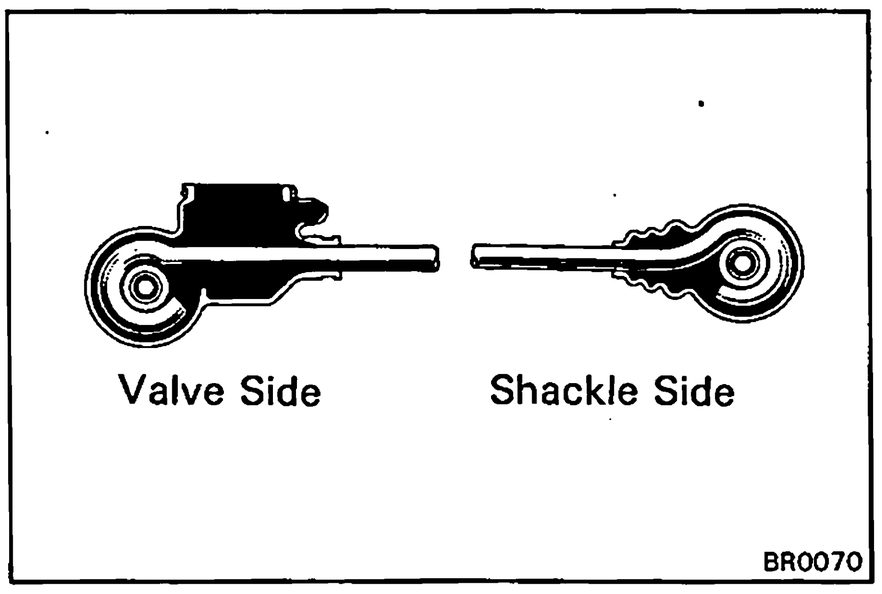
(c) Bushings

(d) Rubber plates

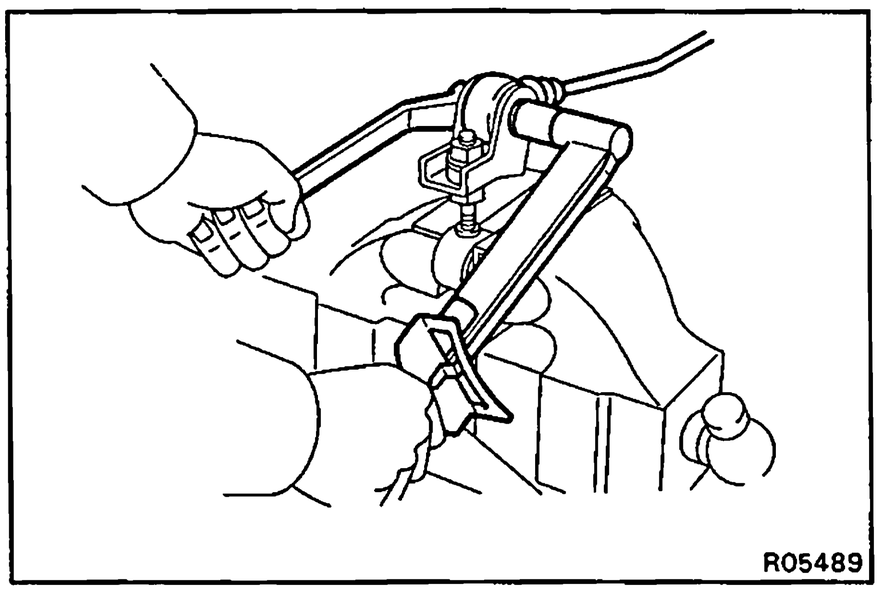
(e) Collars

HINT: Apply lithium soap base glycol grease to all rubbing areas.

Do not mistake the valve side for the shackle side of the load sensing spring.



BR0070

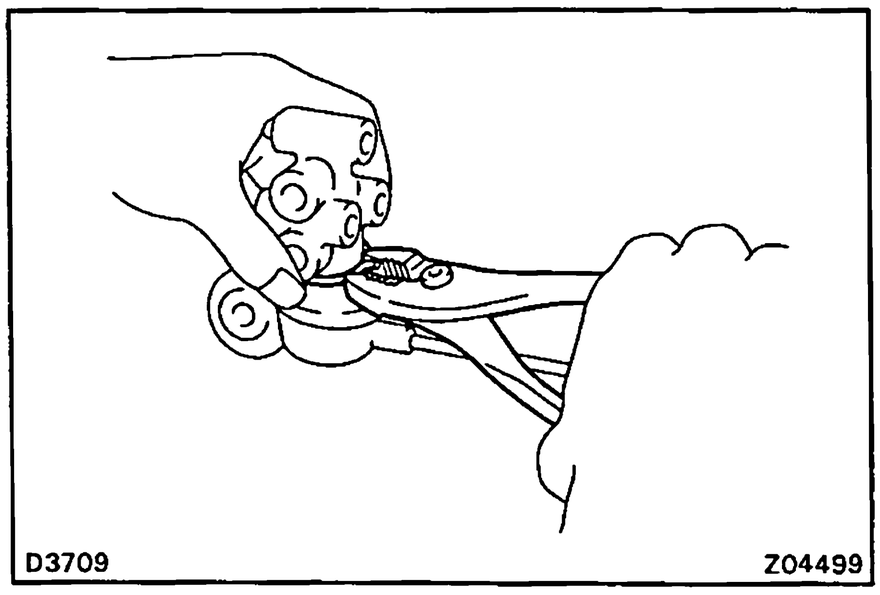

R05489

**2. INSTALL SHACKLE NO.1 AND NO.2 TO LOAD SENSING SPRING**

(a) Install the lock nut and shackle No.1 to the shackle No.2.

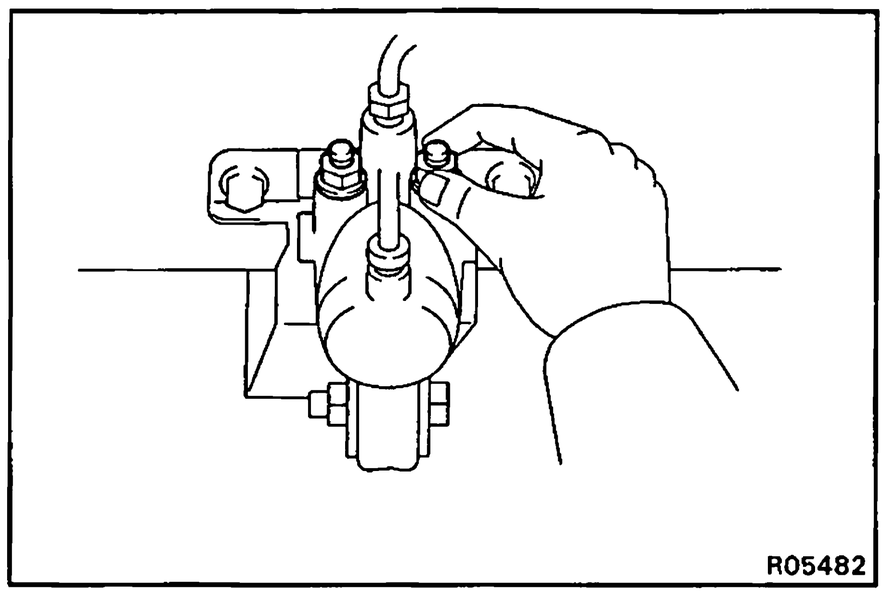
(b) Install and torque the bolt and nut as shown in illustration.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**


D3709 Z04499

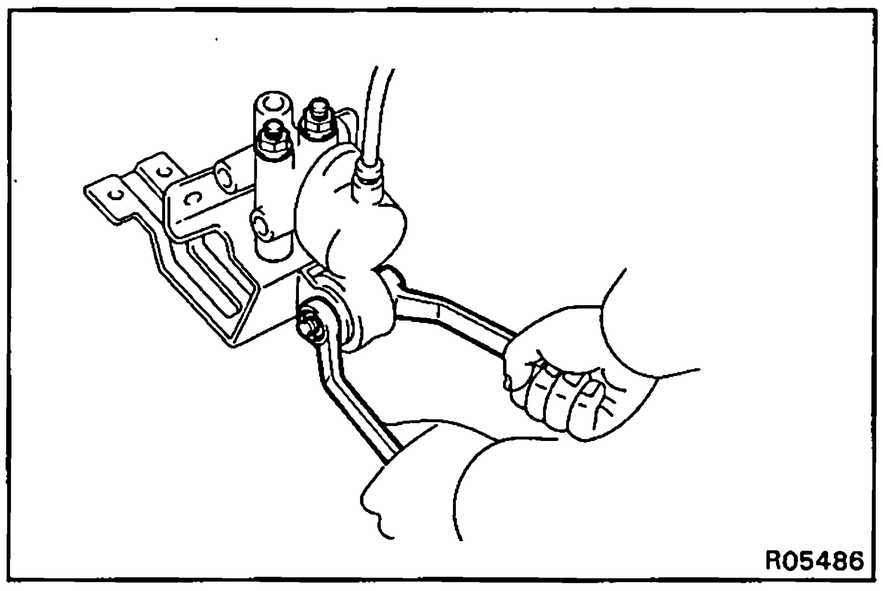
**3. INSTALL LOAD SENSING SPRING TO VALVE BODY**

Install the load sensing spring assembly to the load sensing valve with the clip.


R05482

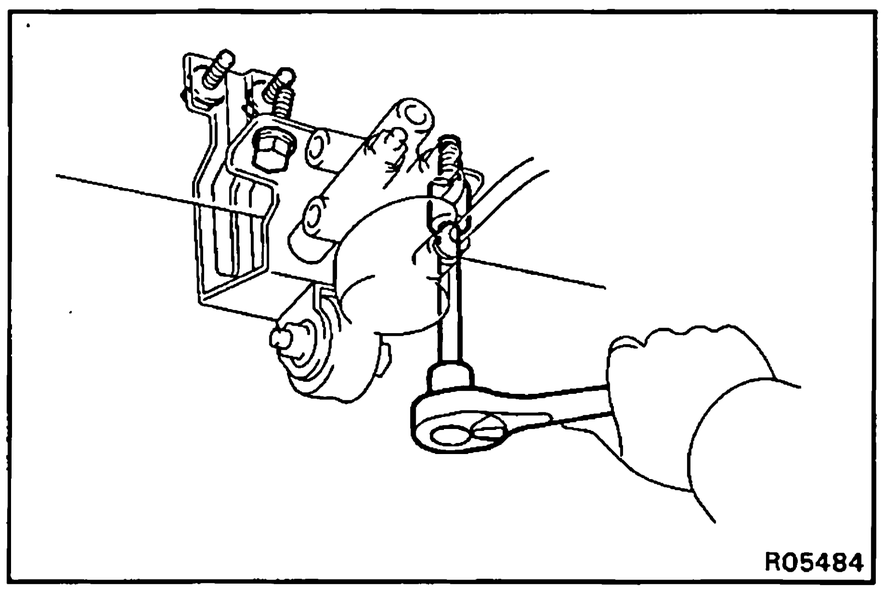
### 4. INSTALL VALVE BRACKET

(a) Install the two set bolts to the valve assembly through the valve bracket and temporarily tighten the two valve body mounting nuts.


R05486

(b) Torque the bolt and nut through the two plate washers.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**

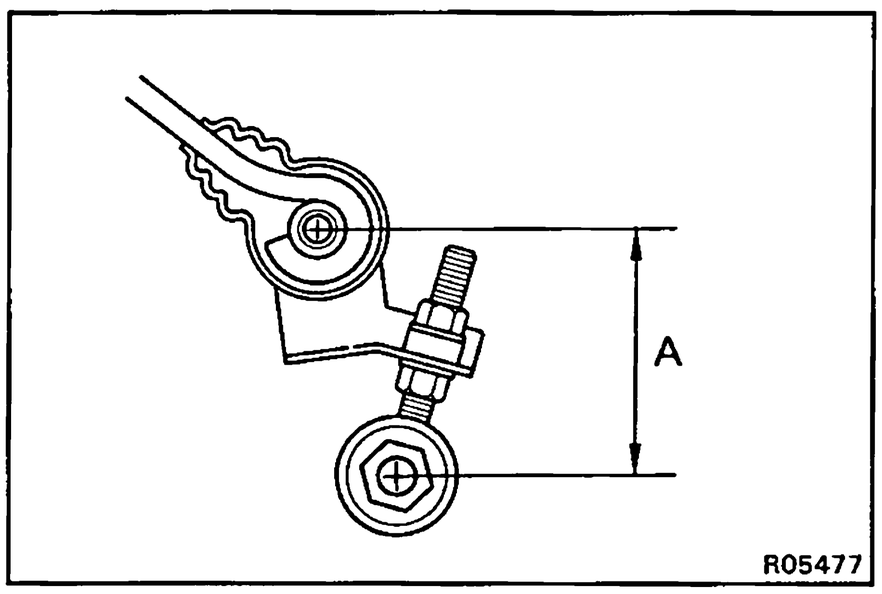

R05484

## LSP & BV INSTALLATION

### 1. INSTALL LSP & BV ASSEMBLY

Install the LSP & BV assembly to the frame with the four bolts.

**Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)**



R05477

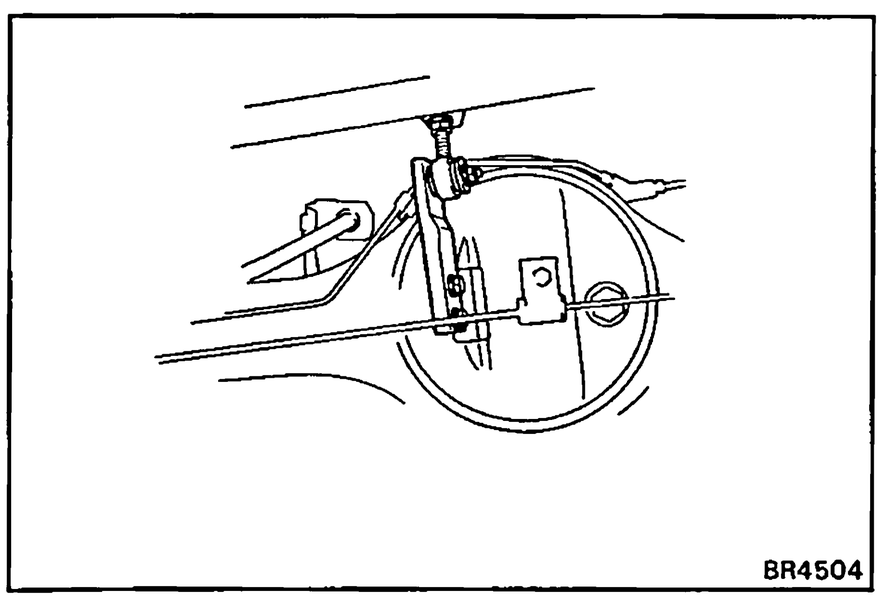
### 2. CONNECT SHACKLE NO.2 TO BRACKET

(a) Set the dimension A by turning shackle No.2.

**Initial set:**
**90 mm (3.54 in.)**

(b) Tighten the lock nut.

**Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)**

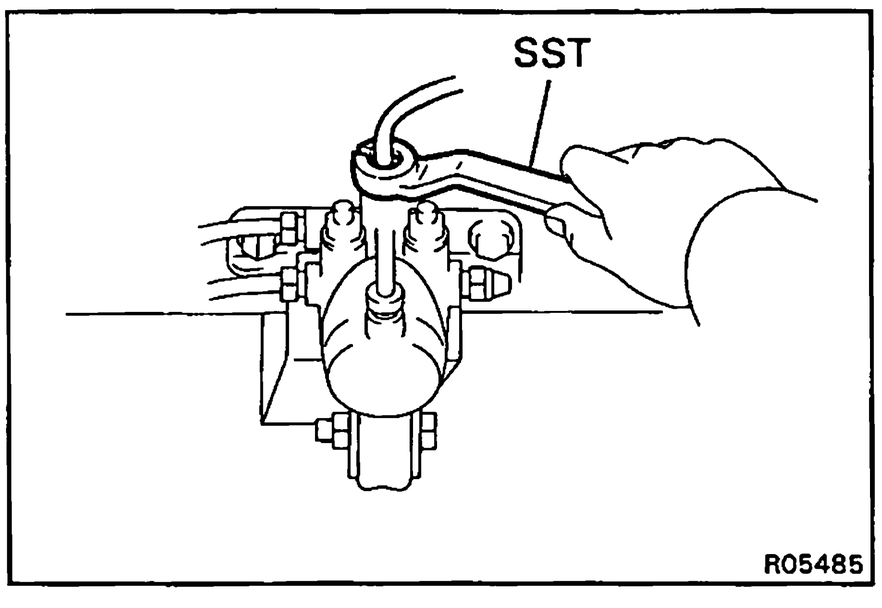

BR4504

(c) Install the two bushings and collar to the load sensing spring shackle.

(d) Install the load sensing spring to the shackle bracket with a retainer and nut.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

(e) Install a new cotter pin.



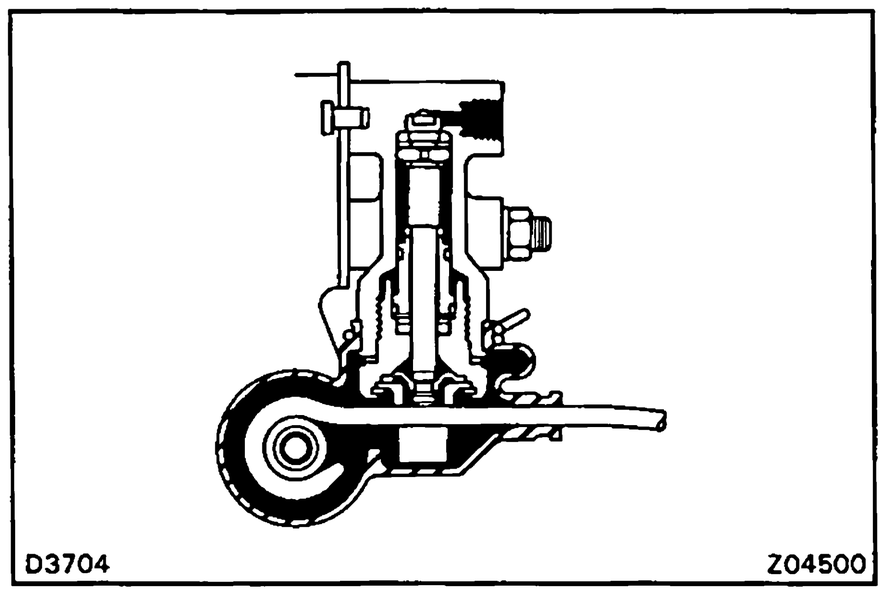

**3. CONNECT BRAKE LINES**

Using SST, connect the brake lines.

SST 09751-36011

**Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)**

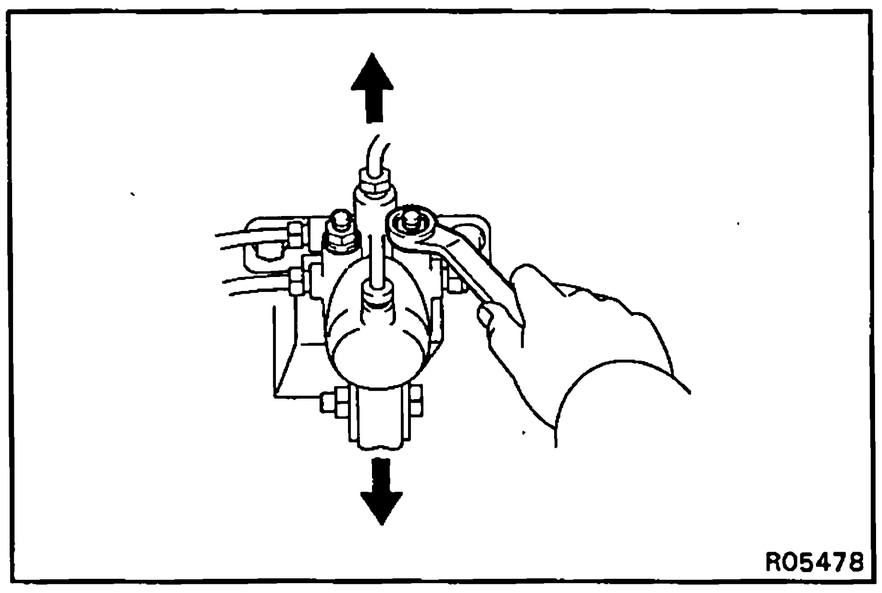
**4. SET REAR AXLE LOAD**
**(See page BR-16)**




**5. SET VALVE BODY**

(a) When pulling down the load sensing spring, confirm that the valve piston moves down smoothly.

(b) Position the valve body so that the valve piston lightly contacts the load sensing spring.




(c) Tighten the valve body mounting nuts.

**Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)**

**6. BLEED BRAKE SYSTEM**
**(See pub No. RM184E, page BR-7)**

**7. CHECK FLUID LEAKAGE**

**8. CHECK AND ADJUST LSP & BV FLUID PRESSURE**
**(See page BR-16)**

# ANTI-LOCK BRAKE SYSTEM (ABS)

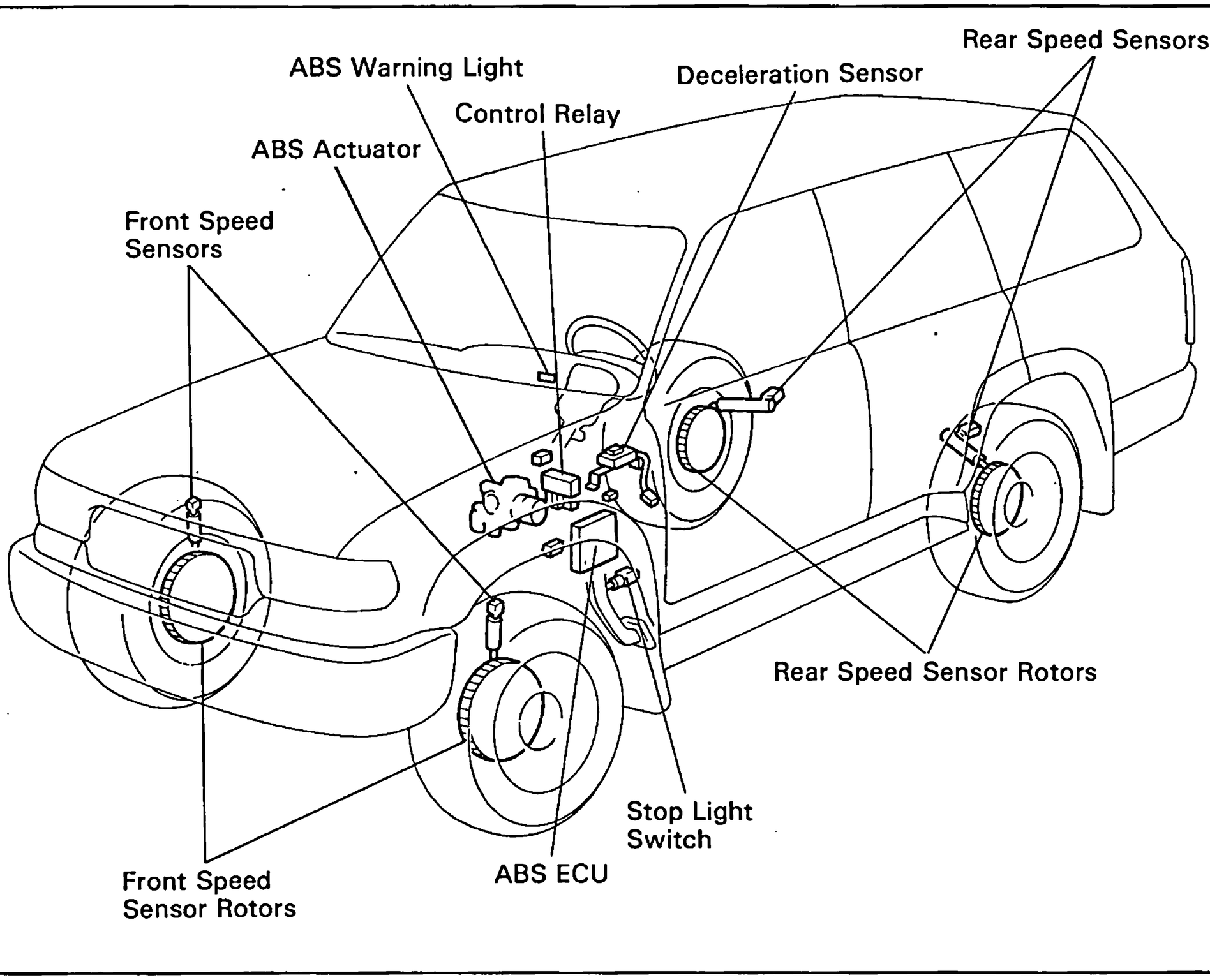
## DESCRIPTION

- The ABS is a brake system which controls the brake cylinder hydraulic pressure of all four wheels during sudden braking and braking on slippery road surfaces, preventing the wheels from locking. This ABS provides the following benefits:
  (1) Enables steering round an obstacle with a greater degree of certainty even when panic braking.
  (2) Enables stopping in a panic brake while keeping the effect upon stability and steerability to a minimum, even on curves.
- The function of the ABS is to help maintain directional stability and vehicle steerability on most road conditions. However, the system cannot prevent the vehicle from skidding if the cornering speed limit is exceeded.
- The ABS has a longitudinal deceleration sensor to match braking characteristics to the full-time four wheel drive.
- In case a malfunction occurs, a diagnosis function and fail-safe system have been adopted for the ABS to increase serviceability.
- When the center differential is locked, the ABS does not operate, so the ABS warning light lights up to indicate this.

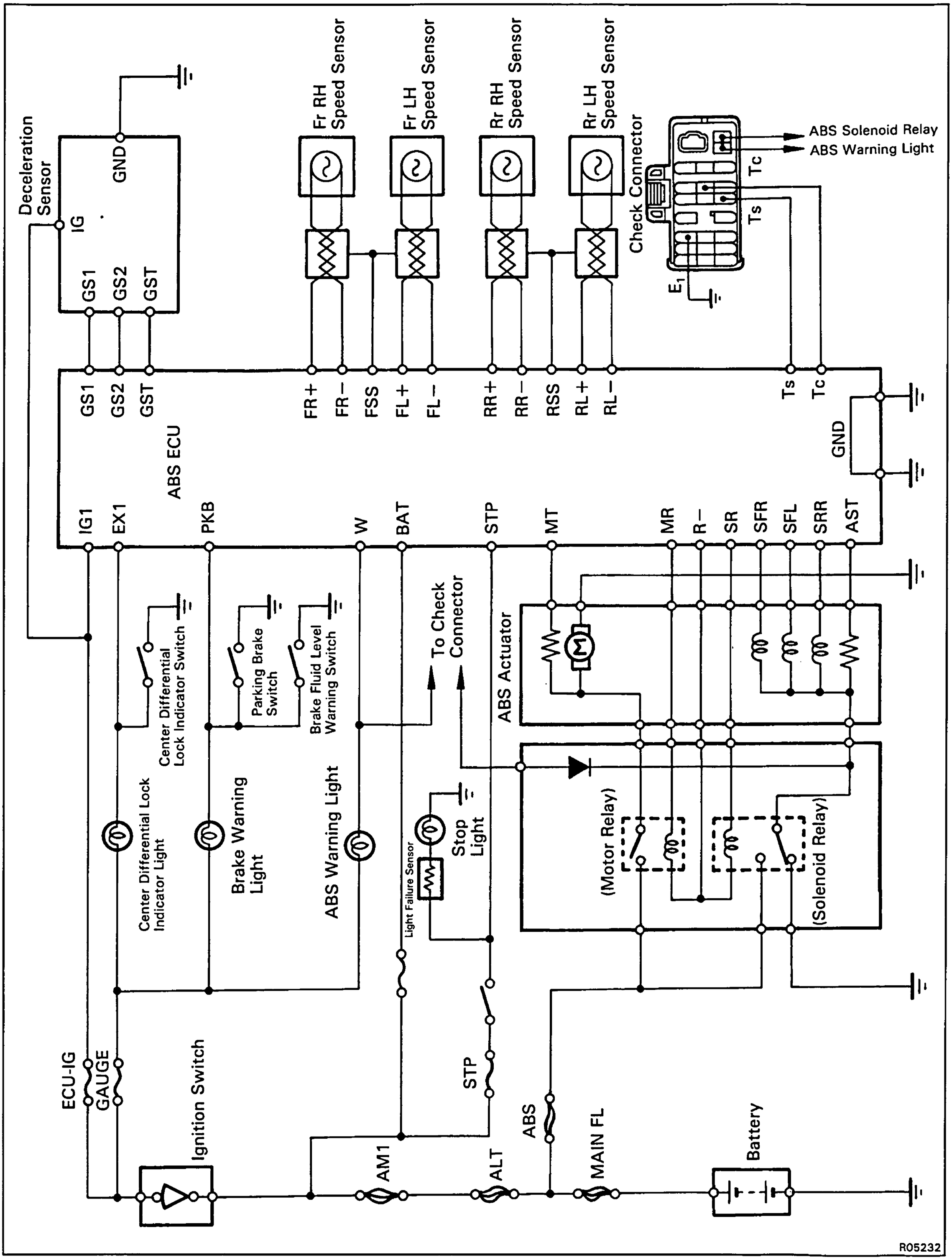
## COMPONENTS FUNCTION

| Component | Function |
|---|---|
| Front Speed Sensor | Detect the wheel speed of each of the left and right front wheels. |
| Rear Speed Sensor | Detect the wheel speed of each of the left and right rear wheels. |
| ABS Warning Light | Lights up to alert the driver when trouble has occurred in the Anti-Lock Brake System and when the center differential is locked. |
| Actuator | Controls the brake fluid pressure to each disc brake cylinder through signals from the ECU. |
| ABS ECU | From the wheel speed signals from each sensor, it calculates acceleration, deceleration and slip values and sends signals to the actuator to control brake fluid pressure. |
| Deceleration Sensor | Detect the deceleration speed of the vehicle and sends a signal accordingly to the ABS ECU. |

## SYSTEM PARTS LOCATION



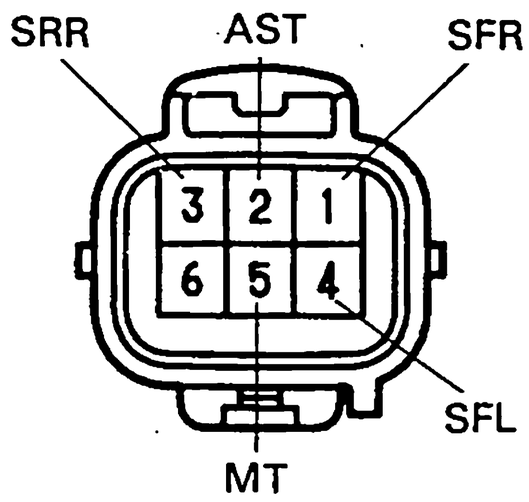
# WIRING DIAGRAM



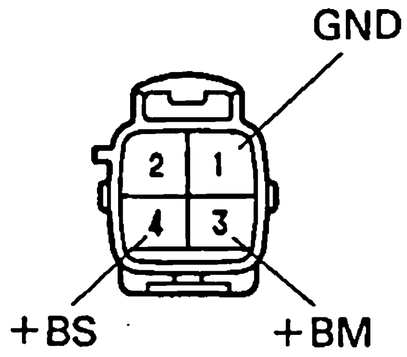
# CONNECTORS

## ABS Actuator

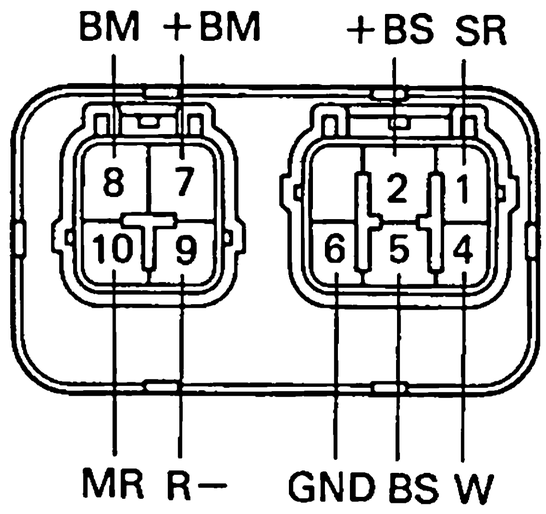
CONNECTOR A



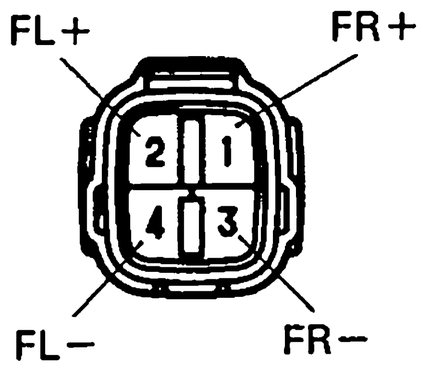

CONNECTOR B



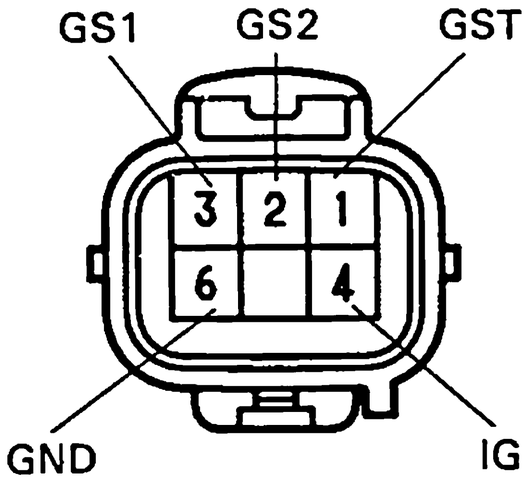

Control Relay



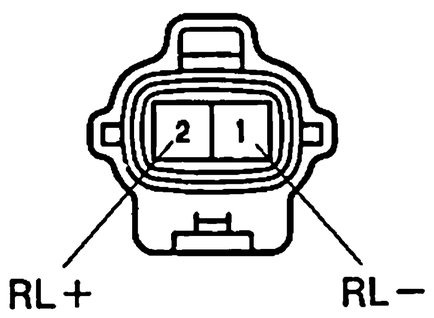

Front Speed Sensor



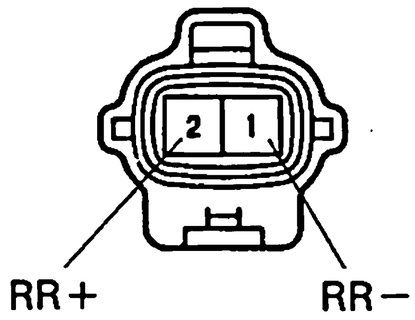

Deceleration Sensor



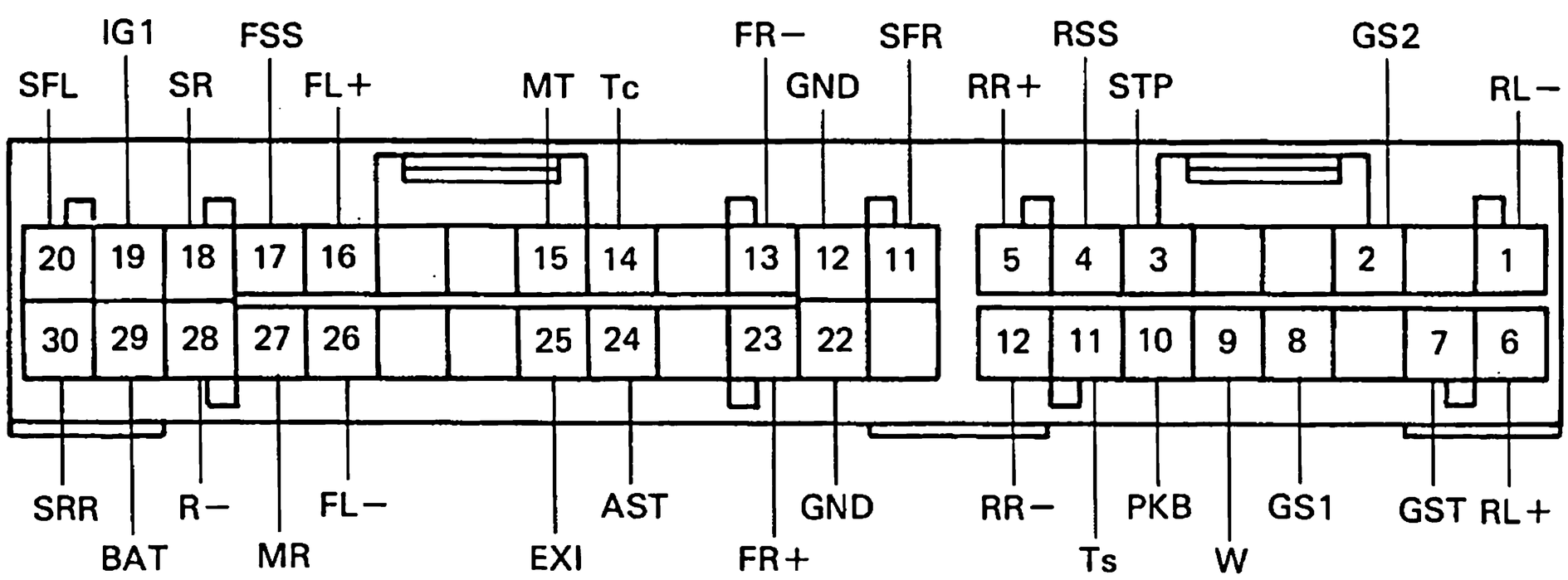

Rear Speed Sensor (LH)



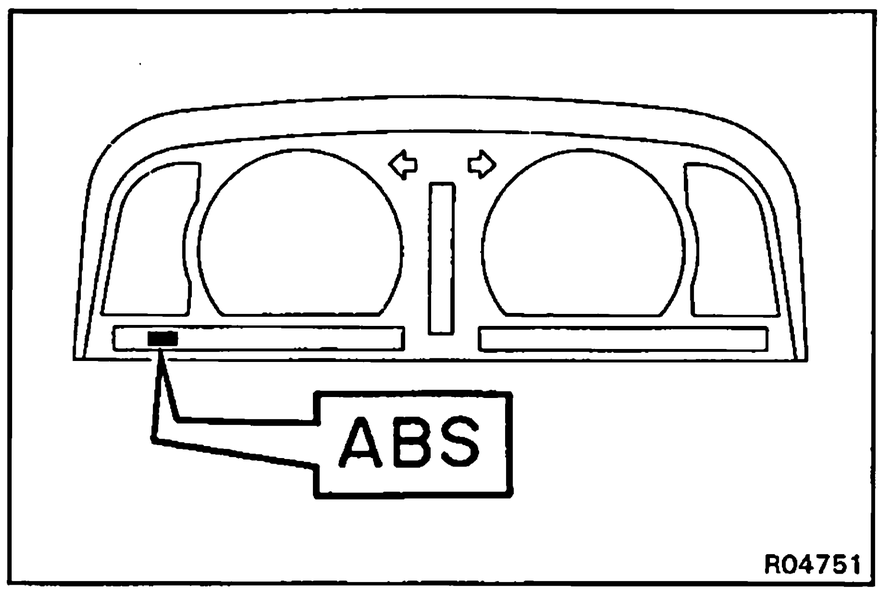

Rear Speed Sensor (RH)




## ABS ECU




Ie-6-2-C Ig-4-2-A BR3999
Ie-4-2-H Ie-6-2-C
Ie-2-2-T Ie-2-2-T
R00463




# DIAGNOSIS SYSTEM

## DESCRIPTION

If a malfunction occurs, the system will identify the problem and the ECU will store the codes for the trouble items.

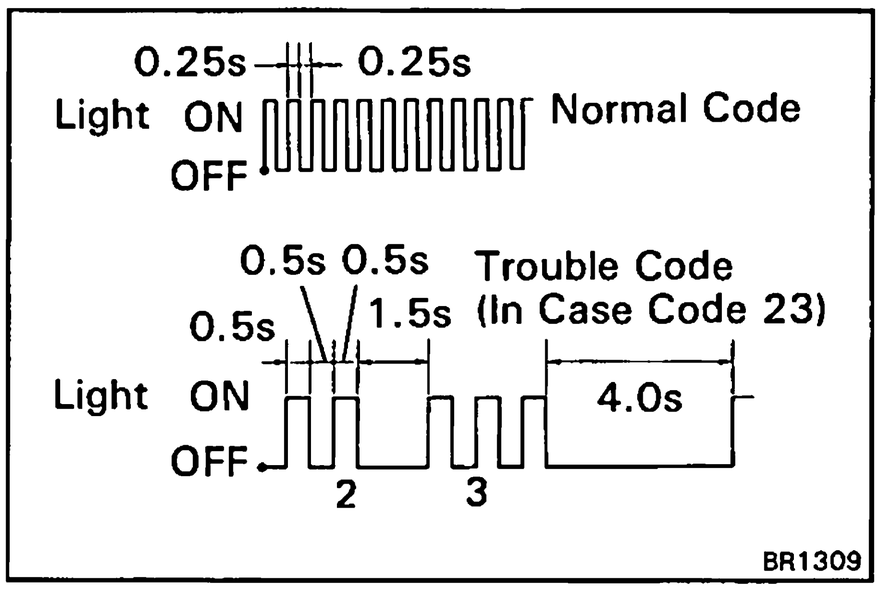
At the same time, the system informs the driver of a malfunction via the "ABS" warning light in the combination meter.

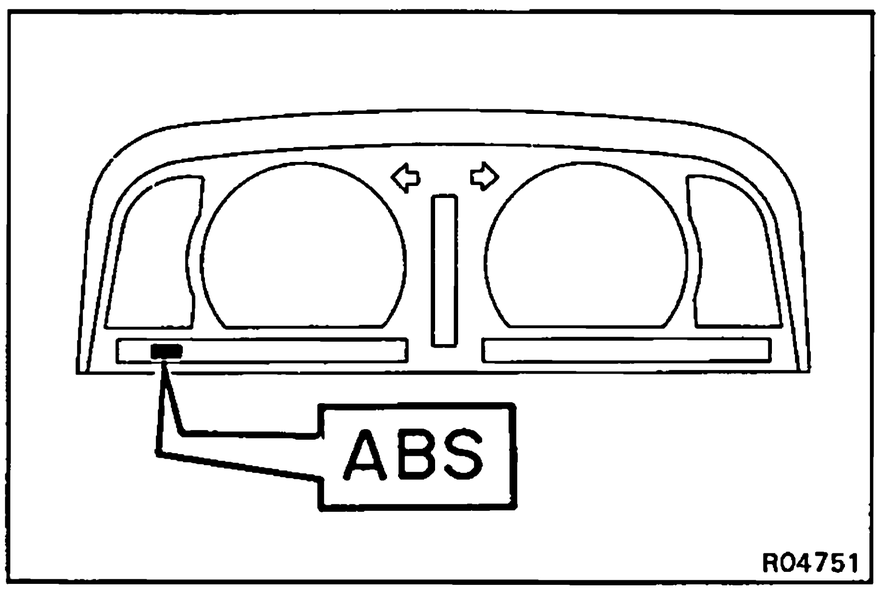
By turning on the ignition switch, disconnecting the short pin of the check connector and use SST to connect Tc and $E_1$ of the check connector, the trouble can be identified by the number of blinks (diagnostic code) of the warning light.

In the event of two codes, that having the smallest numbered code will be identified first.

HINT: The warning light does not show the diagnostic codes while the vehicle is running.

When the transfer is in L (center differential lock) position, the ABS does not operate and the ABS warning light stays on.




## DIAGNOSIS SYSTEM INSPECTION

1. **INSPECT BATTERY VOLTAGE**

   Inspect that the battery voltage is about 12 V.

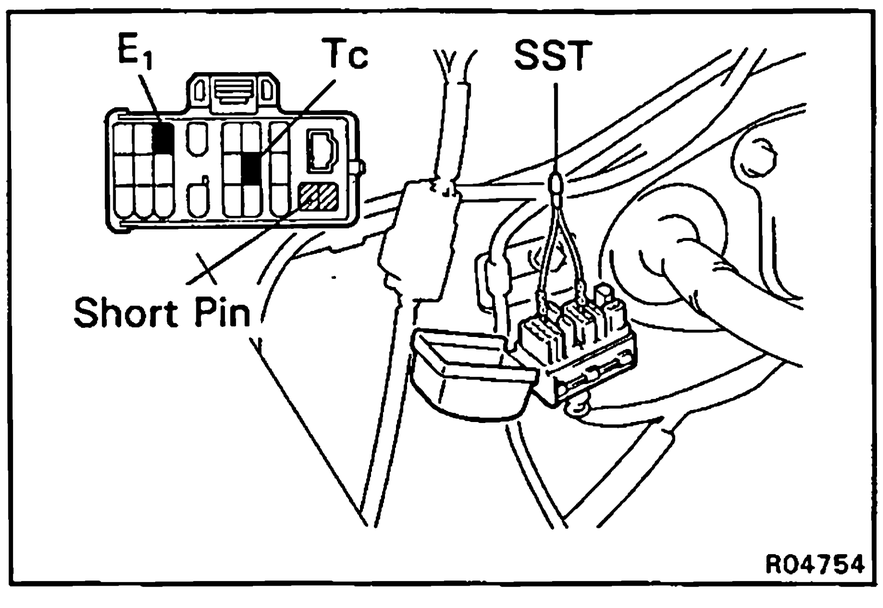
2. **CHECK THAT WARNING LIGHT TURNS ON**

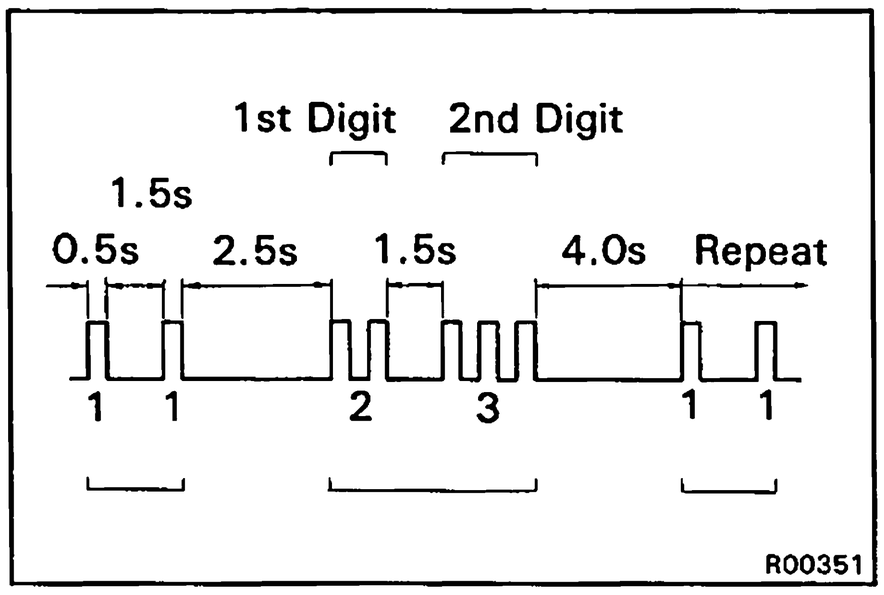
(a) Confirm that the center differential is free.

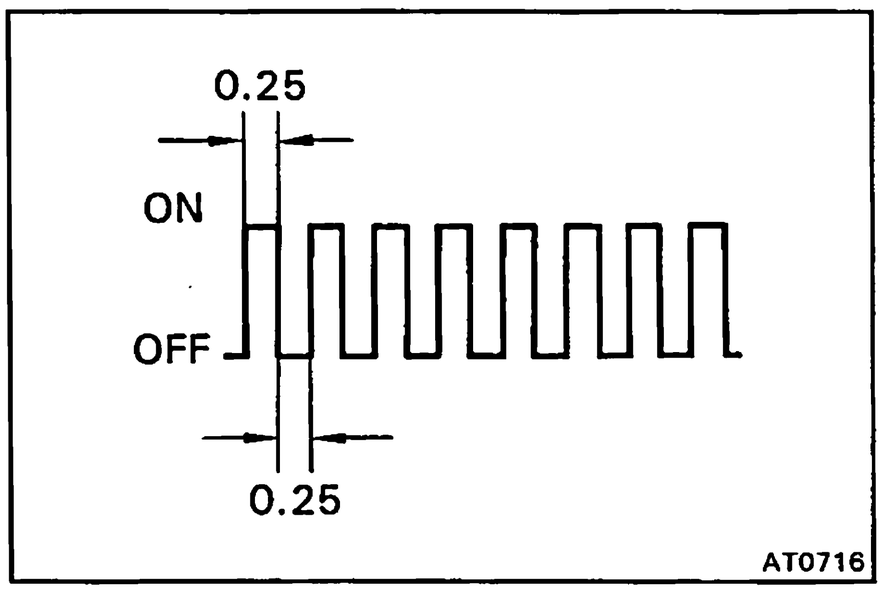
(b) Turn the ignition switch on.

(c) Check that the "ABS" warning light turns on for 3 seconds.

If not, inspect and repair or replace the fuse, bulb and wire harness.




### 3. READ DIAGNOSTIC CODE

(a) Turn the ignition switch on.

(b) Using SST, connect terminals Tc and $E_1$ of the check connector.

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(c) Pull out the short pin from the terminals WA and WB of the check connector in the engine room.

(d) In event of a malfunction, 4 seconds later the warning light will begin to blink. Read the number of blinks. (See page BR-26)

HINT: The first number of blinks will equal the first digit of a two digit diagnostic code. After a 1.5 second pause, the 2nd number of blinks will equal the 2nd number of a two digit code. If there are two or more codes, there will be a 2.5 second pause between each, and indication will begin after 4.0 second pause from the smaller value and continue in order to larger.

(e) If the system is operating normally (no malfunction), the warning light will blink once every 0.5 seconds.

(f) Repair the system.

(g) After the malfunctioning components has been repaired, clear the diagnostic codes stored in the ECU. (See page BR-27)

HINT: If you disconnect the battery cable while repairing, all diagnostic codes in the ECU will erased.

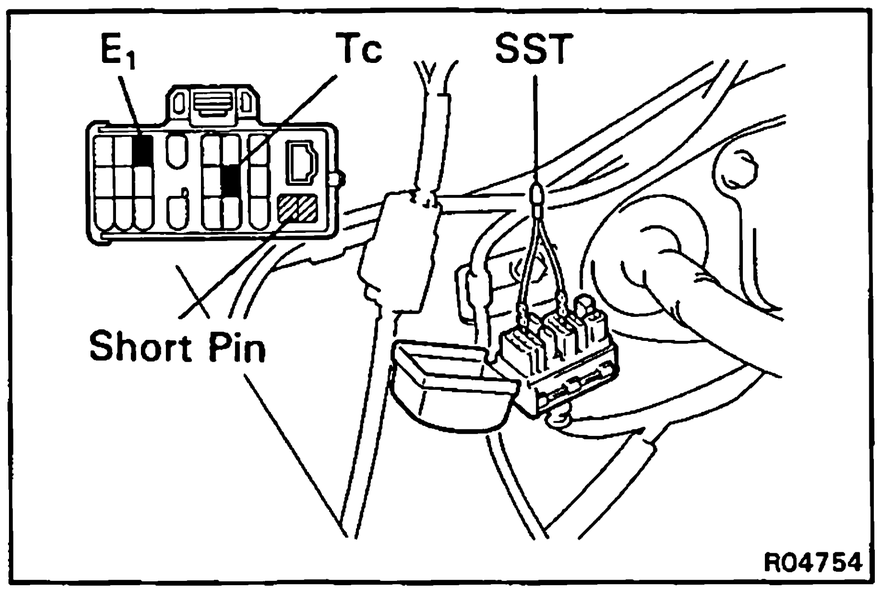
(h) Remove the SST from terminals Tc and $E_1$ of the check connector.

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(i) Install the short pin to the terminals WA and WB.

(j) Turn the ignition switch on, and check that the "ABS" warning light goes off after the warning light goes on for 3 seconds.

| Code No. | Light Pattern | Diagnosis | Trouble Part |
|---|---|---|---|
| 11 | ON / OFF  R05039 | Open circuit in solenoid relay circuit | • Actuator inside wire harness<br>• Solenoid relay<br>• Wire harness and connector of solenoid relay circuit (Include AST circuit) |
| 12 |  R05039 | Short circuit in solenoid relay circuit | |
| 13 |  R05039 | Open circuit in pump motor relay circuit | • Actuator inside wire harness<br>• Pump motor relay<br>• Wire harness and connector of pump motor relay circuit (include MT circuit) |
| 14 |  R05039 | Short circuit in pump motor relay circuit | |
| 21 |  R05039 | Open or short circuit in 3 position solenoid of front right wheel | • Actuator solenoid<br>• Wire harness and connector of actuator solenoid circuit |
| 22 |  R05039 | Open or short circuit in 3 position solenoid of front left wheel | |
| 23 |  R05039 | Open or short circuit in 3 position solenoid of rear wheel | |
| 31 |  R05039 | Front right wheel speed sensor signal malfunction | • Speed sensor<br>• Sensor rotor<br>• Wire harness and connector of speed sensor |
| 32 |  R05039 | Front left wheel speed sensor signal malfunction | |
| 33 |  R05039 | Rear right wheel speed sensor signal malfunction | |
| 34 |  R05039 | Rear left wheel speed sensor signal malfunction | |
| 35 |  R05039 | Open circuit in front left or rear right wheel speed sensor | |
| 36 |  R05039 | Open circuit in front right or rear left wheel speed sensor | |
| 41 |  R05039 | Abnormally high or low battery voltage | • Battery<br>• Voltage regulator |
| 43 |  R05039 | Malfunction in deceleration sensor | • Deceleration sensor<br>• Deceleration sensor installation<br>• Wire harness and connector of deceleration sensor |
| 44 |  R05039 | Open or short circuit in deceleration sensor | |
| 48 |  R05039 | Open or short circuit in center differential lock indicator | • Center differential lock<br>• Center differential lock indicator light<br>• Center differential lock indicator switch<br>• Wire harness and connector of center differential lock |
| 51 |  R05039 | Pump motor of actuator locked or open circuit in pump motor circuit in actuator | • Pump motor, relay and battery<br>• Wire harness, connector and ground bolts or actuator pump motor circuit (Include MT circuit) |
| Always on |  R05039 | Malfunction in ECU | • ECU |




# DIAGNOSTIC CODES CLEARING

## CLEAR DIAGNOSTIC CODES

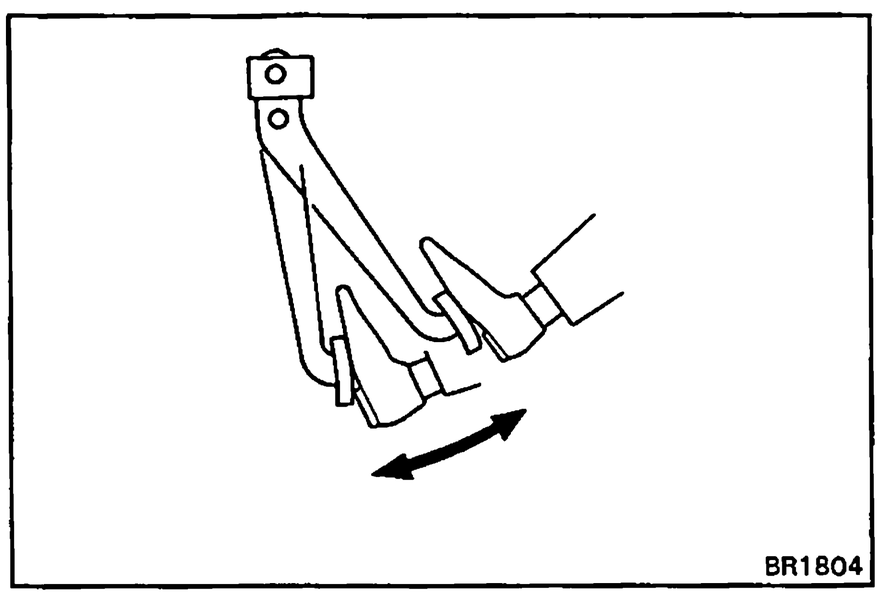
(a) Confirm that the center differential is free.

(b) Turn the ignition switch on.

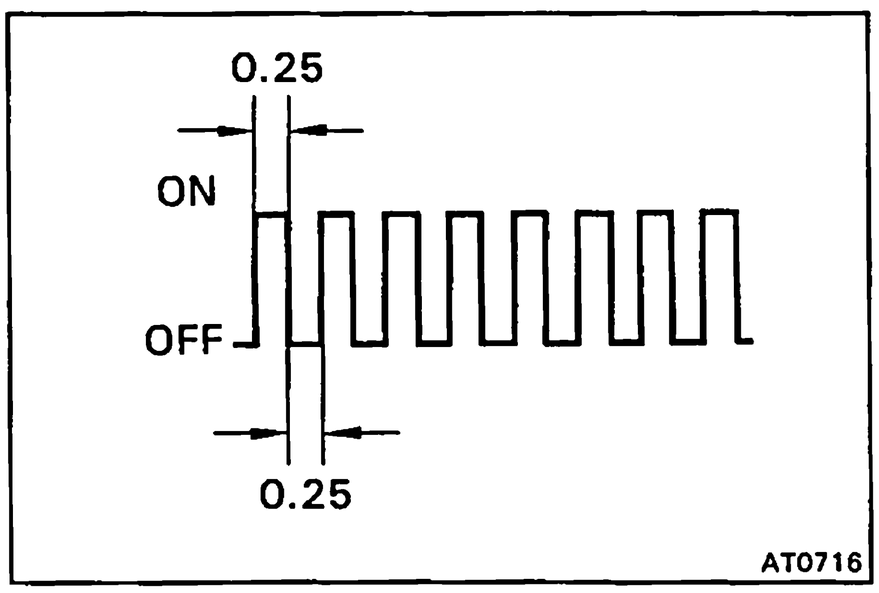
(c) Using SST, connect terminals Tc and $E_1$ of the check connector.

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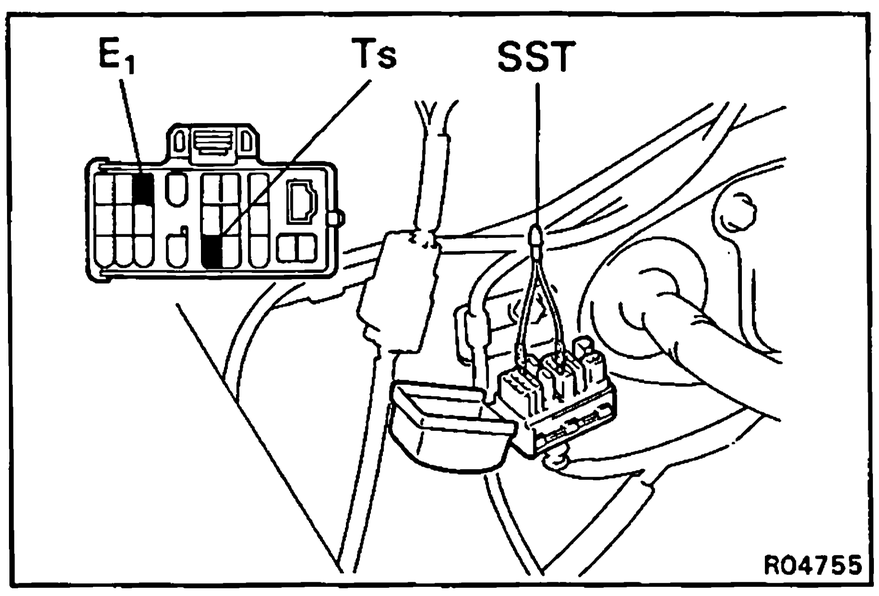
HINT: Keep the vehicle stopped vehicle speed 0 km/h (0 mph).




(d) Clear the diagnostic codes stored in ECU by depressing the brake pedal 8 or more times within 3 seconds.




(e) Check that the warning light shows the normal code.




(f) Remove the SST from terminals Tc and $E_1$ of the check connector.

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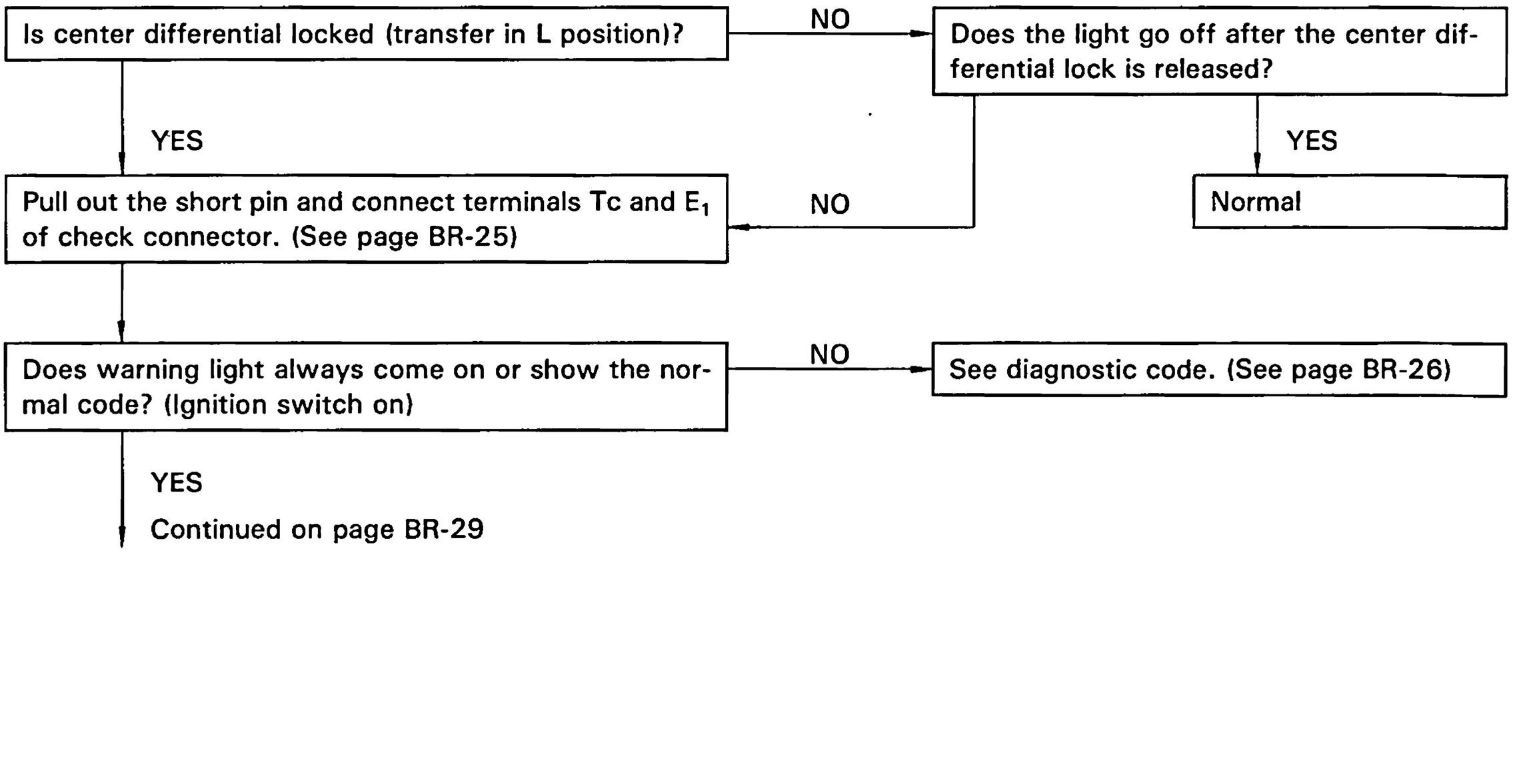
(g) Check that the warning light goes off.

# TROUBLESHOOTING

| Problem | | No. |
|---|---|---|
| "ABS" warning light | Always comes on after ignition switch is turned on. | 1 |
| | Does not come on for 3 seconds after ignition switch on. | 2 |
| | Goes on and off. | 3 |
| | Comes on while running. | 1 |
| | Does not light up when the transfer is in L (center differential lock) position. | 6 |
| Brake condition | Brakes pull.* | 4 |
| | Braking inefficient.* | 4 |
| | ABS operates at ordinary braking. | 4 |
| | ABS operates just before stopping at ordinary braking. | 4 |
| | Brake pedal pulsates abnormally while ABS is operating. | 4 |
| | Skidding noise occurs while ABS operating. (ABS operates inefficiently) | 5 |
| | When the transfer is in L (center differential lock) position, the ABS operates. | 6 |

* Also check the parts of the brake system (brake cylinders, pads, hydraulic lines, etc.) not specifically part of the ABS.

| | |
|---|---|
| 1 | "ABS" warning light comes on. |



Continued from page BR-28

Is connector of ECU properly connected?
And are all terminals in the connector?

NO → Faulty ECU connector.

YES

Is there 10 — 16 V between terminal IG on ECU wire harness side connector and body ground? (Ignition switch on)

NO → Faulty power circuit.

YES

Does warning light go off when both the ECU connector and service connector are disconnected? (Ignition switch on)

NO (Come on) → Short circuit in wire harness between ECU terminal W and control relay Terminal W.

YES (Goes off)

Faulty ECU

| | |
|---|---|
| 2 | "ABS" warning light does not come on for 3 seconds after ignition switch on. |

Pull out the short pin and ground the terminal W of the female side connector. (Ignition switch on)

↓

Does warning light come on?

NO → Bulb burned out or open circuit in wire harness between warning light and control relay terminal W.

YES

↓

Disconnect connectors from ECU and control relay and ground terminal W or ECU wire harness side conenctor. (Ignition switch on)

↓

Does warning light come on?

NO → Open circuit in wire harness between ECU terminal W and warning light.

YES

↓

With ignition switch off, disconnect control relay connectors, and check continuity between terminal W and BS on actuator side.

↓

Reverse tester leads and check again.
Is there one way continuity between terminals?

NO → Short circuit in control relay inside diode.

YES

↓

Faulty ECU.

HINT: If the diode is short-circuited, a malfunction at ECU terminal W will occur. When inspecting the terminal, connect the ECU connector, and disconnect actuator connectors and check connector. Then turn the ignition switch on, and check that the warning light goes on. If it does, the ECU terminal is OK.

| | |
|---|---|
| 3 | "ABS" warning light comes on and off. |

• Check for short circuit in wire harness between terminal Tc and $E_1$ of check connector.

| | |
|---|---|
| 4 | • Brakes pull.<br>• Braking inefficient.<br>• ABS operates at ordinary braking.<br>• ABS operates just before stopping at ordinary braking.<br>• Brake pedal pulsates abnormally while ABS is operating. |

Pull out the short pin and connect terminals Tc and $E_1$ of check connector. (See page BR-25)

↓

Does warning light show the diagnostic normal code? (Ignition switch on)

NO → See diagnostic code. (See page BR-26)

↓ YES

Are each speed sensors installed in place? And are each installation bolts tightened securely?

NO → Speed sensor installation faulty.

↓ YES

Try speed sensor and deceleration sensor diagnosis system. Is sensor signal level OK? (See page BR-34)

NO → Inspect speed sensor, and replace if necessary.

↓ YES

Try speed sensor and deceleration sensor diagnosis system. Is sensor signal change OK? (See page BR-34)

NO → Inspect sensor rotor, and replace if necessary.

↓ YES

Disconnect connector from ECU, inspect continuity between each speed sensor terminals on wire harness side. (See page BR-56)

↓

Does any abnormal change occur in continuity when the connectors or wire harness of the speed sensor and intermediate connectors are twisted or bent?

YES (Abnormal change) → Faulty wire harness.

↓ NO (No change)

Continued on page BR-32

Continued from page BR-31

Is there foreign material or ferric chips on the sensor tip?
- YES → Clean chips from the speed sensor.
- NO ↓

Try deceleration sensor operation diagnosis system. (See page BR-38) is sensor operation OK?
- NO → Faulty deceleration sensor or sensor installation faulty.
- YES ↓

Inspect the actuator operation. (See page BR-52)

Is actuator operation OK?
- NO → Faulty actuator.
- YES ↓

Repalce ECU.

| | |
|---|---|
| 5 | Anti-lock brake system operations infficiently. |

Pull out the short pin and connect terminals Tc and $E_1$ of check connector. (See page BR-25)

Does warning light show the diagnostic normal code? (Ignition switch on)
- NO → See diagnostic code. (See page BR-26)
- YES ↓

Is there battery voltage between ECU terminal STP and body ground when depressing brake pedal?
- NO → Open circuit in stop light switch and/or wire harness.
- YES ↓

Inspect actuator. (See page BR-52)

| | |
|---|---|
| 6 | • Does not light up when the transfer is in L position.<br>• When the transfer is in L position, the ABS operates. |

When the transfer is in L position, does the center differential lock indicator light come on?

NO → • Open circuit in center differential lock indicator switch or wire harness.
• Faulty center differential lock.

YES ↓

When the ECU connector is disconnected, is there continuity between the body and terminal EX1 on the vehicle wire harness side?

NO → Open circuit in wire harness.

YES ↓

Replace ECU.

# SPEED SENSOR AND DECELERATION SENSOR DIAGNOSIS SYSTEM

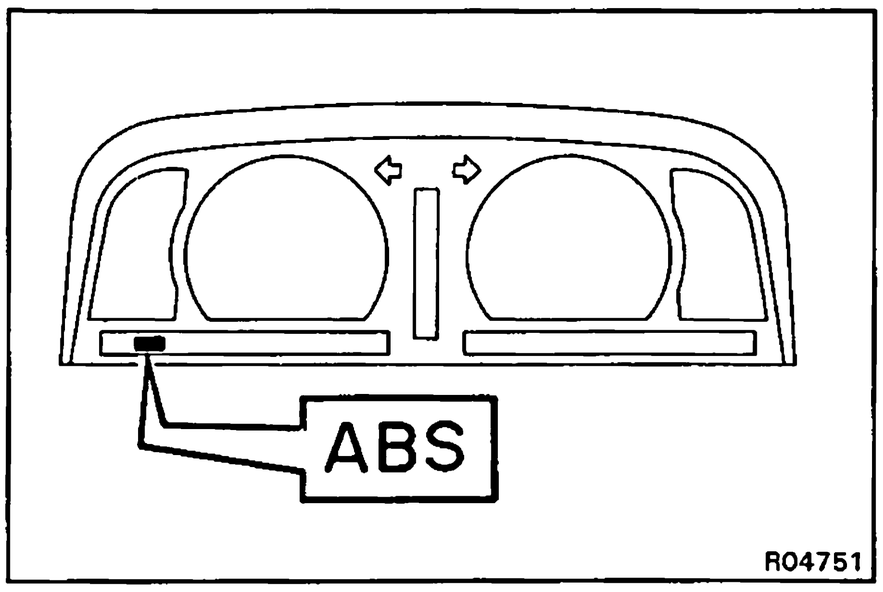
## DIAGNOSIS SYSTEM INSPECTION

### PRECAUTION

**While checking the speed sensor diagnosis system, ABS does not operate and brake system operates as normal brake system.**

### 1. INSPECT BATTERY VOLTAGE

Inspect that the battery voltage is about 12 V.



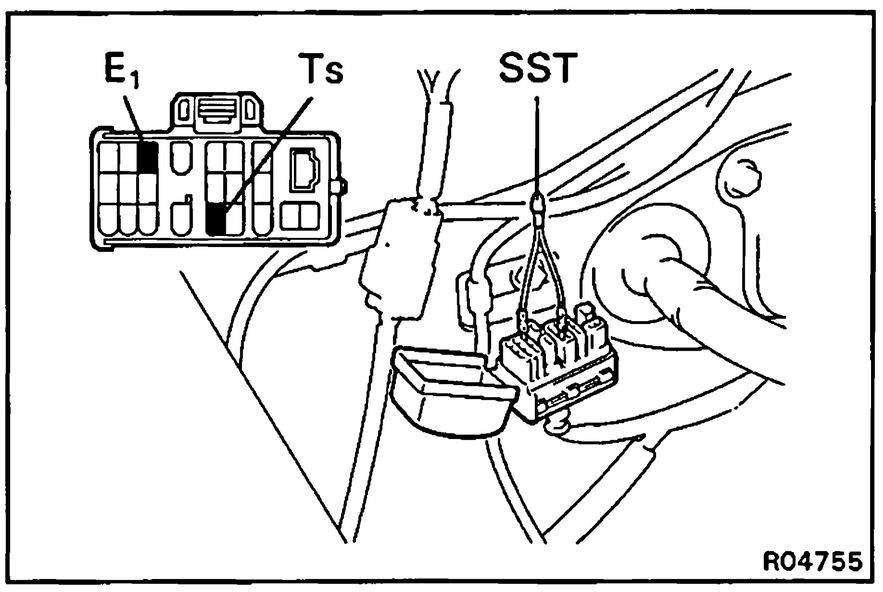

### 2. CHECK THAT WARNING LIGHT TURNS ON

(a) Turn the ignition switch on.

(b) Check that the "ABS" warning light turns on for 3 seconds.
If not, inspect and repair or replace the fuse, bulb and wire harness.

(c) Check that the "ABS" warning light turns off.

(d) Turn the ignition switch off.

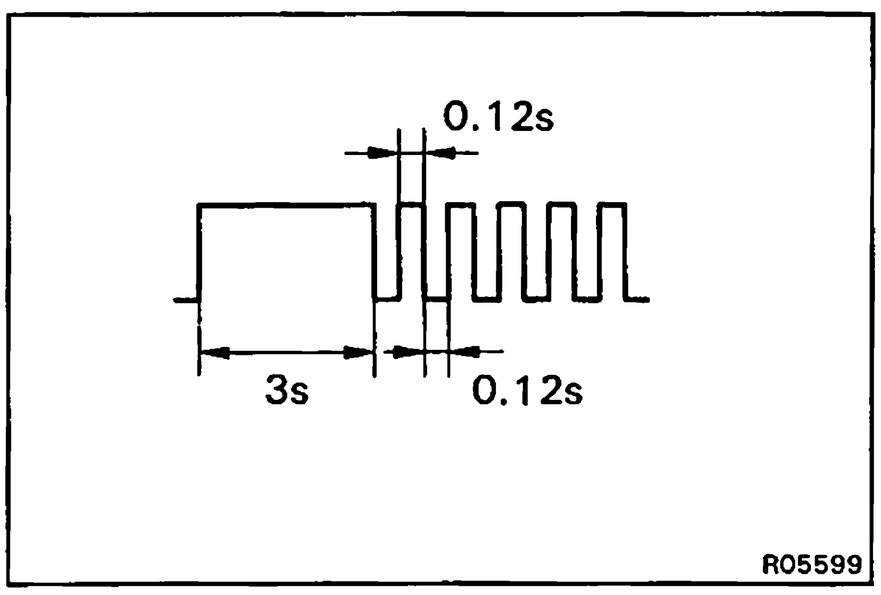



### 3. PERFORM FOLLOWING STEPS

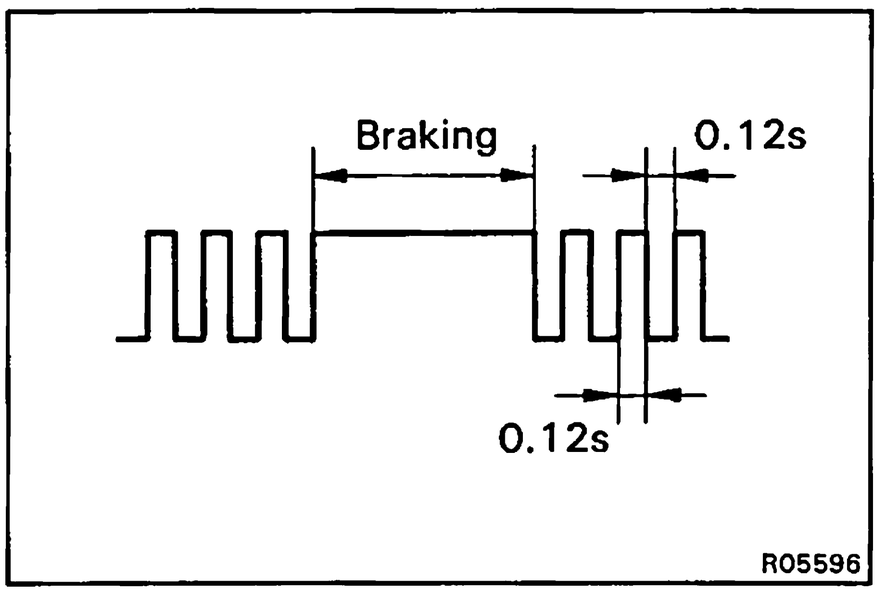
(a) Using SST, connect terminals Ts and $E_1$ of the check connector in engine room.

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(b) Start the engine.



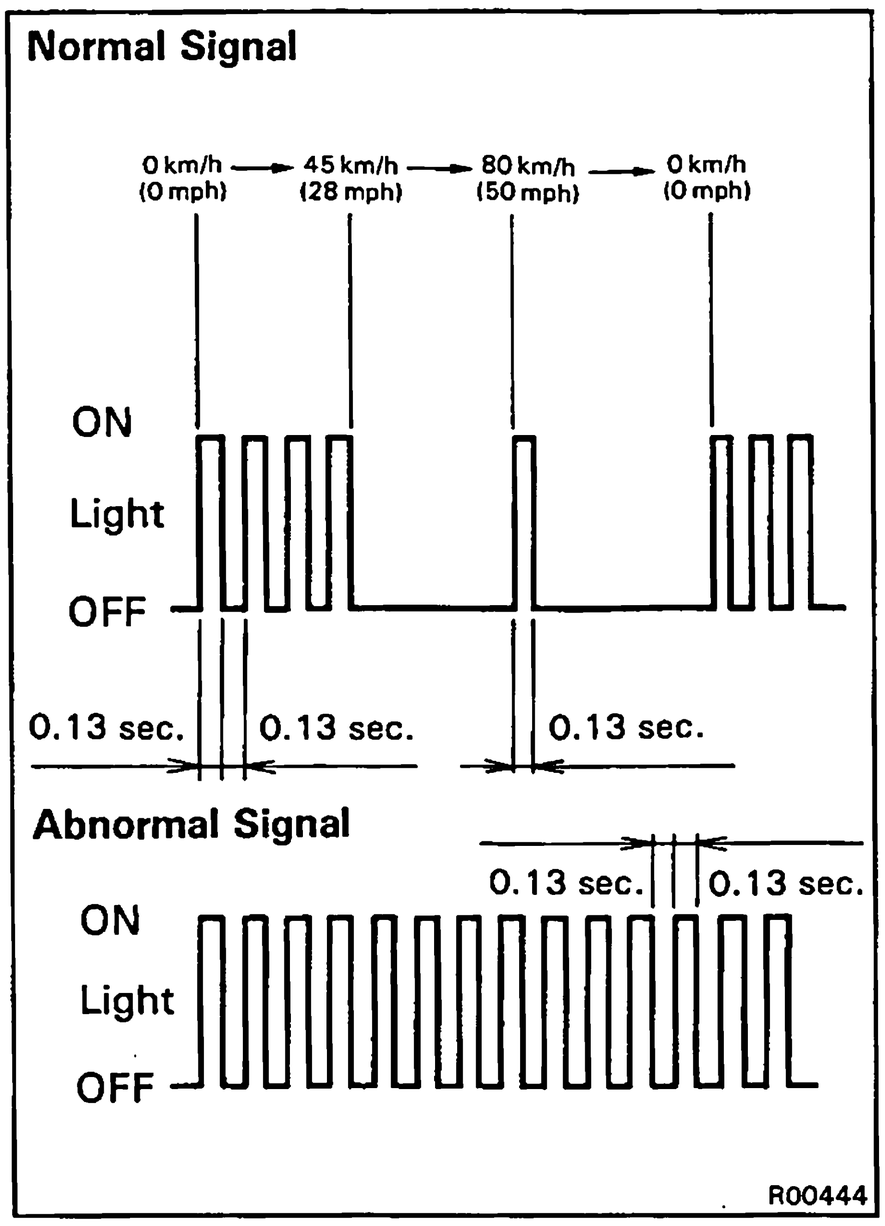

(c) Check that the warning light blinks about 4 times every 1 second as shown.




### 4. INSPECT DECELERATION SENSOR OPERATION

(a) Drive the vehicle straight ahead at about 20 km (12.4 mph) or more, depress the brake pedal a little strong.

(b) Check that the warning light turns on while braking.



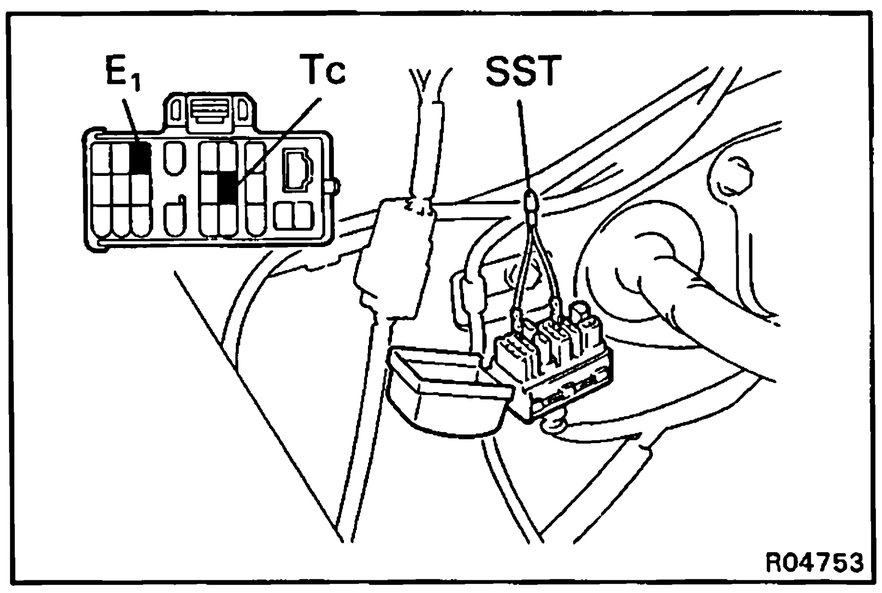

## 5. INSPECT SPEED SENSOR SIGNAL CHANGE

(a) Drive the faster than 45 km/h (28 mph) for several seconds.

(b) Check that the warning light signal.
If the warning light signal is abnormal, perform the steps 6 and 7.

HINT:

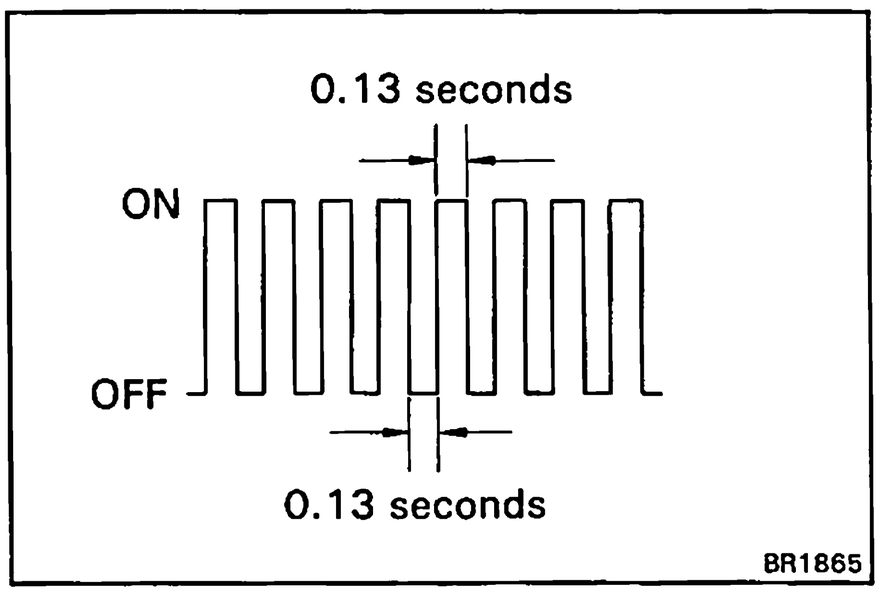
- If the deceleration sensor operation in step 4 does not occur, an abnormal signal is output.
- The high-speed check is possible at 80 km/h (50 mph) or highter.




## 6. READ DIAGNOSTIC CODE

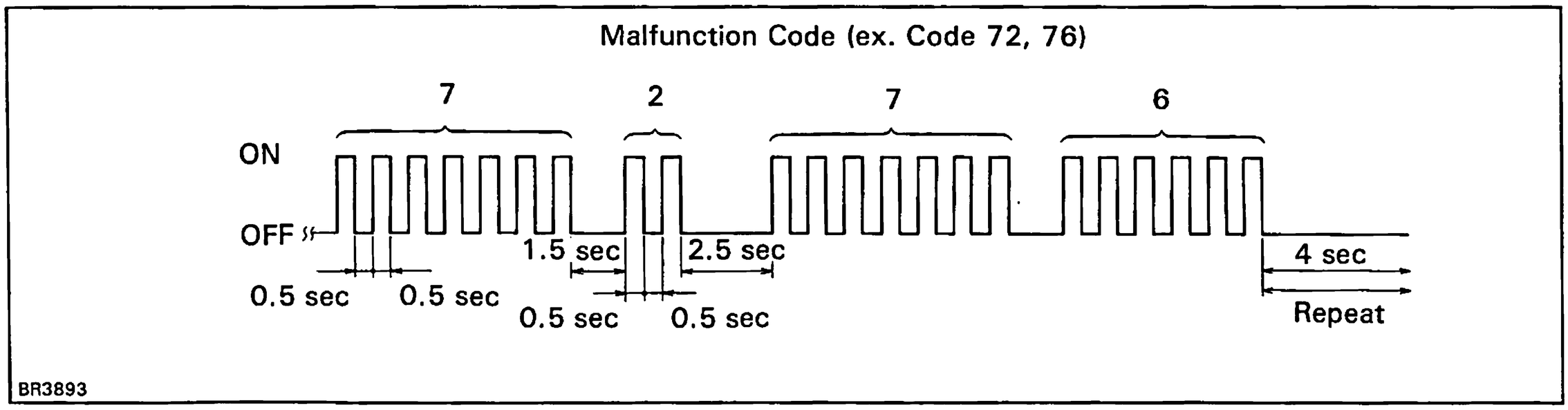
(a) Stop the vehicle, and warning light will being to blink.

(b) Using SST, connect the terminals Tc and $E_1$ of check connector.




(c) Read the number of blinks of the ABS warning light.
(See page BR-37)

HINT: If normal, the warning light blinks about 4 times every 1 second.
If two or more malfunctions are indicated at the same time, the smallest numbered code will be displayed first.



**7. REPAIR MALFUNCTIONING PARTS**

Repair or replace the malfunctioning parts.

HINT: When repairing or replacing parts, turn the ignition switch to OFF.

**8. REMOVE SST**

Remove the SST from terminals Tc, Ts and $E_1$ of the check connector.

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| Code No. | Light Pattern | Diagnosis | Malfunctioning Part |
|---|---|---|---|
| | ON / OFF  BR1807 | All speed sensors and sensor rotors are normal | |
| 71 |  BR1807 | Low voltage of front right speed sensor signal | • Front right speed sensor<br>• Sensor installation |
| 72 |  BR1807 | Low voltage of front left speed sensor signal | • Front left speed sensor<br>• Sensor installation |
| 73 |  BR1807 | Low voltage of rear right speed sensor signal | • Rear right speed sensor<br>• Sensor installation |
| 74 |  BR1807 | Low voltage of rear left speed sensor signal | • Rear left speed sensor<br>• Sensor installation |
| 75 |  BR1807 | Abnormal change of front right speed sensor signal | • Front right sensor rotor |
| 76 |  BR1807 | Abnormal change of front left speed sensor signal | • Front left sensor rotor |
| 77 |  BR1807 | Abnormal change of rear right speed sensor signal | • Rear right sensor rotor |
| 78 |  BR1807 | Abnormal change of rear left speed sensor signal | • Rear left sensor rotor |
| 79 |  BE3937 | Deceleration sensor is faulty | • Deceleration sensor<br>• Sensor installation |

# DECELERATION SENSOR OPERATION DIAGNOSIS SYSTEM

## PRECAUTION

While checking the deceleration sensor operating diagnosis system, the Anti-lock Brake System does not work and brake system works as normal brake system.

## DIAGNOSIS SYSTEM INSPECTION

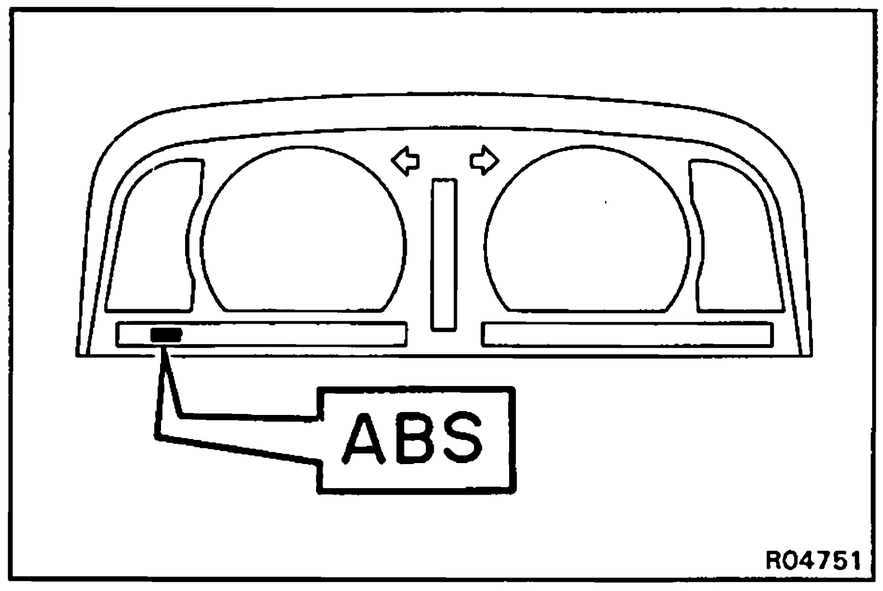
### 1. INSPECT BATTERY VOLTAGE

Inspect that the battery voltage is about 12 V.

### 2. CHECK THAT WARNING LIGHT TURNS ON

(a) Turn the ignition switch to ON.

(b) Check that the "ABS" warning light turns on for about 3 seconds.
If not, inspect and repair or replace the fuse, bulb and wire harness.



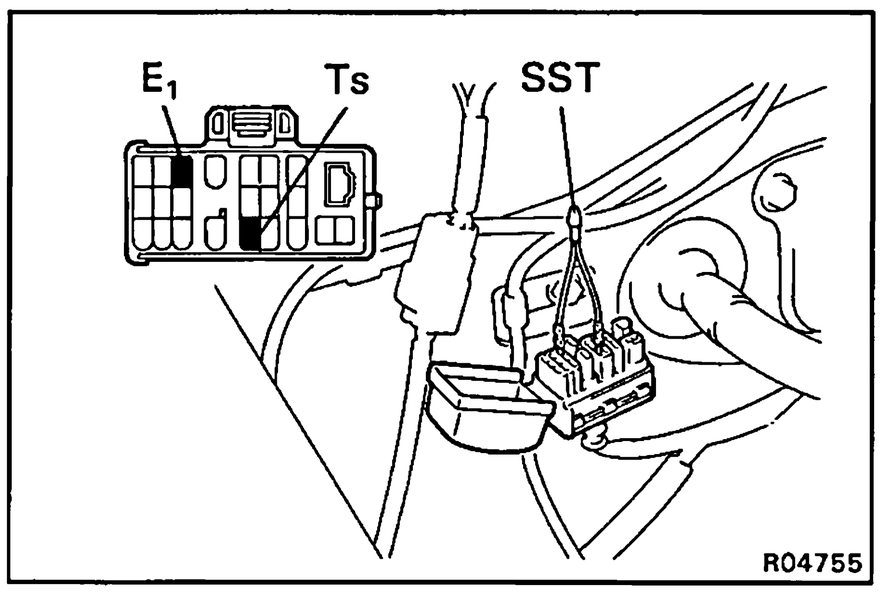

(c) Check that the "ABS" warning light turns off.

(d) Turn the ignition switch to OFF.

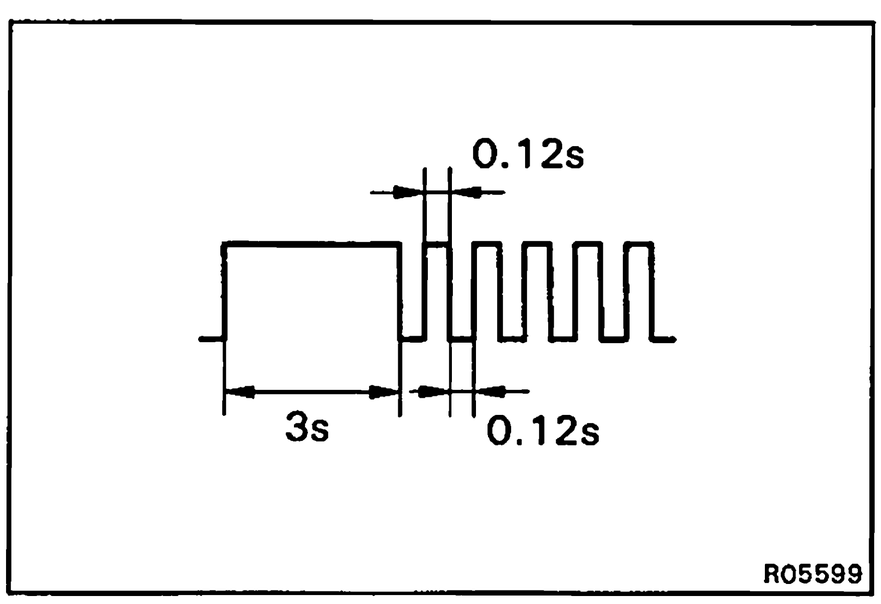
### 3. PERFORM FOLLOWING STEPS

(a) Using SST, connect the terminal Ts to $E_1$ of the check connector.

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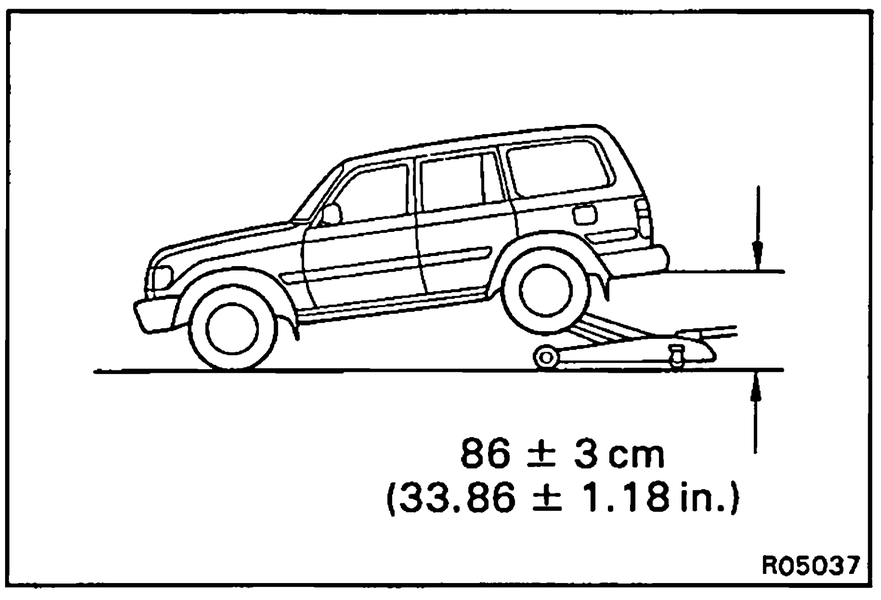

(b) Check that the warning light blinks about 4 time every 1 second when 3 seconds after the engine is started.




### 4. INSPECT SENSOR DETECTION POINT

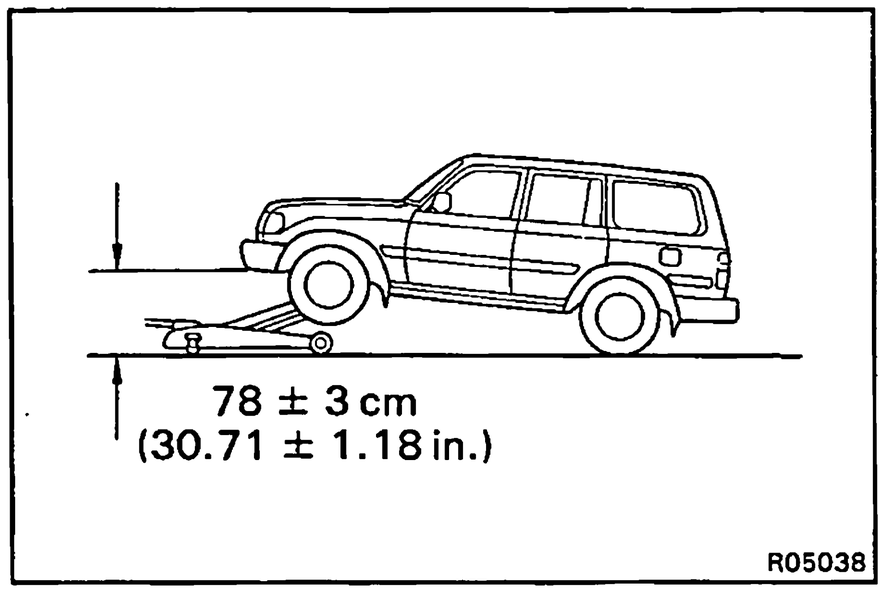
(a) Jack up the rear side of the vehicle slowly as shown.

HINT: When measuring the height, measure at the center of the lower body of the vehicle.




(b) Check that the warning light does not turn on.
If the warning light turns on, inspect the deceleration sensor installation. And if the sensor installation is OK, replace the deceleration sensor.

(c) Jack down the vehicle slowly.




(d) Jack up the front side of the vehicle slowly as shown.

HINT: When measuring the height, measure at the center of the lower body of the vehicle.

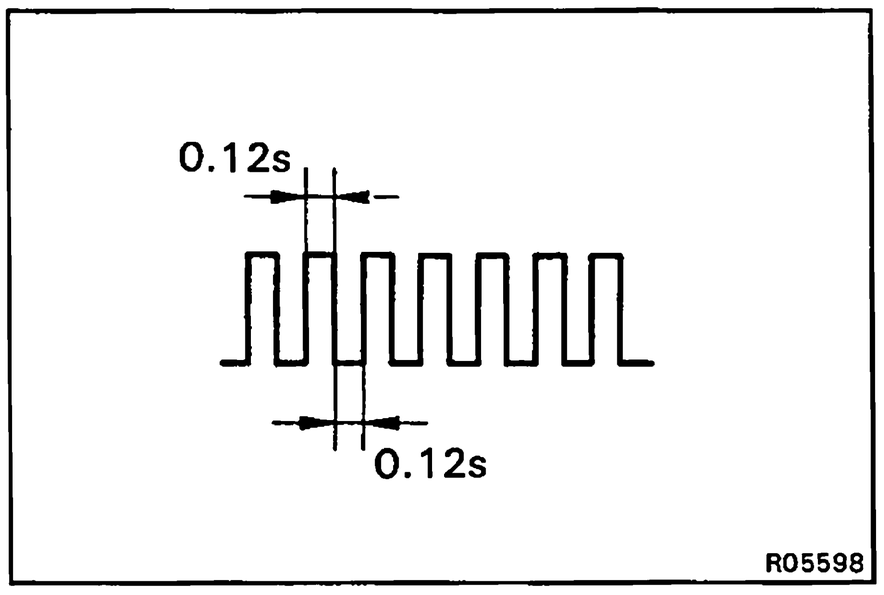
(e) Check that the warning light does not turn on.
If the warning light turns on, inspect the deceleration sensor installation. And if the sensor installation is OK, replace the deceleration sensor.

(f) Jack down the vehicle slowly.

## 5. INSPECT SENSOR OPERATION

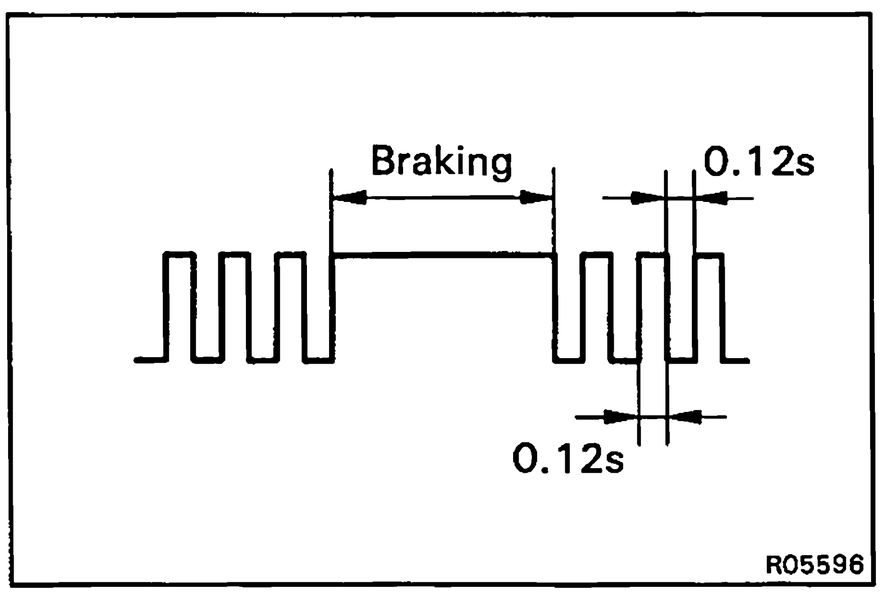
(a) Drive the vehicle straight ahead at about 20 km/h (12.4 mph) or more, lightly depress the brake pedal.

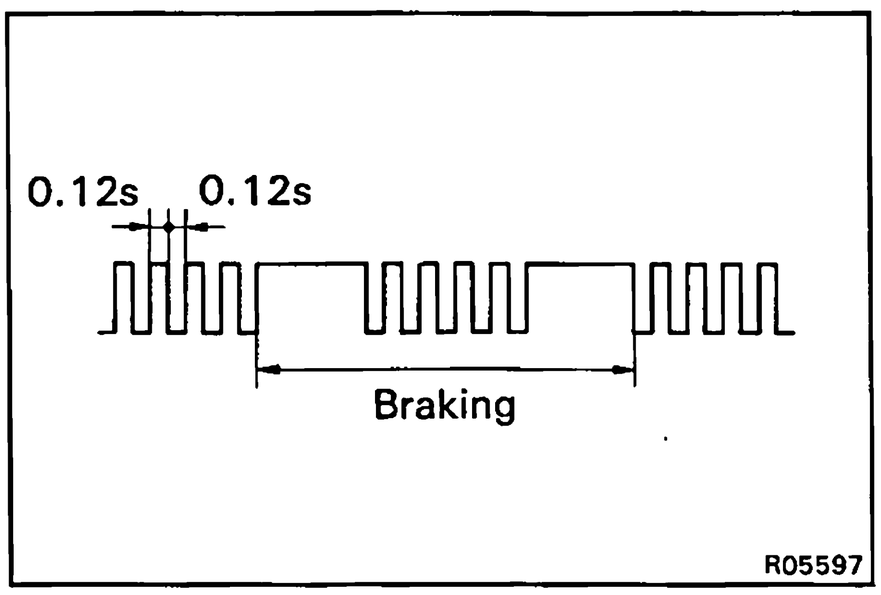
(b) Check that there is no change in the warning light pattern.




(c) Drive the vehicle straight ahead at about 20 km/h (12.4 mph) or more, depress the brake pedal a little strong.

(d) Check that the warning light turns on while braking.




(e) Drive the vehicle straight ahead at about 20 km/h (12.4 mph) or more, depress the brake pedal strongly.

(f) Check that the warning light pattern changes while braking as shown.
If the operation is not as specified, inspect the deceleration sensor installation. And if the sensor installation is OK, replace the deceleration sensor.

## 6. PERFORM FOLLOWING STEPS

(a) Stop the vehicle and turn the ignition switch to OFF.

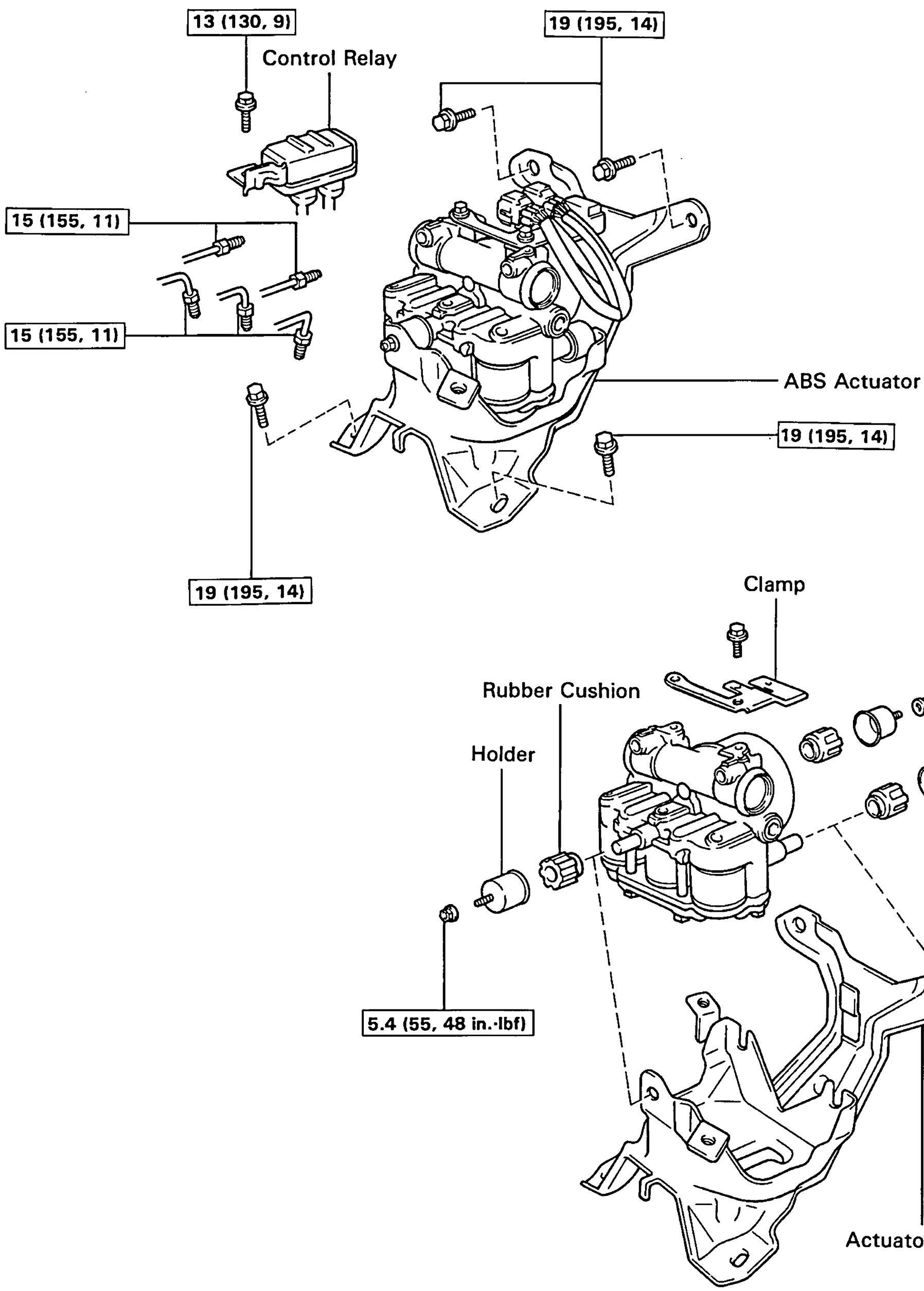
(b) Remove SST from the terminals Ts and $E_1$ of the check connector.

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# ABS ACTUATOR

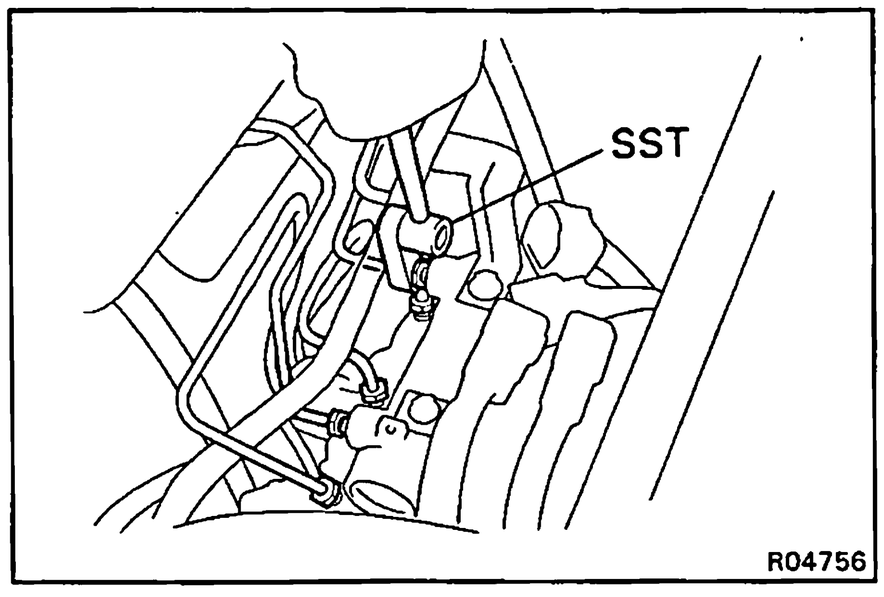
## ABS ACTUATOR REMOVAL AND INSTALLATION

Remove and install the parts as shown.




N·m (kgf·cm, ft·lbf) : Specified torque

R04770




# MAIN POINTS OF REMOVAL AND INSTALLATION

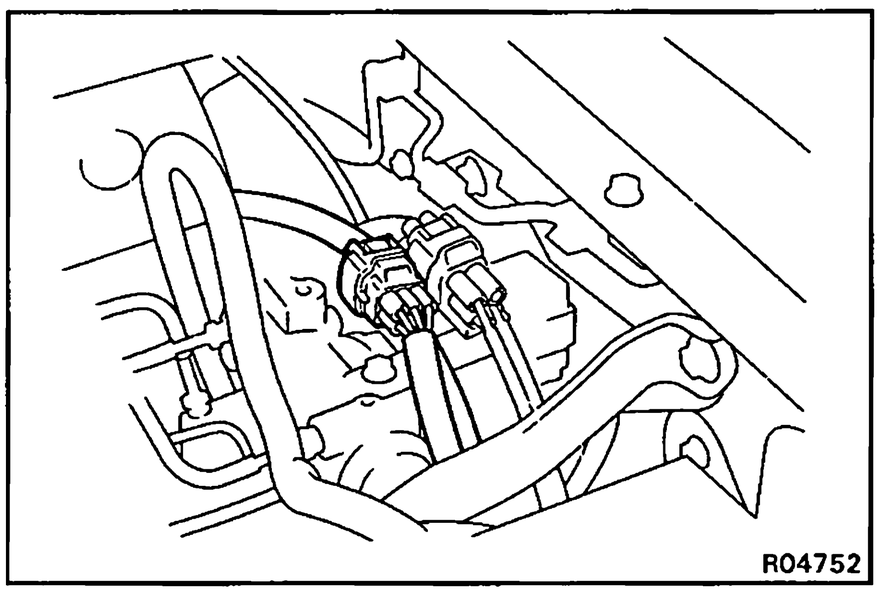
**1. DISCONENCT AND CONNECT BRAKE LINES**

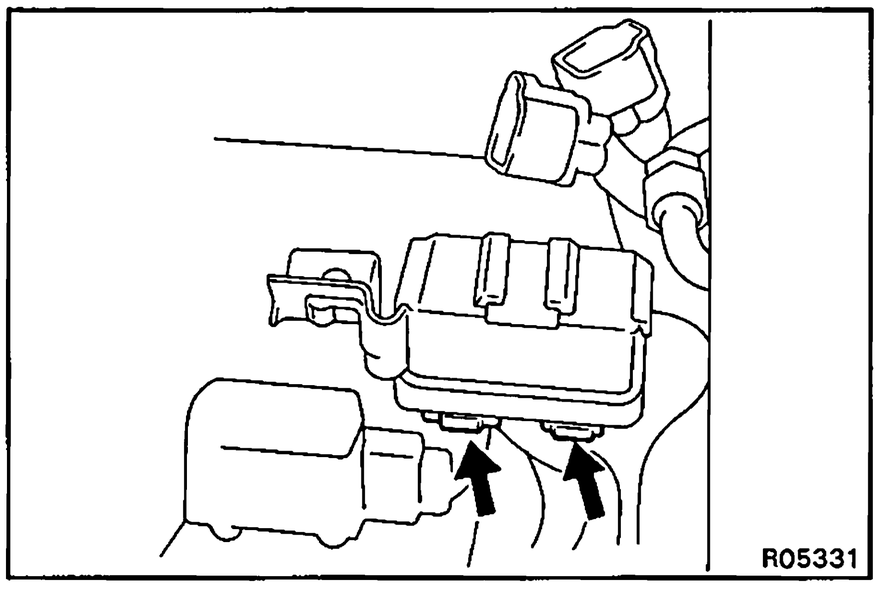
Using SST, disconnect and connect the brake lines from/to the ABS actuator.

SST 09023-00100

**Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)**

**2. BLEED BRAKE SYSTEM**
**(See pub No.RM184E, page BR-7)**


R04752


R05331

# ABS ACTUATOR INSPECTION

## 1. INSPECT BATTERY VOLTAGE

**Battery voltage:**
**10 – 14.5 V**

## 2. DISCONNECT CONNECTORS

(a) Disconnect the connector from the actuator.

(b) Remove the control relay from the actuator bracket.

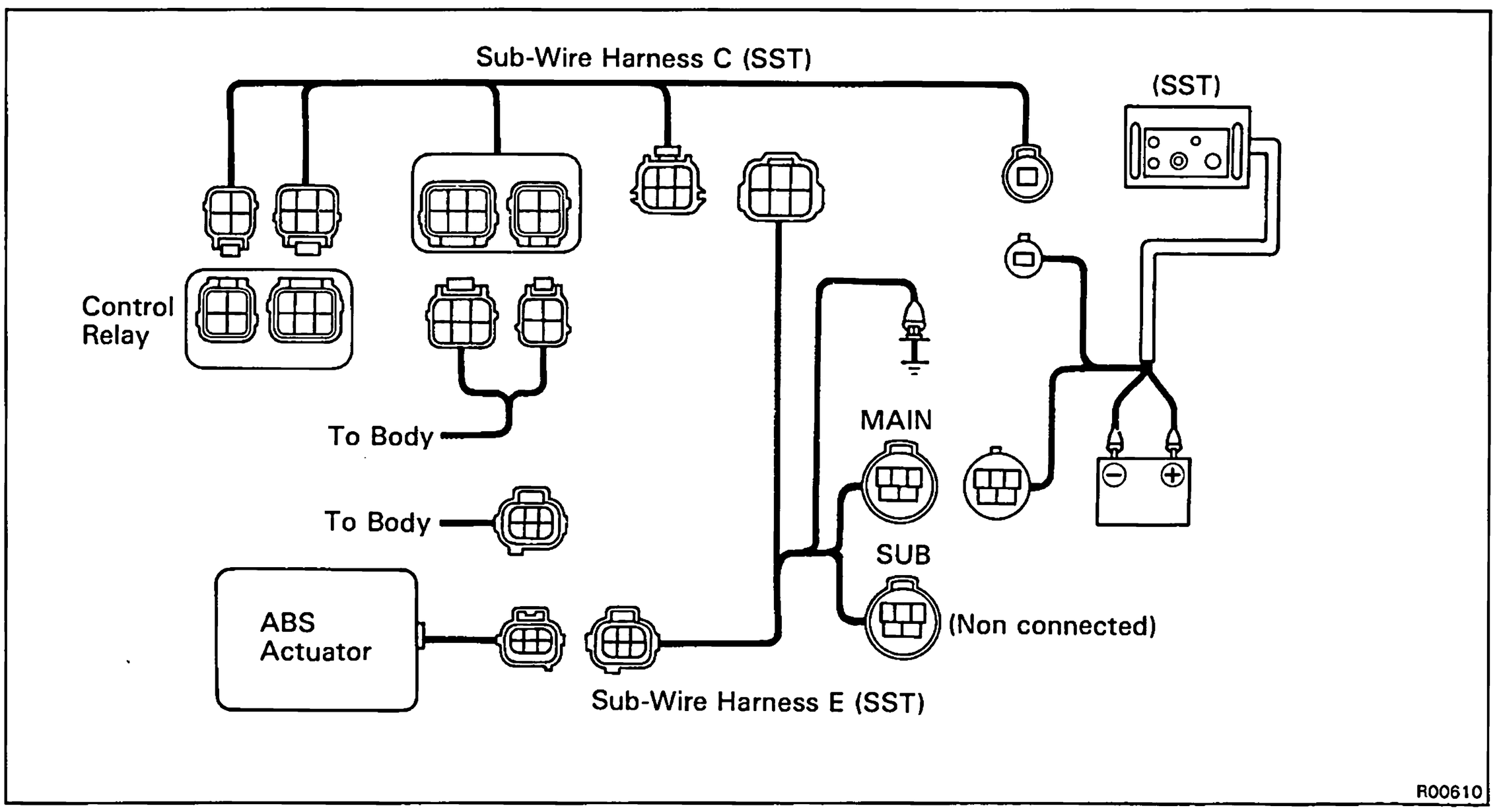
(c) Disconnect the two connectors from the control relay.

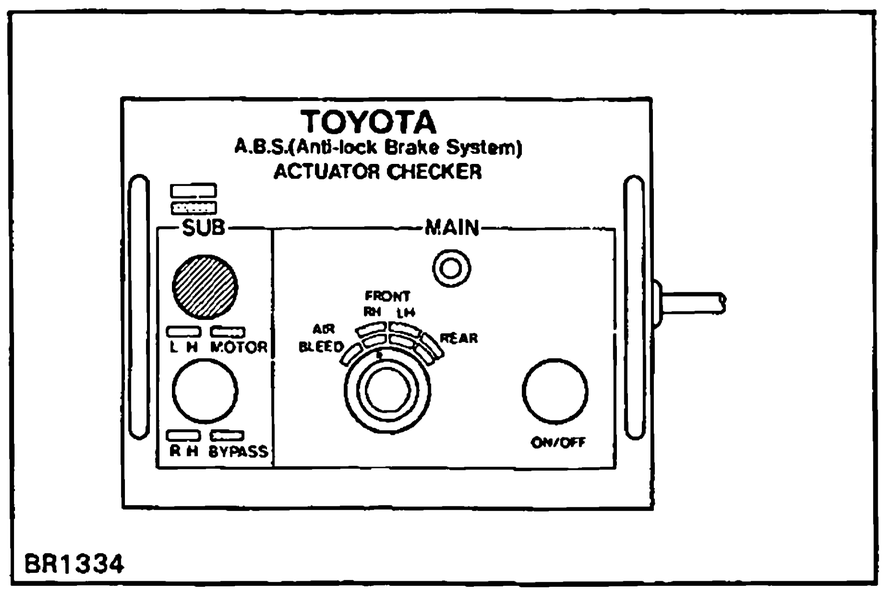
## 3. CONNECT ACTUATOR CHECKER (SST) TO ACTUATOR

(a) Connect the actuator checker (SST) to the actuator, control relay and body side wire harness through the sub-wire harness C and E (SST) as shown.

SST 09990-00150, 09990-00200, 09990-00210

(b) Connect the red cable of the checker to the battery positive (+) terminal and black cable to the negative (–) terminal. Connect the black cable of the sub-wire harness to the battery negative (–) terminal or body ground.





BR1334

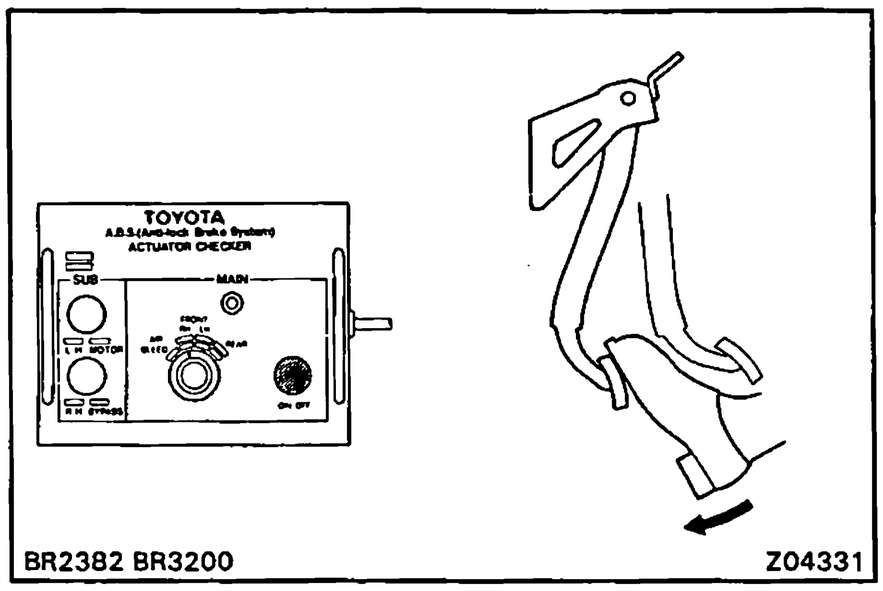
## 4. INSPECT BRAKE ACTUATOR OPERATION

(a) Start the engine, and run it at idle.

(b) Turn the selector switch of the actuator checker to "FRONT RH" position.

(c) Push and hold in the MOTOR SWITCH for a few seconds.

(d) Depress the brake pedal and hold it until the step (g) is completed.

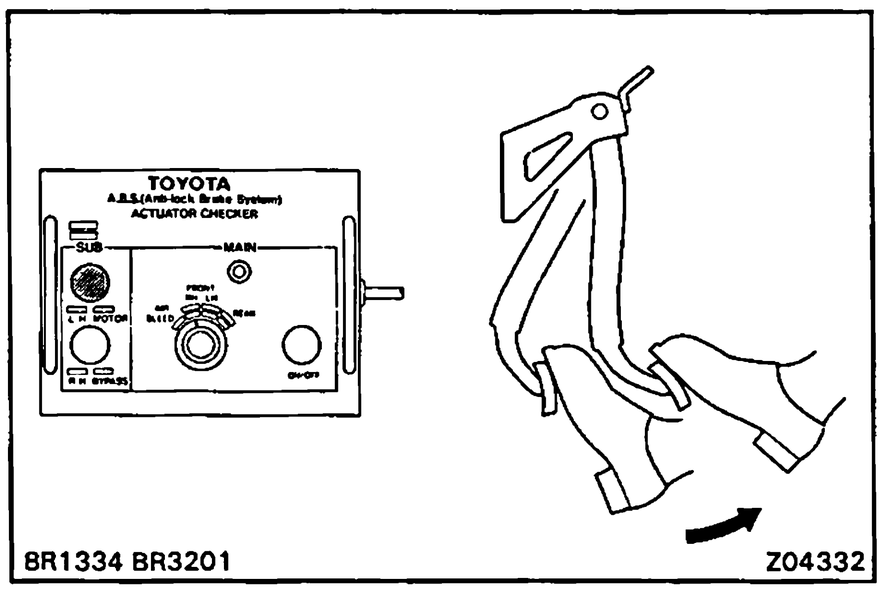


BR2382 BR3200 Z04331

(e) Push the POWER SWITCH, and check that the brake pedal does not go down.

**NOTICE: Do not keep the POWER SWITCH pushed down for more than 10 seconds.**

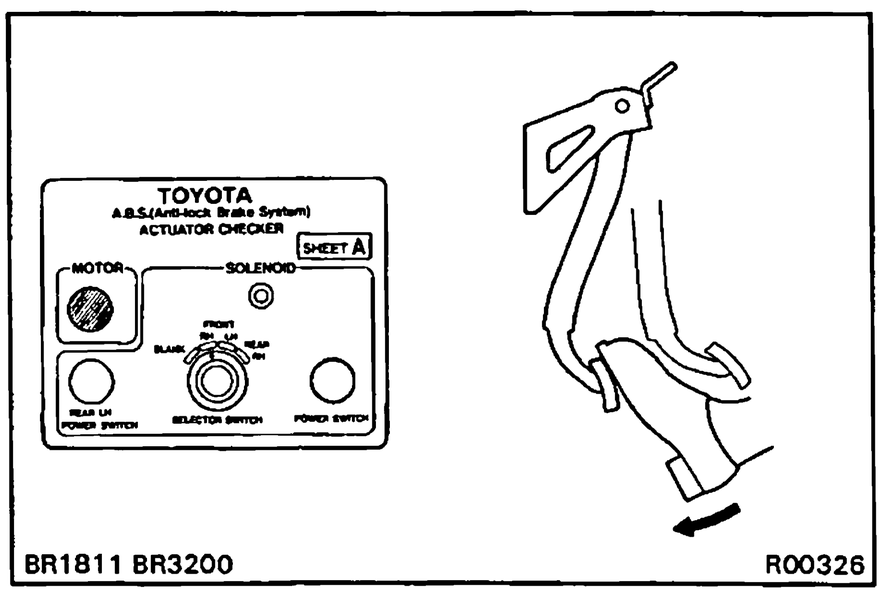
(f) Release the switch, and check that the pedal goes down.



BR1334 BR3201 Z04332

(g) Push and hold in the SUB MOTOR switch for a few seconds, and check that the pedal returns.

(h) Release the brake pedal.

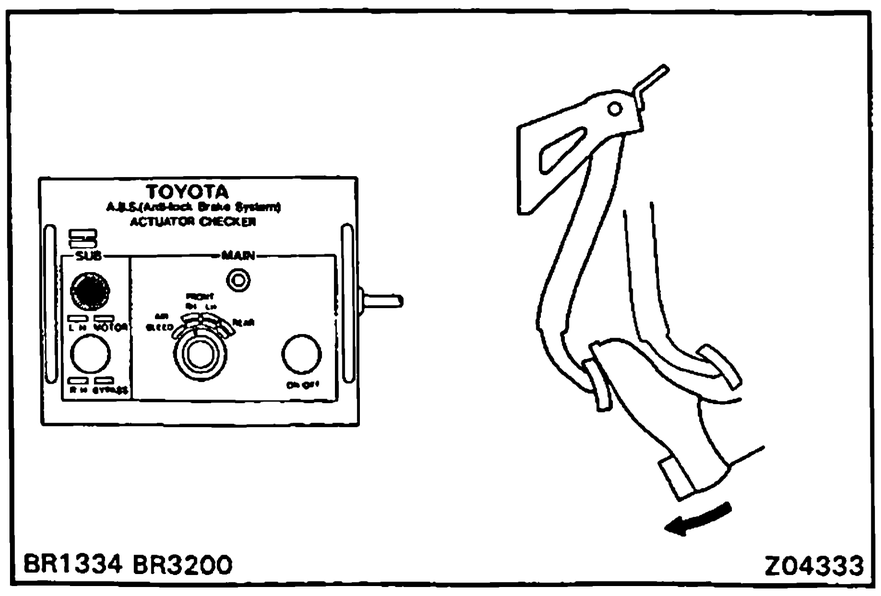


BR1811 BR3200 R00326

(i) Push and hold in the SUB MOTOR switch for a few seconds.

(j) Depress the brake pedal and hold it for about 15 seconds. As you hold the pedal down, push the MOTOR SWITCH for a few seconds. Check that the brake pedal does not pulsate.

(k) Release the brake pedal.



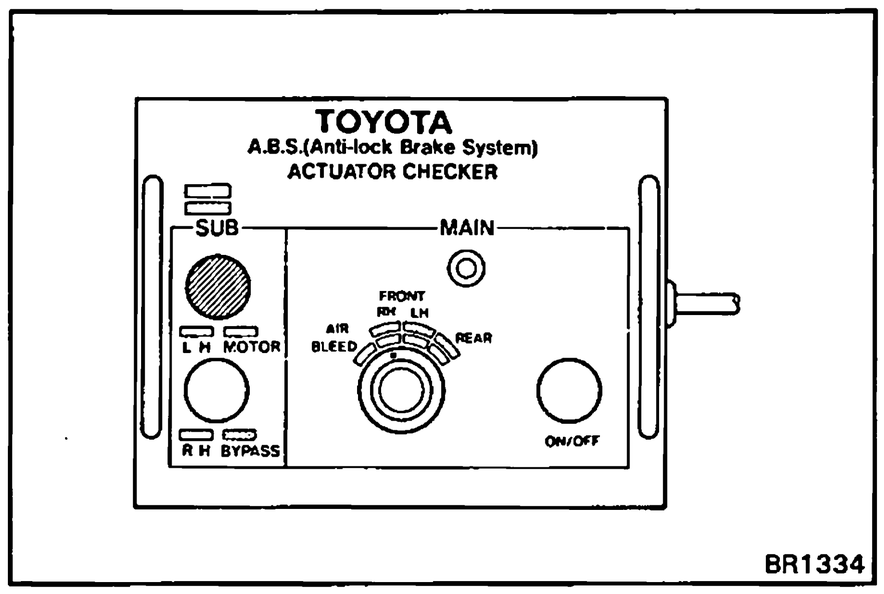
BR1334 BR3200 Z04333

## 5. INSPECT FOR OTHER WHEELS

(a) Turn the selector switch to "FRONT LH" position.

(b) Repeating (c) to (j) of the step 4, check the actuator operation similarly.

(c) Similarly, inspect "REAR" position.




**6. PUSH SUB MOTOR SWITCH**

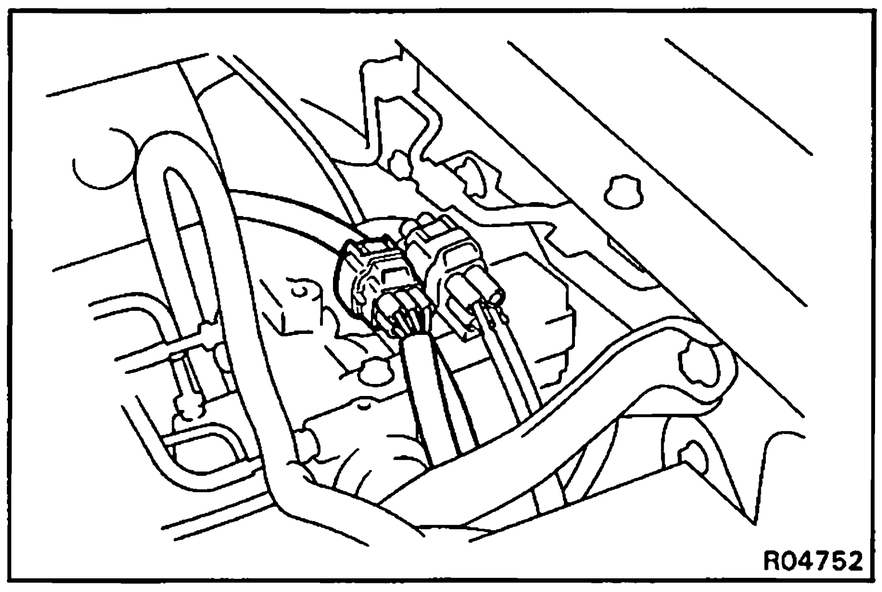
(a) Push and hold in the SUB MOTOR switch for a few seconds.

(b) Stop the engine.

**7. DISCONNECT ACTUATOR CHECKER (SST) FROM ACTUATOR**

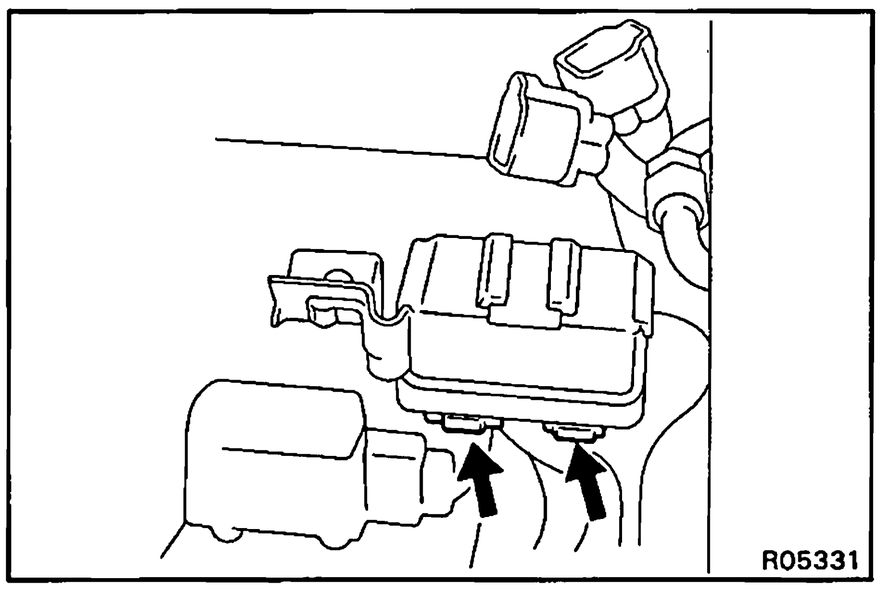
Disconnect the actuator checker (SST) and sub-wire harness (SST) from the actuator, control relay and body side wire harness.

SST 09990-00150, 09990-00200, 09990-00210




**8. CONNECT CONNECTORS**

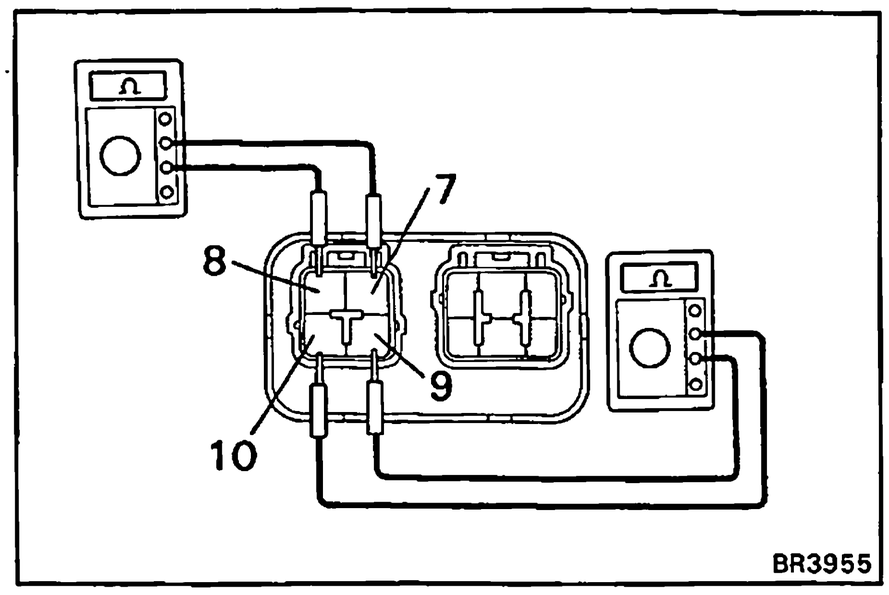
(a) Connect the two connectors to the control relay.




(b) Connect the connector to the actuator.

(c) Install the control relay to the actuator bracket.

**9. CLEAR DIAGNOSTIC CODES**
**(See page BR-27)**



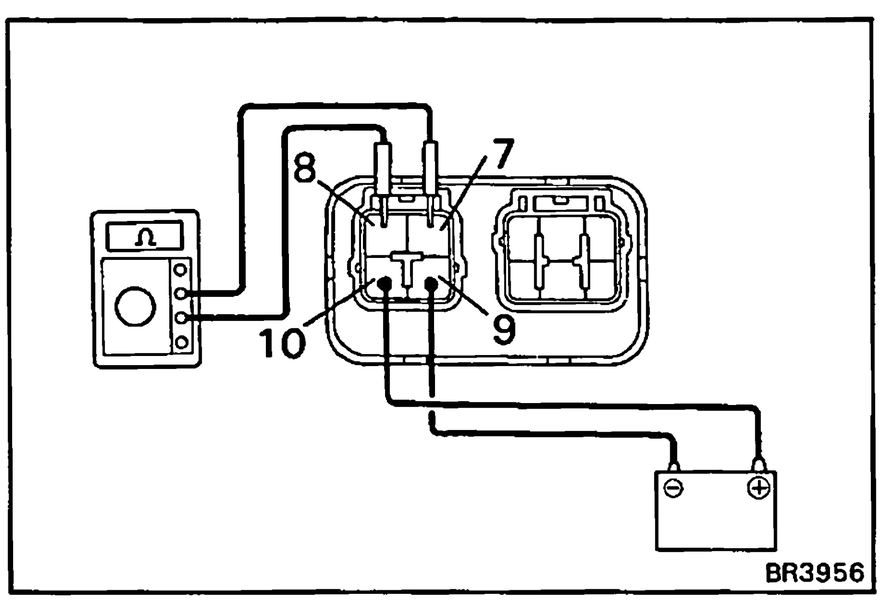

# CONTROL RELAY

## CONTROL RELAY INSPECTION

### 1. INSPECT CONTINUITY OF MOTOR RELAY CIRCUIT

(a) Check that there is continuity between terminals 9 and 10.

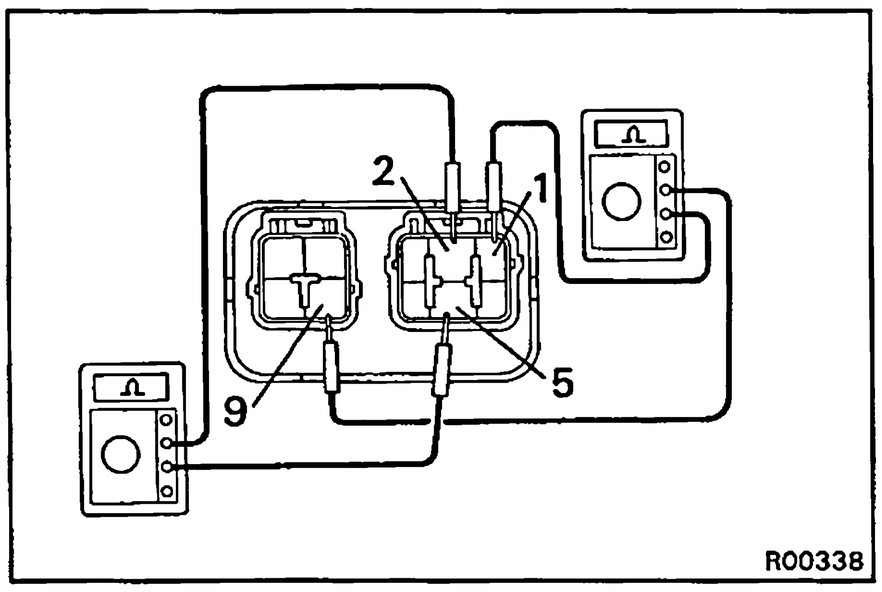
(b) Check that there is no continuity between terminals 7 and 8.
If continuity is not as specified, replace the relay.




### 2. INSPECT OPERATION OF MOTOR RELAY CIRCUIT

(a) Connect the positive (+) lead from the battery to terminal 10 and negative (−) lead to terminal 9.

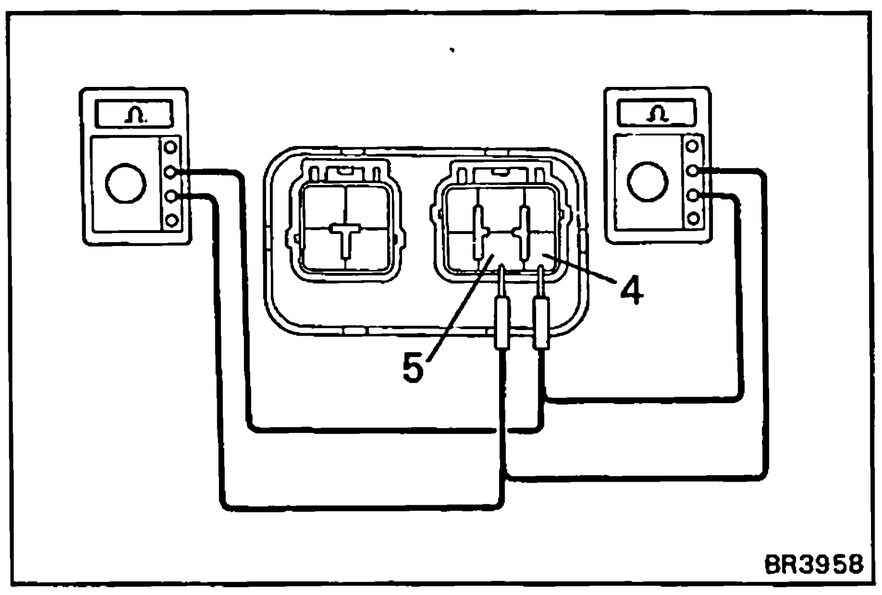
(b) Check that there is continuity between terminals 7 and 8.
If operation is not as specified, replace the relay.




### 3. INSPECT CONTINUITY OF SOLENOID RELAY CIRCUIT

(a) Check that there is continuity between terminals 1 and 9.

(b) Check that there is no continuity between terminals 2 and 5.

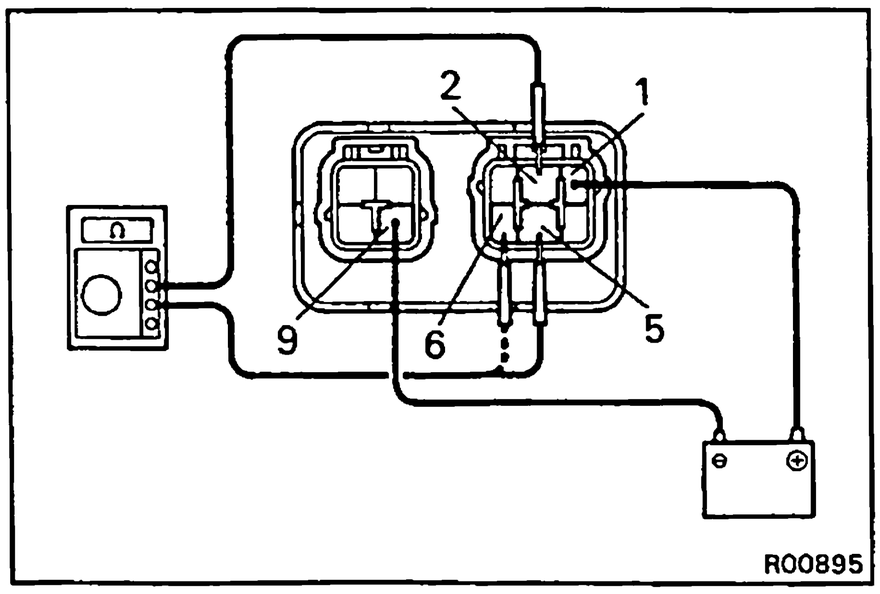



(c) Connect the positive lead from the ohmmeter to terminal 5 and connect negative lead to terminal 4.

(d) Check that there is continuity between terminals.

(e) Connect the two leads in reverse, and check that there is no continuity between terminals.
If continuity is not as specified, replace the relay.

HINT: For the different type ohmmeter, there is no continuity for step (d), and there is continuity for step (e).




### 4. INSPECT OPERATION OF SOLENOID RELAY CIRCUIT

(a) Connect the positive (+) lead from the battery to terminal 1 and negative (−) lead to terminal 9.

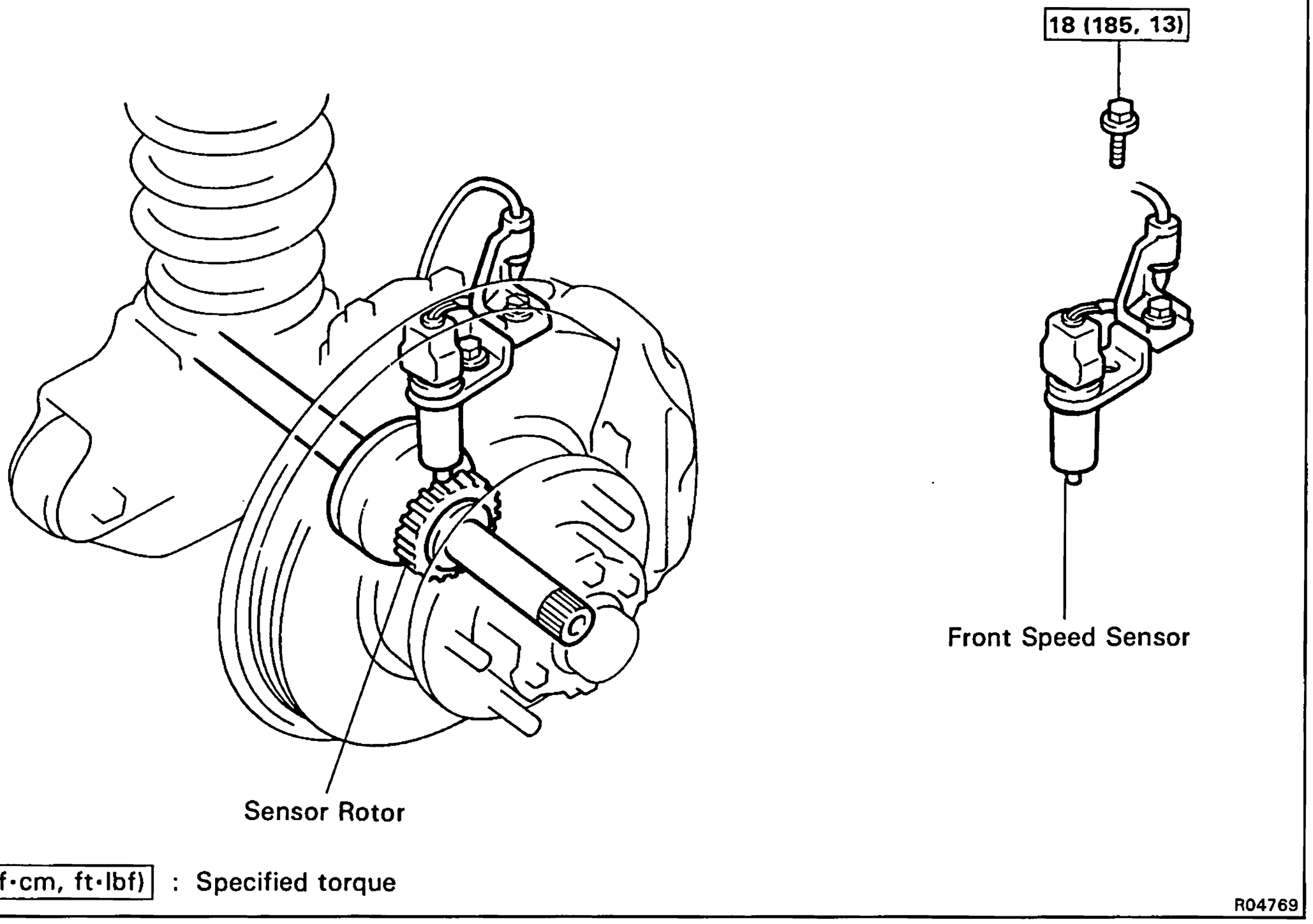
(b) Check that there is continuity between terminals 2 and 5.

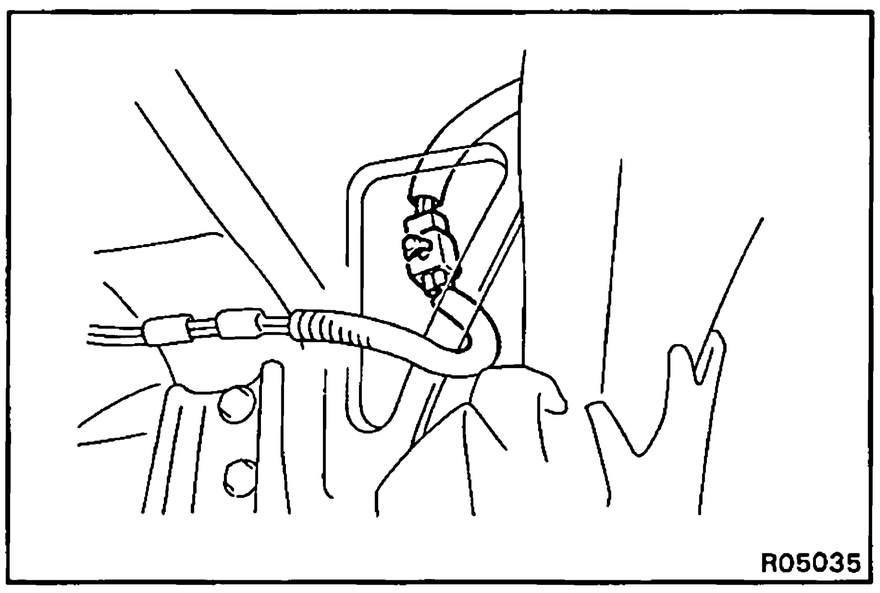
(c) Check that there is no continuity between terminals 2 and 6.

If operation is not as specified, repalce the relay.

# FRONT SPEED SENSOR

## COMPONENTS

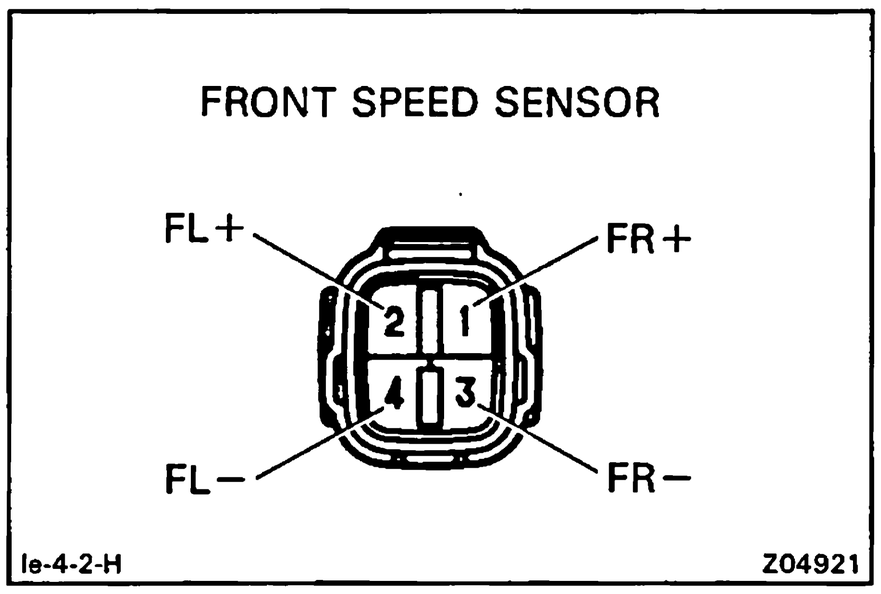



## FRONT SPEED SENSOR INSPECTION

1. **INSPECT SPEED SENSOR**

(a) Disconnect the speed sensor connector.

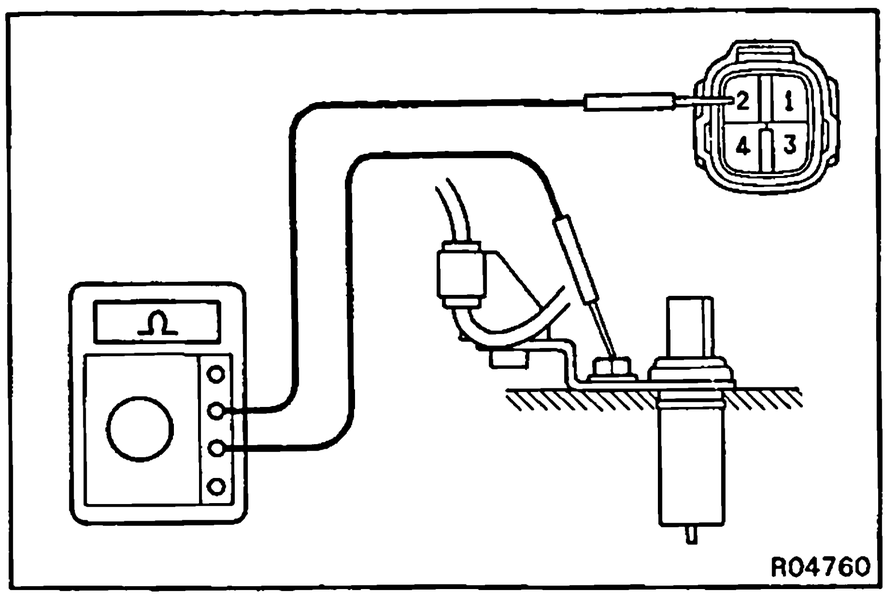



(b) Measure the resistance between terminals FR+, FR– and FL+, FL–.

**Resistance:**

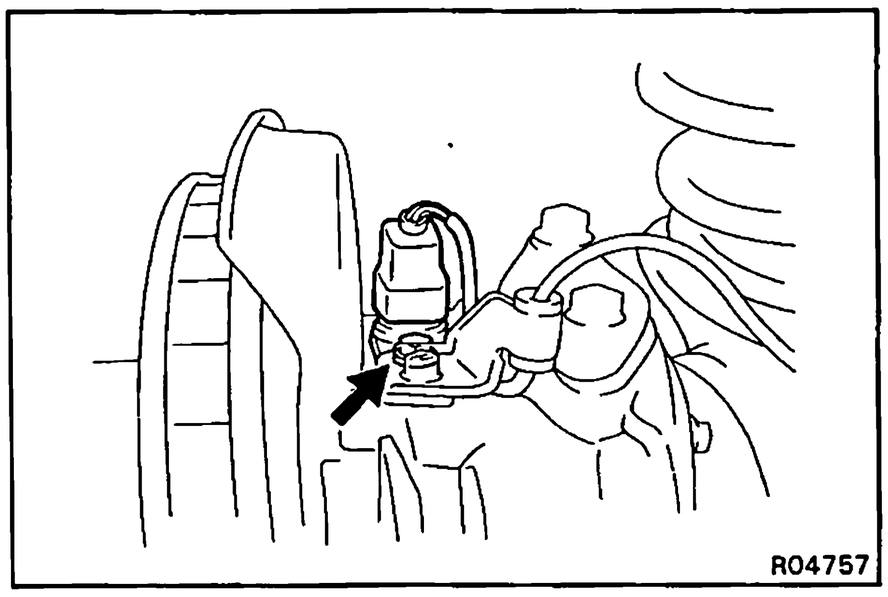
**0.87 – 1.27 kΩ**

If resistance value is not as specified, replace the sensor.




(c) Check that there is no continuity between each terminal and sensor body.
If there is continuity, replace the sensor.

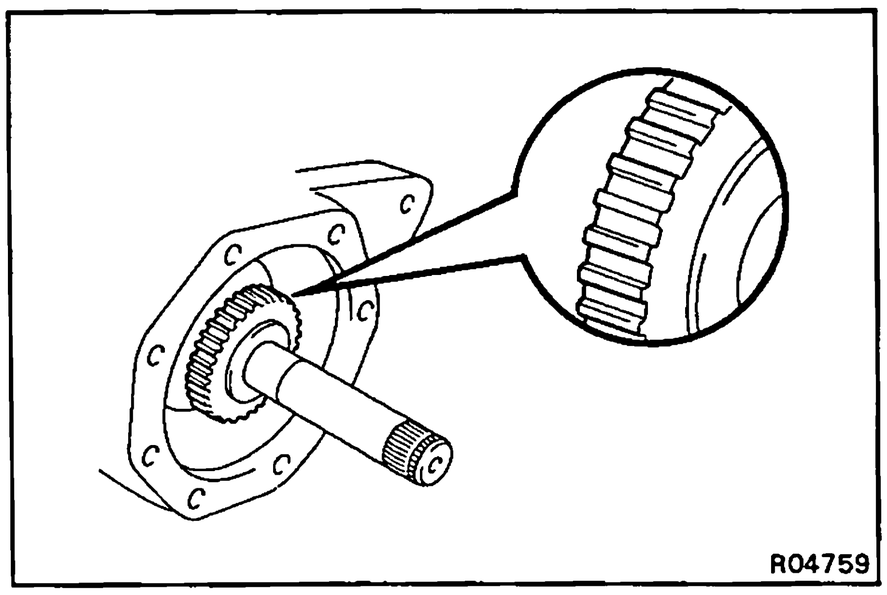
(d) Connect the speed sensor connector.




## 2. INSPECT SENSOR INSTALLATION

Check that the sensor installation bolt is tightened properly. If not, tighten the bolt.

**Torque: 18 N·m (184 kgf·cm, 13 ft·lbf)**

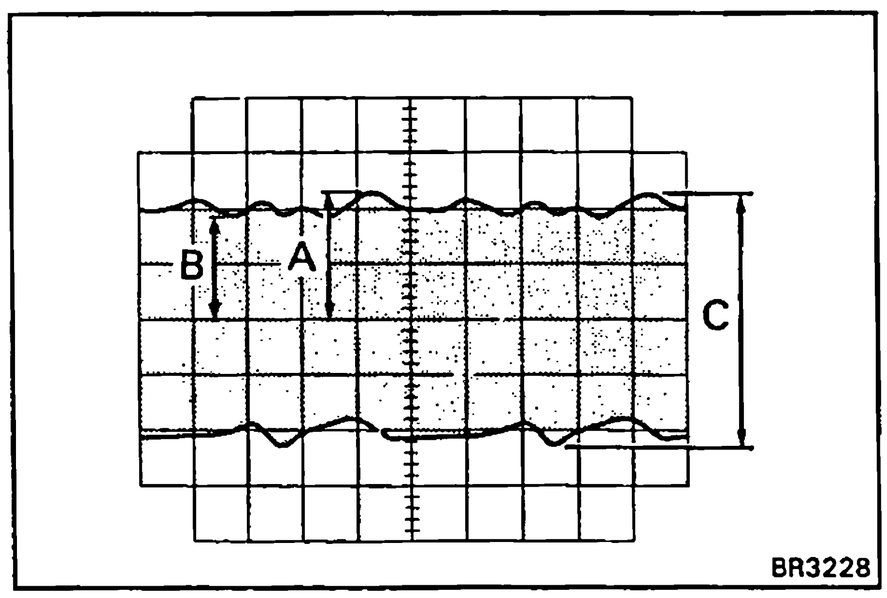



## 3. VISUALLY INSPECT SENSOR ROTOR SERRATIONS

(a) Remove the axle hub with disc.
(See pub No. RM184E, page SA-16)

(b) Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.

(c) Install the axle hub with disc.
(See pub No. RM184E, page SA-19)




# FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

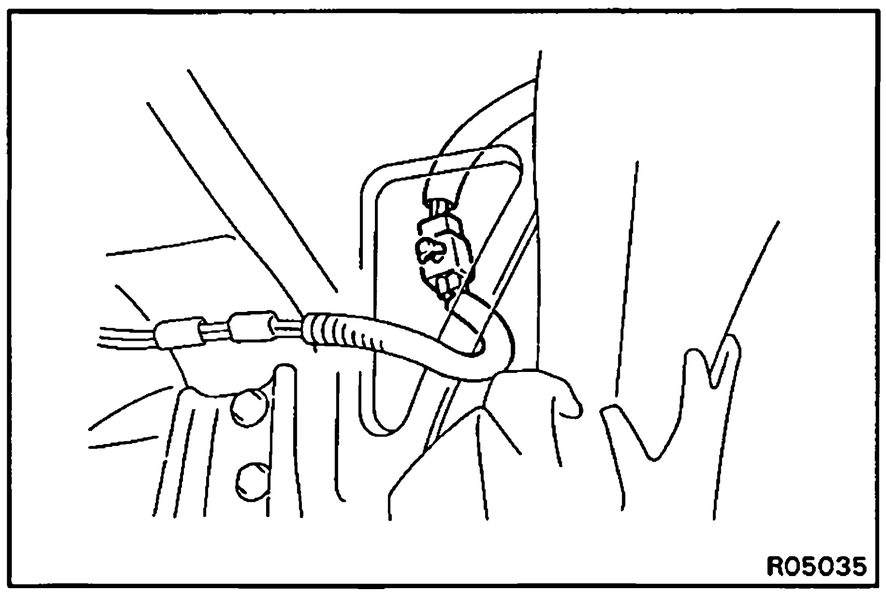
## INSPECT FRONT SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE

(a) Connect an oscilloscope to the speed sensor connector.

(b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.

(c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.

(d) Check that B is 50 % or more of A.
If not as specified, replace the sensor rotor.

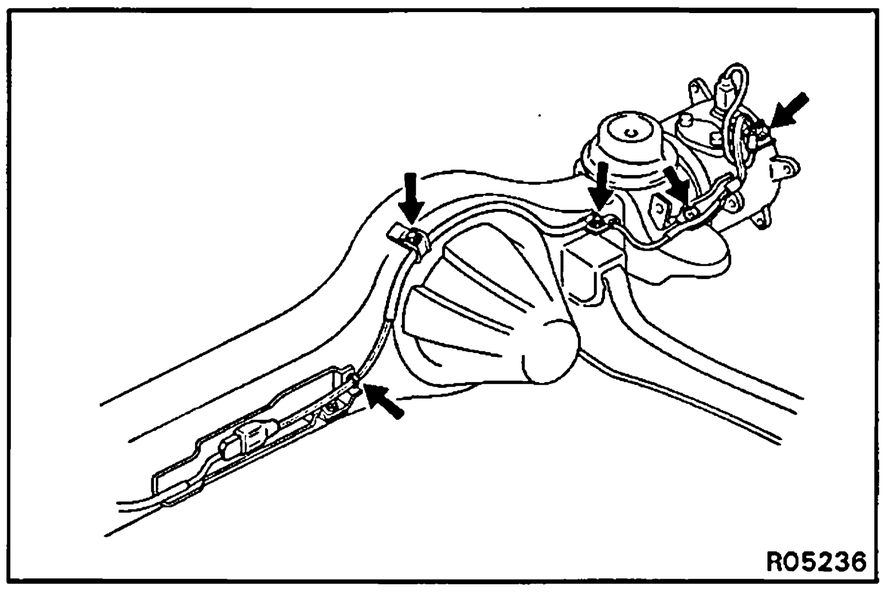



# FRONT SPEED SENSOR REMOVAL

HINT: When replacing the sensor or sensor harness, replace the sensor and sensor harness together as a set.

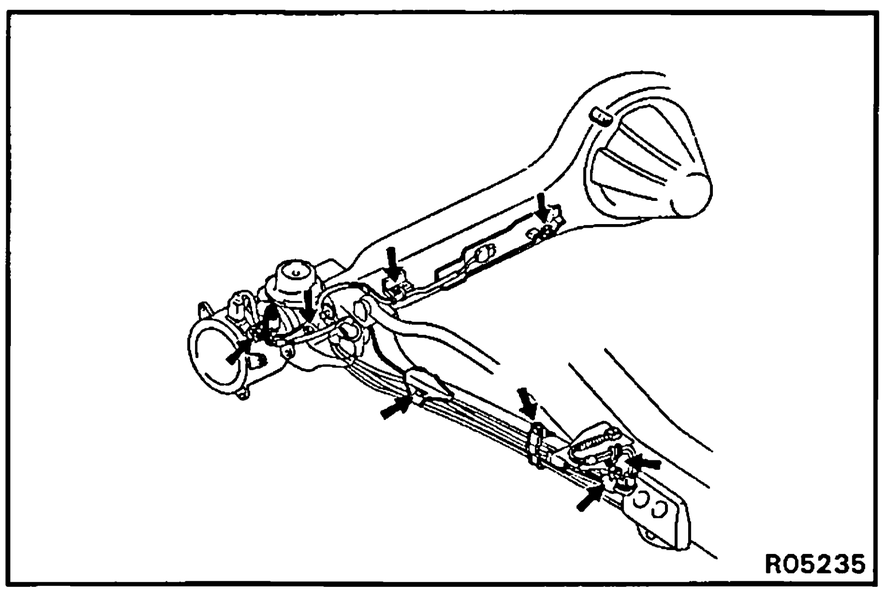
Disconnect the speed sensor connector.

**1. DISCONNECT SPEED SENSOR CONNECTOR**

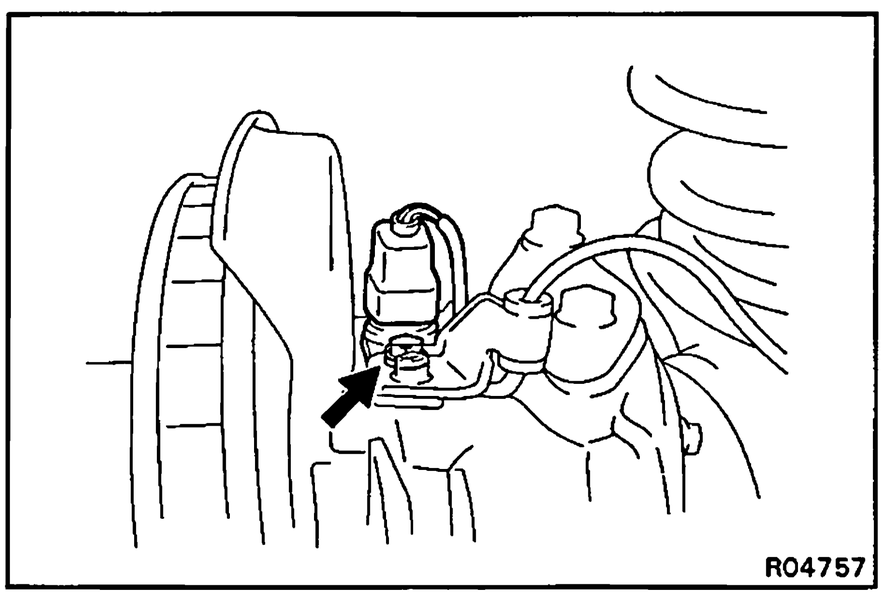



**2. REMOVE SPEED SENSOR**

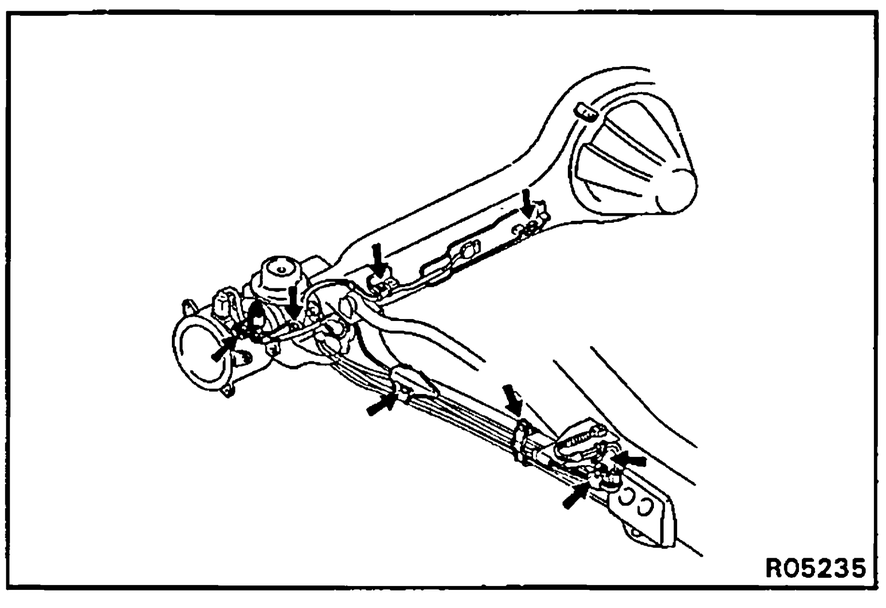
(a) Remove the four clamp bolts holding the sensor harness RH from the axle housing.




(b) Remove the eight clamp bolts holding the sensor harness LH from the axle housing and leading arm.




(c) Remove the speed sensor LH and RH from the steering knuckle.

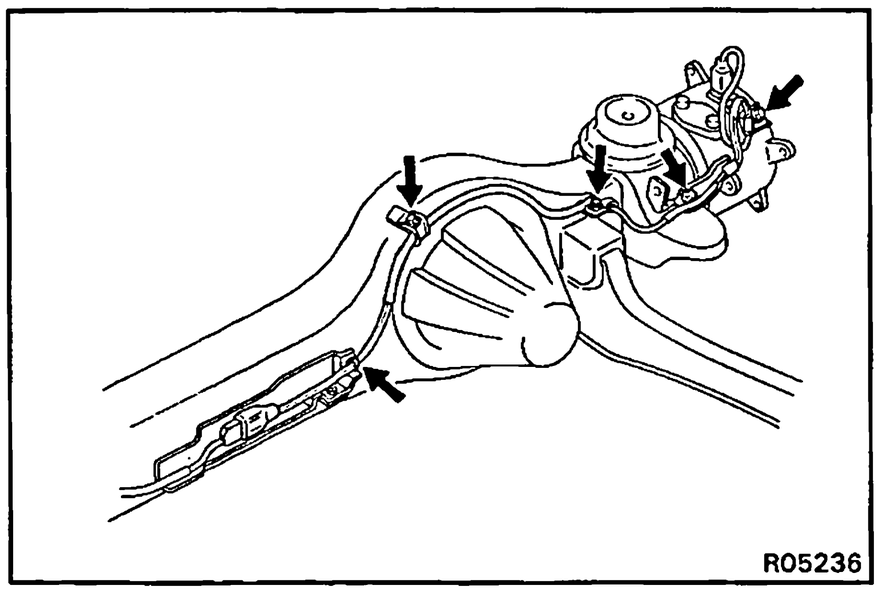



# FRONT SPEED SENSOR INSTALLATION

**1. INSTALL SPEED SENSOR WIRE HARNESS**

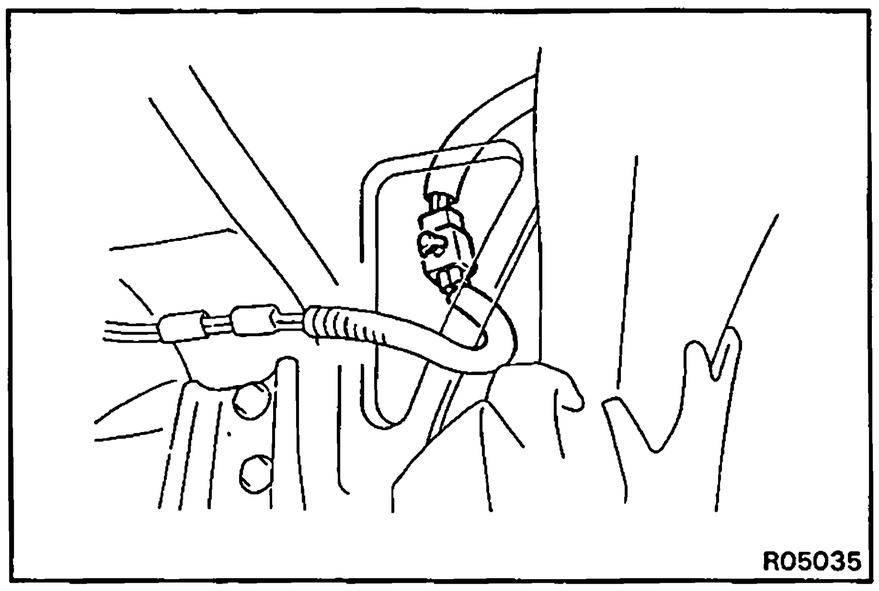
(a) Install the sensor harness LH with the clamps and bolts in place.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**



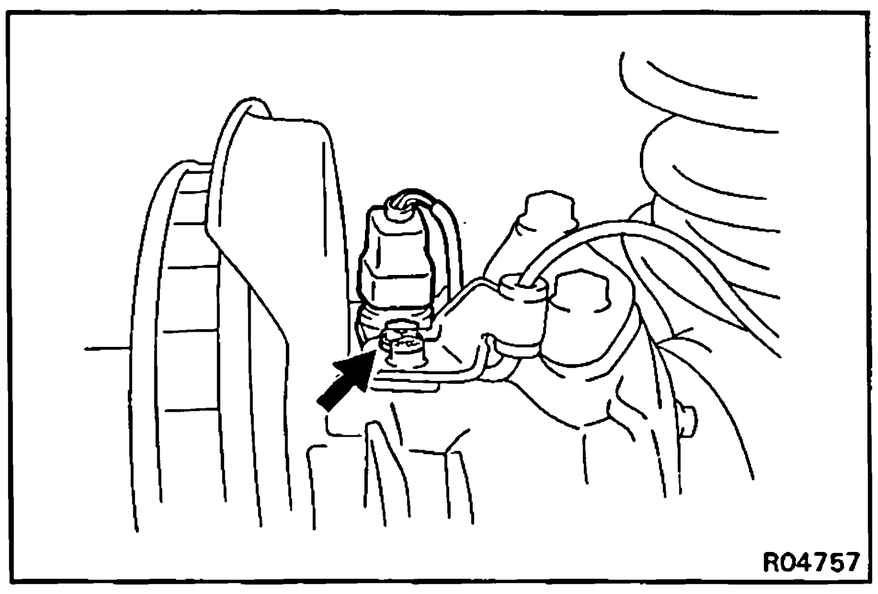

(b) Install the sensor harness RH with the clamps and bolts in place.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**




(c) Connect the speed sensor connector.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**



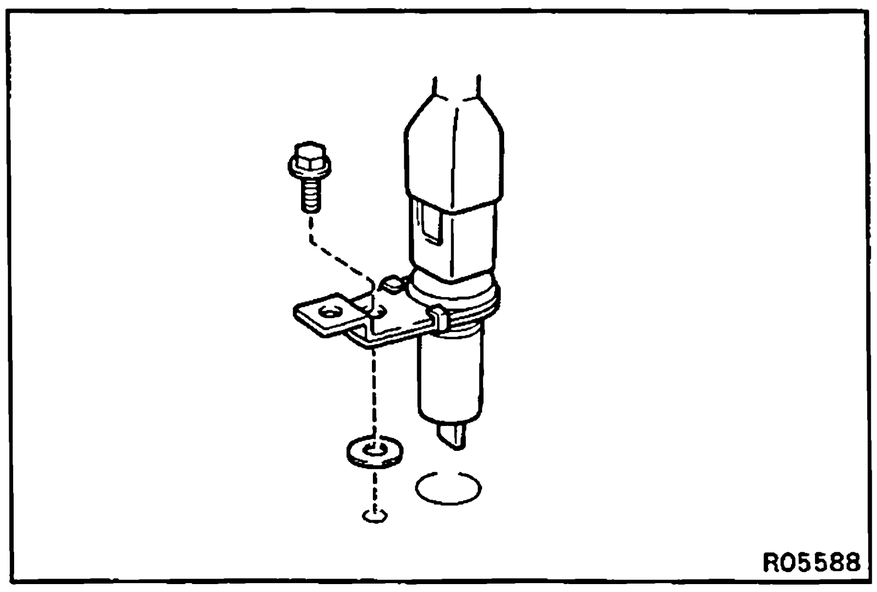

**2. INSTALL SPEED SENSOR**

HINT: When replacing the sensor, adjust the air gap.

(a) Install the speed sensor LH and RH to the steering knuckle.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**

(b) Connect the connector.



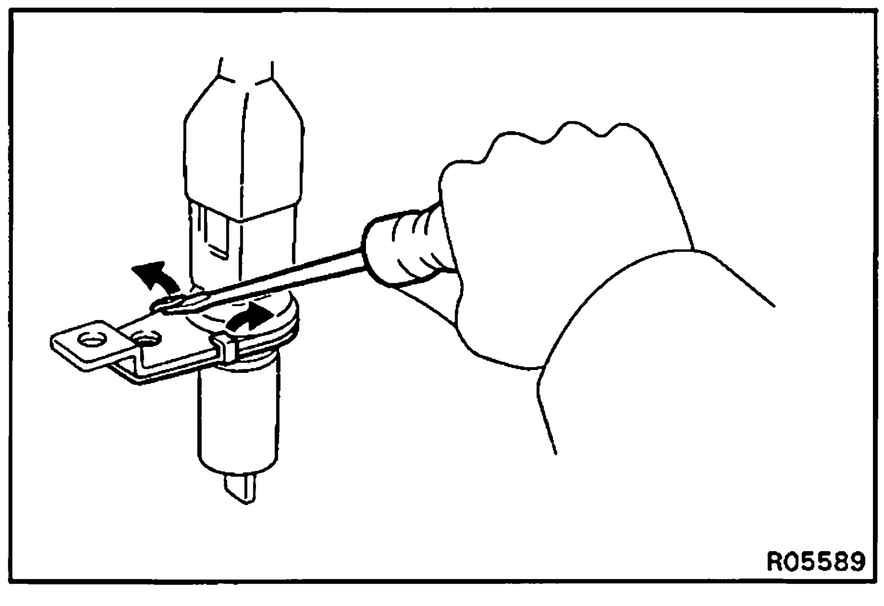

## FRONT SPEED SENSOR AIR GAP ADJUSTMENT

**FRONT SPEED SENSOR AIR GAP ADJUSTMENT**

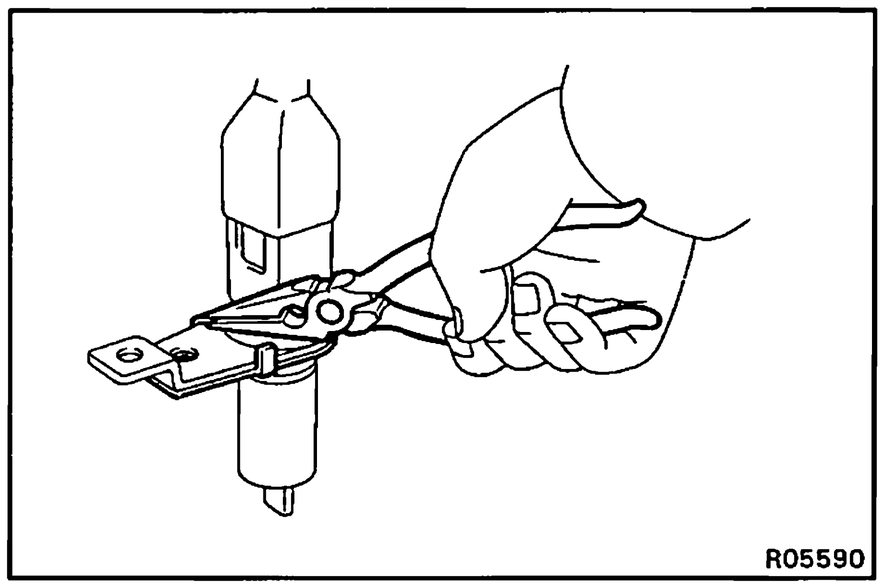
(a) Install the speed sensor and 0.2 mm spacer to the steering knuckle.

(b) Try speed sensor and deceleration sensor diagnosis system.

(c) If diagnosis code 71 or 72 is not displayed, remove the 0.2 mm spacer and install the speed sensor to the steering knuckle.


R05589

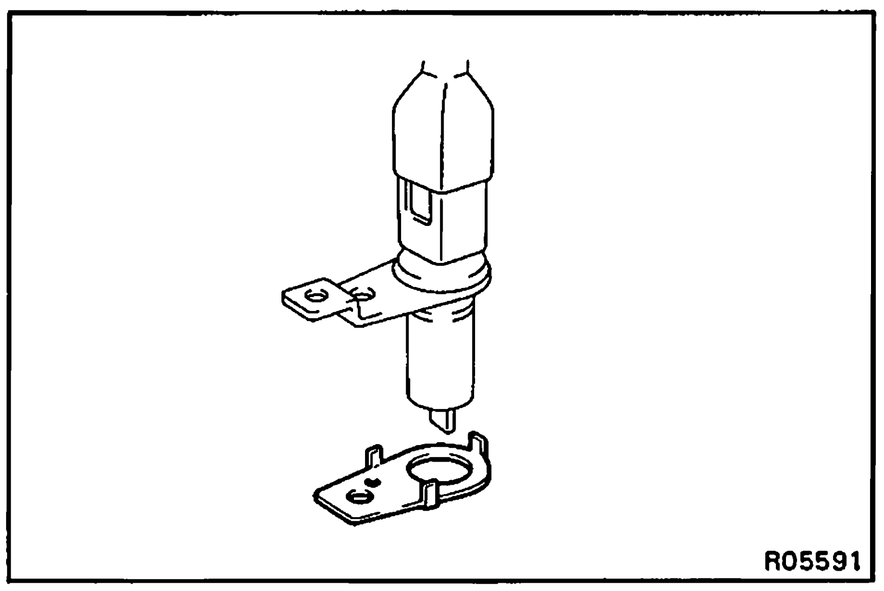
(d) If diagnosis code 71 or 72 is displayed, replace the 0.5 mm spacer inserted in the speed sensor with a 0.35 mm spacer.
   (1) Using a screwdriver to remove the 0.5 mm spacer.


R05590

   (2) Using needle-nose pliers to install the 0.35 mm spacer.

(e) Repeating (a) and (b) to the step 1.

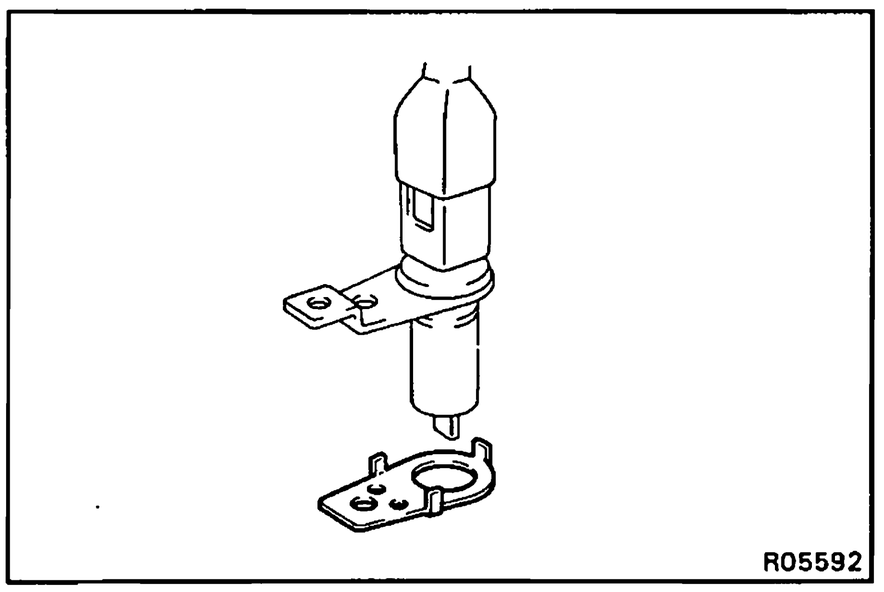
(f) If diagnosis code 71 or 72 is not displayed, remove the 0.2 mm spacer and install the speed sensor to the steering knuckle.


R05591

(g) If diagnosis code 71 or 72 is displayed, replace the 0.35 mm spacer with a 0.25 mm spacer.

(h) Repeating (a) and (b) to the step 1.

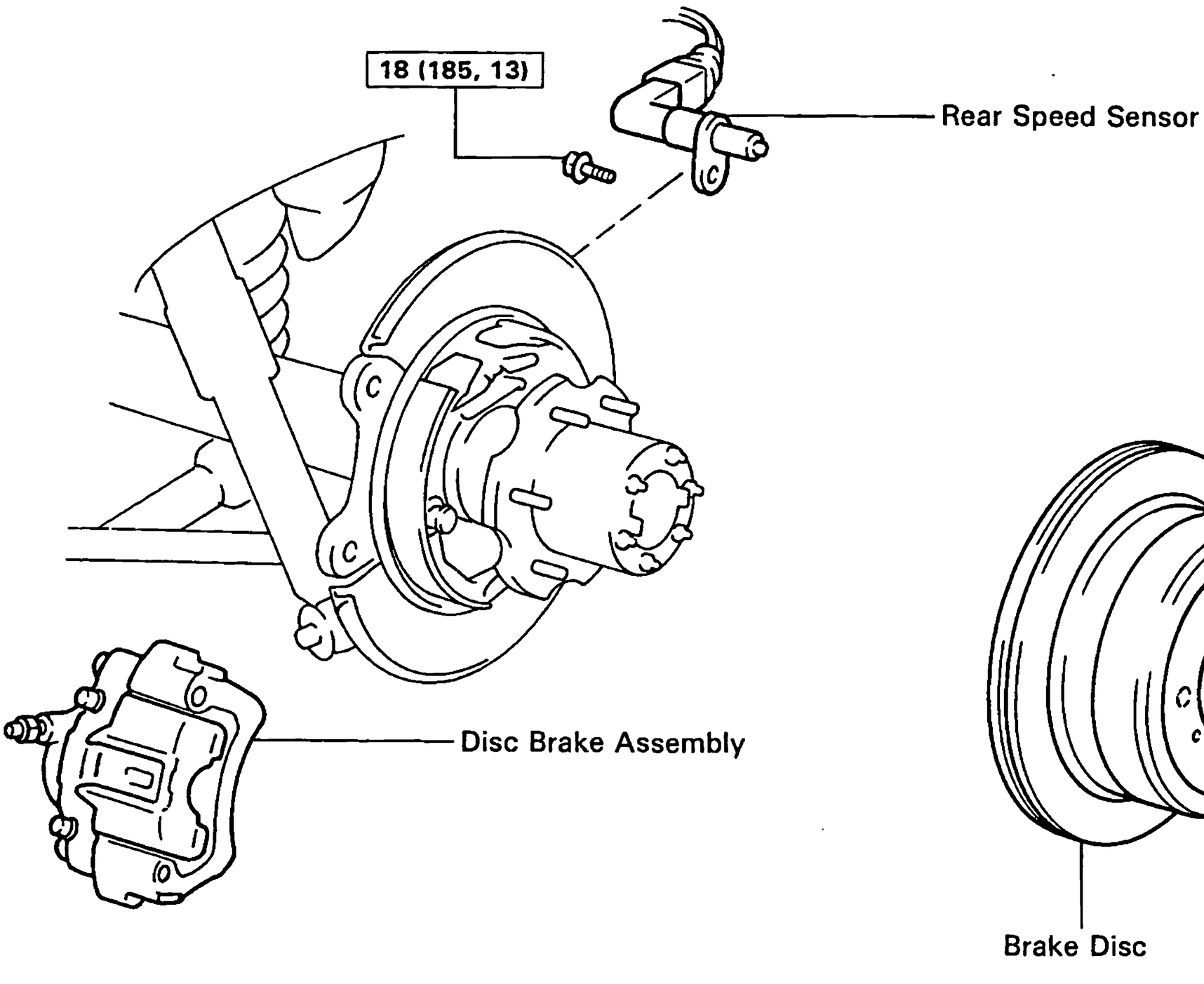
(i) If diagnosis code 71 or 72 is not displayed, remove the 0.2 mm spacer and install the speed sensor to the steering knuckle.

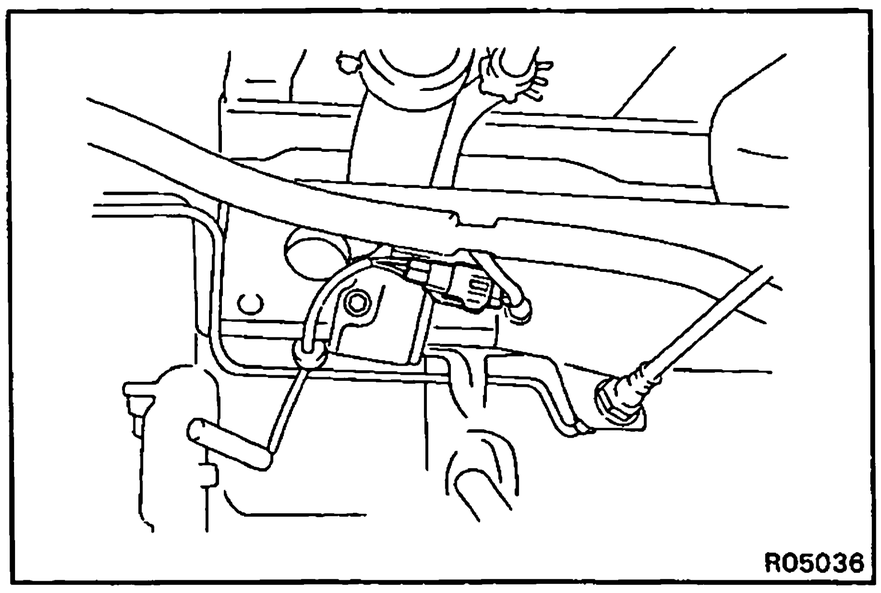

R05592

(j) If diagnosis code 71 or 72 is displayed, replace the 0.25 mm spacer with a 0.15 mm spacer and install the speed sensor to the steeing knuckle without using the 0.2 mm spacer.

# REAR SPEED SENSOR

## COMPONENTS

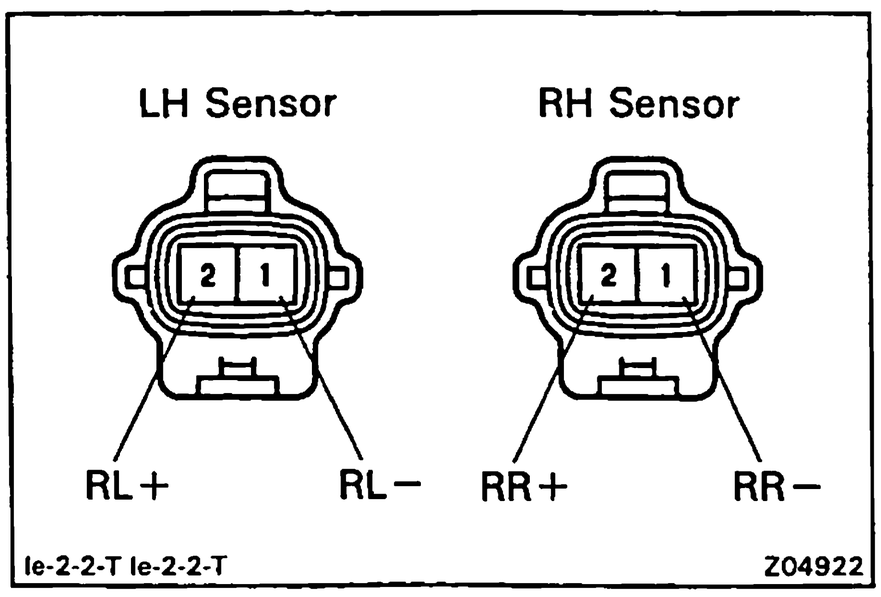



## REAR SPEED SENSOR INSPECTION

1. **INSPECT SPEED SENSOR**

(a) Disconnect the speed sensor connector.

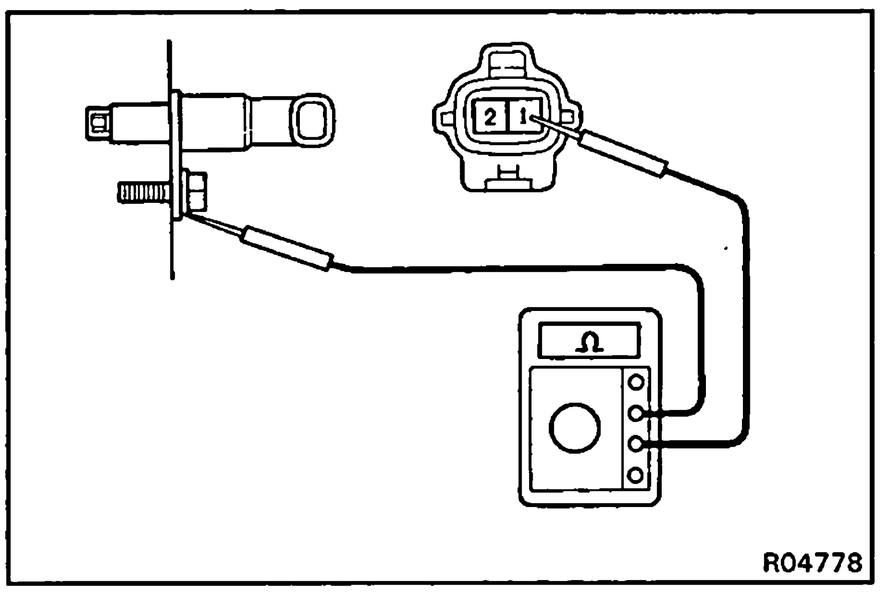



(b) Measure the resistance between terminals.

**Resistance:**

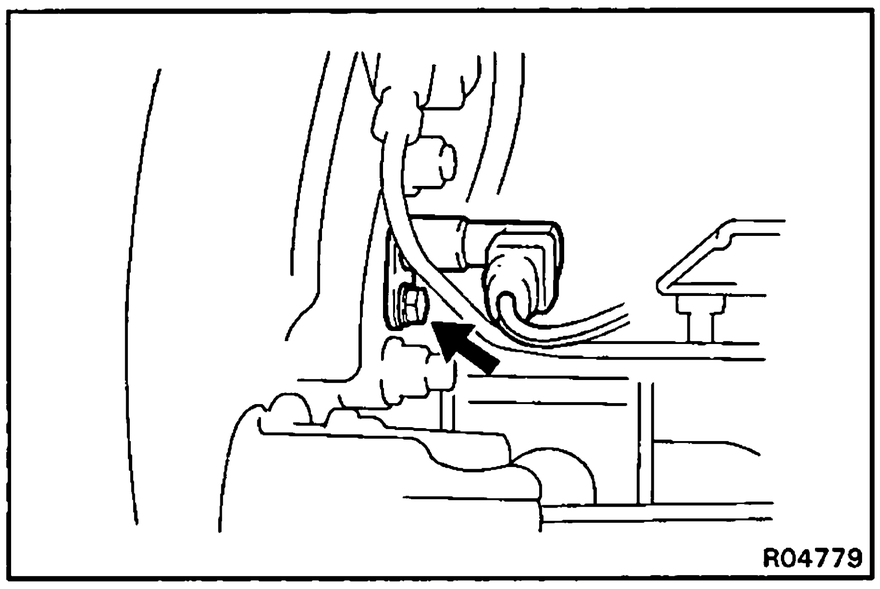
**0.7 — 1.1 kΩ**

If resistance value is not as specified, replace the sensor.




(c) Check that there is no continuity between each terminal and sensor body.
If there is continuity, replace the sensor.

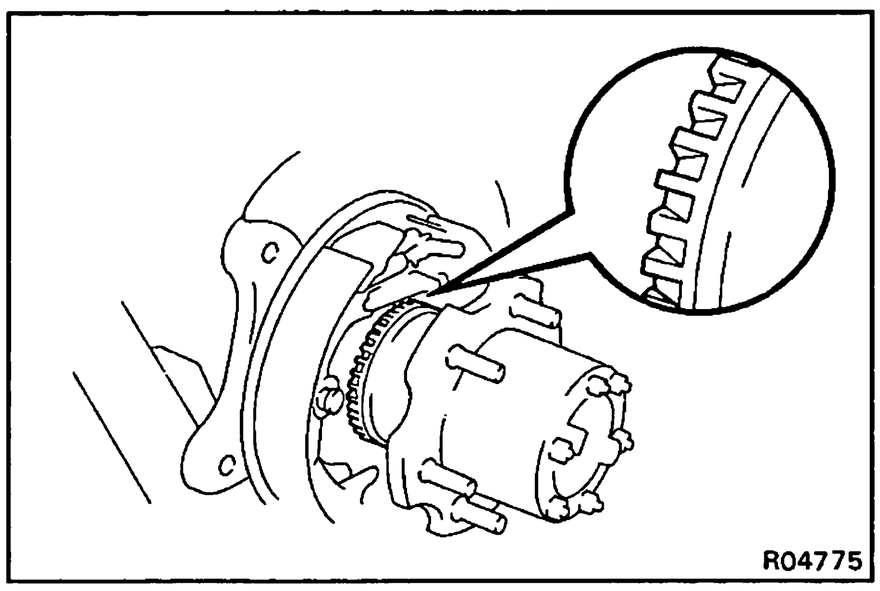
(d) Connect the speed sensor connector.




**2. INSPECT SENSOR INSTALLATION**

Check that the sensor installation bolt is tightened properly. If not, tighten the bolt.

**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**



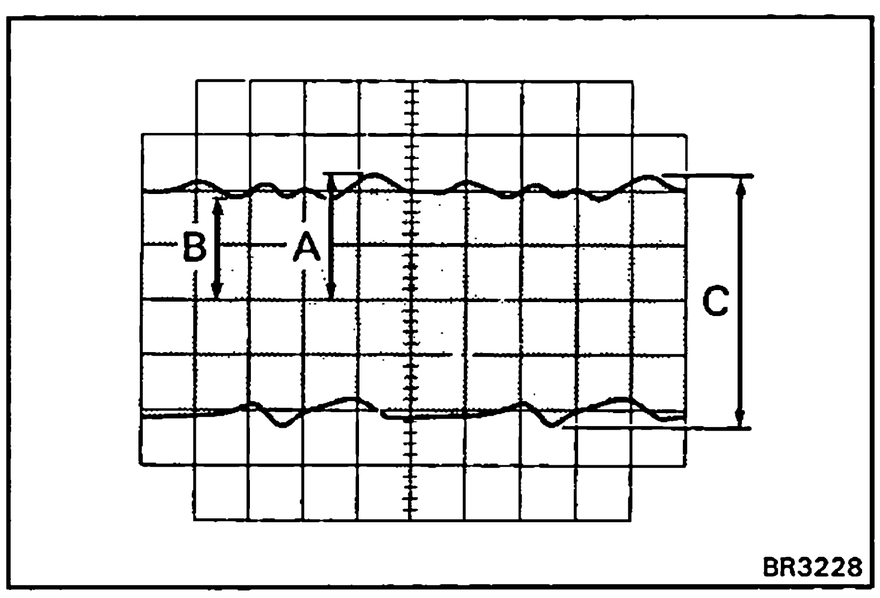

**3. VISUALLY INSPECT SENSOR ROTOR SERRATIONS**

(a) Remove the brake disc.
(See pub No. RM184E, page BR-57)

(b) Inspect the sensor rotor serrations for scratches, cracks, warping or missing teeth.

(c) Install the brake disc.
(See pub No. RM184E, page BR-64)

**NOTICE: To prevent damage to the serrations, do not strike the axle hub.**




## REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS INSPECTION (REFERENCE)

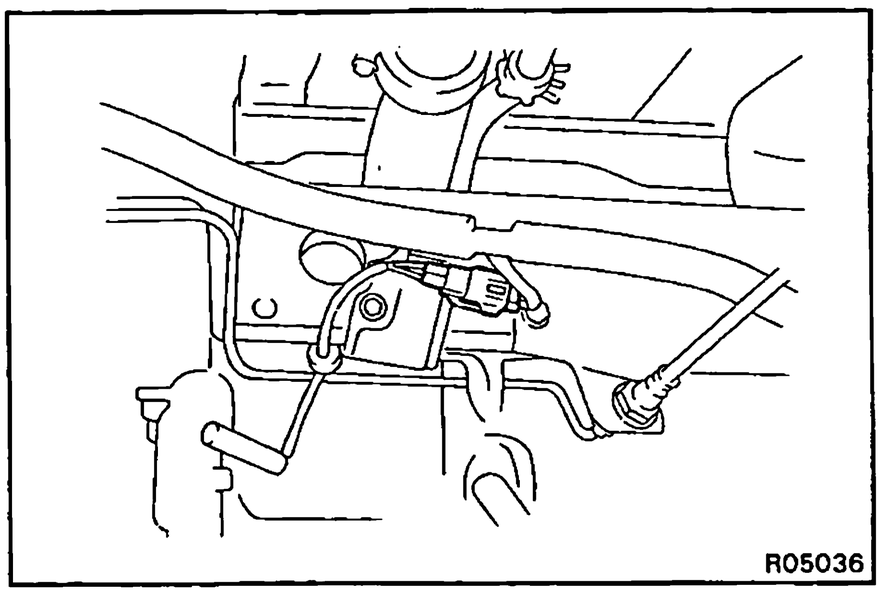
### INSPECT REAR SPEED SENSOR AND SENSOR ROTOR SERRATIONS BY USING AN OSCILLOSCOPE

(a) Connect an oscilloscope to the speed sensor connector.

(b) Run the vehicle at 20 km/h (12.4 mph), and inspect speed sensor output wave.

(c) Check that C is 0.5 V or more.
If not as specified, replace the speed sensor.

(d) Check that B is 50 % or more of A.
If not as specified, replace the rear axle hub.

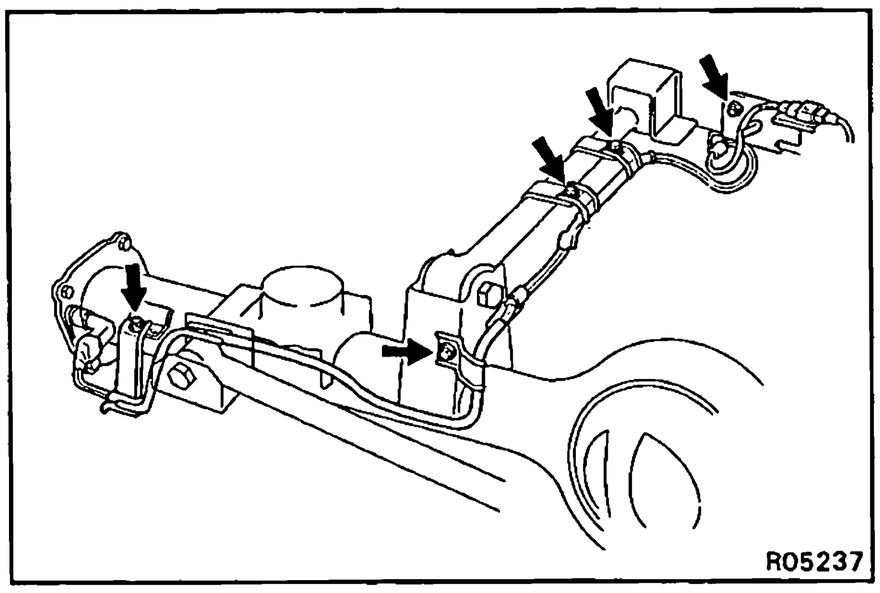



## REAR SPEED SENSOR REMOVAL

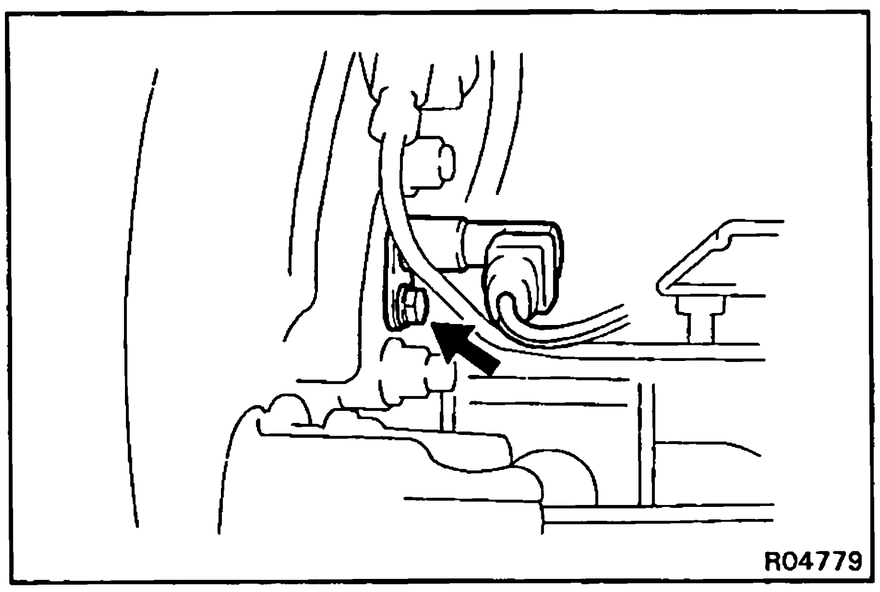
HINT: When replacing the sensor or sensor harness, replace the sensor and sensor harness together as a set.

**1. DISCONNECT SPEED SENSOR CONNECTOR**

(a) Disconnect the speed sensor connector.




(b) Remove the five clamp bolts holding the sensor wire harness from the suspension arm and frame.




**2. REMOVE SPEED SENSOR**

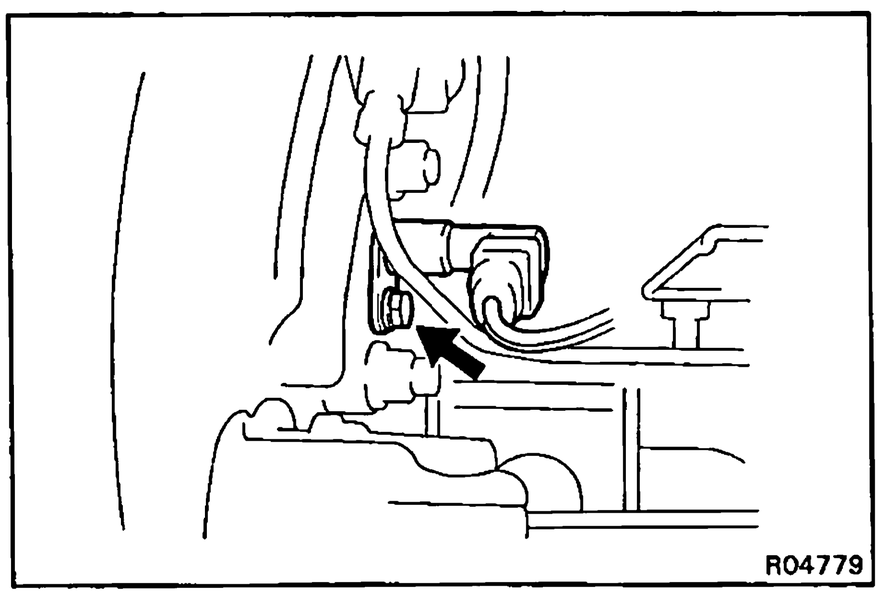
Remove the speed sensor from the axle end.

## REAR SPEED SENSOR INSTALLATION

**1. INSTALL SPEED SENSOR**

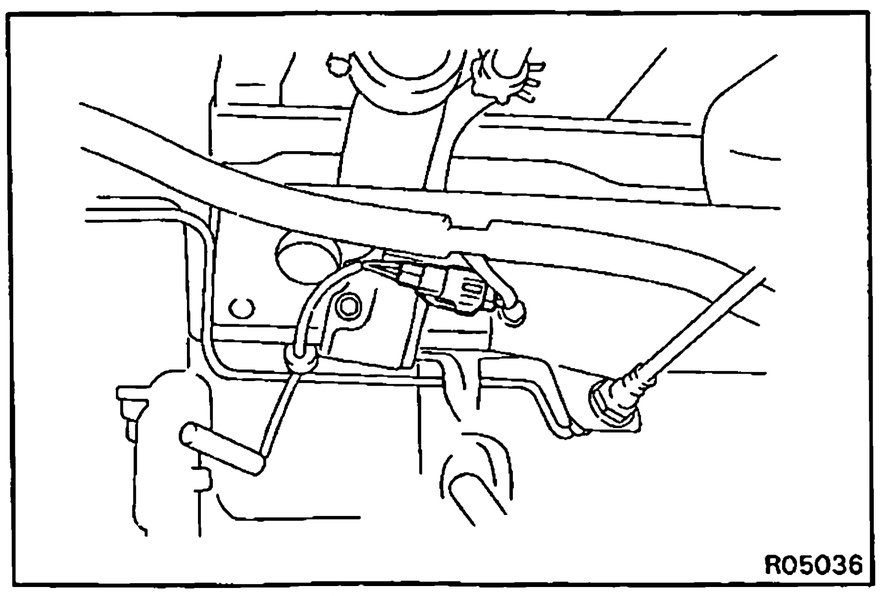
Install the speed sensor to the axle end.

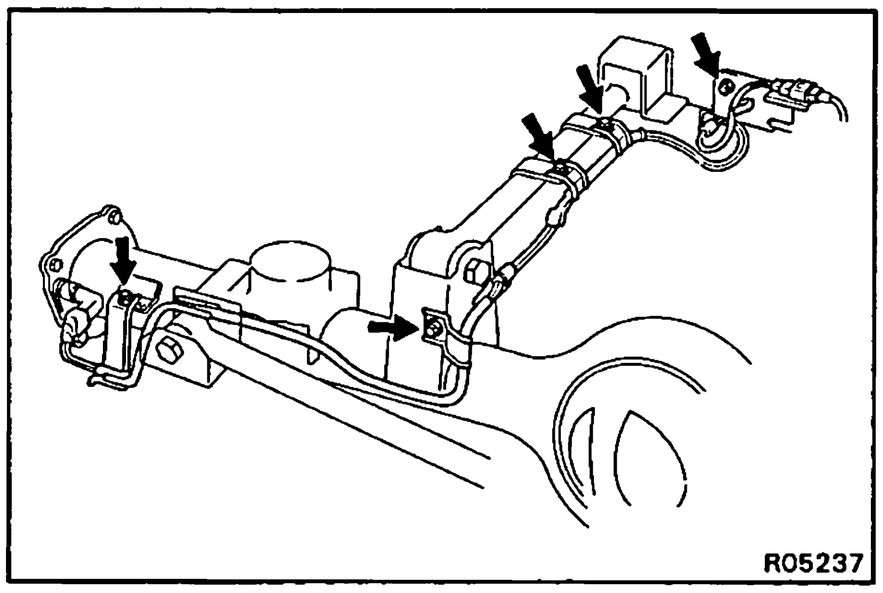
**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**




**2. CONNECT SPEED SENSOR CONNECTOR**

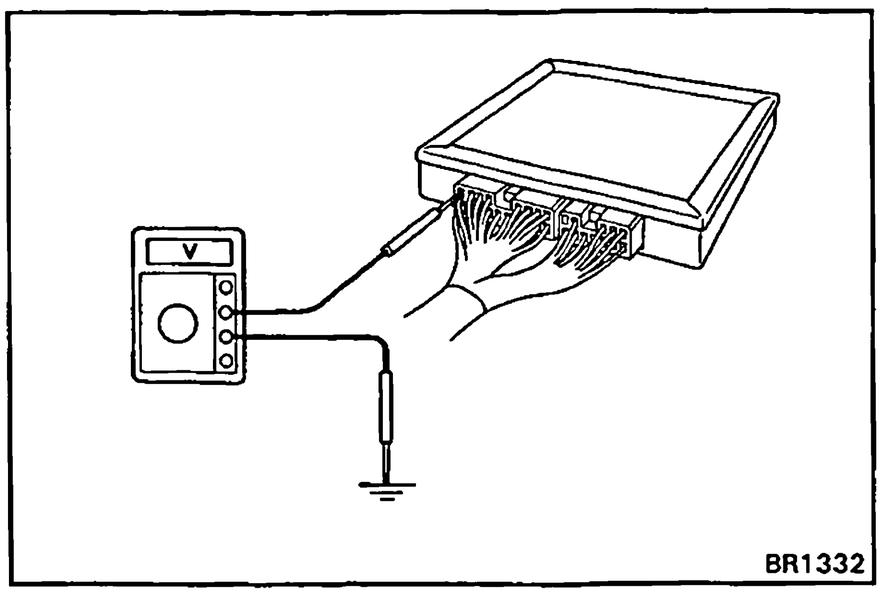
(a) Connect the speed sensor connector.






(b) Install the sensor harness with the clamps and bolts in place.

**3. INSPECT SPEED SENSOR AND DECELERATION SENSOR DIAGNOSIS SYSTEM**



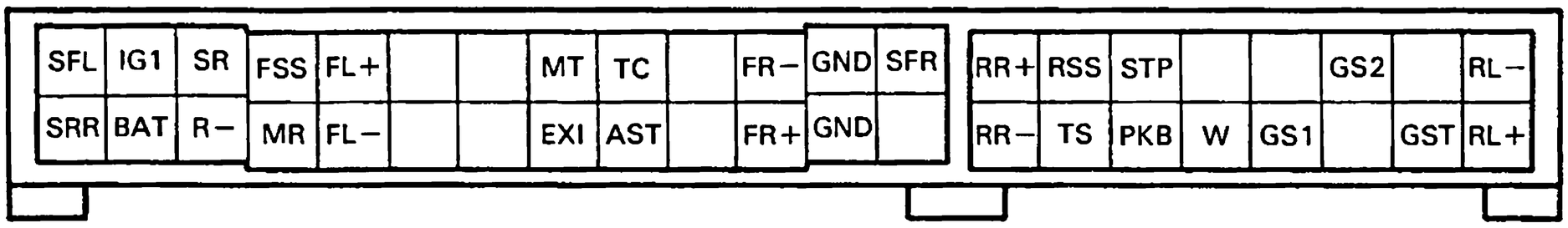

# ANTI-LOCK BRAKE SYSTEM CIRCUIT

## SYSTEM CIRCUIT INSPECTION

**1. INSPECT SYSTEM CIRCUIT WITH CONNECTOR CONNECTED**

(a) Remove the ABS ECU.

(b) Using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal and body ground.

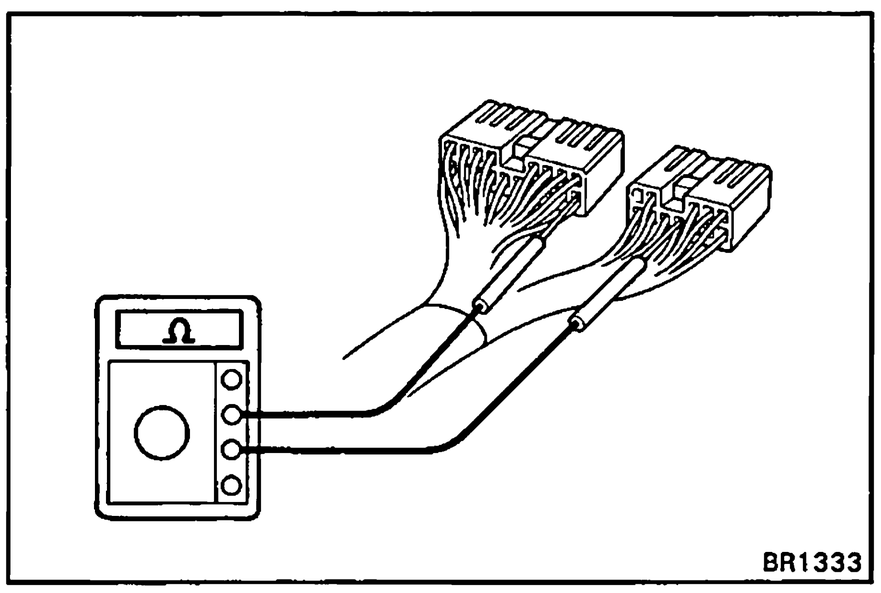



R01275

| Tester Connection | Check Item | Condition | Specified Value | Trouble Part |
|---|---|---|---|---|
| RL− | Continuity | IG switch off | Continuity | ABS ECU |
| GS2 | Voltage | IG switch on | 4 ~ 6 V | Deceleration Sensor |
| STP | Voltage | IG switch off and brake pedal depressed | Battery voltage | Stop light switch<br>Stop Light |
| | Continuity | IG switch off and brake pedal returned | Continuity | |
| RSS | Continuity | IG switch off | Continuity | ABS ECU |
| GS1 | Voltage | IG switch on | 4 ~ 6 V or<br>7 ~ 12 V | Deceleration Sensor |
| W | Voltage | IG switch on and "ABS" warning light goes on | About 0 V | ABS ECU<br>"ABS" warning light |
| | | IG switch on and "ABS" warning light goes off | Battery voltage | |
| PKB | Voltage | IG switch on and PKB lever pulled | About 0 V | Parking brake switch<br>Level warning switch |
| | | IG switch on and PKB lever returned | Battery voltage | |
| TS | Voltage | IG switch on and check connector Tc−$E_1$ connected | About 0 V | ABS ECU |
| RR− | Continuity | IG switch off | Continuity | |
| SFR | Voltage | IG switch on and "ABS" warning light goes on | About 0 V | Actuator |
| | | IG switch on and "ABS" warning light goes off | Battery voltage | |
| GND | Continuity | IG switch off | Continuity | Wiring harness |
| FR− | Continuity | IG switch off | Continuity | ABS ECU |
| TC | Voltage | IG switch on and check connector Tc−$E_1$ not connected | Battery voltage | |
| | | IG switch on and check connector Tc−$E_1$ connected | About 0 V | |
| FSS | Continuity | IG switch off | Continuity | |
| SR | Voltage | IG switch on and "ABS" warning light goes on | About 0 V | |
| | | IG switch on and "ABS" warning light goes off | Battery voltage | |
| IG1 | Voltage | IG switch on | Battery voltage | ECU-IG Fuse |

| Tester Connection | Check Item | Condition | Specified Value | Trouble Part |
|---|---|---|---|---|
| SFL | Voltage | IG switch on and "ABS" warning light goes on | About 0 V | Actuator |
| | | IG switch on and "ABS" warning light goes off | Battery voltage | |
| AST | Voltage | IG switch on and "ABS" warning light goes on | About 0 V | |
| | | IG switch on and "ABS" warning light goes off | Battery voltage | |
| EXI | Voltage | IG switch on and center differential lock indicator light goes off | Battery voltage | GAUGE Fuse |
| FL− | Continuity | IG switch off | Continuity | ABS ECU |
| R− | Continuity | IG switch off | Continuity | |
| BAT | Voltage | IG switch off | Battery voltage | DOME Fuse |
| SRR | Voltage | IG switch on and "ABS" warning light goes on | About 0 V | Actuator |
| | | IG switch on and "ABS" warning light goes off | Battery voltage | |

If the circuit is not as specified, check and repair or replace the trouble part shown in the table above.




**2. INSPECT SYSTEM CIRCUIT WITH CONNECTOR DISCONNECTED**

(a) Disconnect the connectors from the ECU, inspect at the wire harness side connector.

| Tester Connection | Check Item | Specified Value | Trouble Part | Tester Connection | Check Item | Specified Value | Trouble Part |
|---|---|---|---|---|---|---|---|
| RR+↔RR− | Resistance | *0.7 ~1.1 kΩ | Rear RH speed sensor | SFL↔AST | Resistance | *About 6 Ω | Actuator |
| RL+↔RL− | Resistance | *0.7 ~1.1 kΩ | Rear LH speed sensor | FR+↔FR− | Resistance | *0.87 ~1.27 kΩ | Front RH speed sensor |
| SFR↔AST | Resistance | *About 6 Ω | Actuator | AST↔Body ground | Resistance | *About 5 Ω | Actuator |
| MT↔Body ground | Continuity | Continuity | Actuator | MR↔R− | Resistance | *55.8 ~68.2 Ω | Control relay |
| FL+↔FL− | Resistance | *0.87 ~1.27 kΩ | Front LH speed sensor | SRR↔AST | Resistance | *About 6 Ω | Actuator |
| SR↔R− | Resistance | *60~100 Ω | Control relay | | | | |

*: 20°C (68°F)

If the circuit is not as specified, check and repair or repalce the trouble part shown in the table above.

(b) Connect the connectors, and install the ECU in place.

# SERVICE SPECIFICATIONS

## SERVICE DATA

| | |
|---|---|
| Brake pedal height from asphalt sheet | 167.5 — 177.5 mm (6.59 — 6.99 in.) |
| Brake pedal freeplay | 3 — 6 mm (0.12 — 0.24 in.) |
| Brake pedal reserve distance at 490 N (50 kgf, 110.2 lbf) | More than 59 mm (2.32 in.) |
| Brake booster push rod to piston clearance (W/SST) | 0 mm (0 in.) |

## TORQUE SPECIFICATIONS

| Part tightened | N·m | kgf·cm | ft·lbf |
|---|---|---|---|
| Master cylinder × Piston stopper bolts | 10 | 100 | 7 |
| Master cylinder × Reservoir | 1.7 | 17.5 | 15.2 in.·lbf |
| Master cylinder × Brake booster | 13 | 130 | 9 |
| Brake tube union nut | 15 | 155 | 11 |
| LSP & BV Bracket × Frame | 19 | 195 | 14 |
| LSP & BV × LSP & BV Bracket | 13 | 130 | 9 |
| LSP & BV Spring × LSP & BV Bracket | 18 | 185 | 13 |
| LSP & BV Spring × Shackle No. 1 | 18 | 185 | 13 |
| LSP & BV Shackle lock nut | 25 | 250 | 18 |
| LSP & BV Shackle × Shackle bracket | 13 | 130 | 9 |
| LSP & BV Shackle bracket × Rear axle housing | 19 | 195 | 14 |
| ABS actuator bracket × Body | 19 | 195 | 14 |
| Front speed sensor installation bolt | 18 | 185 | 13 |
| Rear speed sensor installation bolt | 18 | 185 | 13 |

# BODY ELECTRICAL SYSTEM

**REFER TO FOLLOWING REPAIR MANUALS:**

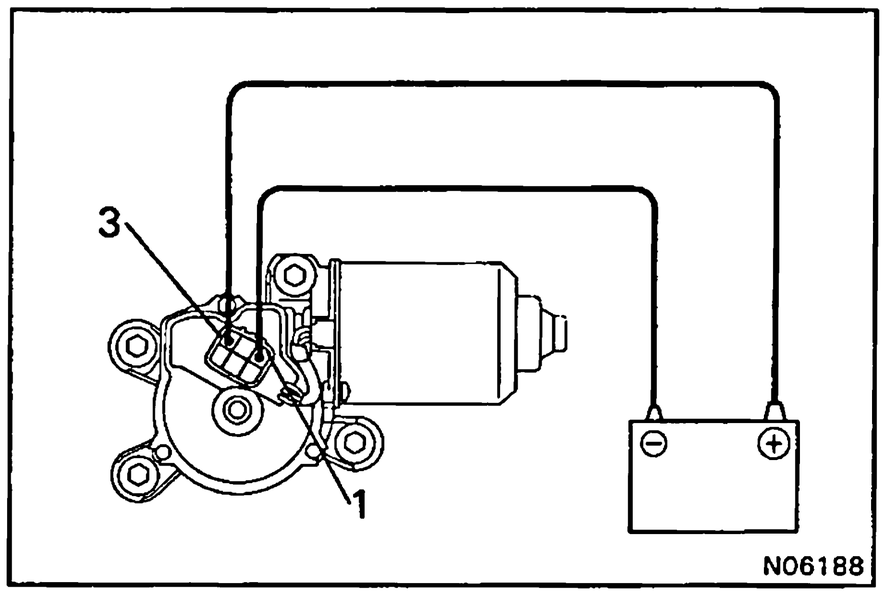
| Manual Name | Pub. No. |
|---|---|
| • Land Cruiser (Hardtop and Canvas Top) Chassis and Body Repair Manual | RM183E |
| • Land Cruiser (Station Wagon) Chassis and Body Repair Manual | RM184E |
| • Land Cruiser (Hardtop, Canvas Top and Station Wagon) Chassis and Body Repair Manual Supplement | RM290E |

NOTE: The following pages contain only the points which differ from the above listed manuals.

BE

**(HARDTOP, CANVAS TOP & STATION WAGON)**

WIPER AND WASHER SYSTEM ····· BE-2
COMBINATION METER ····· BE-3
POWER SEAT CONTROL SYSTEM ····· BE-21
CRUISE CONTROL SYSTEM ····· BE-29
EXTRA (SUB) TANK SYSTEM ····· BE-50
SATELLITE NAVIGATION SYSTEM ····· BE-59




# WIPER AND WASHER SYSTEM

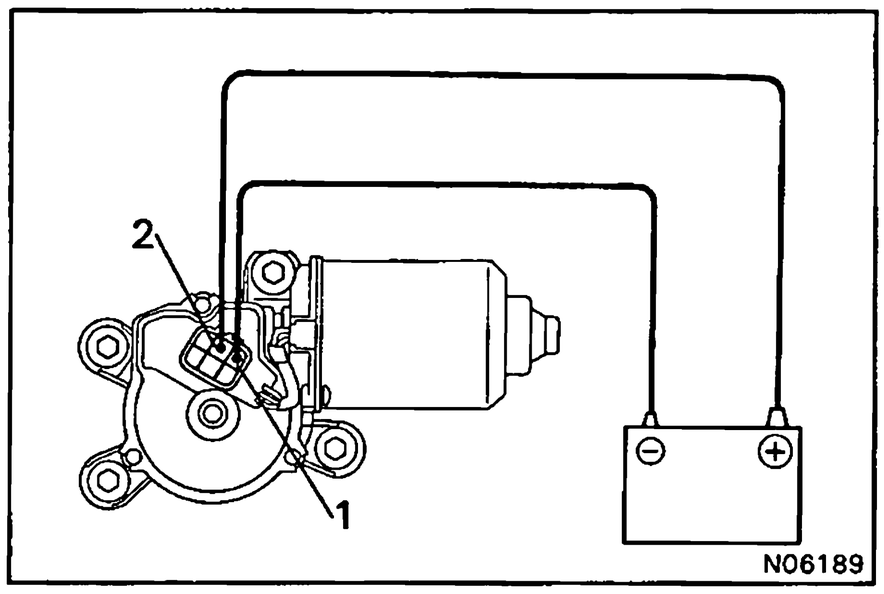
## FRONT WIPER MOTOR

## FRONT WIPER MOTOR INSPECTION

OPERATION AT LOW SPEED

Connect the positive (+) lead from the battery to terminal 3 and negative (−) lead to terminal 1, check that the motor operates at low speed.

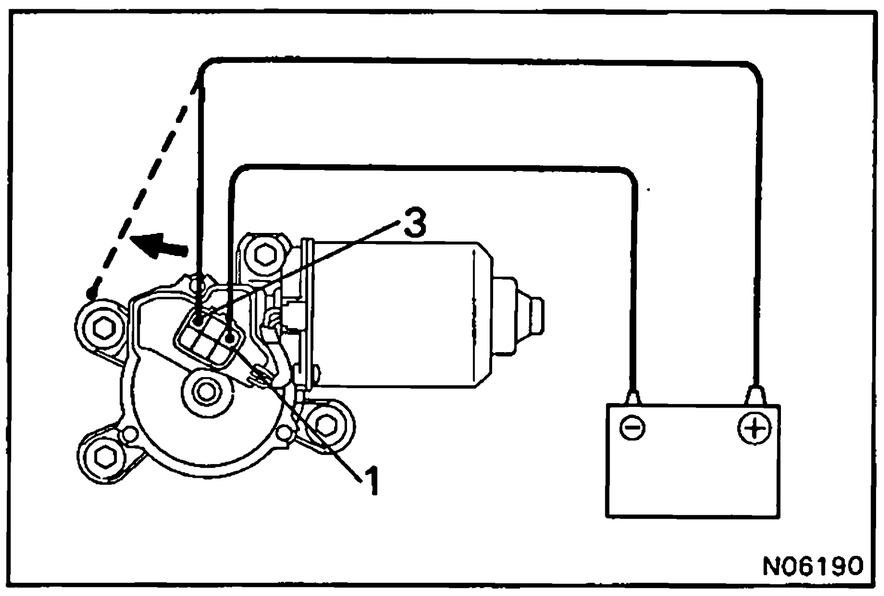
If operation is not as specified, replace the motor.




OPERATION AT HIGH SPEED

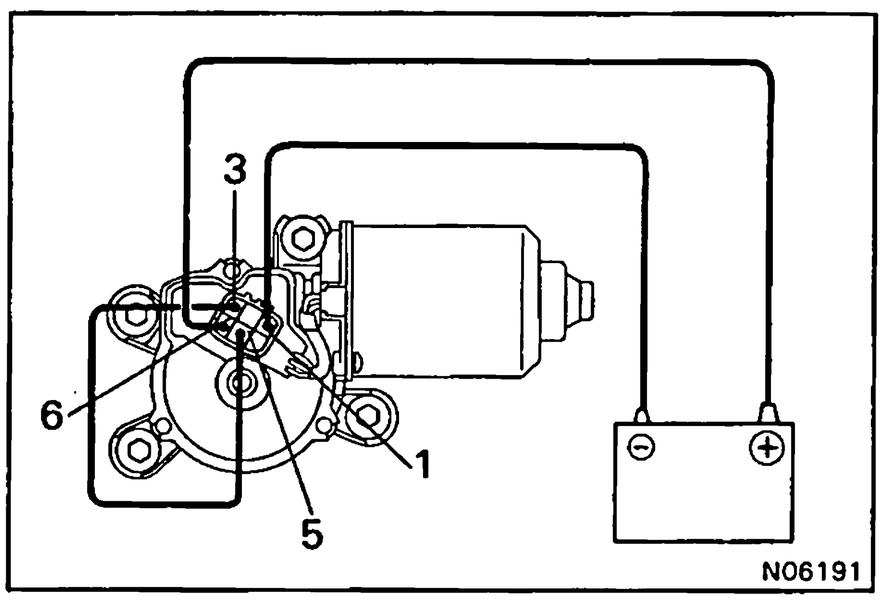
Connect the positive (+) lead from the battery to terminal 2 and the negative (−) lead to terminal 1, check that the moor operates at high speed.

If operation is not as specified, replace the motor.




OPERATION, STOPPING AT STOP POSITION

(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 3.



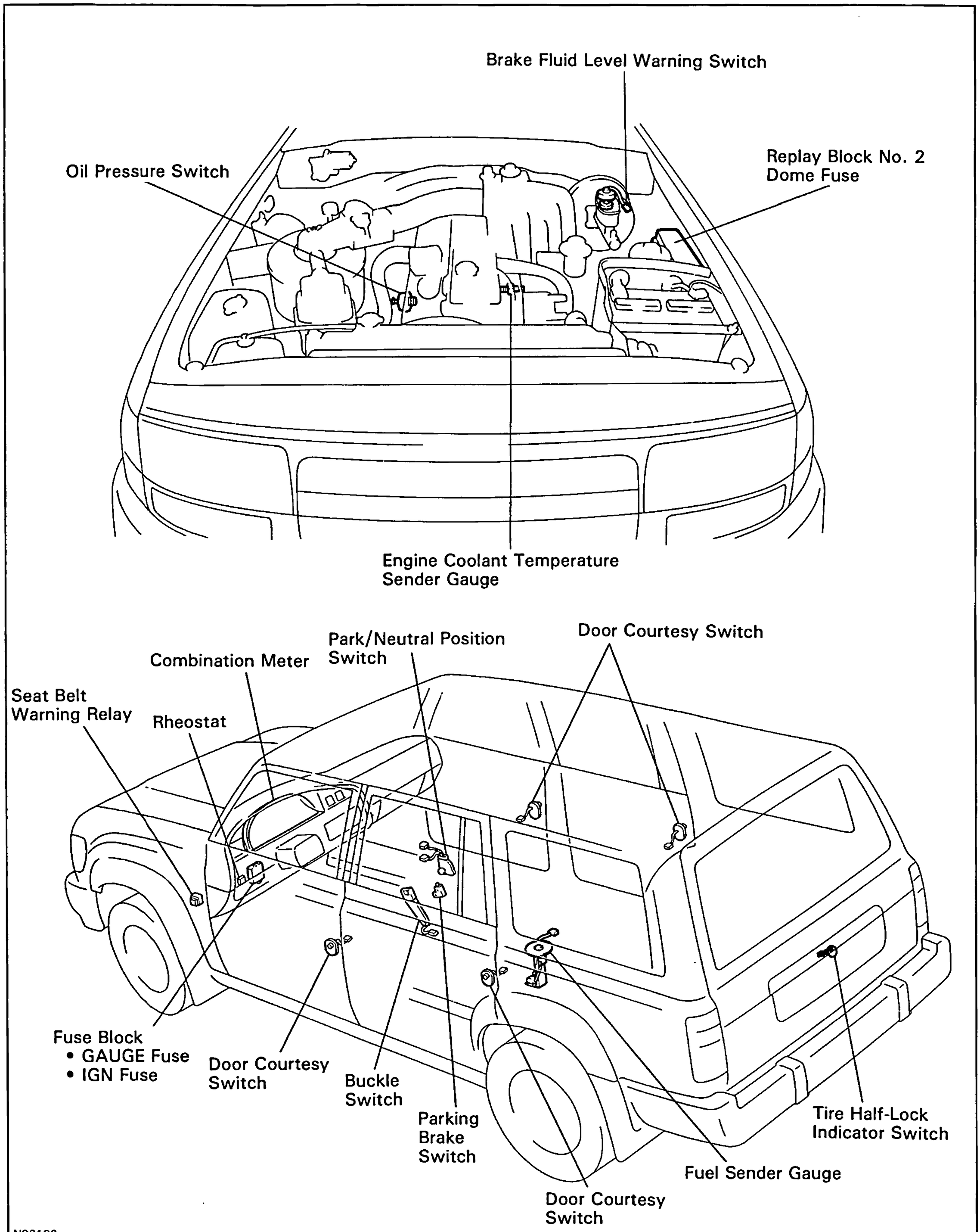

(b) Connect terminal 3 and 5.

(c) Connect the positive (+) lead from the battery to terminal 6 and the negative (−) lead to the terminal 1, check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.

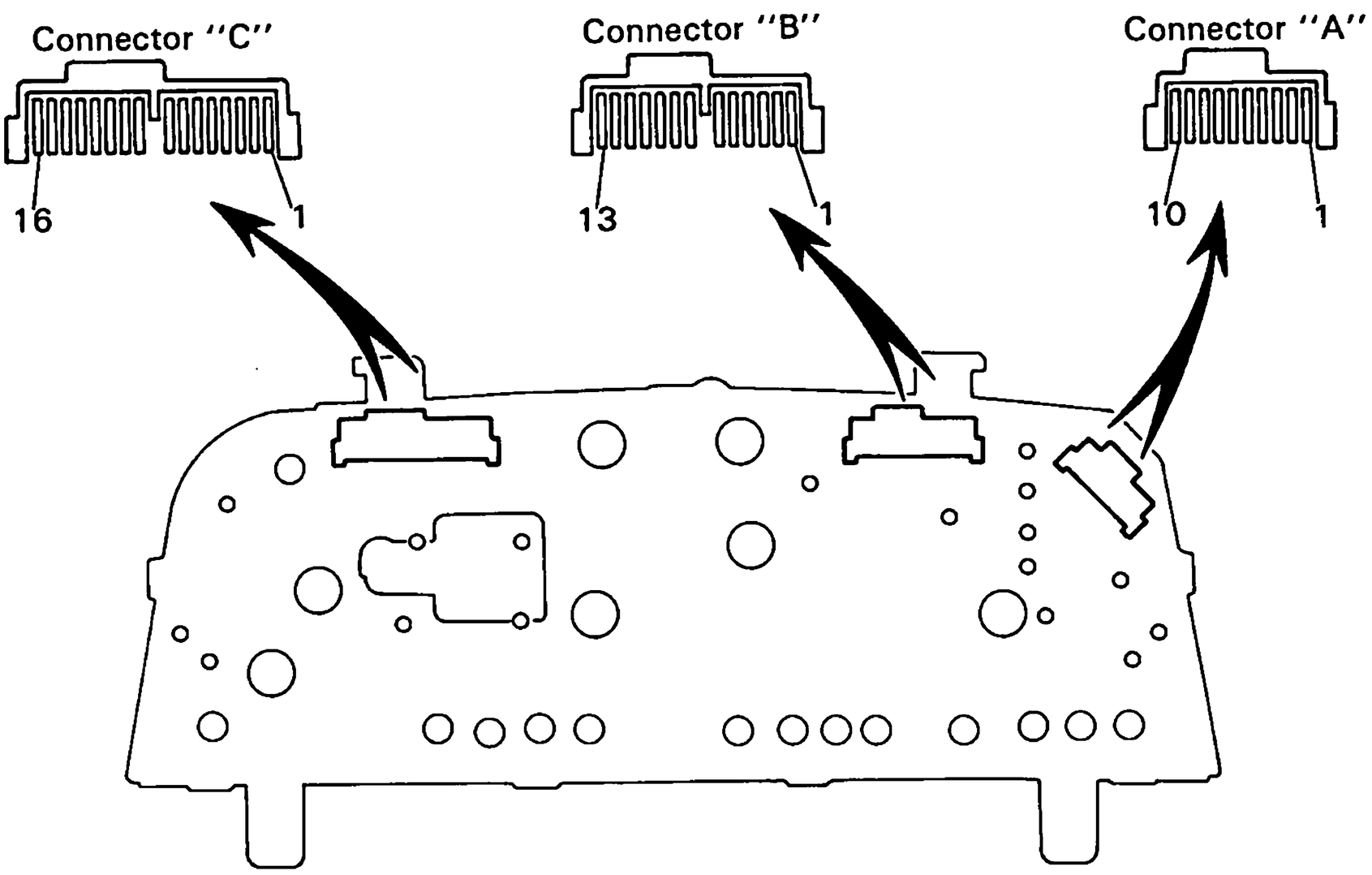
# COMBINATION METER

## PARTS LOCATION




N06192
BE5221

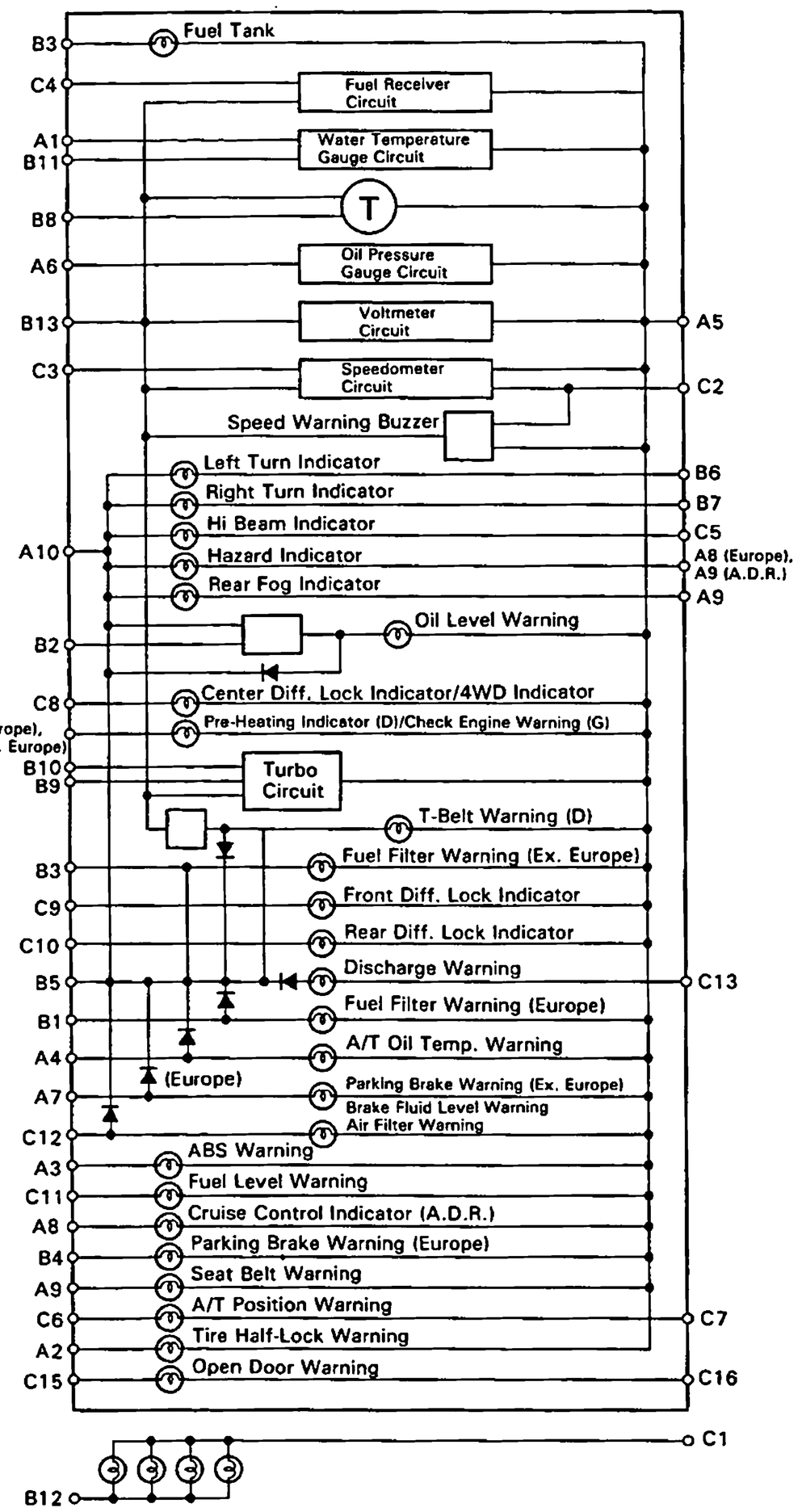
# METER CIRCUIT




N06193

# METER CIRCUIT

**Hi-Grade**

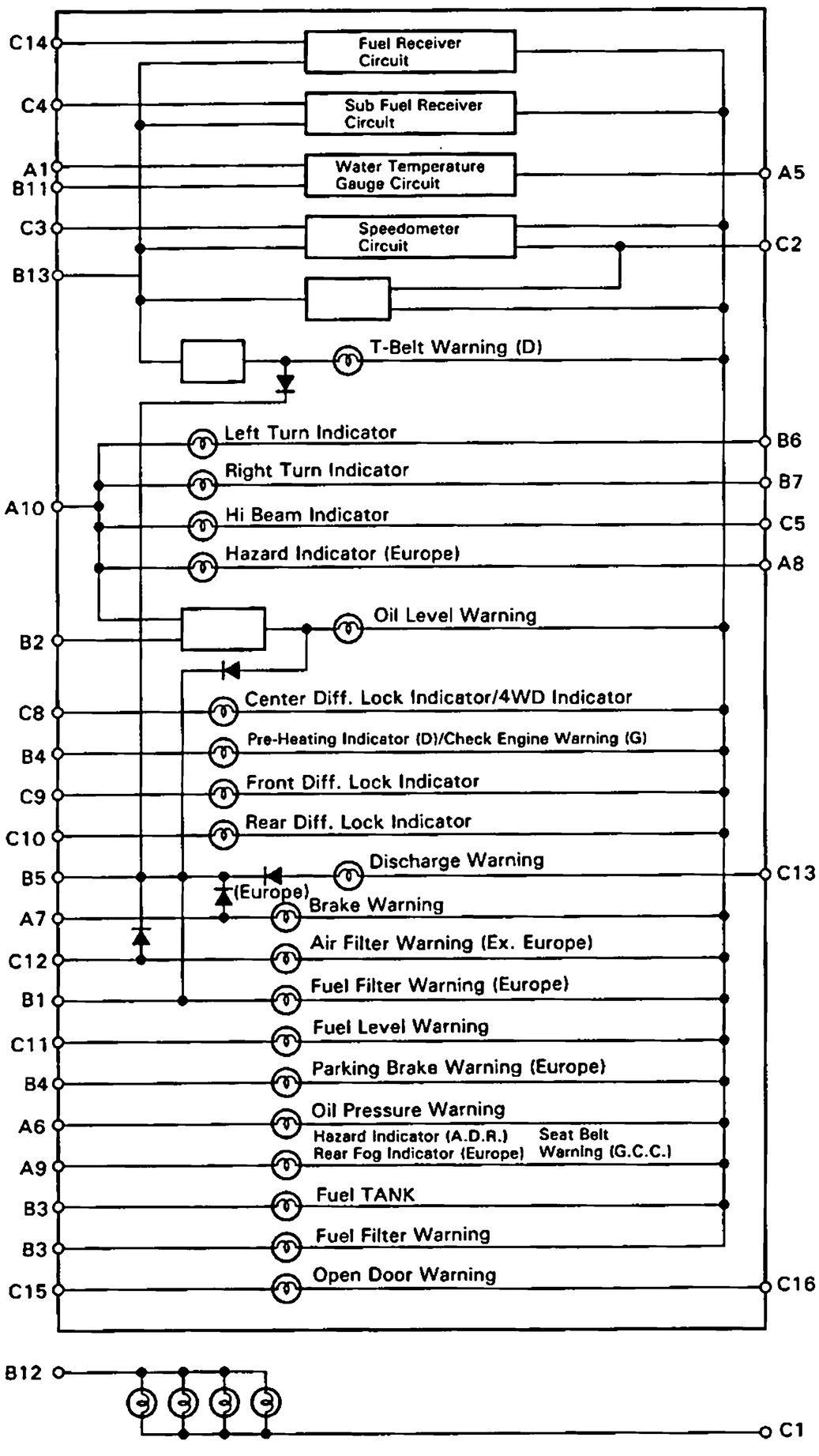



N06714

| No. | | Wiring Connector Side |
|---|---|---|
| A | 1 | Ground (TEMP) |
| | 2 | Tire Half-Lock Indicator Switch |
| | 3 | ABS ECU (Ex. G.C.C.) |
| | 4 | A/T Fluid Temperature Sensor |
| | 5 | GAUGE Fuse |
| | 6 | Low Oil Pressure Sender Gauge |
| | 7 | Brake Warning Switch<br>Brake Fluid Level Warning (Europe)<br>Brake Fluid Level Warning and Parking Brake Warning (Ex. Europe) |
| | 8 | Hazard Warning Light Switch (Europe)<br>Cruise Control ECU (A.D.R.) |
| | 9 | Rear Fog Light Switch (Europe)<br>Hazard Warning Light Switch (A.D.R.)<br>Seat Belt Warning Relay (G.C.C.) |
| | 10 | Ground |
| B | 1 | Fuel Filter Warning Switch (Europe) |
| | 2 | Engine Oil Level Sensor (Ex. G.C.C.) |
| | 3 | EFI ECU (Gasoline engine) (Europe)<br>Glow Timer Relay (Diesel engine)(Europe)<br>Fuel Tank ECU (Ex. Europe), Fuel Filter Warning |
| | 4 | EFI ECU (Gasoline engine) (Ex. Europe)<br>Glow Timer Relay (Diesel engine)(G.C.C., A.D.R.)<br>Parking Brake Switch (Europe) |
| | 5 | Charge Light Relay |
| | 6 | Light Control Switch (Left) |
| | 7 | Light Control Switch (Right) |
| | 8 | Igniter (Gasoline engine), Tacho Pick Sensor (Diesel engine M/T), ECT ECU (Diesel engine A/T) |
| | 9 | Turbo Pressure Switch B (Diesel engine) |
| | 10 | Turbo Pressure Switch A (Diesel engine) |
| | 11 | Water Temperature Gauge |
| | 12 | Light Control Rheostat, Illumination (−) |
| | 13 | Ground (Gauge) |
| C | 1 | TAIL Fuse |
| | 2 | Speed Control Unit |
| | 3 | Speed Sensor |
| | 5 | Headlight Hi-Beam |
| | 6 | Neutral Start Switch (−) |
| | 7 | Neutral Start Switch (+) |
| | 8 | Center Diff. Lock Indicator Switch<br>4WD Indicator Switch (G.C.C., A.D.R.) |
| | 9 | Front Diff. Lock Indicator Switch |
| | 10 | Rear Diff. Lock Indicator Switch |
| | 11 | Fuel Level Warning Switch |
| | 12 | Air Filter Warning Switch |
| | 13 | IGN Fuse |
| | 14 | Fuel Sender Gauge |
| | 15 | Door Courtesy Switch |
| | 16 | Dome Fuse |

# METER CIRCUIT

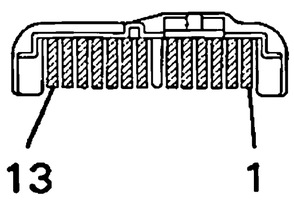
**Lo-Grade**

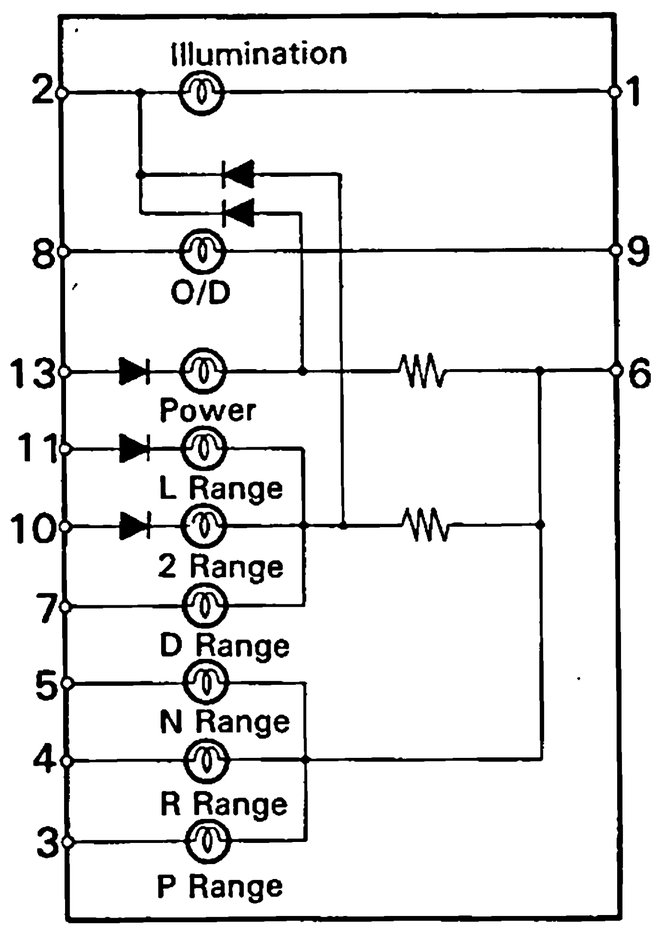



N06715

| No. | | Wiring Connector Side |
|---|---|---|
| A | 1 | Ground (TEMP) |
| | 5 | GAUGE Fuse |
| | 6 | Oil Pressure Switch |
| | 7 | Brake Warning Switch |
| | 8 | Hazard Warning Switch (Europe) |
| | 9 | Hazard Warning Switch (A.D.R.)<br>Rear Fog Light Switch (Europe)<br>Seat Belt Warning Relay (G.C.C.) |
| | 10 | Ground |
| B | 1 | Fuel Filter Warning Switch (Europe) |
| | 2 | Engine Oil Level Sensor (Ex. G.C.C.) |
| | 3 | Fuel Filter Warning (Ex. Europe)<br>Glow Timer Relay (Europe), Fuel Tank (A.D.R.) |
| | 4 | EFI ECU (Gasoline)(A.D.R.)<br>Glow Timer Relay (Ex. Europe)<br>Parking Brake Switch (Europe) |
| | 5 | Charge Light Relay |
| | 6 | Light Control Switch (Left) |
| | 7 | Light Control Switch (Right) |
| | 11 | Engine Coolant Temperature Gauge |
| | 12 | Light Control Rheostat, Illumination (−) |
| | 13 | Ground (Gauge) |
| C | 1 | TAIL Fuse |
| | 2 | Speed Control Unit |
| | 3 | Speed Sensor |
| | 4 | Sub Fuel Sender Gauge (Ex. Europe) |
| | 5 | Headlight Hi-Beam |
| | 8 | Center Diff. Lock Indicator Switch (Europe)<br>4WD Indicator Switch (Ex. Europe) |
| | 9 | Front Diff. Lock Indicator Switch |
| | 10 | Rear Diff. Lock Indicator Switch |
| | 11 | Fuel Level Warning Switch |
| | 12 | Air Filter Warning Switch (Ex. Europe) |
| | 13 | IGN Fuse |
| | 14 | Fuel Sender Gauge |
| | 15 | Door Courtesy Switch |
| | 16 | Dome Fuse |

- **SHIFT POSITION INDICATOR**




| No. | Wiring Connector Side |
|---|---|
| 1 | Ground |
| 2 | TAIL Fuse |
| 3 | Neutral Start Switch "P" |
| 4 | Neutral Start Switch "R" |
| 5 | Neutral Start Switch "N" |
| 6 | Ground |
| 7 | Neutral Start Switch "D" |
| 8 | GAUGE Fuse |
| 9 | O/D Switch |
| 10 | Neutral Start Switch "N" |
| 11 | Neutral Start Switch "L" |
| 13 | ECT SELECT Switch |

N03970
N06733

# TROUBLESHOOTING

The table below will be useful for you in troubleshooting these electrical problems. The most likely causes of the malfunction are shown in the order of their probability. Inspect each part in the order shown, and replace the part when it is found to be faulty.

| Trouble | Part name | See page |
|---|---|---|
| Combination meter do not operate. | 1. GAUGE Fuse<br>2. Wire Harness | —<br>— |
| Speedometer does not operate. | 1. Speed Sensor | BE-10 |
| Tachometer does not operate. | 1. Tachometer<br>2. Igniter (Tacho pick sensor, ECT ECU)<br>3. Wire Harness | BE-11<br>—<br>— |
| Fuel gauge does not operate. | 1. Receiver Gauge<br>2. Sender Gauge<br>3. Wire Harness | BE-11<br>BE-12<br>— |
| Fuel level warning light does not light up. | 1. Bulb<br>2. Fuel Level Warning Switch<br>3. Wire Harness | —<br>BE-12<br>— |
| Water temperature gauge does not operate. | 1. Receiver Gauge<br>2. Sender Gauge<br>3. Wire Harness | BE-13<br>BE-13<br>— |
| Oil pressure gauge does not operate. | 1. Receiver Gauge<br>2. Sender Gauge<br>3. Wire Harness | BE-15<br>BE-15<br>— |
| Voltmeter does not operate. | 1. Receiver Gauge<br>2. Wire Harness | BE-14<br>— |
| Brake warning light does not light up. | 1. Bulb<br>2. Brake Fluid Level Warning Switch<br>3. Parking Brake Switch<br>4. Wire Harness | —<br>BE-16<br>BE-16<br>— |
| Seat belt warning light does not light up. | 1. Bulb<br>2. Seat Belt Warning Switch<br>3. Seat Belt Warning Relay<br>4. Wire Harness | —<br>BE-17<br>BE-17<br>— |
| Open door warning light does not light up. | 1. Bulb<br>2. Door Courtesy Switch<br>3. Wire Harness | —<br>BE-16<br>— |
| Tire half-lock warning light does not light up. | 1. Bulb<br>2. Tire Half-Lock Indicator Switch<br>3. Wire Harness | —<br>BE-18<br>— |

| Trouble | Part name | See page |
|---|---|---|
| ABS warning light does not light up. | 1. Bulb<br>2. ABS ECU<br>3. Wire Harness | –<br>–<br>– |
| Meter illumination control system does not operate. | 1. Bulb<br>2. Light Control Rheostat<br>3. Wire Harness | –<br>BE-19<br>– |
| Shift position indicator light does not light up. | 1. Bulb<br>2. Neutral Position Switch<br>3. Wire Harness | –<br>–<br>– |
| Engine oil level warning light does not light up. | 1. Bulb<br>2. Engine Oil Level Sensor<br>3. Wire Harness | –<br>BE-19<br>– |

(km/h) A.D.R.

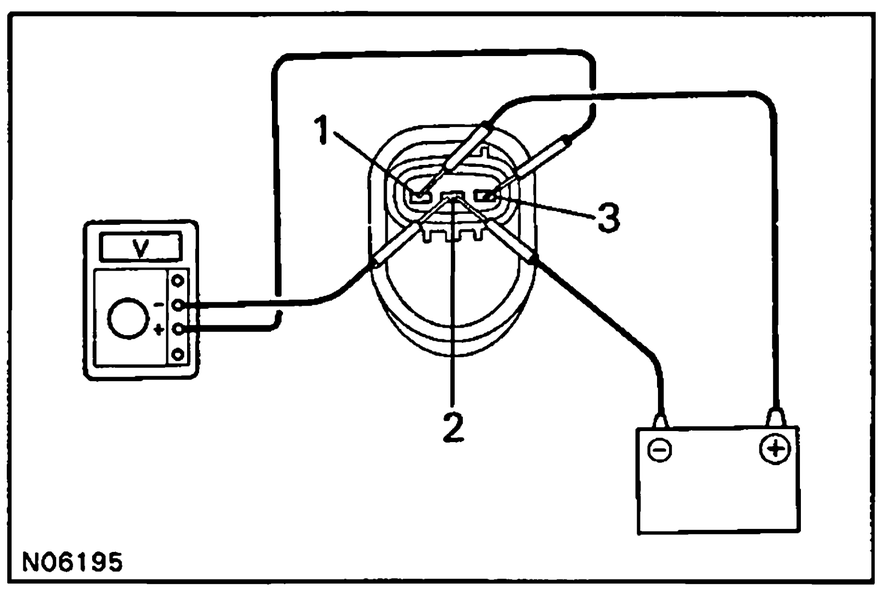
| Standard indication | Allowable range |
|---|---|
| 40 | 36 — 44 |
| 60 | 54 — 66 |
| 80 | 72 — 88 |
| 100 | 90 — 110 |
| 120 | 108 — 132 |
| 140 | 126 — 154 |
| 160 | 144 — 176 |

(km/h) Europe, G.C.C., General

| Standard indication | Allowable range |
|---|---|
| 20 | 20 — 26 |
| 40 | 40 — 48 |
| 60 | 60 — 70 |
| 80 | 80 — 92 |
| 100 | 100 — 114 |
| 120 | 120 — 136 |
| 140 | 140 — 158 |
| 160 | 160 — 180 |

(mph) General

| Standard indication | Allowable range |
|---|---|
| 20 | 20 — 24.5 |
| 40 | 40 — 46.5 |
| 60 | 60 — 68.5 |
| 80 | 80 — 90.5 |
| 100 | 100 — 112.5 |




# SPEEDOMETER SYSTEM

## INSPECT SPEEDOMETER (ON-VEHICLE)

(a) Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.

HINT: Tire wear and tire over or under inflation will increase the indication error.

(b) Check the speedometer for pointer vibration and abnormal noise.

HINT: Pointer vibration can be caused by a loose speedometer cable.

## SPEED SENSOR INSPECTION

(a) Connect the positive (+) lead from battery to terminal 1 and negative (−) lead to terminal 2.

(b) Connect the positive (+) lead from tester to terminal 3 and negative (−) lead to terminal 2.

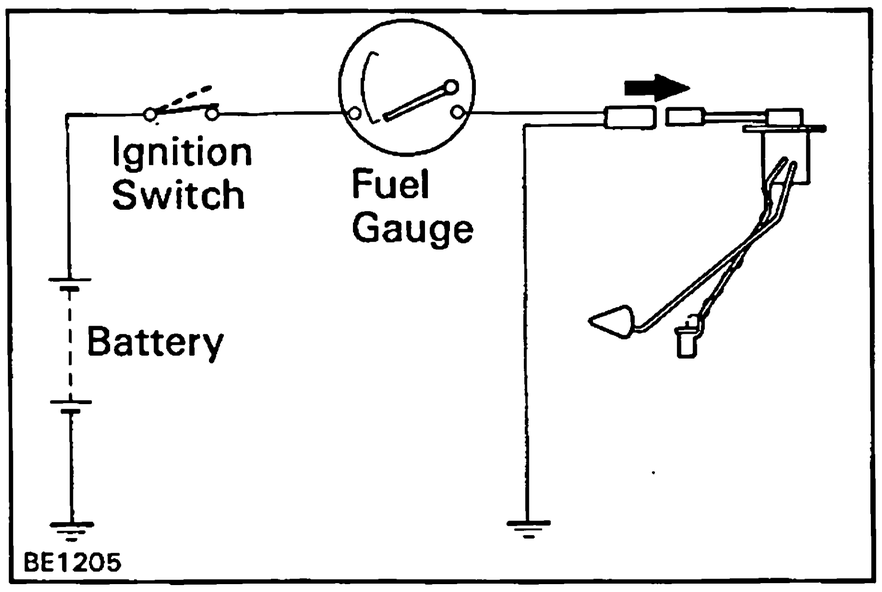
(c) Revolve shaft.

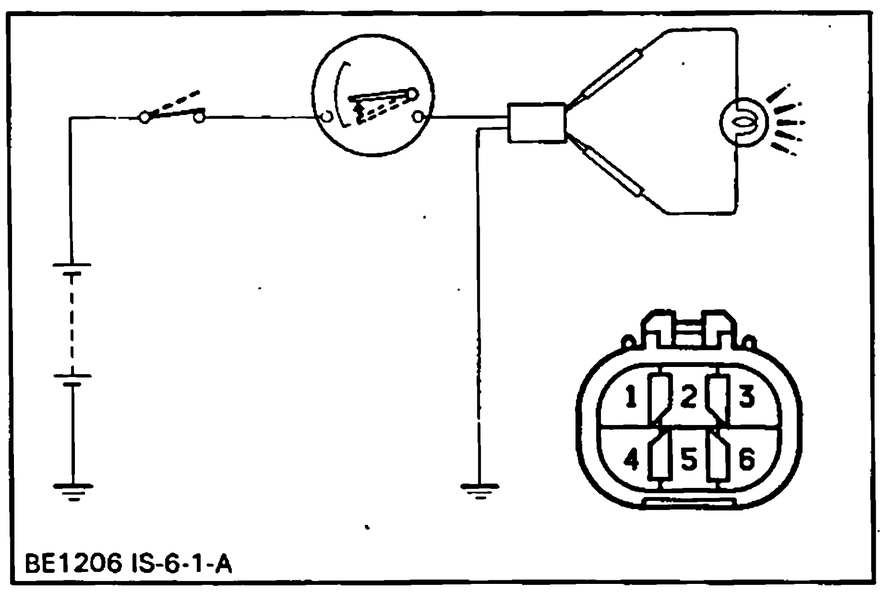
(d) Check that there is voltage changer from approx. 0 V to 11 V or more between terminal 3 and 2.

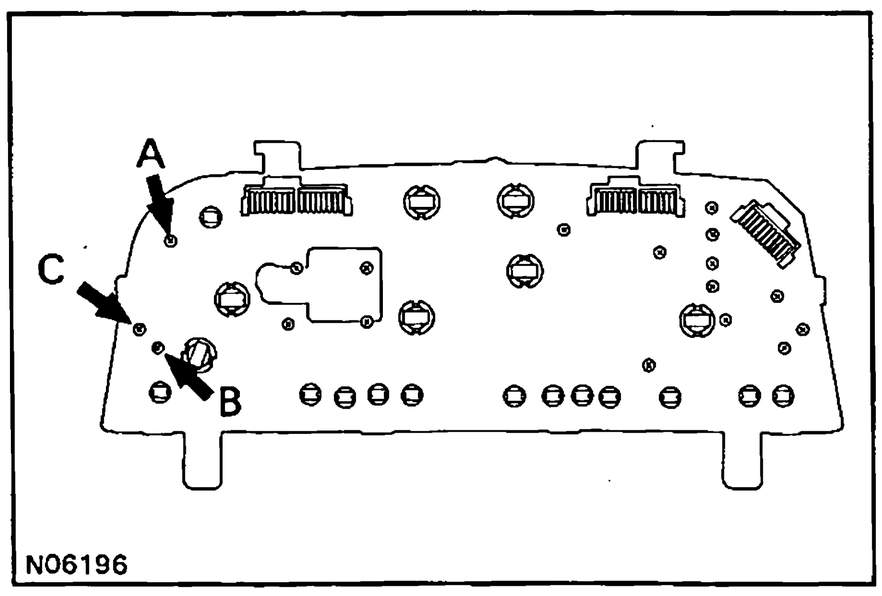
HINT: The voltage change should be 20 times per each revolution of the speed sensor shaft.

If operation is not as specified, replace the sensor.

| DC 13.5 V 20°C (68°F) rpm | |
|---|---|
| Standard Indication | Allowable range |
| 700 | 630 — 770 |
| 1,000 | 900 — 1,100 |
| 2,000 | 1,875 — 2,125 |
| 3,000 | 2,850 — 3,150 |
| 4,000 | 3,850 — 4,150 |
| 5,000 | 4,850 — 5,150 |




# TACHOMETER SYSTEM

## TACHOMETER INSPECTION

### INSPECT TACHOMETER (ON-VEHICLE)

(a) Connect a tune-up test tachometer, and start the engine.

**NOTICE:**

- **Reversing the connection of the tachometer will damage the transistors and diodes inside.**
- **When removing or installing the tachometer, be careful not to drop or subject it to heavy shocks.**

(b) Compare the tester and tachometer indications.

If error is excessive, replace the tachometer.

# FUEL GAUGE SYSTEM

## FUEL RECEIVER GAUGE INSPECTION

OPERATION

(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON, check that the receiver gauge needle indicates EMPTY.

(c) Connect terminals 4 and 5 on the wire harness side connector through a 3.4 watts test bulb.

(d) Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle moves towards the full side.

HINT: Because of the silicon oil in the gauge, it will take a short time for needle to stabilize.

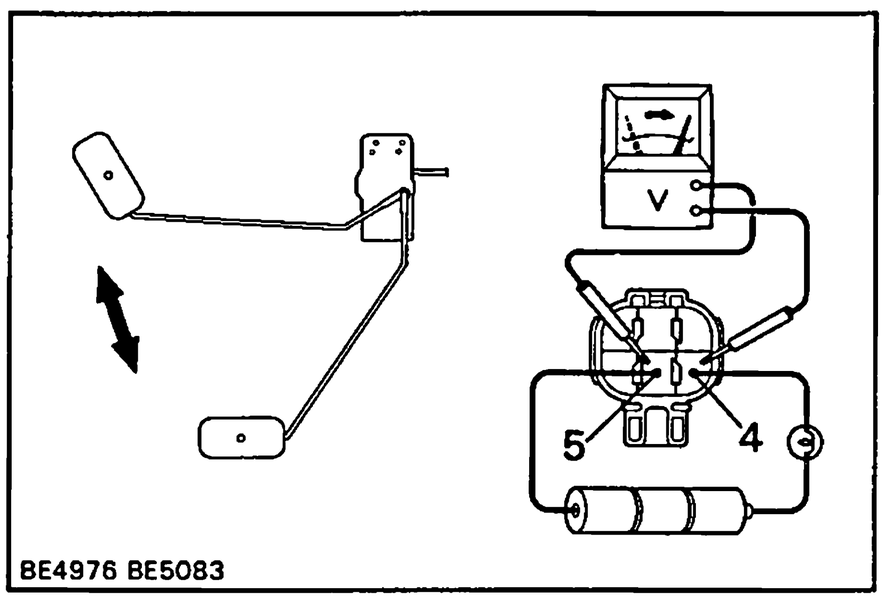
If operation is not as specified, inspect the receiver gauge resistance.

RESISTANCE

Measure the resistance between terminals.

| Between terminals | Resistance (Ω) |
|---|---|
| A — B | 85.5 — 105.5 |
| A — C | 126 — 150 |
| C — B | *90 — 110 |
| *: Include voltmeter resistance. | |

If resistance value is not as specified, replace the receiver gauge.



BE4976 BE5083

## FUEL SENDER GAUGE INSPECTION

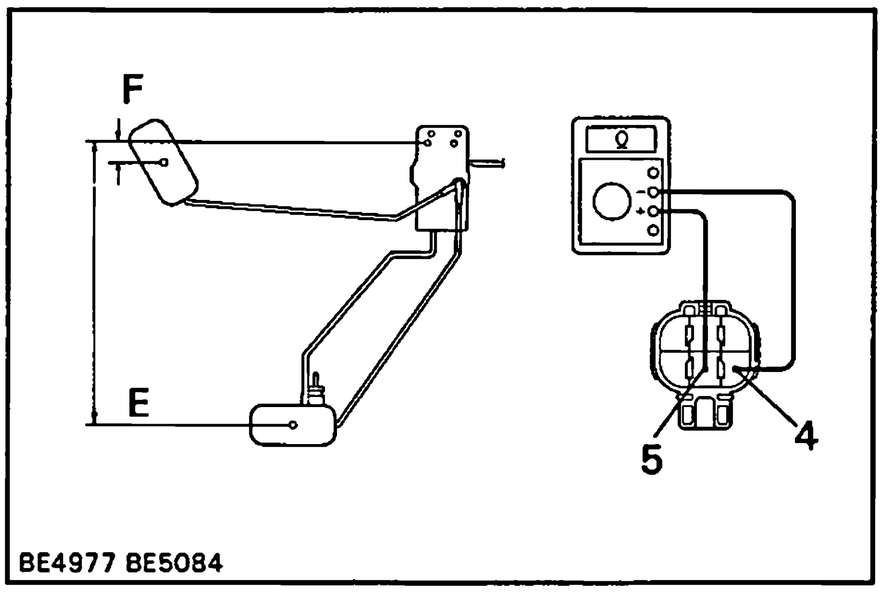
OPERATION

(a) Connect a series of three 1.5 volts dry cell batteries.

(b) Connect the positive (+) lead from the dry cell batteries to terminal 4 through a 3.4 watts test bulb and the negative (−) lead to terminal 5.

(c) Connect the positive (+) lead from the voltmeter to terminal 4 and the negative (−) lead to terminal 5.

(d) Check that the voltage rises as the float is moved from the full to empty position.



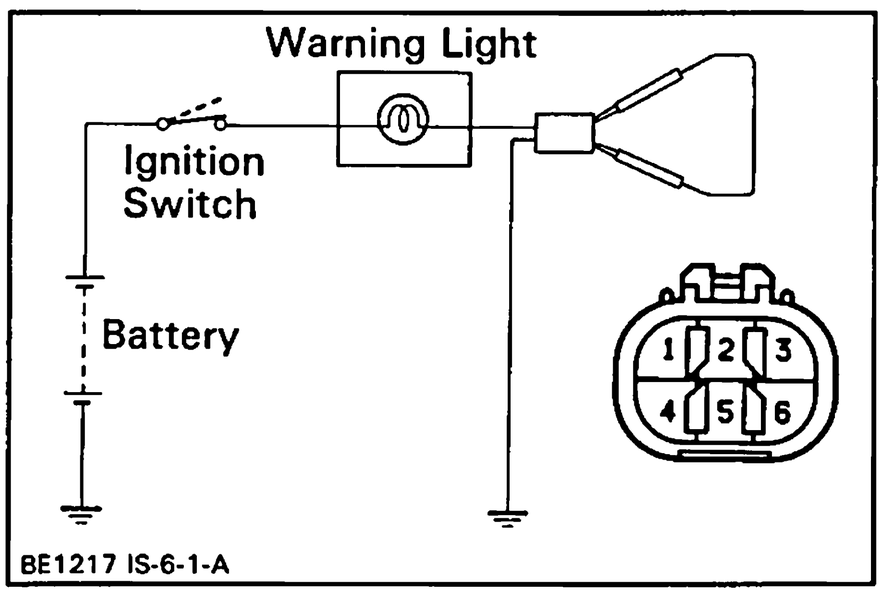
BE4977 BE5084

RESISTANCE

Measure the resistance between terminals 4 and 5.

| Float position mm (in.) | Resistance (Ω) |
|---|---|
| F approx. 15 (0.59) | approx. 3 |
| E approx. 200 (7.87) | approx. 110 |

If resistance value is not as specified, replace the sender gauge.



BE1217 IS-6-1-A

# FUEL LEVEL WARNING SYSTEM

## INSPECT WARNING LIGHT

(a) Disconnect the connector from the sender gauge.

(b) Connect terminals 1 and 5 on the wire harness side connector.

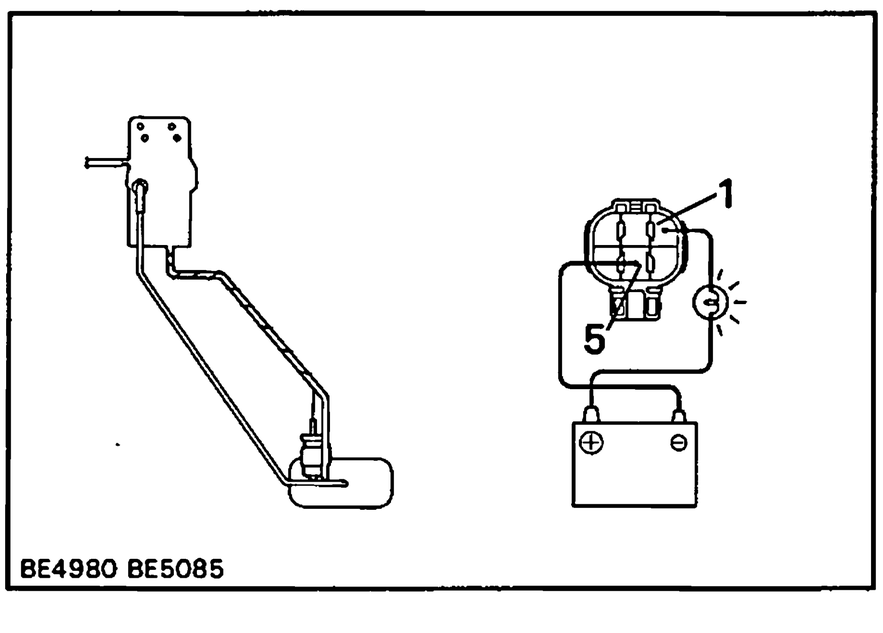
(c) Turn the ignition switch ON, check that the warning light lights up.

If the warning light does not light up, test the bulb.

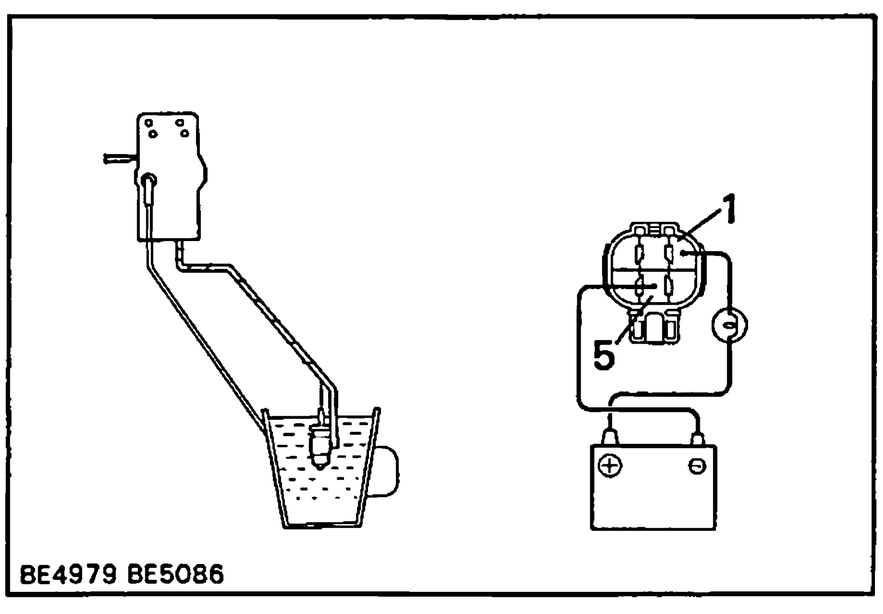
## INSPECT WARNING SWITCH

(a) Apply battery voltage between terminals 1 and 5 through a 3.4 watts test bulb, check that the bulb lights up.

HINT: It will take a short time for the bulb to light up.



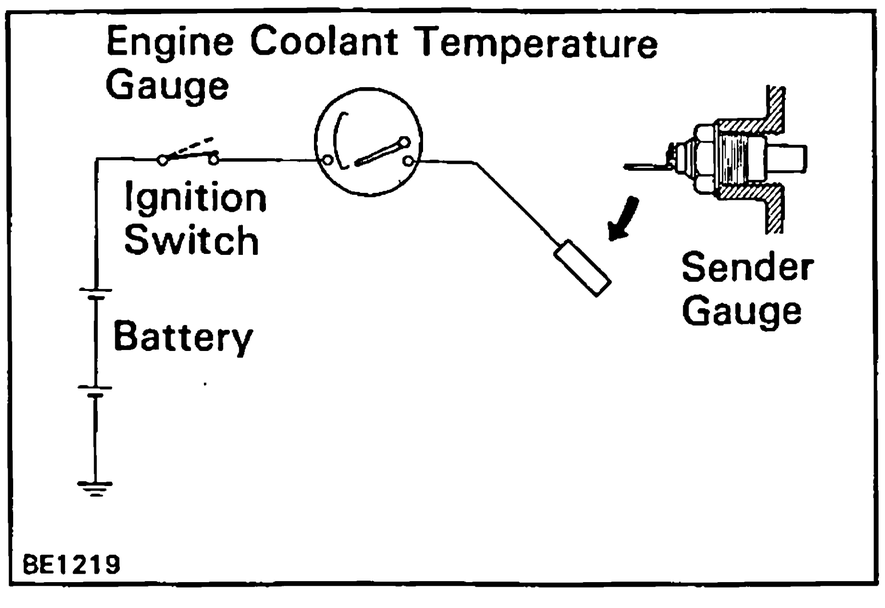
BE4980 BE5085



BE4979 BE5086

(b) Submerge the switch in fuel, check that the bulb goes out.

If operation is not specified, replace the sender gauge.



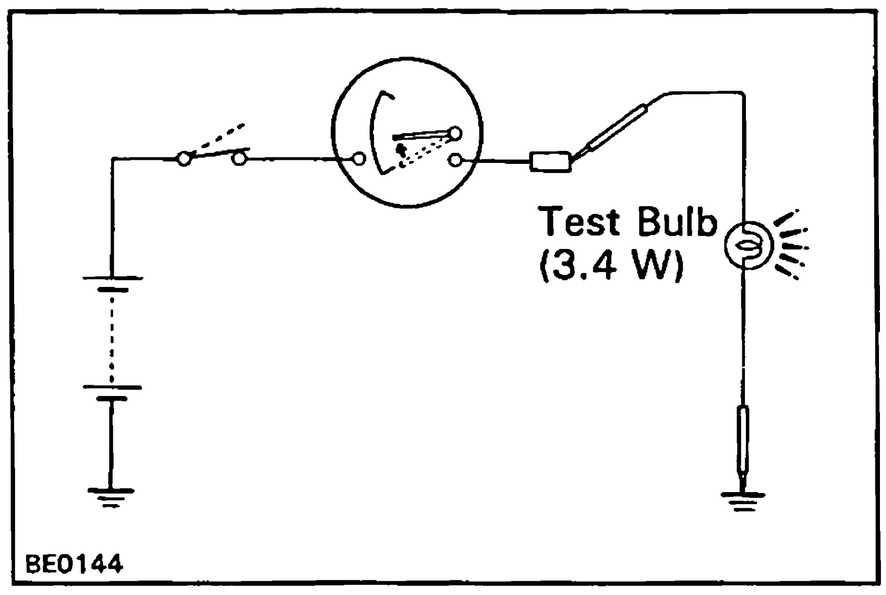

# WATER TEMPERATURE GAUGE SYSTEM

## WATER TEMPERATURE RECEIVER GAUGE INSPECTION

OPERATION

(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON, check that the receiver gauge needle indicates COOL.

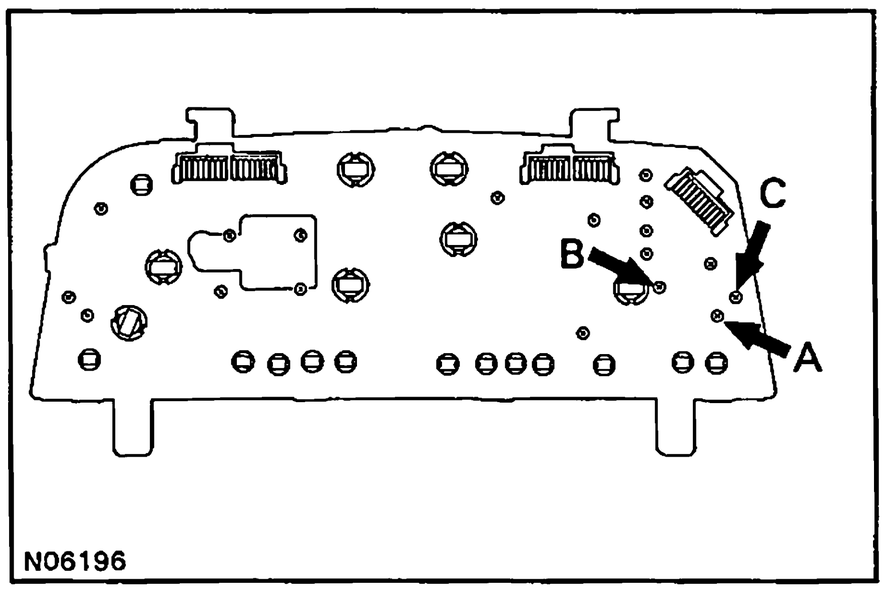



(c) Ground terminal on the wire harness side connector through a 3.4 watts test bulb.

(d) Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle moves to the hot side.

If operation is as specified, replace the sender gauge. Then recheck the system.

If operation is not as specified, measure the receiver gauge resistance.




RESISTANCE

Measure the resistance between terminals.

| Between terminals | Resistance (Ω) |
|---|---|
| A – B | 71 – 79 |
| A – C | 117 – 141 |
| B – C | 185 – 215 |

HINT: Connect the test leads so that the current from the ohmmeter can flow according to the above order. This circuit include the diode.

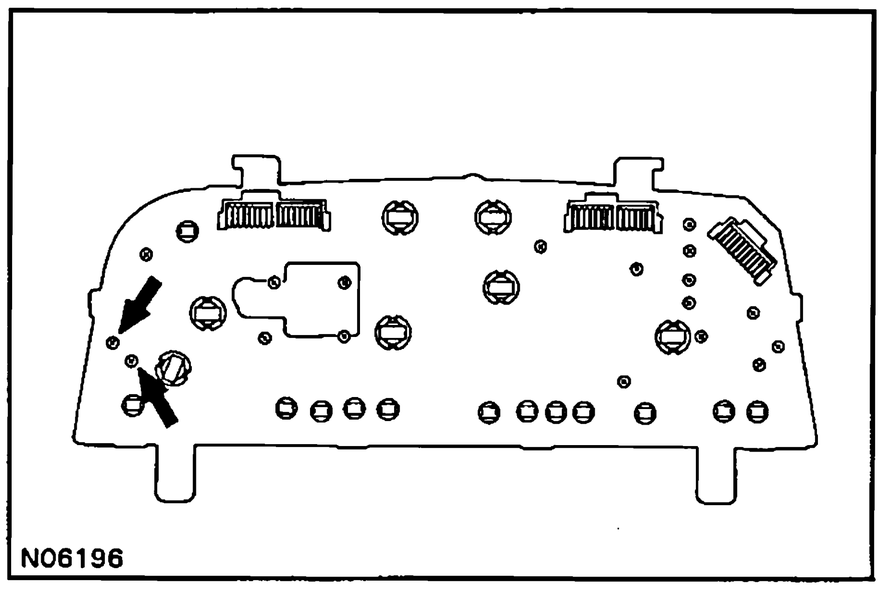
If resistance value is not as specified, replace the receiver gauge.

# VOLTMETER SYSTEM

## INSPECT VOLTMETER (ON-VEHICLE)

Compare the tester and voltmeter indications.

If error is excessive, replace the voltmeter.



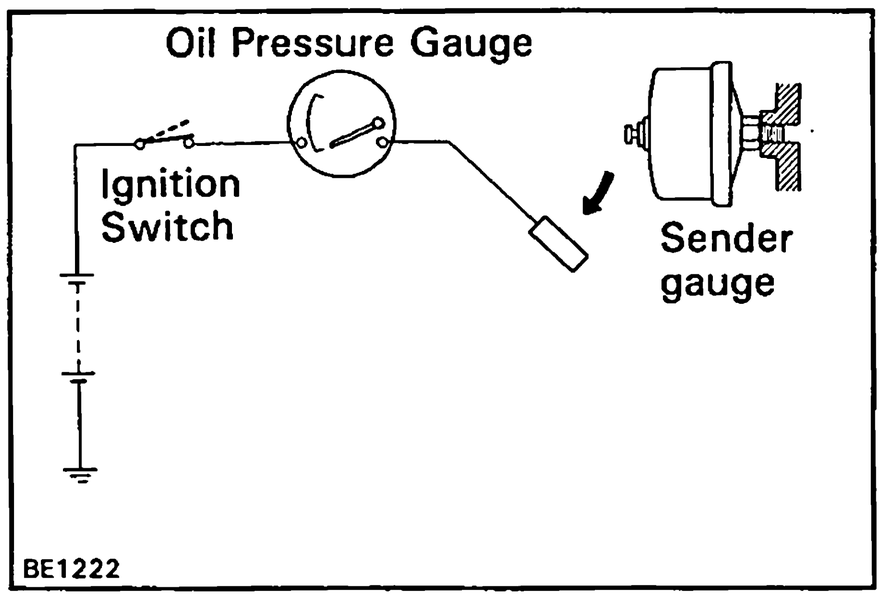

RESISTANCE

Measure the receiver gauge resistance between terminals.

**Resistance: 90 — 110 Ω**

If resistance value is not as specified, replace the receiver gauge.

HINT: This resistance include fuel receiver gauge resistance.



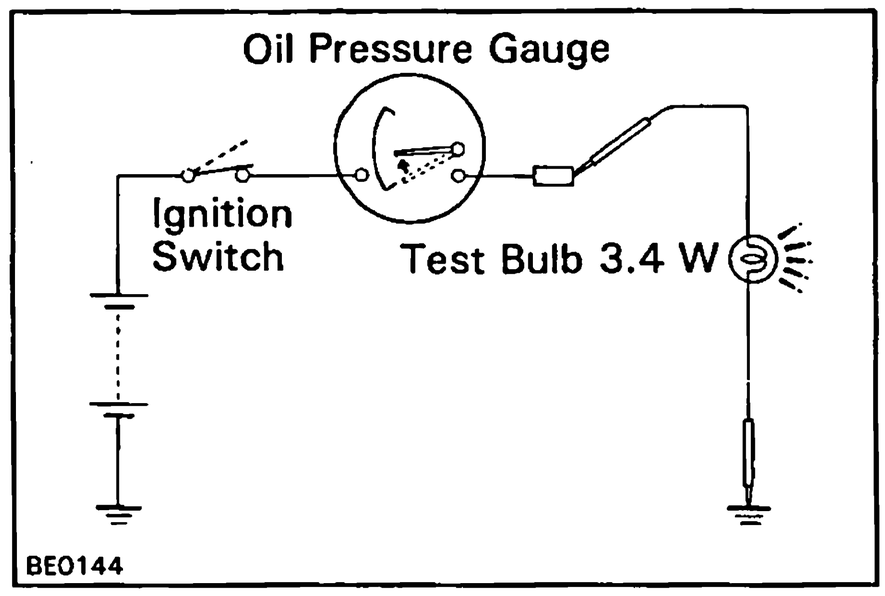

# OIL PRESSURE GAUGE SYSTEM

## OIL PRESSURE RECEIVER GAUGE INSPECTION

OPERATION

(a) Disconnect the connector from the sender gauge.

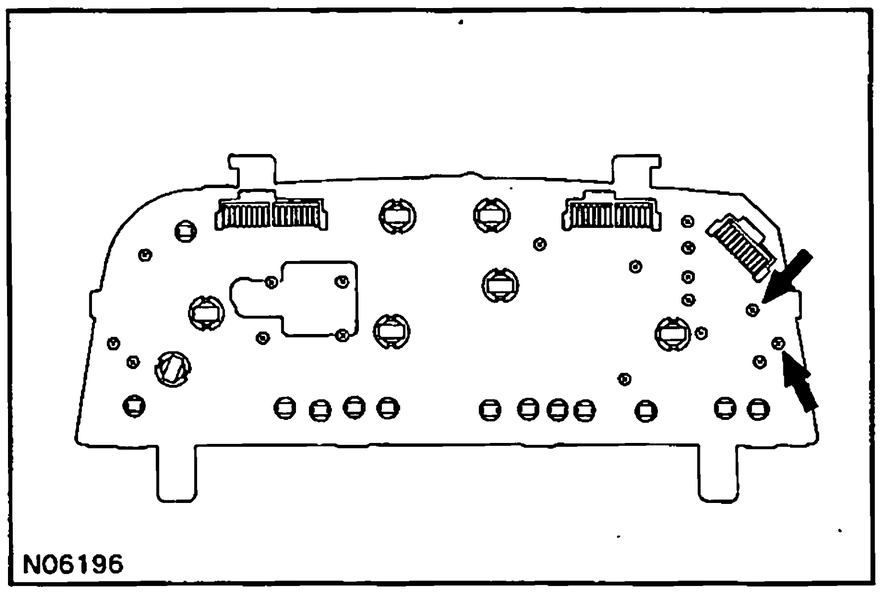
(b) Turn the ignition switch ON, check that the receiver gauge needle indicates LOW.




(c) Ground terminal on the wire harness side through a 3.4 W test bulb.

(d) Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle, moves to the high side.

If operation is not as specified, measure the receiver gauge resistance.

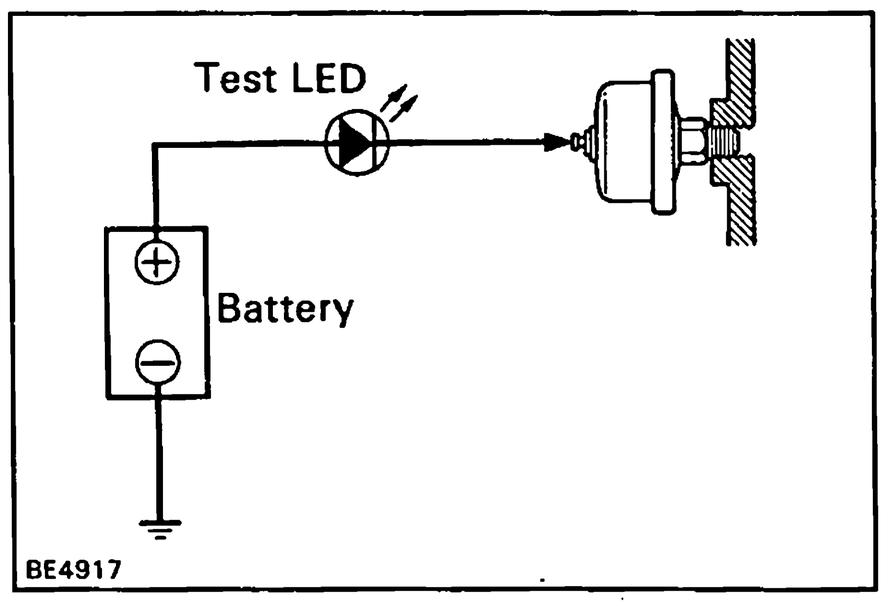



RESISTANCE

Measure the receiver gauge resistance between terminals.

**Resistance: 22 — 28 Ω**

If resistance value is not as specified, replace the receiver gauge.




## OIL PRESSURE SENDER GAUGE INSPECTION

### INSPECT SENDER GAUGE

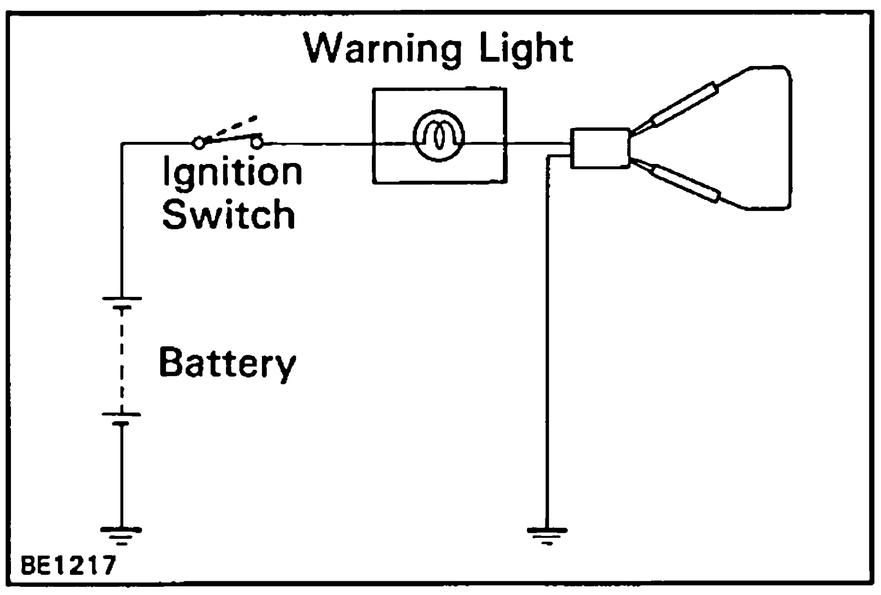
(a) Disconnect the connector from the sender gauge.

(b) Apply battery voltage to the sender gauge terminal through a test LED.

(c) Check that the bulb does not light when the engine is stopped.

(d) Check that the LED flashes when the engine is running. The number of flashed should vary with engine speed.

If operation is not as specified, replace the sender gauge.




# BRAKE WARNING SYSTEM

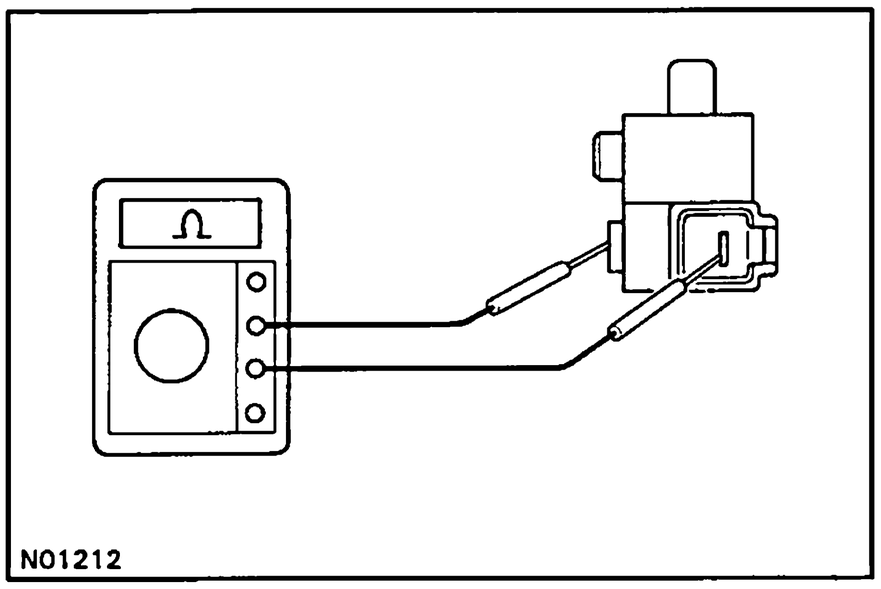
## BRAKE WARNING LIGHT INSPECTION

### INSPECT WARNING LIGHT

(a) Disconnect the connectors from the level warning switch, parking brake switch.

(b) Connect terminals on the wire harness side connector of the level warning switch connector.

(c) Turn the ignition switch ON, check that the warning light lights up.



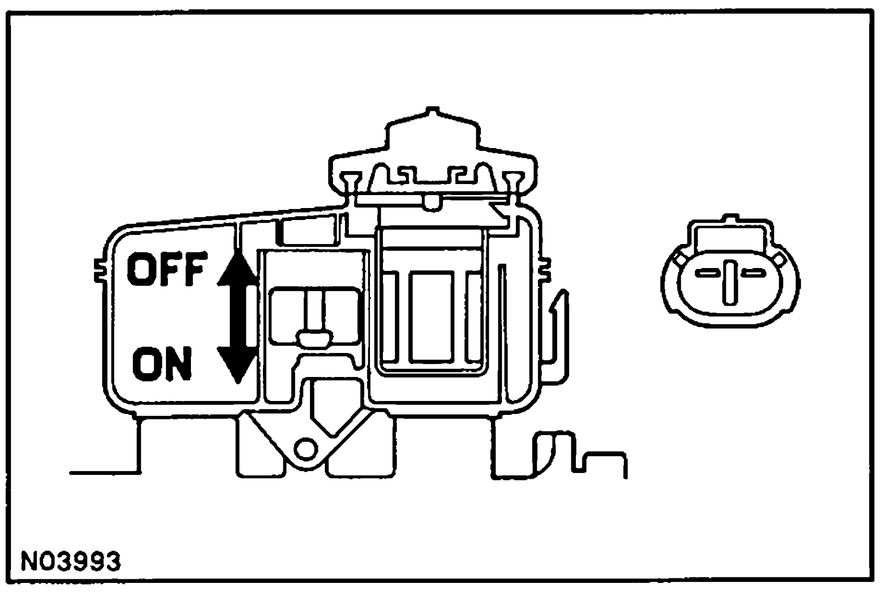

## PARKING BRAKE SWITCH INSPECTION

### INSPECT SWITCH

(a) Check that there is continuity between terminal and the switch set nut with switch pin released. (parking brake lever pulled up)

(b) Check that there is no continuity between terminal and the switch set nut with switch pin pushed in. (parking brake lever released)

If operation is not as specified, replace the switch.




## BRAKE FLUID LEVEL WARNING SWITCH INSPECTION

### INSPECT SWITCH

(a) Remove the reservoir tank cap and strainer.

(b) Disconnect the connector.

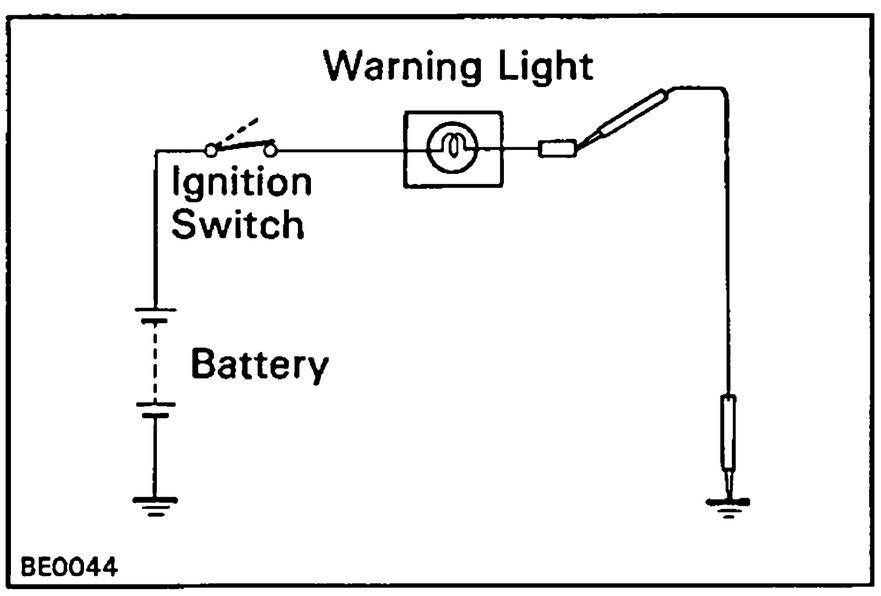
(c) Check that there is no continuity between terminals with the switch OFF (float up).

(d) Use syphon, etc. to take fluid out of the reservoir tank.

(e) Check that there is continuity between terminals with the switch ON (float down).

(f) Pour the fluid back in the reservoir tank.

If operation is not as specified, replace the switch.




# OPEN DOOR WARNING SYSTEM

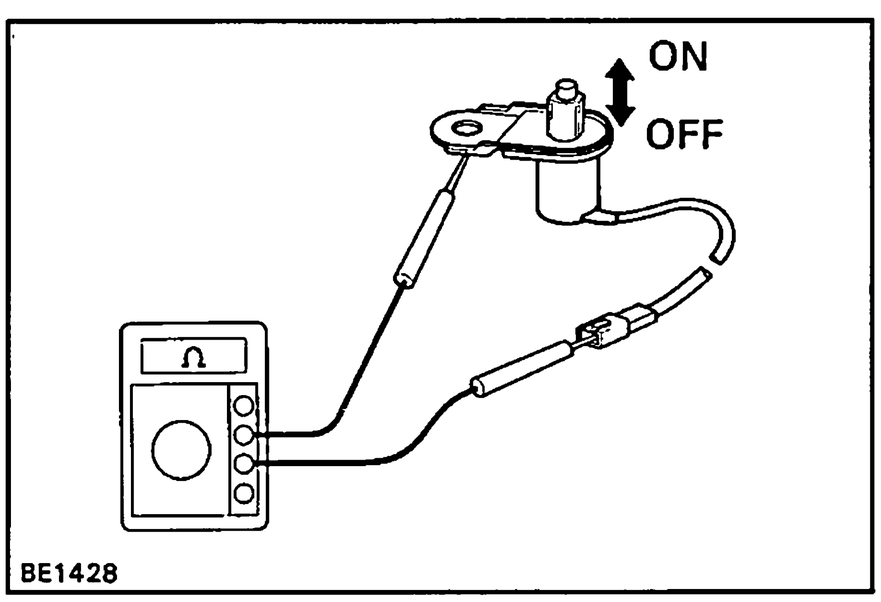
## OPEN DOOR WARNING INSPECTION

### INSPECT WARNING LIGHT

(a) Disconnect the connector form the door courtesy switch and ground terminal on the wire harness side connector.

(b) Turn the ignition switch ON, check that the warning light lights up.

If the warning light does not light up, test the bulb.



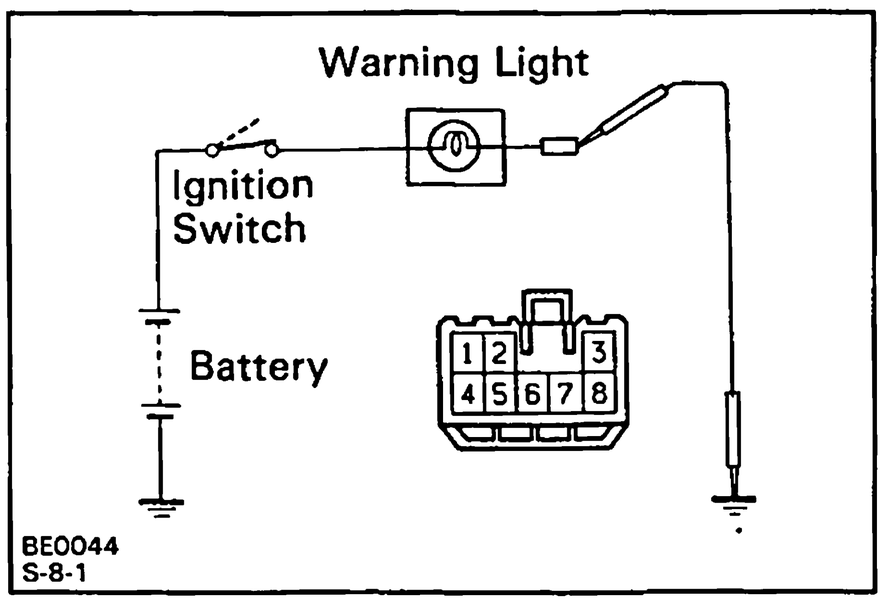

## DOOR COURTESY SWITCH INSPECTION

### INSPECT COURTESY SWITCH

(a) Check that there is continuity between terminal and the switch body with the ON (switch pin released: opened door).

(b) Check that there is no continuity between terminal and the switch body with the OFF (switch pin pushed in: closed door).

If operation is not as specified, replace the switch.




# SEAT BELT WARNING SYSTEM

## SEAT BELT WARNING INSPECTION

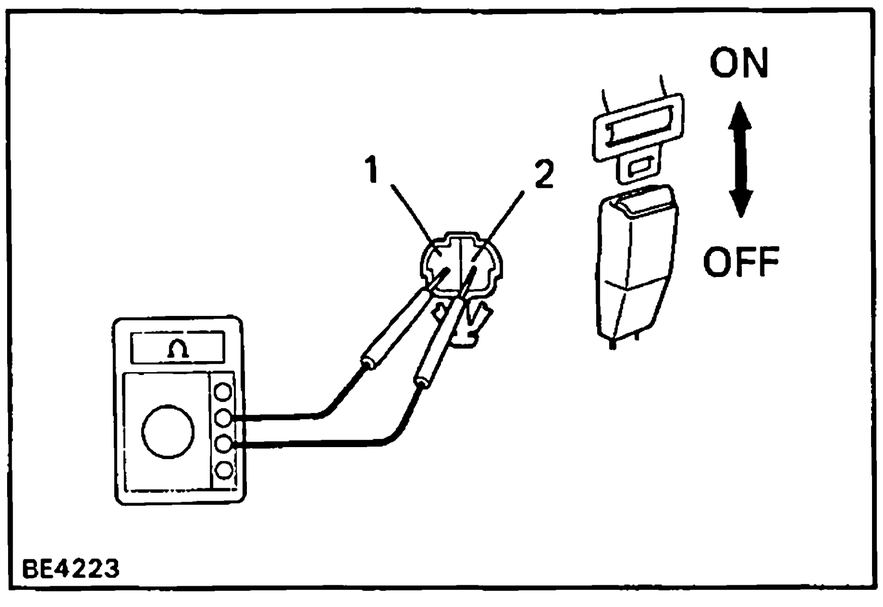
### INSPECT WARNING LIGHT

(a) Disconnect the connector from the seat belt warning relay.

(b) Ground terminal 2 on the wire harness side connector.

(c) Turn the ignition switch ON, check that the warning light lights up.

If the warning light does not light, test the bulb.




## SEAT BELT BUCKLE SWITCH INSPECTION

### INSPECT SWITCH

(a) Check that there is no continuity between terminals with the switch ON (belt unfastened).

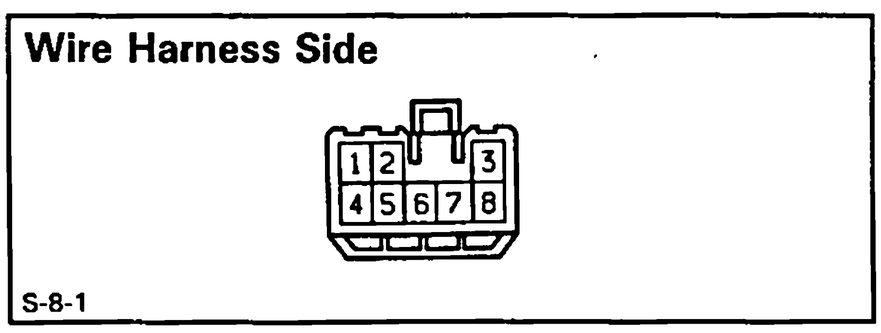
(b) Check that there is continuity between terminals with the switch OFF (belt fastened).

If operation is not as specified, replace the seat belt inner.

# DOOR COURTESY SWITCH

## DOOR COURTESY SWITCH INSPECTION

See page BE-16




## SEAT BELT WARNING RELAY INSPECTION

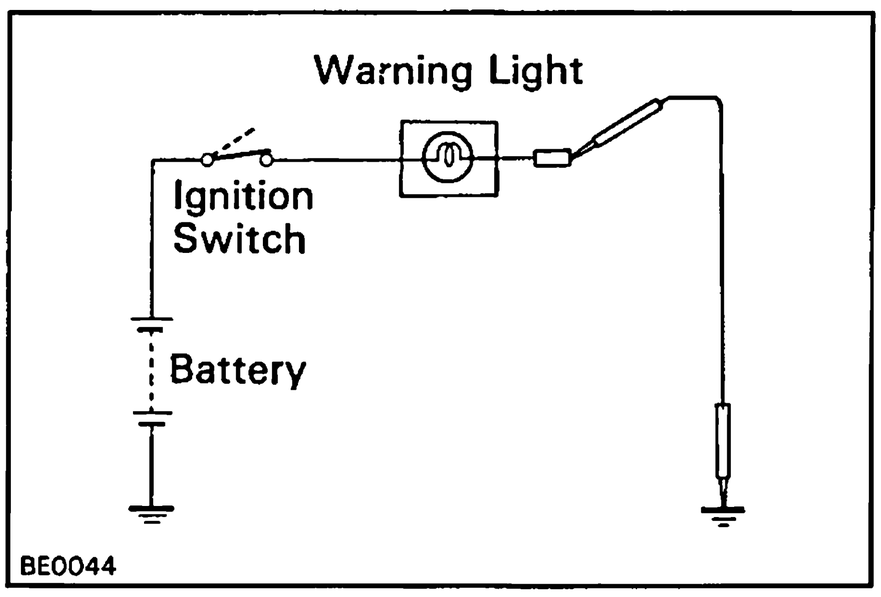
### RELAY CIRCUIT

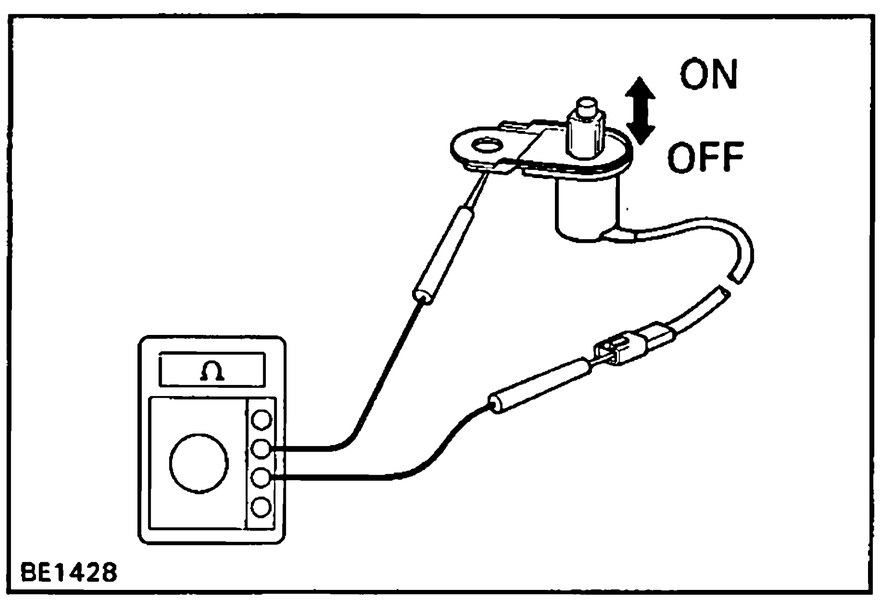
Disconnect the connector from the relay and inspect the connector on the wire harness side as shown in the chart.

| Check for | Tester connection | Condition | | Specified value |
|---|---|---|---|---|
| Voltage | 5 — Ground | Ignition switch position | ON | Battery voltage |
| | | | LOCK or ACC | No voltage |
| | 1 — Ground | Constant | | Battery voltage |

| | | | | |
|---|---|---|---|---|
| Continuity | 3 —Ground | Driver' s door | Open | Continuity |
| | | | Close | No continuity |
| | 4 —Ground | Driver's seat belt | Fasten | Continuity |
| | | | Unfasten | No continuity |
| | 7 —Ground | Ignition key | Set | Continuity |
| | | | Remove | No continuity |
| | 6 —Ground | Constant | | Continuity |

If circuit is as specified, try another relay.




# TIRE HALF-LOCK WARNING SYSTEM

## TIRE HALF-LOCK WARNING INSPECTION

### INSPECT WARNING LIGHT

(a) Disconnect the connector from the door courtesy switch and ground terminal on the wire harness side connector.

(b) Turn the ignition switch ON, check that the warning light lights up.

If the warning light does not light up, test the bulb.

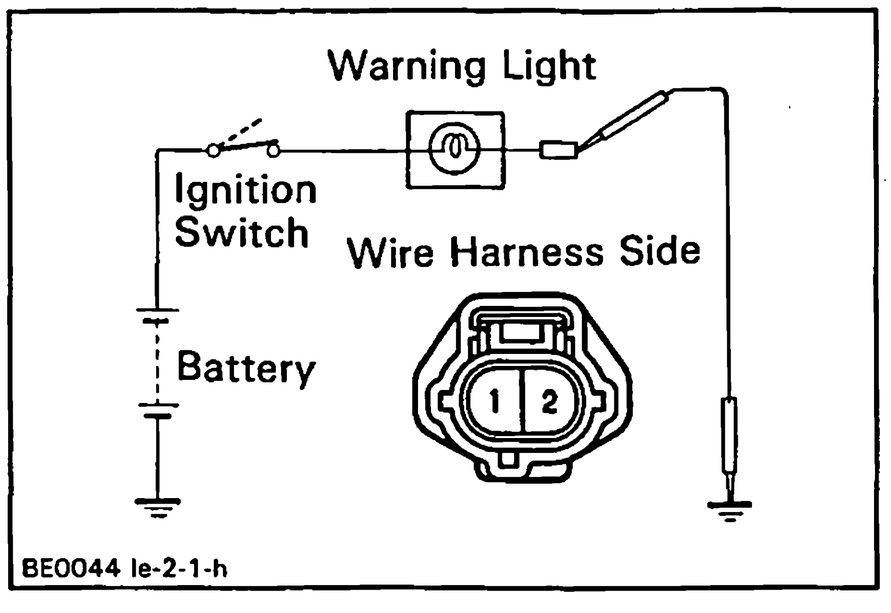
### TIRE HALF-LOCK INDICATOR SWITCH INSPECTION

### INSPECT SWITCH

(a) Check that there is continuity between terminal and the switch body with the ON (switch pin released: opened door).

(b) Check that there is no continuity between terminal and the switch body with the OFF (switch pin pushed in: closed door).

If operation is not as specified, replace the switch.




# ENGINE OIL LEVEL WARNING SYSTEM

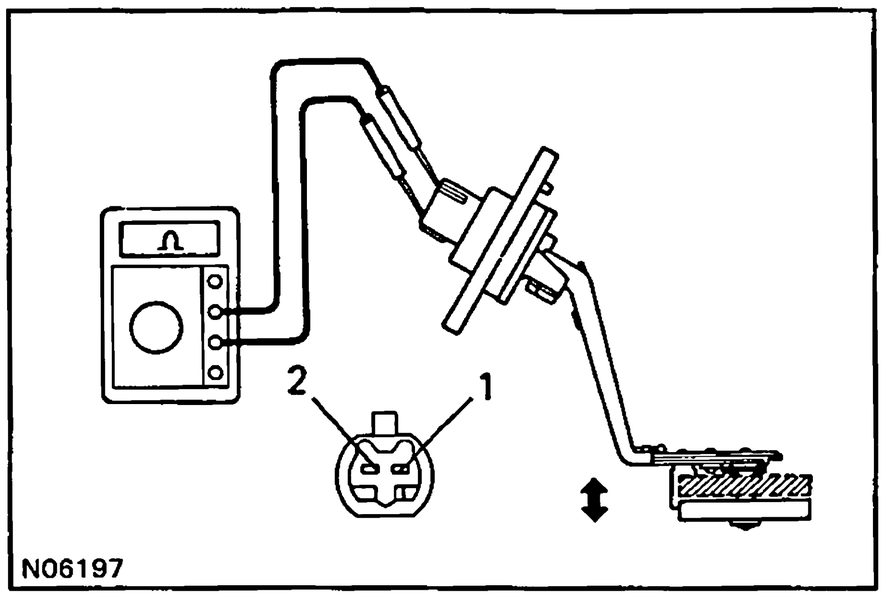
## INSPECT WARNING LIGHT

(a) Disconnect the connector from the engine oil level sensor.

(b) Ground terminal 2 on the wire harness side connector.

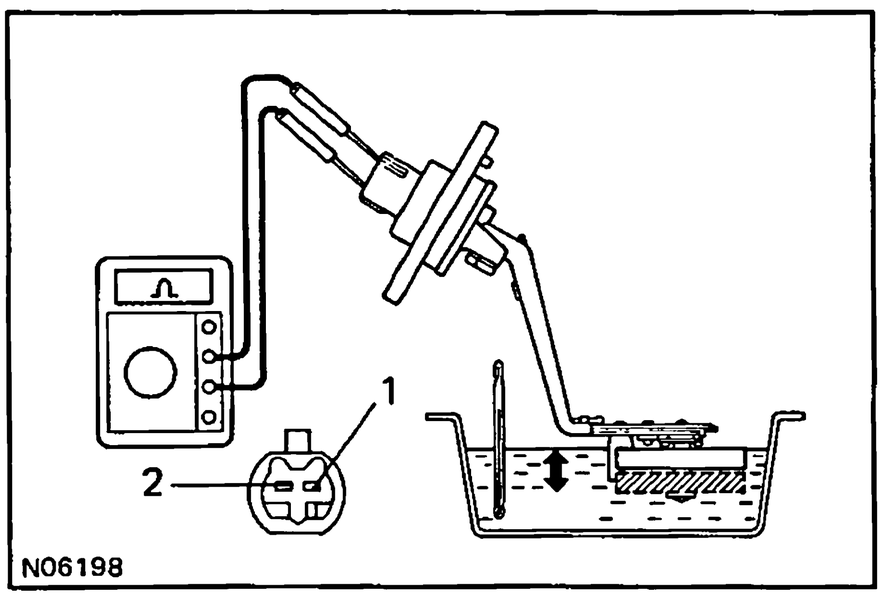
(c) Turn the ignition switch ON, check that the warning light lights up.

If the warning light does not light up, test the bulb.




## INSPECT ENGINE OIL LEVEL SENSOR

(a) Check that there is continuity between terminals with the switch each position.

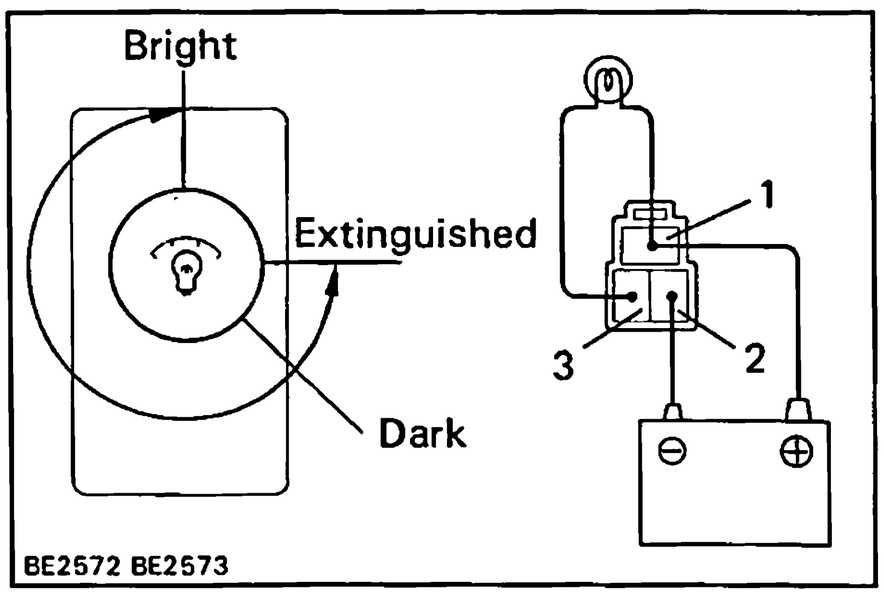



(b) Heat the switch to above 60°C (140°F) in an oil bath.

(c) Check that there is continuity between terminals with the switch ON (float up).

(d) Check that there is no continuity between terminals with the switch OFF (float down).

If operation is not as specified, replace the sensor.




# METER ILLUMINATION CONTROL SYSTEM

## INSPECT LIGHT CONTROL RHEOSTAT

(a) Connect terminals 1 and 3 through a 3.4 watts test bulb.

(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (−) lead to terminal 2.

(c) Turn the rheostat knob to fully counterclockwise, check that the test bulb goes out.

(d) Gradually turn the rheostat knob to clockwise, check that the test bulb brightness changes from dark to bright.

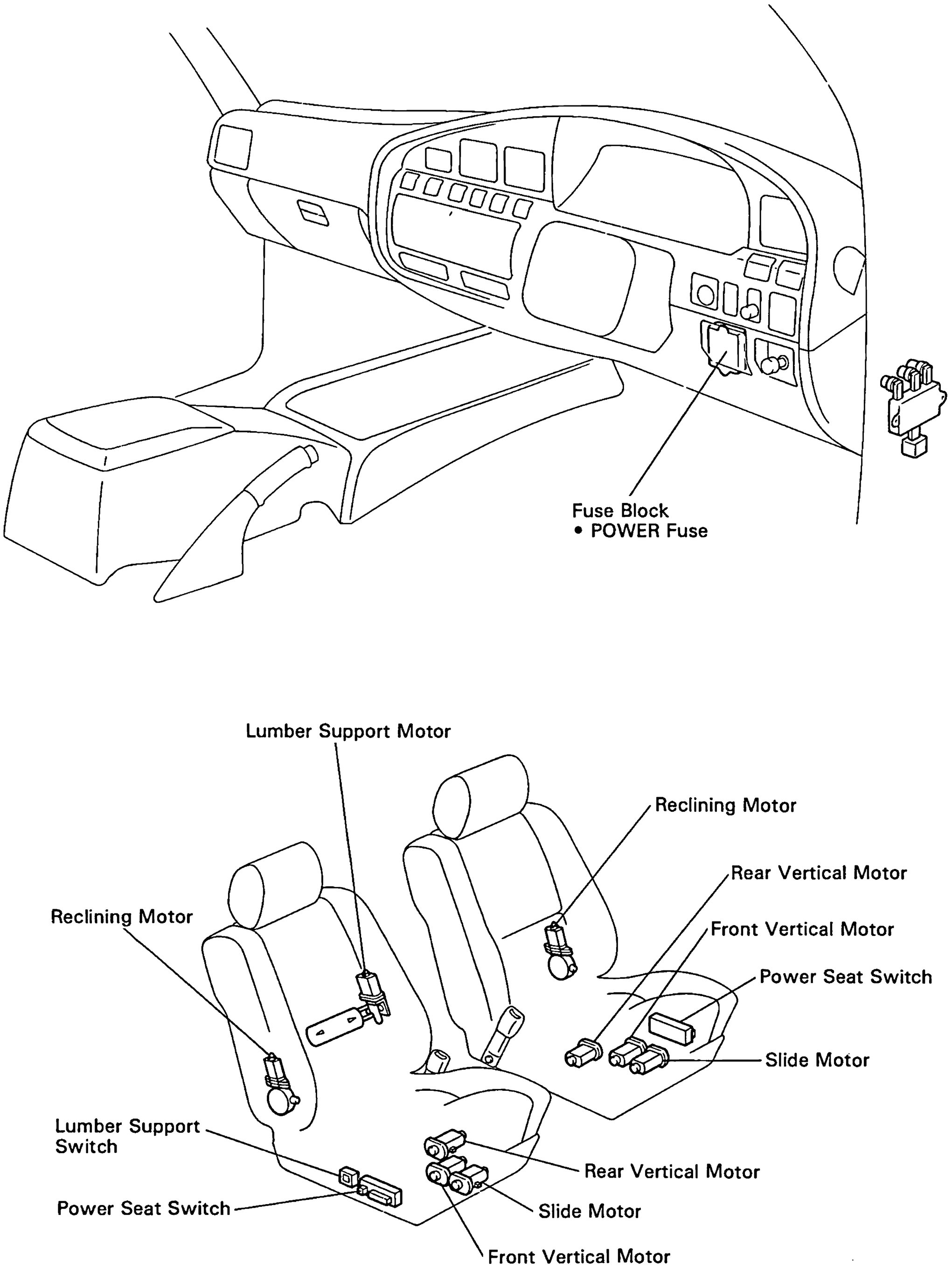
If operation is not as specified, replace the rheostat.

HINT: Illumination lights with adjustable brightness.

- Cigarette Lighter
- Ash Receptacle
- Antenna Switch
- Defogger Switch
- Headlight Cleaner Switch
- Audio
- A/C Control Assembly
- Center Diff. Lock Switch
- Hazard Warning Light Switch
- Shift Lever

# POWER SEAT CONTROL SYSTEM

## PARTS LOCATION




BE5073R
N06200R

# TROUBLESHOOTING

The table below will be useful for you in troubleshooting these electrical problems. The most likely causes of the malfunction are shown in the order of their probability. Inspect each part in the order shown, and replace the part when it is found to be faulty.

| Trouble | Part name | See page |
|---|---|---|
| Power seat does not operate.<br>(Door lock does not operate.) | 1. FL AM1<br>2. POWER Fuse<br>3. Wire Harness<br>4. Power Seat Switch (D)<br>5. Power Seat Switch (P) | –<br>–<br>–<br>BE-23<br>BE-24 |
| Power seat does not operate.<br>(Door lock is normal.) | 1. POWER Fuse<br>2. Wire Harness<br>3. Power Seat Switch (D)<br>4. Power Seat Switch (P) | –<br>–<br>BE-23<br>BE-24 |
| Driver's seat does not operate. | 1. Power Seat Switch (D)<br>2. Wire Harness | BE-23<br>– |
| Passenger's seat does not operate. | 1. Power Seat Switch (P)<br>2. Wire Harness | BE-24<br>– |
| "Slide operation" does not operate. | 1. Power Seat Switch (D)<br>2. Power Seat Switch (P)<br>3. Wire Harness | BE-23<br>BE-24<br>– |
| "Front vertical operation" does not operate. | 1. Power Seat Switch (D)<br>2. Power Seat Switch (P)<br>3. Wire Harness<br>4. Slide Motor (D, P) | BE-23<br>BE-24<br>–<br>BE-25 |
| "Rear vertical operation" does not operate. | 1. Power Seat Switch (D)<br>2. Power Seat Switch (P)<br>3. Wire Harness<br>4. Front Vertical Motor (D, P) | BE-23<br>BE-24<br>–<br>BE-25 |
| "Reclining operation" does not operate. | 1. Power Seat Switch (D)<br>2. Power Seat Switch (P)<br>3. Wire Harness<br>4. Reclining Motor (D, P) | BE-23<br>BE-24<br>–<br>BE-26 |
| "Lumber support operation" does not operate. | 1. Lumber Support Switch (D)<br>2. Wire Harness<br>3. Lumber Support Motor (D) | BE-23<br>–<br>BE-28 |

(D): Driver's Seat
(P): Passenger's Seat

# POWER SEAT SWITCH

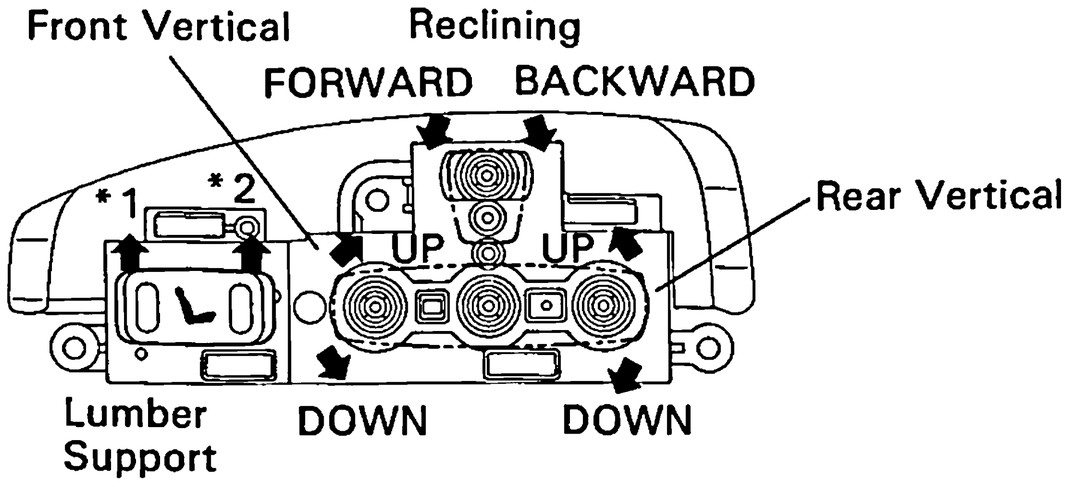
## POWER SEAT SWITCH INSPECTION

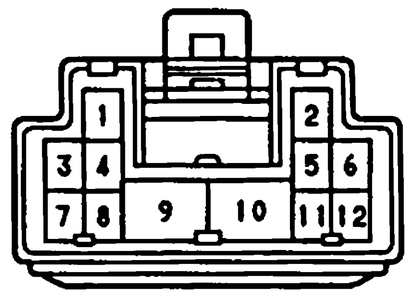
(DRIVER'S SIDE)

CONTINUITY

Inspect the switch continuity between terminals.

*1: FORWARD
*2: BACKWARD




N06201R eg-12-1

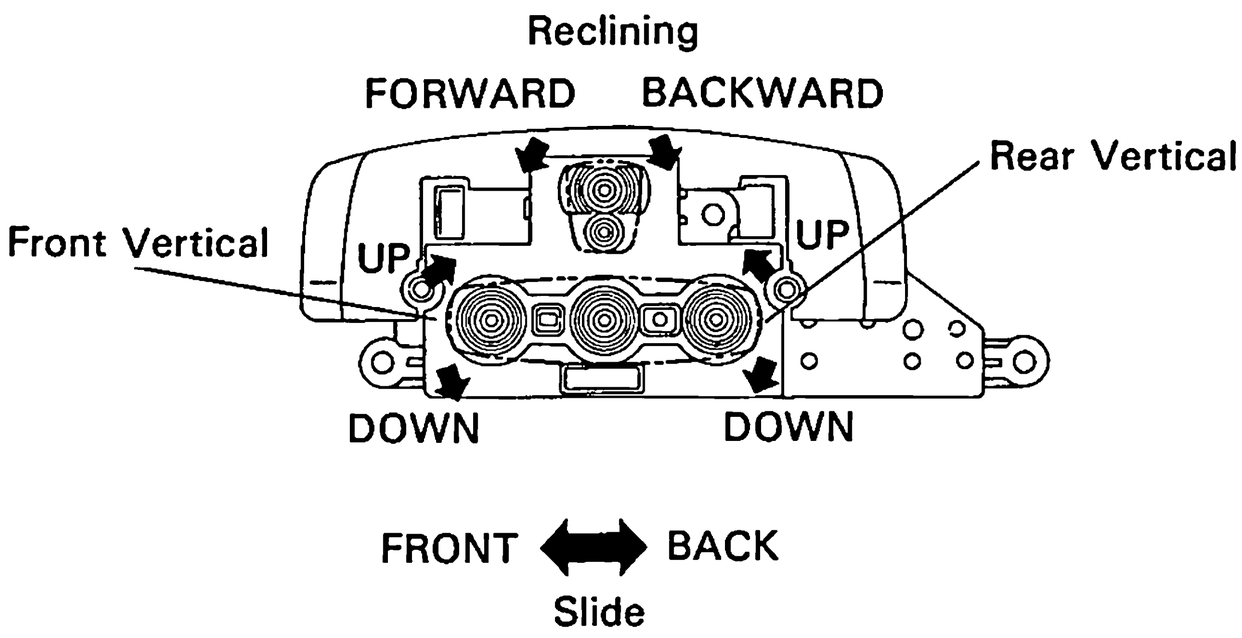
| Terminal / Switch position | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slide Switch | FORWARD | | | | | ○ | | | ○ | | ○ | | |
| | OFF | | | | | ○ | | | ○ | ○ | | | |
| | BACKWARD | | | | | | ○ | | | ○ | ○ | | |
| Front Vertical Switch | UP | | | | ○ | | | | | | ○ | | ○ |
| | OFF | | | | ○ | | | | | | | ○ | ○ |
| | DOWN | | | | ○ | | | | | | ○ | ○ | |
| Rear Vertical Switch | UP | | ○ | | | | ○ | | | | ○ | | |
| | OFF | | ○ | | | | ○ | | | | | | |
| | DOWN | | ○ | | | | | ○ | | | ○ | | |
| Reclining Switch | FORWARD | | | | ○ | | | | ○ | ○ | | | |
| | OFF | | | | ○ | | | ○ | ○ | | | | |
| | BACKWARD | | | | ○ | | | ○ | | ○ | | | |
| Lumber Support Switch | FORWARD | ○ | | ○ | | | | | | ○ | | | |
| | OFF | ○ | | ○ | | | | | | | | | |
| | BACKWARD | ○ | | ○ | | | | | | ○ | | | |

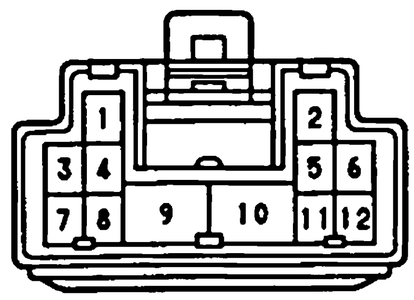
If continuity is not as specified, replace the switch.

(PASSENGER' S SIDE)

CONTINUITY

Inspect the switch continuity between terminals.

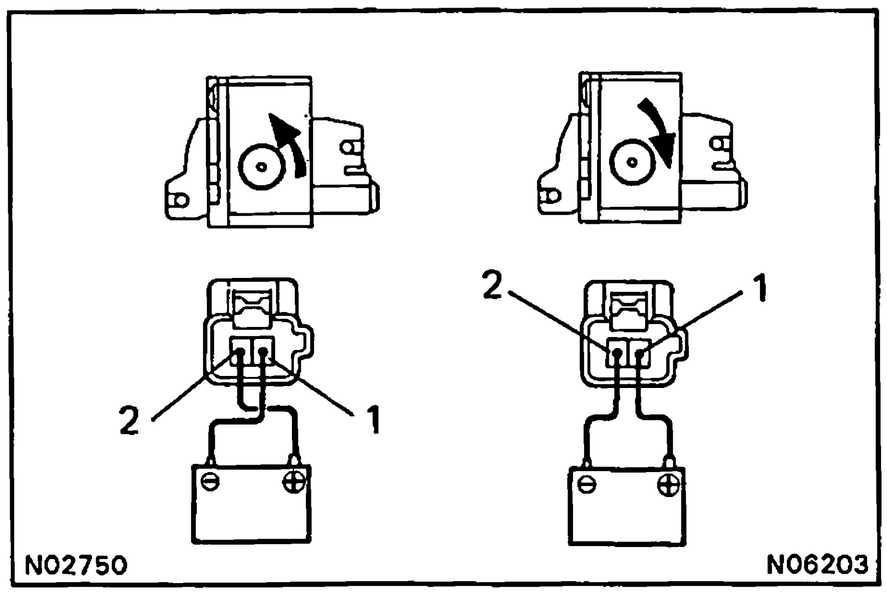



N06202R eg-12-1

| Switch position \ Terminal | | 2 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Slide Switch | FORWARD | | | ○ | — | — | ○ | ○ | ○ | | |
| | OFF | | | ○ | — | — | ○ | ○ | | | |
| | BACKWARD | | | ○ | — | — | ○ | ○ | ○ | | |
| Front Vertical Switch | UP | | ○ | — | — | — | — | — | ○ | — | ○ |
| | OFF | | ○ | — | — | — | — | — | ○ | ○ | ○ |
| | DOWN | | ○ | — | — | — | — | — | ○ | ○ | ○ |
| Rear Vertical Switch | UP | ○ | — | — | ○ | ○ | — | — | ○ | | |
| | OFF | ○ | — | — | ○ | ○ | — | — | | | |
| | DOWN | ○ | — | — | ○ | ○ | — | — | ○ | | |
| Reclining Switch | FORWARD | | ○ | — | — | ○ | — | ○ | ○ | | |
| | OFF | | ○ | — | — | ○ | — | ○ | | | |
| | BACKWARD | | ○ | — | — | ○ | — | ○ | ○ | | |

If continuity is not as specified, replace the switch.



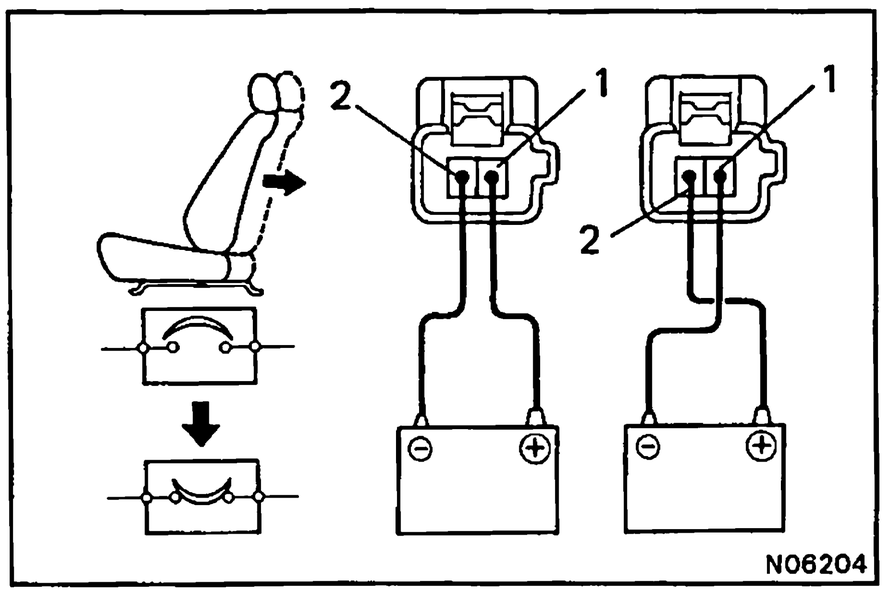

# POWER SEAT MOTOR

## SLIDE MOTOR INSPECTION
## MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (−) lead to terminal 2, check that the motor turns counterclockwise.

(b) Reverse the polarity, check that the motor turns clockwise.

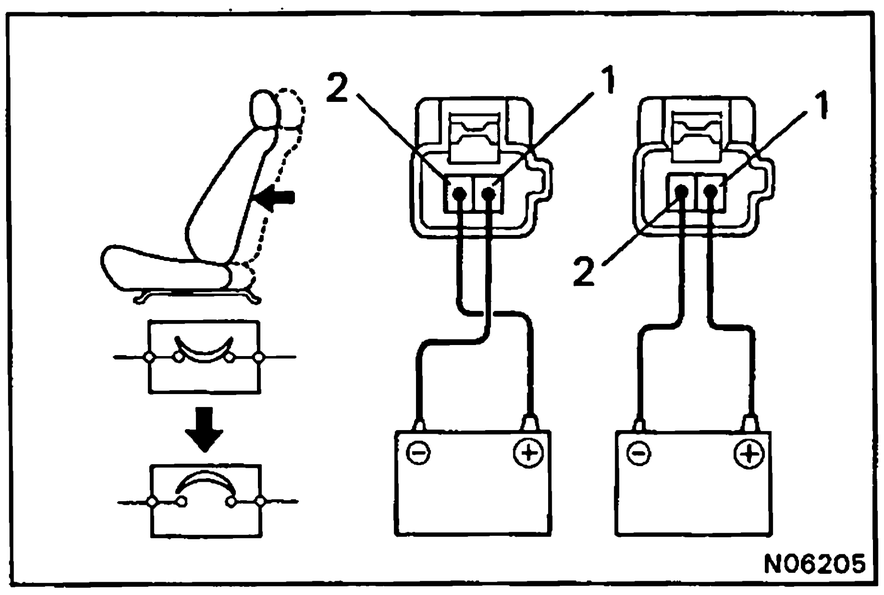
If operation is not as specified, replace the motor.




## CIRCUIT BREAKER OPERATION

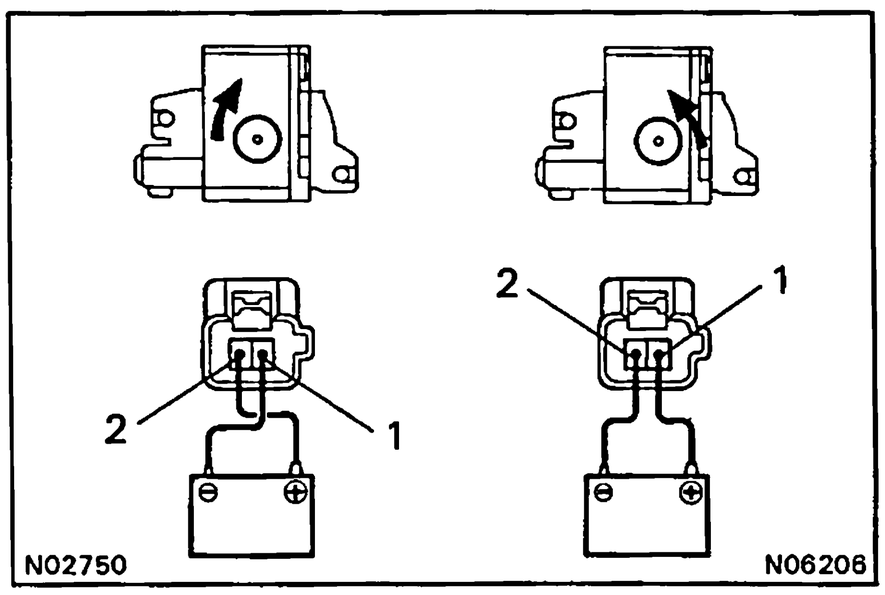
(a) Connect the positive (+) lead and the negative (−) lead from the battery to slide motor connector (illustrated terminals), and slide the seat to front end position.

(b) Continue to apply voltage, check that there is a circuit breaker operation noise within 4 to 60 seconds.




(c) Reverse the polarity, check that the seat begins to move backwards within approximately 60 seconds.

If operation is not as specified, replace the motor.

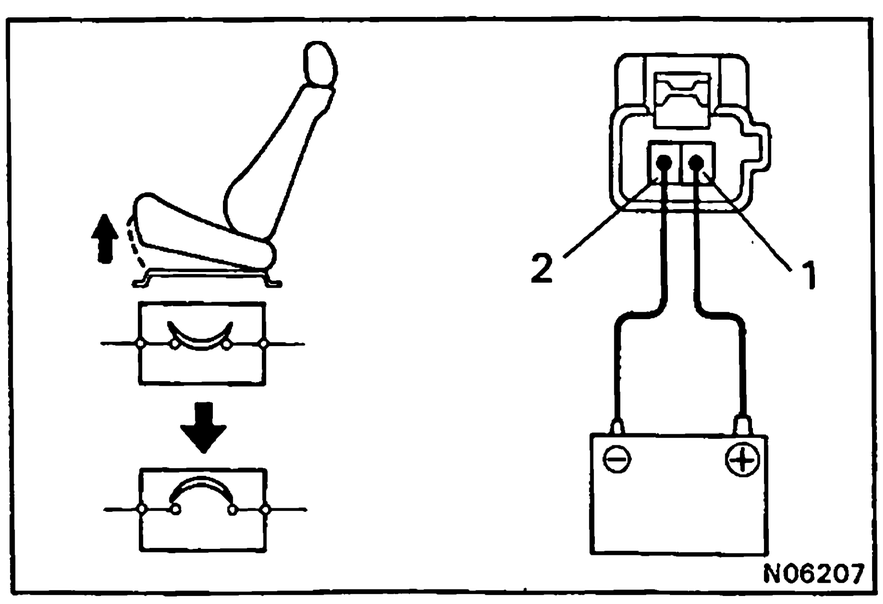



## FRONT VERTICAL MOTOR INSPECTION
## MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (−) lead to terminal 2, check that the motor turns counterclockwise.

(b) Reverse the polarity, check that the motor turns clockwise.

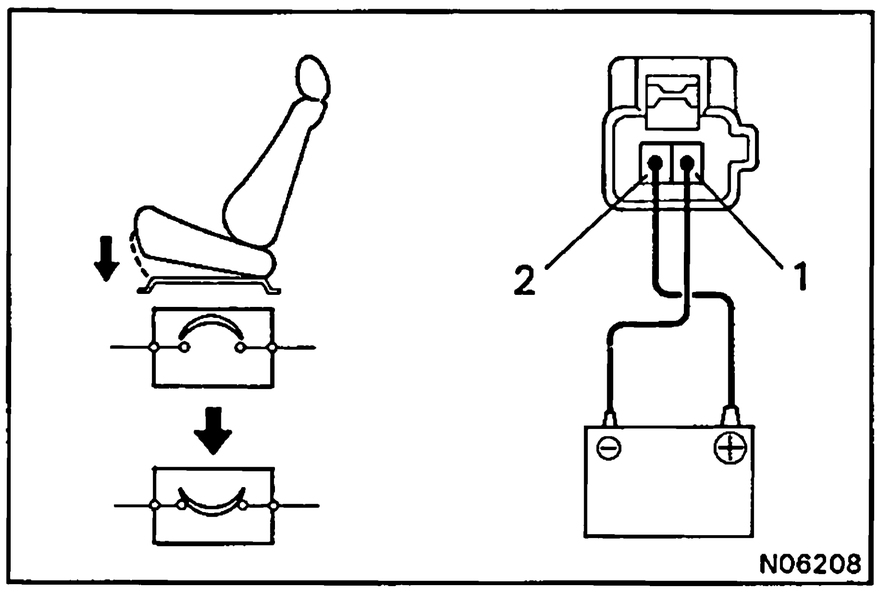
If operation is not as specified, replace the motor.




## CIRCUIT BREAKER OPERATION

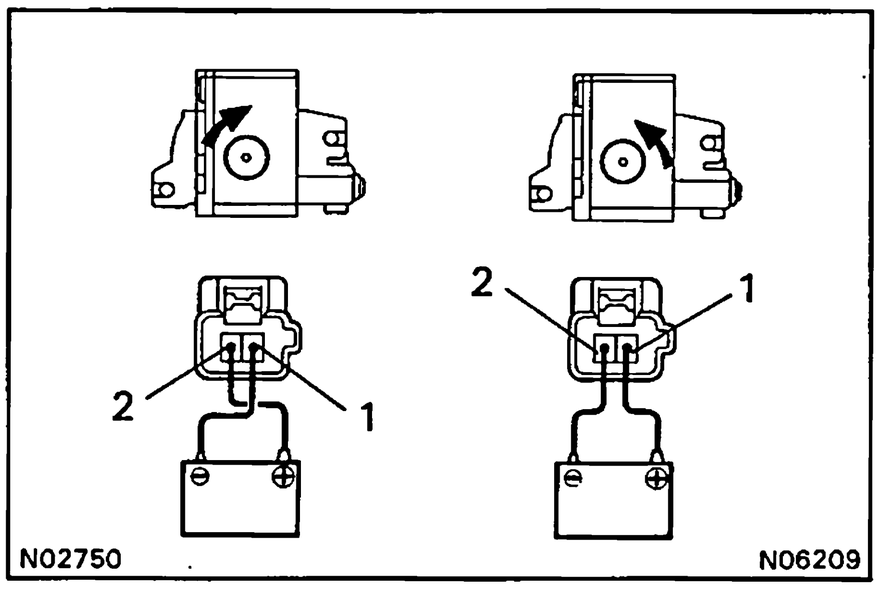
(a) Connect the positive (+) lead and the negative (−) lead from the battery to the front vertical motor connector (illustrated terminals), and move the front edge of seat cushion to the highest position.

(b) Continue to apply voltage, check that there is a circuit breaker operation noise within 4 to 60 seconds.




(c) Reverse the polarity, check that the seat cushion begins to descend within approximately 60 seconds.

If operation is not as specified, replace the motor.

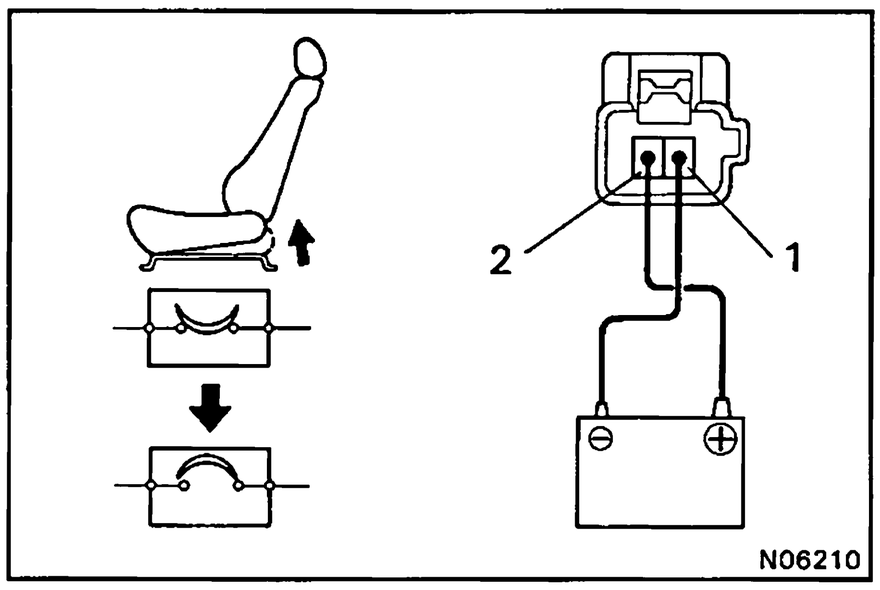



**REAR VERTICAL MOTOR INSPECTION**
**MOTOR OPERATION**

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (−) lead to terminal 1, check that the motor turns counterclockwise.

(b) Reverse the polarity, check that the motor turns clockwise.

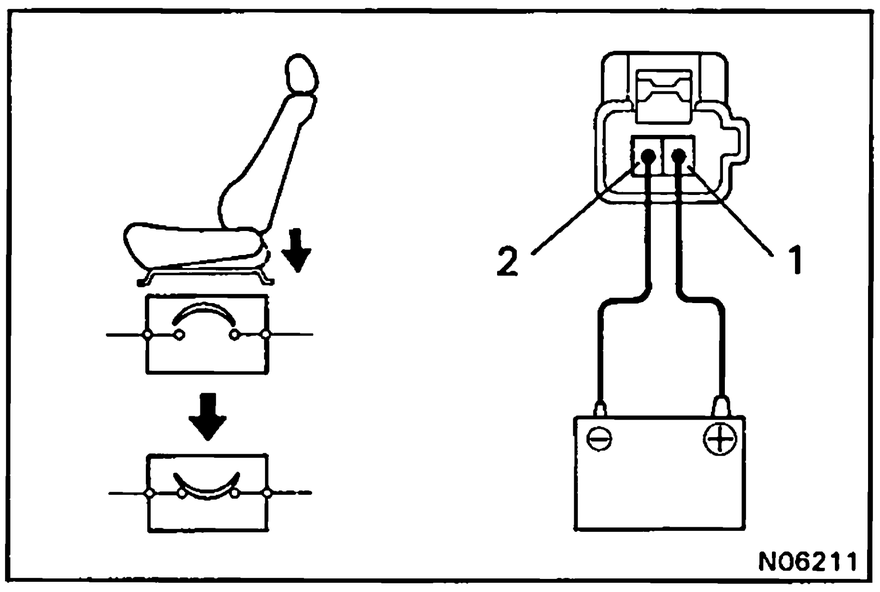
If operation is not as specified, replace the motor.




**CIRCUIT BREAKER OPERATION**

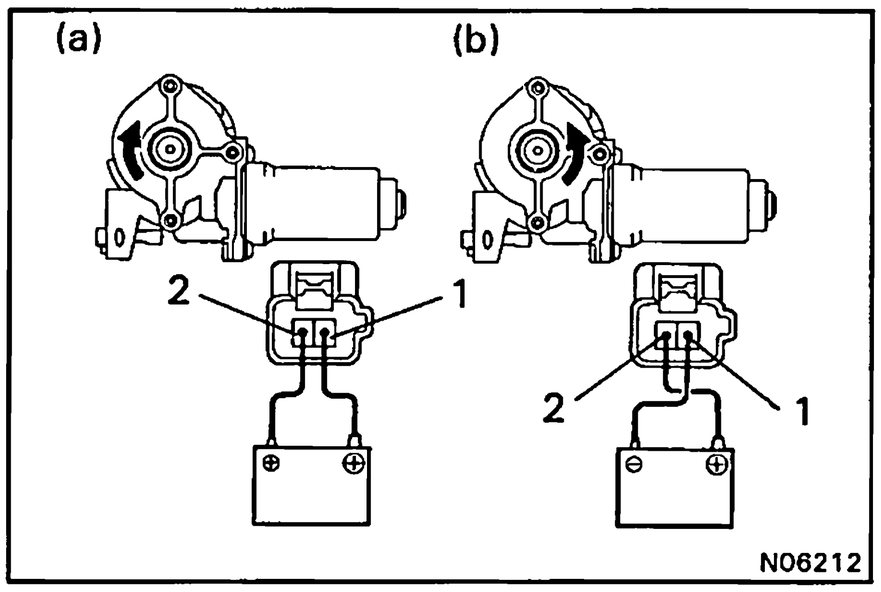
(a) Connect the positive (+) lead and the negative (−) lead from the battery to the rear vertical motor connector (illustrated terminals), and move the front edge of seat cushion to the highest position.

(b) Continue to apply voltage, check that there is a circuit breaker operation noise within 4 to 60 seconds.




(c) Reverse the polarity, check that the seat cushion begins to descend within approximately 60 seconds.

If operation is not as specified, replace the motor.

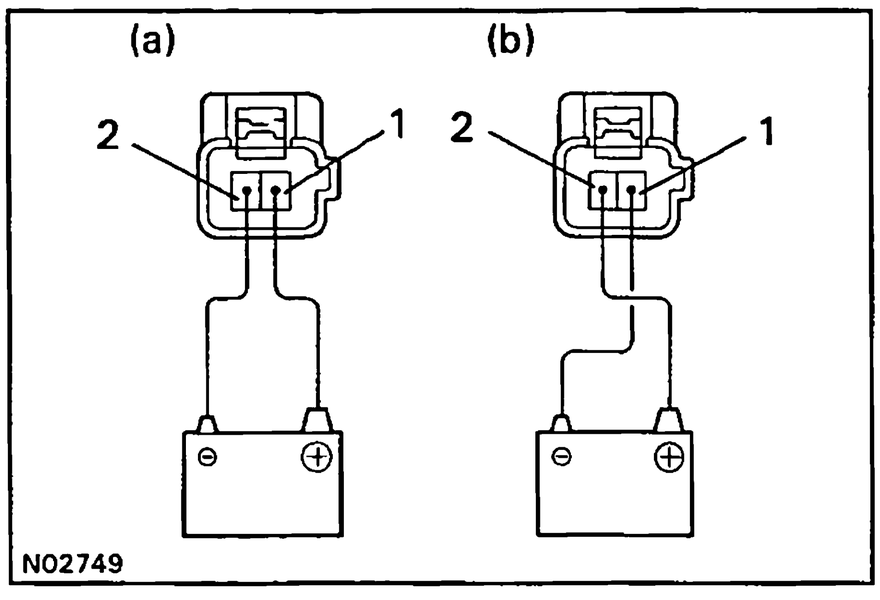



**RECLINING MOTOR INSPECTION**
**MOTOR OPERATION DRIVER' S SEAT**

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (−) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counterclockwise.

If operation is not as specified, replace the motor.

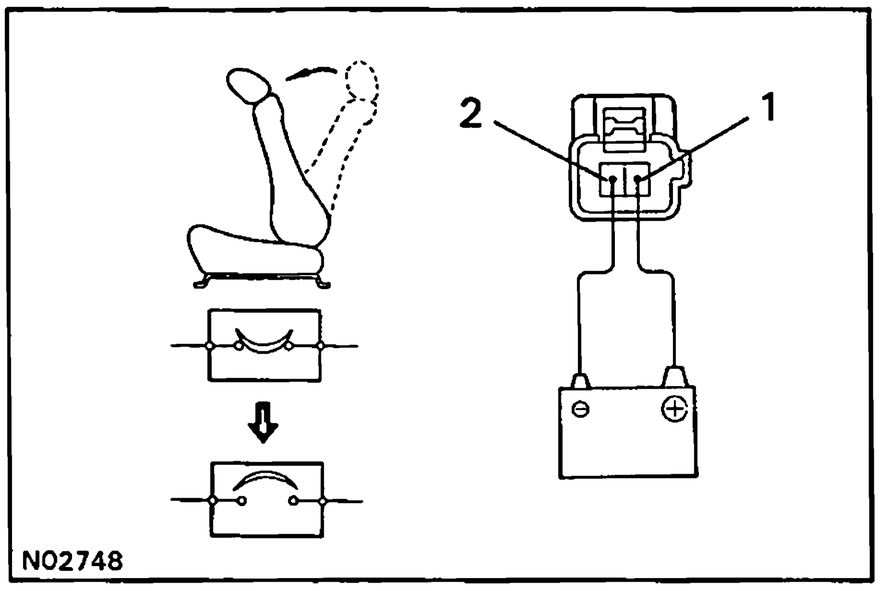



## MOTOR OPERATION PASSENGER' S SEAT

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (−) lead to terminal 2, check that the motor turns counterclockwise.

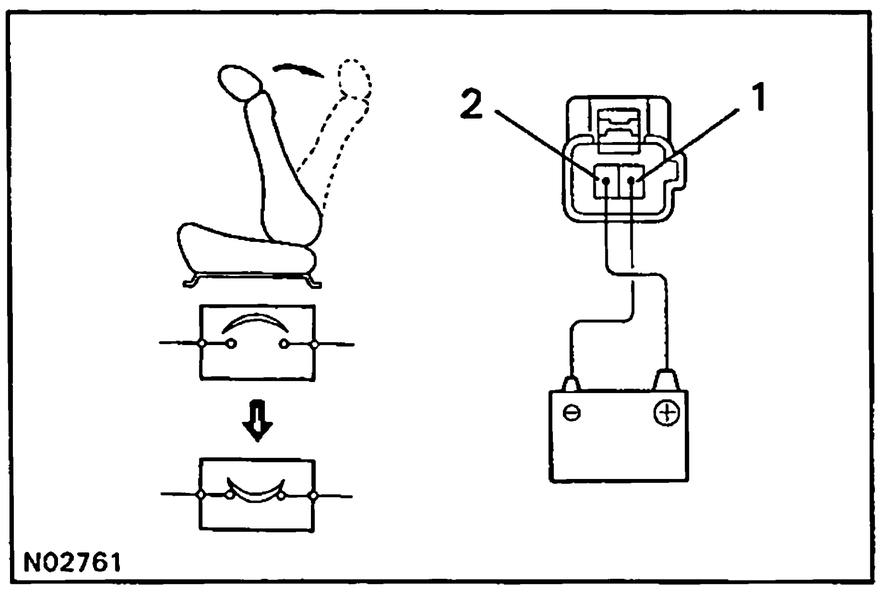
(b) Reverse the polarity, check that the motor turns clockwise.

If operation is not as specified, replace the motor.




## CIRCUIT BREAKER OPERATION DRIVER' S SEAT

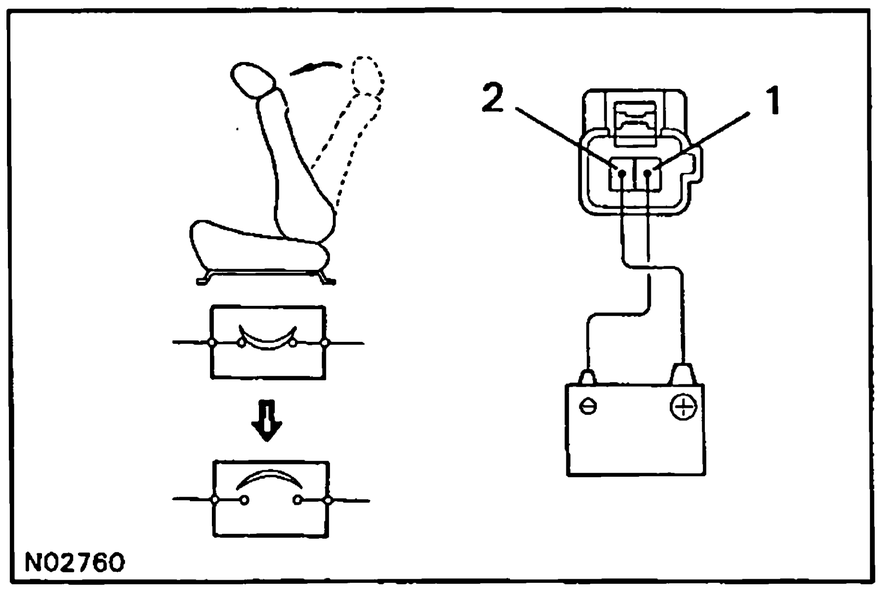
(a) Connect the positive (+) lead from terminal 1 and negative (−) lead to terminal 2.
Check that the seat back reclines to the most forward position.




(b) Continue to apply voltage, check that there is a circuit breaker operation noise within 4 to 40 seconds.

(c) Reverse the polarity, check that the seat starts to fall backwards within approximately 60 seconds.

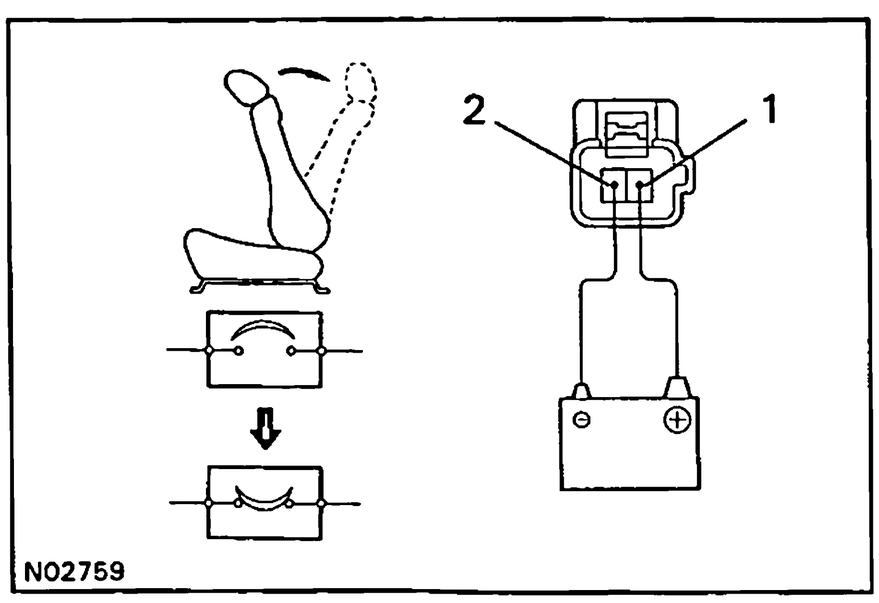
If operation is not as specified, replace the motor.




## CIRCUIT BREAKER OPERATION PASSENGER'S SEAT

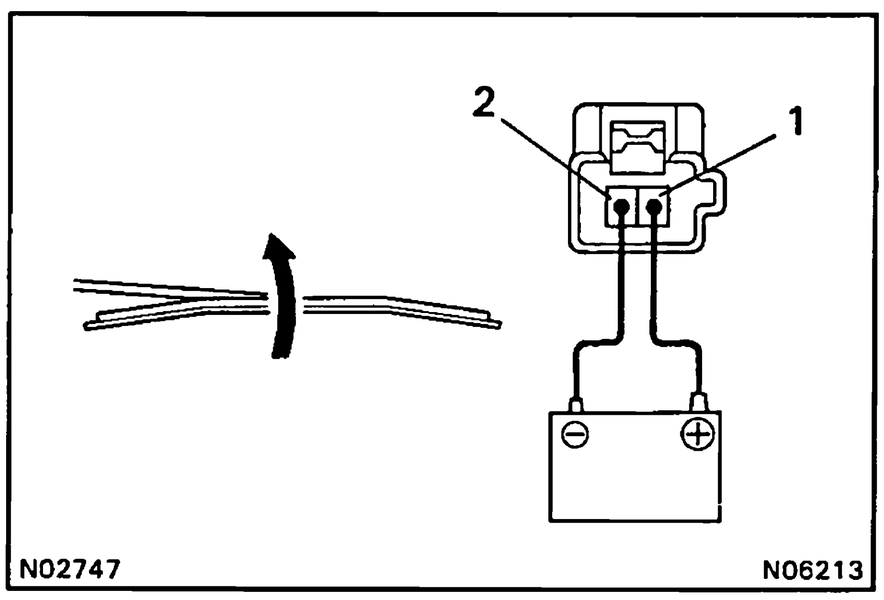
(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (−) lead to terminal 1 on the seat wire harness side connector, and recline the seat back to the most forward position.

(b) Continue to apply voltage, check that there is a circuit breaker operation noise within 4 to 40 seconds.




(c) Reverse the polarity, check that the seat back starts to fall backwards within approximately 60 seconds.

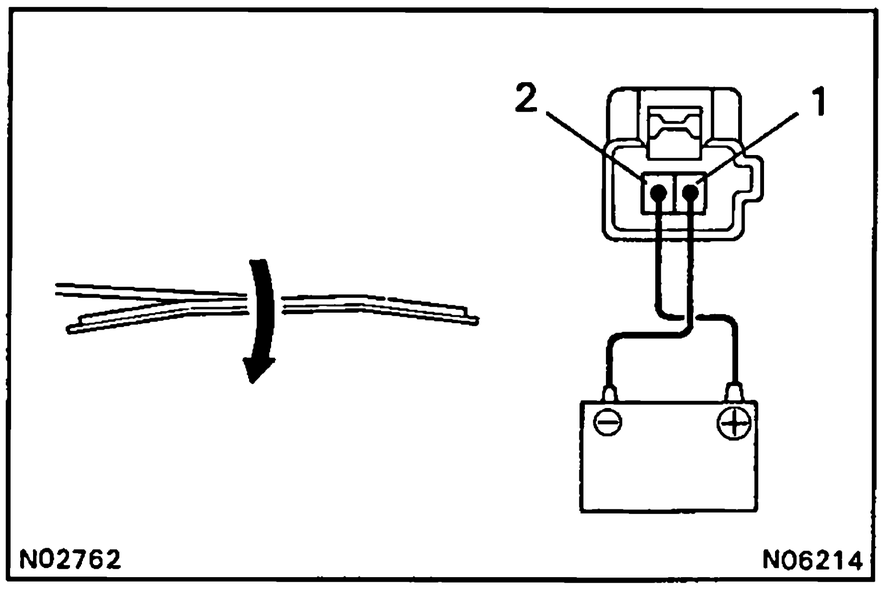
If operation is not as specified, replace the motor.




## LUMBAR SUPPORT MOTOR INSPECTION

### MOTOR OPERATION

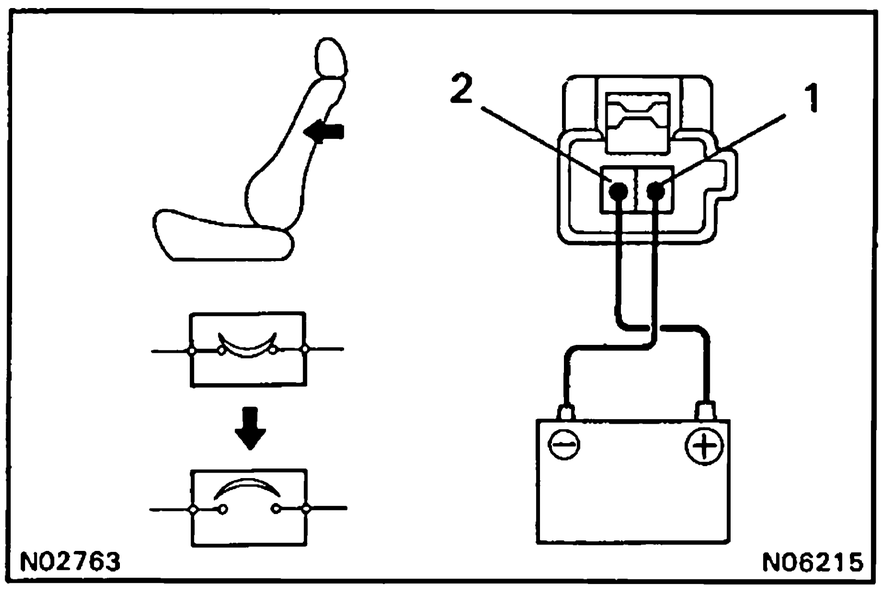
(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (−) lead to terminal 2, check that the lumbar support moves release side.




(b) Reverse the polarity, check that the lumbar support moves forward.

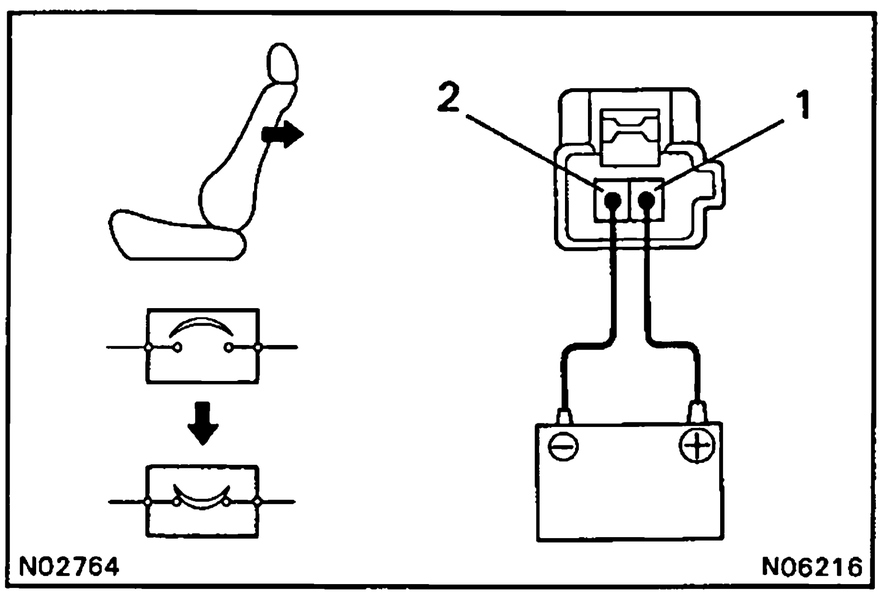
If operation is not as specified, replace the motor.

### CIRCUIT BREAKER OPERATION




(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (−) lead to terminal 1 on the lumbar support motor connector and move the lumbar support to front end position.

(b) Continue to apply voltage, check that there is a circuit breaker operation noise within 4 to 60 seconds.

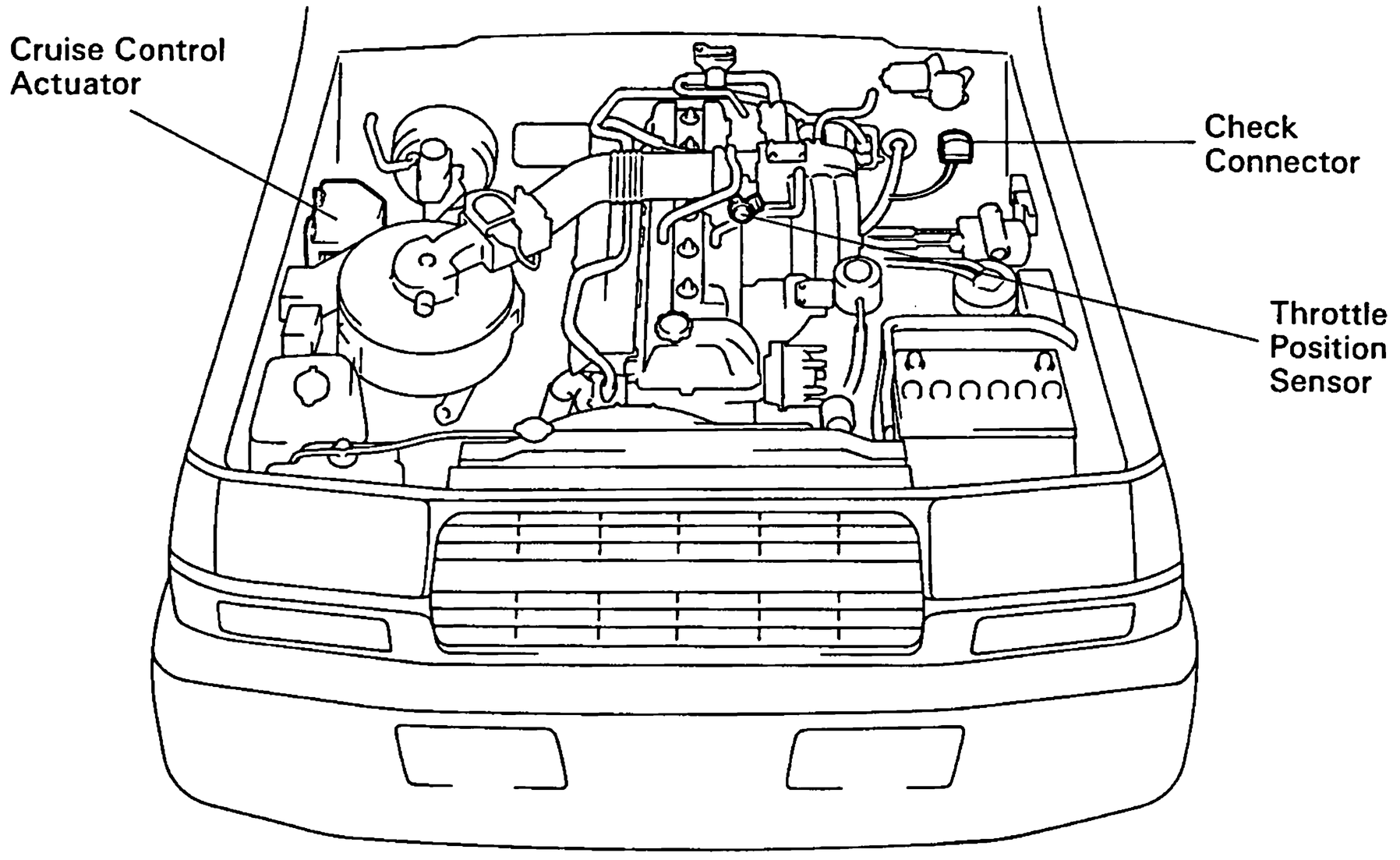



(c) Reverse the polarity, check that the lumbar support begins to move release side within approximately 60 seconds.

If operation is not as specified, replace the motor.

# CRUISE CONTROL SYSTEM

## PARTS LOCATION



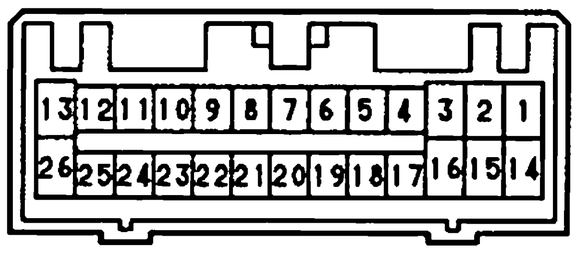




N06712
N04081

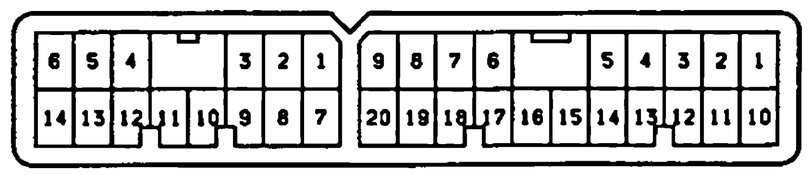
# CONNECTOR DIAGRAMS

Cruise Control ECU

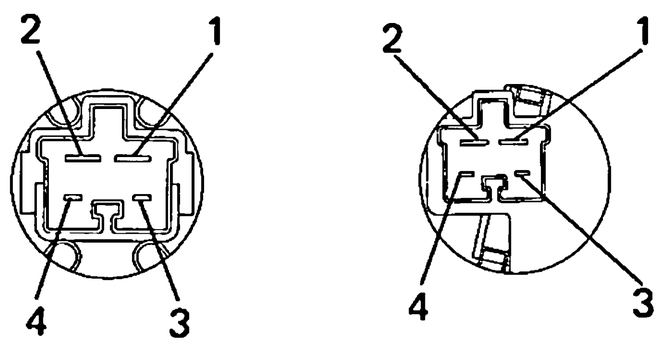



Control Switch (in Combination Switch)

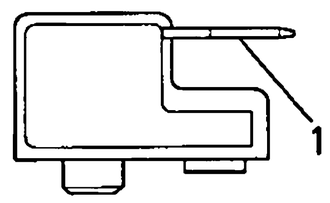
Connector "A" Connector "B"




Stop Light Switch



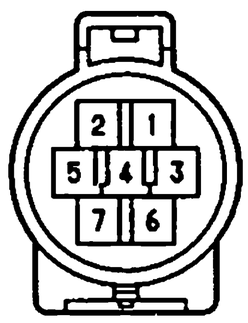

Parking Brake Switch



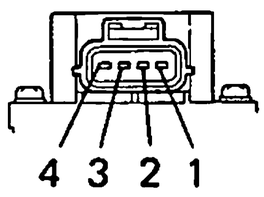

Speed Sensor



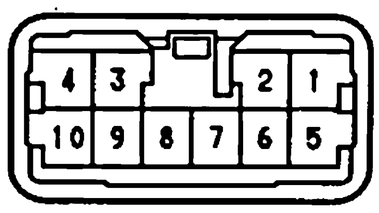

Actuator



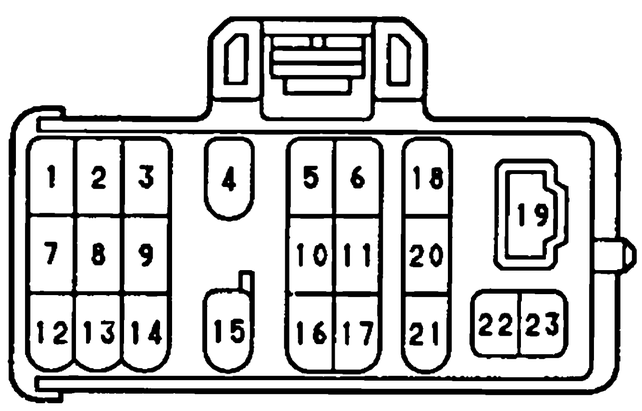

Throttle Position Sensor
(1FZ-FE)




Ignition Switch

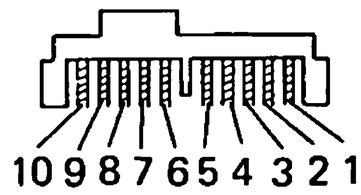



Check Connector
(TDCL)

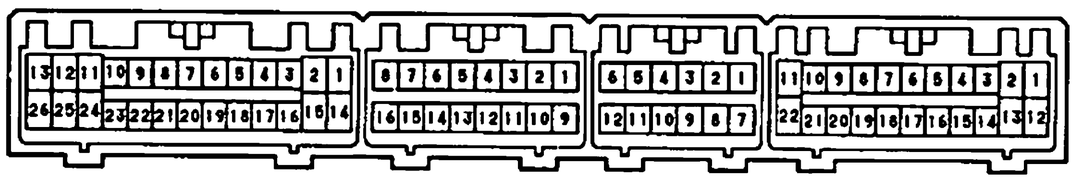



Combination Meter
(Cruise Control Indicator)
(Brake Warning)

Connector "A"




EFI ECU



# SYSTEM DESCRIPTION

- When the ignition switch is turned ON, current flows from the battery to terminal 14 of the cruise control (CC) ECU.
- Terminal 13 of the CC ECU is always grounded.

**Basic Operation**

HINT: For all explanations below, the ignition switch is in the ON position.

**1. MAIN SWITCH OPERATION**

When the main switch is pushed ON, current flows from terminal 4 of the CC ECU → terminal B-15 of the control switch → terminal B-20 of the switch → ground.

As a result, the CC ECU is on standby and terminal 5 of the CC ECU is grounded. Therefore the CC indicator lights up.

**2. CONTROL SWITCH OPERATION**

The control switch controls the SET, COAST, RESUME, ACCEL and CANCEL functions. When the control switch is turned to each position, current flows from terminals 18 of the CC ECU → terminals B-5 of the control switch → terminal B-20 of the switch → ground.

In the way, the CC ECU detects each position the control switch is turned to, and starts operation.
HINT: The SET function is detected by the CC ECU when the control switch released from SET/COAST.

**3. SPEED CONTROL OPERATION**

When the vehicle speed is set by the control switch, the ECU sends signal from terminal 10 → terminal 2 of the stop light switch → terminal 4 of the switch → terminal 5 of the actuator → (magnetic clutch) → terminal 4 of the actuator → ground.

At the same time, the CC ECU sends the signal from terminal 24 → terminal 1 of the actuator → (position sensor) → terminal 3 of the actuator → terminal 26 of the CC ECU. When the occurs, the position sensor sends the position of the actuator arm as a signal (voltage) from terminal 2 of the actuator to terminal 25 of the CC ECU.

When the actual vehicle speed drops below the set speed, the CC ECU sends a signal (voltage) from terminal 12 → terminal 6 of actuator → (motor) → terminal 7 of actuator → terminal 11 of CC ECU. This causes the motor to rotate the actuator arm in the throttle opening direction, increasing the vehicle speed. Then, when the arm reaches the prescribed angle, the CC ECU detects this at terminal 25 and stops the signal from 12.

When the actual vehicle speed rises above the set speed, the CC ECU sends a signal from terminal 11, turning the motor in the opposite direction so that the vehicle speed is reduced.

**4. MANUAL CANCEL OPERATION**

The CC system has the following methods of cancellation:

- **Speed Control Switch (CANCEL)**
  When the control switch is turned to CANCEL position.
- **Parking Brake Switch**
  When the parking brake lever is pulled, the parking brake switch is turned ON and sends a cancellation signal (ground voltage) to terminal 3 of the CC ECU.
- **Neutral Start Switch (A/T)**
  When the shift lever is set to "N" or "P" range, the neutral start switch is turned ON and sends a cancellation signal (ground voltage) to terminal 2 of the CC ECU.
- **Stop Light Switch**
  When the brake pedal is depressed, SW B of the stop light switch is turned OFF, the magnetic clutch (in actuator) is released, and SW A of the stop light switch is turned ON and sends a cancellation signal (battery voltage) to terminal 16 of the CC ECU.

When the CC ECU detects any of the above signals, it stops output of signals to the actuator, and cancels cruise control.

# DIAGNOSIS SYSTEM

**Output of Diagnostic Code**

**READ DIAGNOSTIC CODE**

**(Type A)**

(a) Turn the ignition switch on.

(b) Turn the control switch to SET or RESUME position and keep it there.

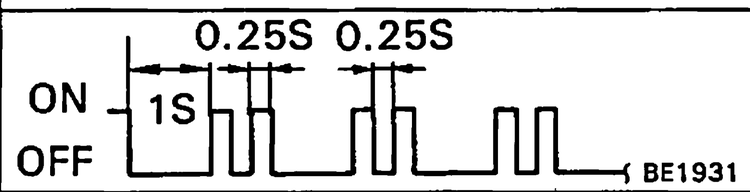
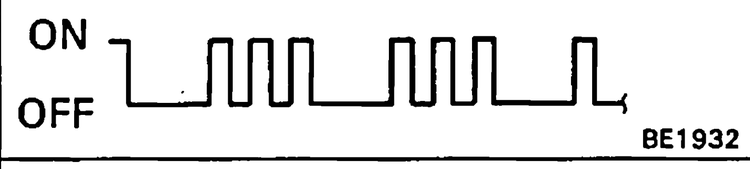
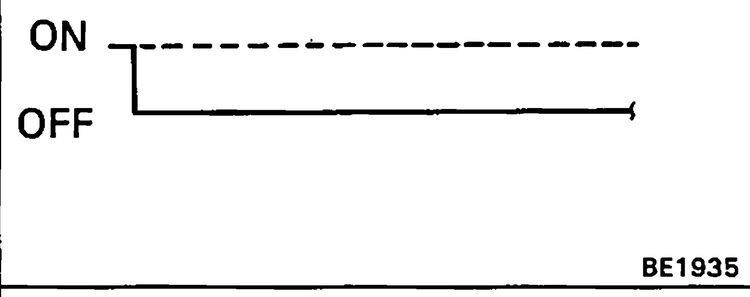
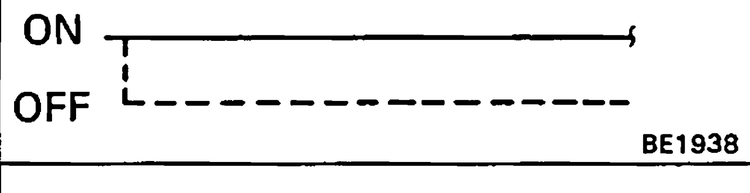
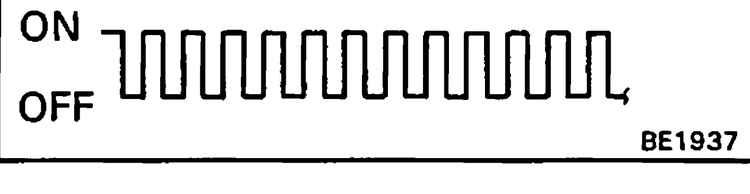
(c) After pushing the main switch ON, keep the SET or RESUME switch ON for 3 seconds.

(d) Check that the "CRUISE" indicator light lights up in the combination meter.

(e) Turn the SET/COAST switch off.

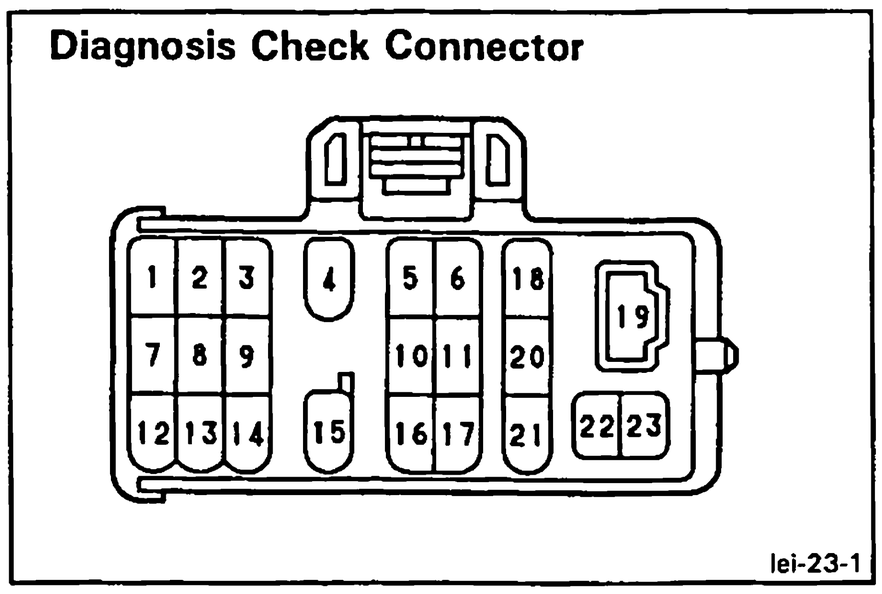
(f) Meet the conditions listed in the table below.

(g) Read the diagnosis code on the cruise control indicator light.

| No. | Conditions | Indication code | Diagnosis |
|---|---|---|---|
| 1 | Turn the control switch to SET/COAST position. |   | SET/COAST circuit is normal. |
| 2 | Turn the control switch to RES/ACC position. |   | RES/ACC circuit is normal. |
| 3 | Each cancel switch is turned ON.<br>• Control switch (to CANCEL)<br>• Stop light switch<br>• Parking brake switch<br>• Neutral start switch (to N or P range) |   | Each cancel switch is normal. |
| 4 | Drive at approx. 40 km/h (25 mph) or below. |   | Speed sensor circuit is normal. |
| | Drive at approx. 40 km/h (25 mph) or over. |   | Speed sensor circuit is normal. |

HINT:

- Indication codes appear in order from No. 1.
- If there is no indication code, perform troubleshooting and inspection. (See page BE-34)
- Indication is stopped when the MAIN switch is repushed.



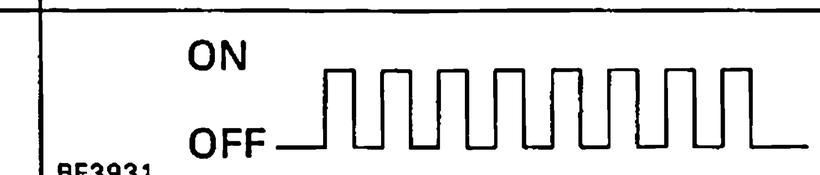
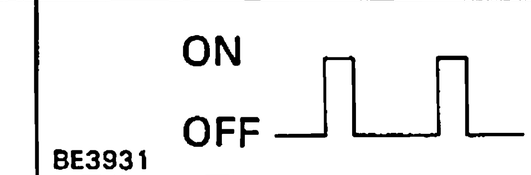
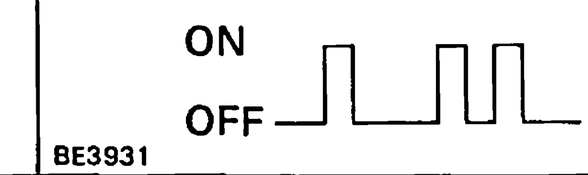
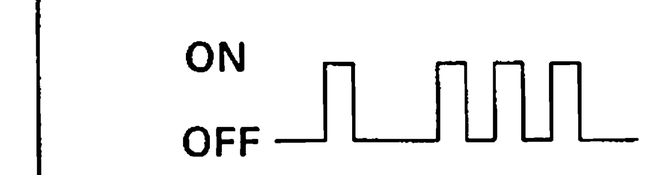
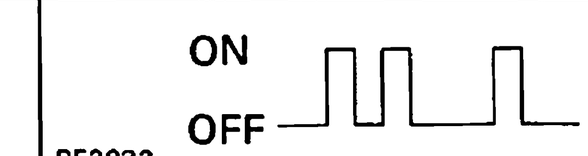
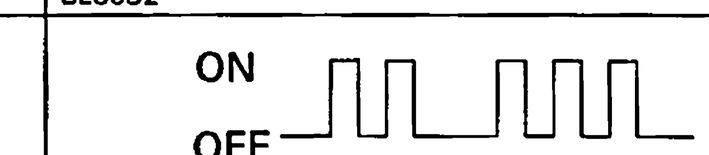

**(Type B)**

(a) If while driving with the cruise control on, the system is canceled by a malfunction in either the actuator, speed sensor or speed control switch circuit, the cruise control indicator light "CRUISE" will blink 5 times.

(b) While stopped, connect terminals $E_1$ (3) and Tc (11) of the check connector.

HINT: If the ignition switch is turned off, the diagnostic code will be erased from the computer memory.

(c) Read the diagnostic code on the indicator light "CRUISE".

| Code No. | CRUISE MAIN Indicator Light Blinking Pattern | Diagnosis |
|---|---|---|
| – |   | Normal |
| 11 |   | • Duty ratio of 100 % output to motor acceleration side.<br>• Overcurrent in motor circuit. |
| 12 |   | • Overcurrent in magnet clutch circuit.<br>• Open in magnet clutch circuit. |
| 13 |   | • Open in actuator motor circuit.<br>• Position sensor detects abnormal voltage.<br>• Position sensor signal value does not change when the motor operates. |
| 21 |   | • Vehicle speed signal not sent for 140 msec. or longer |
| *23 |   | • Actual vehicle speed has dropped by 16 km/h (10 mph) or more below the set speed. |
| 32 |   | • Short in control switch circuit. |
| 34 |   | • Voltage abnormality in control switch. |

HINT: When two or more codes are indicated, the lowest numbered code will be displayed first.

(*) When the vehicle speed is reduced on uphill roads, the speed can be set again and driving continued. (This is not a malfunction.)

# TROUBLESHOOTING

You will find the source of the trouble more easily by properly using the table shown below. In this table, the numbers indicate the order of priority of the causes of trouble. Check each part in the order shown.

| Chart No. | | | | D | C | C | F | H | G | E | I | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inspection Item / Diagnosis Code / Problem | Type B | Type A | | CC ECU | Actuator | Main Switch (in Control Switch) | Control Switch | Stop Light Switch | Neutral Start Switch | Parking Brake Switch | Speed Sensor | Throttle Position Sensor | Speed Control Cable and Control Link | Wire Harness |
| • "CRUISE" indicator light blinks 5 times.<br>• Cruise control system does not set.<br>• Cruise control system does not operate. | 11 | | | 2 | 1 | | | | | | | | | 3 |
| | 12 | | | 3 | 1 | | | 2 | | | | | | 4 |
| | 13 | | | 2 | 1 | | | | | | | | | 3 |
| | 21 | | | 2 | | | | | | | 1 | | | 3 |
| | 23 | | | 4 | 3 | | | | | | 2 | | 1 | |
| | 32 | | | 2 | | | 1 | | | | | | | 3 |
| | 34 | | | 2 | | | 1 | | | | | | | |
| | 41 | | | 1 | | | | | | | | | | |
| | Normal | 4 | OK | 8 | 7 | 1 | 2 | 3 | 4 | 5 | | | 6 | 9 |
| | | | NG | 2 | | | | | | | 1 | | | |
| Set speed deviates on high or low side. | | | | 4 | 3 | | | | | | 1 | | 2 | |
| Large speed increase or speed drop when the speed control switch turned to SET. | | | | 4 | 3 | | | | | | | 2 | 1 | |
| Vehicle speed fluctuates when speed control switch turned to SET. | | | | 4 | 3 | | | | | | 1 | | 2 | |
| Set speed does not cancel when brake pedal depressed. | 3 | | OK | 1 | | | | | | | | | | |
| | | | NG | 2 | | | | 1 | | | | | | |
| Set Speed does not cancel when parking brake lever pulled. | 3 | | OK | 1 | | | | | | | | | | |
| | | | NG | 2 | | | | | | 1 | | | | |
| Set speed does not cancel when shifted to "N" range. | 3 | | OK | 1 | | | | | | | | | | |
| | | | NG | 2 | | | | | 1 | | | | | |
| Vehicle speed does not decrease when speed control switch turned to COAST. | 1 | | OK | 4 | 1 | | | | | | 3 | | 2 | |
| | | | NG | 2 | | | 1 | | | | | | | |
| Vehicle speed does not accelerate when speed control switch turned to ACCEL. | 2 | | OK | 4 | 1 | | | | | | 3 | | 2 | |
| | | | NG | 2 | | | 1 | | | | | | | |
| Vehicle speed does not return to memorized speed when control switch turned on RESUME. | 2 | | OK | 4 | 1 | | | | | | 3 | | 2 | |
| | | | NG | 2 | | | 1 | | | | | | | |
| Set speed does not cancel when speed control switch turned to CANCEL. | 3 | | OK | 1 | | | | | | | | | | |
| | | | NG | 2 | | | 1 | | | | | | | |
| Speed can be set below about 40 km/h (25 mph). | 4 | | OK | 1 | | | | | | | | | | |
| | | | NG | 2 | | | | | | | 1 | | | |
| Cruise control will not disengage even at about 40 km/h (25 mph). | 4 | | OK | 1 | | | | | | | | | | |
| | | | NG | 3 | | | | | | | 1 | | 2 | |
| Acceleration response is sluggish when speed control switch turned to "ACCEL" or "RESUME". | | | | 4 | 3 | | 1 | | | | 2 | | 1 | |

## A POWER SOURCE CIRCUIT

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Is ECU-IG fuse normal?
→ No → Replace fuse and turn ignition switch ON. Is fuse normal?
→ Yes → Fuse faulty.

Is ECU-IG fuse normal? → Yes → CC ECU → Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

Replace fuse and turn ignition switch ON. Is fuse normal? → No → Disconnect connectors from CC ECU. Replace fuse and turn ignition switch ON. Is fuse normal?
→ No → Short circuit in wire harness on vehicle side.
→ Yes → Replace CC ECU. The recheck system.

**INSPECT GROUND CONNECTION**
Is there continuity between terminal 13 and ground?
→ No →
- Open circuit in wire harness between terminal 13 of CC ECU and ground.
- Ground faulty.

→ Yes →

**INSPECT POWER SOURCE**
Turn ignition switch ON.
Is there battery voltage between terminal 14 and ground?
→ No → Open circuit in wire harness between terminal 14 of CC ECU and ground.
→ Yes → Replace CC ECU. Then recheck system.

CC: Cruise Control

## B CRUISE CONTROL INDICATOR CIRCUIT

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Is GAUGE fuse normal?
- No → Replace fuse and turn ignition switch ON. Is fuse normal?
  - Yes → Fuse faulty.
  - No → Short circuit in wire harness on vehicle side.
- Yes → COMBINATION METER → Disconnect connector "A" from combination meter and inspect connector on wire harness side as follow.

**INSPECT POWER SOURCE**
Turn ignition switch ON.
Is there battery voltage between terminal A-5 and ground?
- No → Open circuit in wire harness between terminal A-5 and GAUGE fuse.
- Yes

**INSPECT BULB CONDITION**
Is bulb condition normal?
- No → Replace bulb. Then recheck system.
- Yes → CC ECU → Install bulb and connect connector to combination meter.
Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

**INSPECT INDICATOR CIRCUIT**
Is there no continuity between terminal 5 and ground?
- No →
  - Short circuit in wire harness between terminals 5 of CC ECU and A-8 of combination meter.
  - Short circuit in circuit plate of combination meter between terminal A-8 and CC indicator bulb.
- Yes

Turn ignition switch ON.
Is there battery voltage between terminal 5 and ground?
- No →
  - Open circuit in wire harness between terminals 5 of CC ECU and A-8 of combination meter.
  - Open circuit in circuit plate of combination meter between terminal A-8 and CC indicator bulb or between terminal A-5 and CC indicator bulb.
- Yes

Replace CC ECU. Then recheck system.

CC: Cruise Control

## C CONTROL SWITCH CIRCUIT

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

CONTROL SWITCH

Disconnect connector from control switch and inspect connector on wire harness side as follows.

↓

**INSPECT GROUND CONNECTION**
Is there continuity between terminal B-20 and ground?

No → • Open circuit in wire harness between terminal B-20 of control switch and ground.
• Ground faulty.

↓ Yes

INSPECT CONTROL SWITCH (See page BE-47)
Is control switch operation normal?

No → Replace control switch. Then recheck system.

↓ Yes

CC ECU

Connect connector to control switch.
Disconnect connectors from CC ECU and inspect connectors on wire harness side as follows.

↓

**INSPECT MAIN SWITCH CIRCUIT**
Is there continuity between terminal 4 and ground with main switch OFF?

Yes → Short circuit in wire harness between terminals 4 of CC ECU and B-15 of control switch.

↓ No

Is there continuity between terminal 4 and ground with main switch ON?

No → Open circuit in wire harness between terminals 4 of CC ECU and B-15 of control switch.

↓ Yes

**INSPECT CONTROL SWITCH CIRCUIT**
Is there continuity between terminal 18 and ground with control switch OFF?

Yes → Short circuit in wire harness between terminals 18 of CC ECU and B-5 of control switch.

↓ No

Is there resistance as shown in table below between terminal 18 and ground when control switch is turned to each position?

| Position | Resistance (Ω) |
|---|---|
| RES/ACC | Approx. 68 |
| SET/COAST | Approx. 198 |
| CANCEL | Approx. 418 |

No → Open circuit in wire harness between terminals 18 of CC ECU and B-5 of control switch.

↓ Yes

Replace CC ECU. Then recheck system.

CC: Cruise Control

## D ACTUATOR CIRCUIT

HINT: While carrying out the following inspection, make certain that connectors and terminals are properly connected.

ACTUATOR

Disconnect connector from actuator and inspect connector on wire harness side as follows.

↓

**INSPECT GROUND CONNECTION**
Is there continuity between terminal 4 and ground?

No → • Open circuit in wire harness between terminal 4 of actuator and ground.
• Ground faulty.

Yes ↓

**INSPECT ACTUATOR (See page BE-48)**
Is actuator operation normal?

No → Replace actuator. Then recheck system.

Yes ↓

STOP LIGHT SWITCH

**INSPECT STOP LIGHT SWITCH INSTALLATION**
Is stop light switch installed properly?

No → Reinstall stop light switch properly. Then recheck system.

Yes ↓

Connect connector to actuator.
Disconnect connector from stop light switch and inspect connector on wire harness side as follows.

↓

**INSPECT SAFETY MAGNETIC CLUTCH CIRCUIT**
Is there approx. 38.5 Ω between terminal 4 and ground?

No → Open or short circuit in wire harness between terminals 4 of stop light and 5 of actuator.

Yes ↓

**INSPECT STOP LIGHT SWITCH (See page BE-47)**
Is stop light switch operation normal?

No → Replace stop light switch. Then recheck system.

Yes ↓

CONTINUED ON NEXT PAGE

CC: Cruise Control

CONTINUED FROM PREVIOUS PAGE

CC ECU

Connect connector to stop light switch.
Disconnect connectors from CC ECU and inspect connectors on wire harness side as follows.

**INSPECT MAGNETIC CLUTCH CIRCUIT**
Is there approx. 38.5 Ω between terminal 10 and ground?

No → Open or short circuit in wire harness between terminals 10 of CC ECU and 5 of actuator.

Yes

**INSPECT MOTOR CIRCUIT**
Is there no continuity between terminal 12 and ground?

No → Short circuit in wire harness between terminals 12 of CC ECU and 6 of actuator.

Yes

Is there no continuity between terminal 11 and ground?

No → Short circuit in wire harness between terminals 11 of CC ECU and 7 of actuator.

Yes

Is there continuity between terminals 12 and 11 with actuator arm in a position except max. open or max. close?

No → Open circuit in wire harness between terminals 12 of CC ECU and 6 of actuator or between terminals 11 of CC ECU and 7 of actuator.

Yes

**INSPECT POSITION SENSOR CIRCUIT**
Is there no continuity between terminal 24 and ground?

No → Short circuit in wire harness between terminals 24 of CC ECU and 1 of actuator.

Yes

Is there approx. 2 kΩ between terminals 24 and 26?

No →
- Open circuit in wire harness between terminals 26 of CC ECU and 3 of actuator.
- Open circuit in wire harness between terminals 24 of CC ECU and 1 of actuator.

Yes

Does resistance change even between terminals 26 and 25?

No → Open or short circuit in wire harness between terminals 25 of CC ECU and 2 of actuator.

Yes

Replace CC ECU. Then recheck system.

CC: Cruise Control

## E SPEED SENSOR CIRCUIT

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

SPEED SENSOR

Disconnect connector from speed sensor and inspect connector on wire harness side as follows.

↓

**INSPECT GROUND CONNECTION**
Is there continuity between terminal 13 and ground?

No → • Open circuit in wire harness between terminal 13 of speed sensor and ground.
• Ground faulty.

Yes ↓

**INSPECT SPEED SENSOR (See page BE-47)**
Is speed sensor operation normal?

No → Replace speed sensor. Then recheck system.

Yes ↓

CC ECU

Connect connector to speed sensor.
Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

↓

**INSPECT SPEED SENSOR CIRCUIT**
Is there continuity repeatedly between terminal 20 and ground?

No → • Open or short circuit in wire harness between terminals 20 of CC ECU and 2 of speed sensor.

Yes ↓

Replace CC ECU. Then recheck system.

CC: Cruise Control

## F STOP LIGHT SWITCH CIRCUIT

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

**INSPECT STOP LIGHT SYSTEM**
Is stop light system operation normal?

Yes → Inspect CC ECU on next page.

No ↓

Is STOP fuse normal?

No → Replace fuse.
Is fuse normal?

Yes → Fuse faulty.

No ↓

Disconnect connector from CC ECU and replace fuse.
Is fuse normal?

No →
- Short circuit in wire harness between terminal 1 of stop light switch and STOP fuse.
- Short circuit in wire harness between terminal 16 of CC ECU and STOP fuse.

Yes ↓

Replace fuse and depress brake pedal.
Is fuse normal?

No →
- Short circuit in wire harness between terminal 3 of stop light switch and stop light.
- Short circuit in wire harness between terminals 1 of CC ECU and 3 of stop light switch.

Yes ↓

Replace CC ECU. Then recheck system.

Yes ↓

STOP LIGHT SWITCH

**INSPECT STOP LIGHT SWITCH INSTALLATION**
Is stop light switch installed properly?

No → Reinstall stop light switch properly. Then recheck system.

Yes ↓

CC: Cruise Control

CONTINUED ON NEXT PAGE

CONTINUED FROM PREVIOUS PAGE

STOP LIGHT SWITCH

Disconnect connector from stop light switch and inspect connector on wire harness side as follows.

**INSPECT POWER SOURCE**
Is there battery voltage between terminal 1 and ground?

No → Open circuit in wire harness between terminal 1 of stop light switch and STOP fuse.

Yes

**INSPECT STOP LIGHT CIRCUIT**
Connect terminals 1 and 3.
Do stop lights light up?

No →
- Open circuit in wire harness between terminal 3 of stop light switch and ground.
- Ground faulty.

Yes

**INSPECT STOP LIGHT SWITCH (See page BE-47)**
Is stop light switch operation normal?

No → Replace stop light switch. Then recheck system.

Yes

CC ECU

Connect connector to stop light switch.
Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

→ If stop light system operation is normal, start inspection from this step.

**INSPECT STOP LIGHT SWITCH CIRCUIT**
Is there battery voltage between terminal 1 and ground?

No → Open circuit in wire harness between terminal 1 of CC ECU and STOP fuse.

Yes

Is there battery voltage between terminal 16 and ground when brake pedal depressed?

No → Open circuit in wire harness between terminals 16 of CC ECU and 3 of stop light switch.

Yes

Replace CC ECU. Then recheck system.

CC: Cruise Control

## G PARKING BRAKE SWITCH CIRCUIT

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

**INSPECT PARKING BRAKE SWITCH**
**(See page BE-47)**
Is parking brake switch operation normal?

No → Replace parking brake switch. Then recheck system.

Yes

CC ECU

Connect connector to parking brake switch.
Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

**INSPECT PARKING BRAKE SWITCH CIRCUIT**
Is there continuity between terminal 3 and ground when parking brake lever is pulled?

No → Short circuit in wire harness between terminal 3 of CC ECU and parking brake switch.

Yes

Is there no continuity between terminal 3 and ground when parking brake lever is released?

No → Open circuit in wire harness between terminal 3 of CC ECU and parking brake switch.

Yes

Replace CC ECU. Then recheck system.

CC: Cruise Control

## H NEUTRAL START SWITCH CIRCUIT

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

**INSPECT STARTING SYSTEM**
Is starting system normal?

No → Repair starting system. Then recheck system.

Yes

CC ECU

Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

**INSPECT NEUTRAL START SWITCH CIRCUIT**
Is there continuity between terminal 2 and ground when shift lever is shifted to P or N range?

No → Open circuit in wire harness between terminals 2 of CC ECU and neutral start switch.

Yes

Is there no continuity between terminal 2 and ground when shift lever is shifted to L, 2, 3, or R range?

No → Short circuit in wire harness between terminals 2 of CC ECU and neutral start switch.

Yes

Replace CC ECU. Then recheck system.

CC: Cruise Control

## I ECT SOLENOID No.2 CIRCUIT (with A/T)

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

**INSPECT ECT SYSTEM**
Is ECT system normal?

No → Repair ECT system. Then recheck system.

Yes

CC ECU

Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

**INSPECT NO.2 SOLENOID CIRCUIT**
Is there approx. 13 Ω between terminal 22 and ground?

No → Open or short circuit in wire harness between terminal 22 of CC ECU and No.2 solenoid.

Yes

Replace CC ECU. Then recheck system.

CC: Cruise Control

## J IDL SIGNAL CIRCUIT (w/ 1FZ-FE Engine)

HINT: While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

THROTTLE POSITION SENSOR

**INSPECT THROTTLE POSITION SENSOR ADJUSTMENT (Refer to FI Section of ENGINE Repair Manual.)** Is throttle position sensor adjustment normal?

No → Adjust position sensor position. Then recheck system.

Yes ↓

**INSPECT THROTTLE POSITION SENSOR (Refer to FI Section of ENGINE Repair Manual.)** Is throttle position sensor operation normal?

No → Replace throttle position sensor. Then recheck system.

Yes ↓

CC ECU

Connect connector to throttle position sensor. Disconnect connector from CC ECU and inspect connector on wire harness side as follows.

↓

**INSPECT IDL SIGNAL CIRCUIT** Is there continuity between terminal 23 and ground when acceleration pedal is released?

No → Open circuit in wire harness between terminals 23 of CC ECU and 2 of throttle position sensor.

Yes ↓

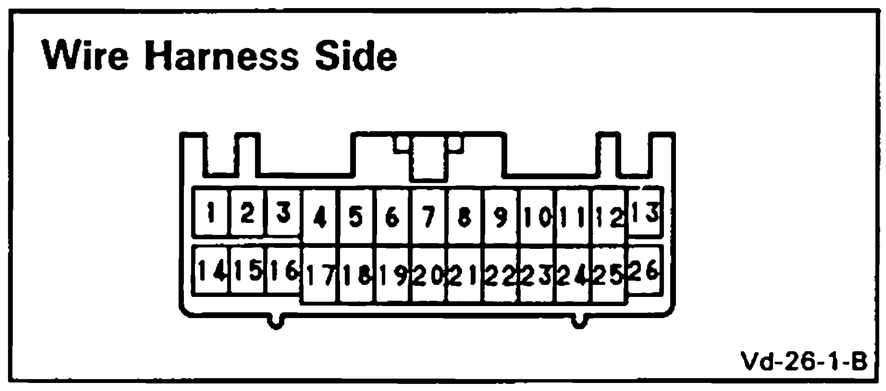
Is there no continuity between terminal 23 and ground when acceleration pedal is depressed?

No → Short circuit in wire harness between terminals 23 of CC ECU and 2 of throttle position sensor.

Yes ↓

Replace CC ECU. Then recheck system.

CC: Cruise Control




# Cruise Control ECU Circuit

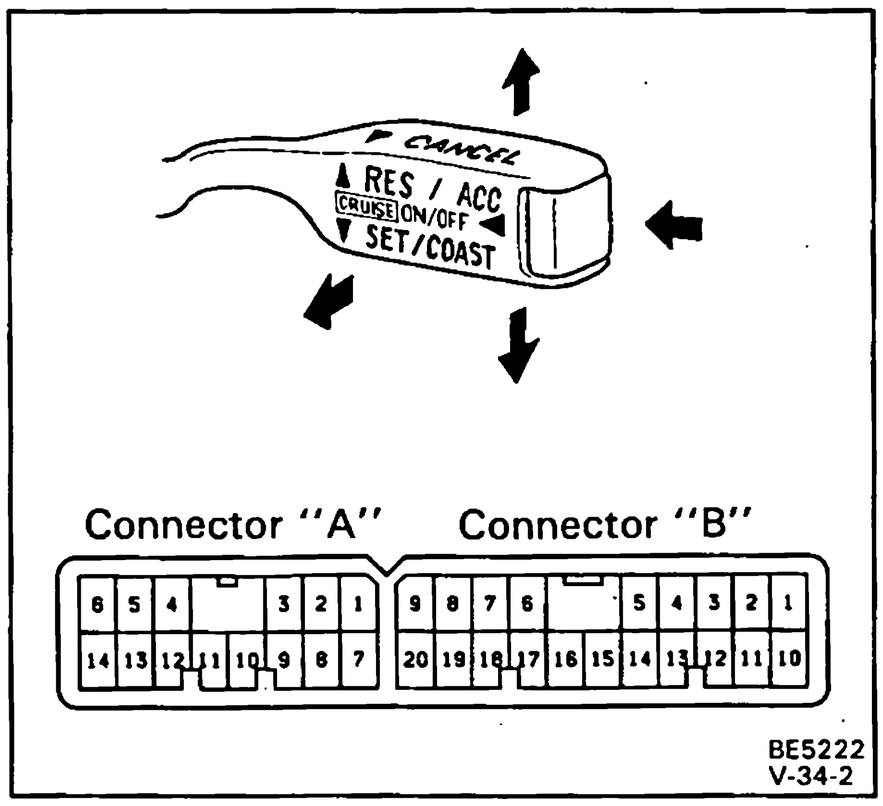
## INSPECT ECU CIRCUIT

Disconnect connector and inspect connector on wire harness side as shown in the chart.

| Check for | Measured item | Tester connection | Condition | | Specified value |
|---|---|---|---|---|---|
| Continuity | Neutral start switch | 2 — ground | Shift lever position | N or P | Continuity |
| | | | | L, 2, D or R | No continuity |
| | Parking brake switch | 3 — ground | Parking brake lever position | released | No continuity |
| | | | | pulled | Continuity |
| | Control switch | 4 — ground | Main switch position | OFF | No continuity |
| | | | | ON | Continuity |
| | Ground connection | 13 — ground | Constant | | Continuity |
| | Actuator (motor) | *11 — 12 | Actuator arm position | max. OPEN | (12 → 11) Continuity |
| | | | | max. CLOSE | (11 → 12) Continuity |
| | | | | any position except above position | (12 → 11) Continuity |
| | TDCL circuit | 8 — ground | Constant | | No continuity |
| | | | Terminals Tc and E1 connected | | Continuity |
| | Throttle position sensor (IDL: 1FZ-FE Engine) | 23 — ground | Acceleration pedal position | released | Continuity |
| | | | | depressed | No continuity |
| | Speed sensor | 20 — ground | With ignition switch ON, speedometer shaft or speed sensor shaft turned. | | Continuity ↕ No continuity |
| Resistance | Actuator (position sensor) | 24 — 26 | Constant | | Approx. 2 kΩ |
| | | 24 — 25 | Actuator arm turned | | Resistance change even |
| | Actuator (magnetic clutch) | 10 — ground | Brake pedal position | released | Approx. 38.5 Ω |
| | | | | depressed | No continuity |
| | Control switch | 18 — ground | Control switch position | OFF | No continuity |
| | | | | RES/ACC | Approx. 68 Ω |
| | | | | SET/COAST | Approx. 198 Ω |
| | | | | CANCEL | Approx. 418 Ω |
| | ECT No.2 solenoid valve (A/T) | 22 — ground | Constant | | Approx. 13 Ω |
| Voltage | Power source | 14 — ground | Ignition switch position | LOCK or ACC | No voltage |
| | | | | ON | Battery voltage |
| | STOP fuse | 1 — ground | Constant | | Battery voltage |
| | Stop light | 16 — ground | Brake pedal position | released | No voltage |
| | | | | depressed | Battery voltage |

*: This circuit includes the diode. If the circuit shown no continuity, change the positive and negative proves and recheck system.

If circuit is as specified, try another ECU.




# CONTROL SWITCH INSPECTION

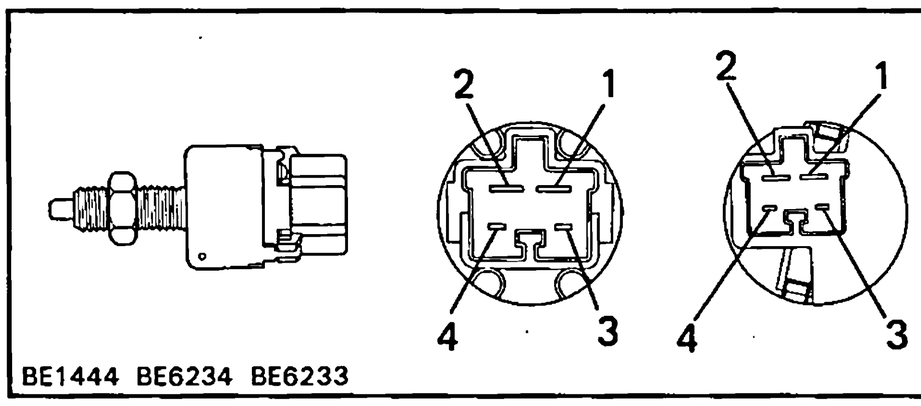
## INSPECT SWITCH

| Switch position | | B20 | B11 | B5 | B17 | B15 |
|---|---|---|---|---|---|---|
| Main | ON | ○ | | | | ○ |
| | OFF | | | | | |
| Control | RES/ACC | ○ | | ○ | | |
| | SET/COAST | ○ | | ○ | | |
| | CANCEL | ○ | | ○ | | |

If the continuity is not as specified, replace the control switch.

# STOP LIGHT SWITCH INSPECTION

## INSPECT SWITCH




| Switch position | 1 | 2 | w/ CCS 3 | w/ CCS 4 |
|---|---|---|---|---|
| Switch pin free (Brake pedal depressed) | ○ | ○ | | |
| Switch pin pushed in (Brake pedal released) | | | ○ | ○ |

If continuity is not as specified, replace the stop light switch.

# NEUTRAL START SWITCH INSPECTION

See page AT section

# THROTTLE POSITION SWITCH INSPECTION

(Refer to FI section of Engine Repair Manual)

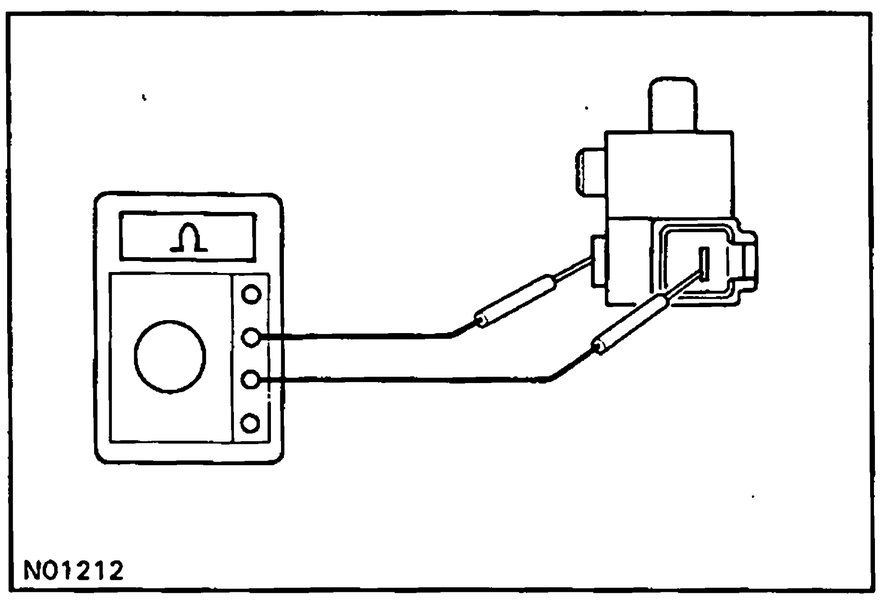
# PARKING BRAKE SWITCH INSPECTION

## INSPECT SWITCH

(a) Check that there is continuity between terminal and the switch set nut with switch pin released. (parking brake lever pulled up)

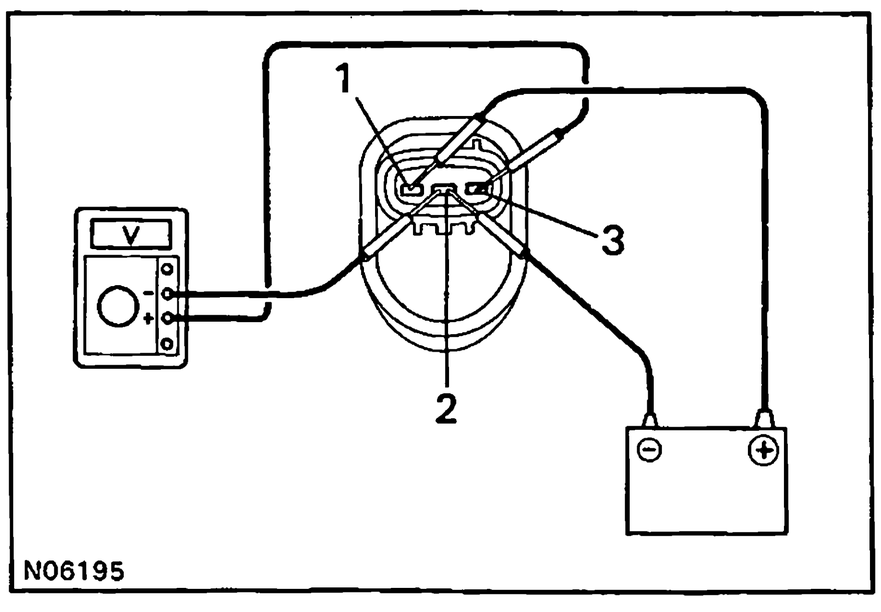
(b) Check that there is no continuity between terminal and the switch set nut with switch pin pushed in. (parking brake lever released)

If operation is not as specified, replace the switch.




# SPEED SENSOR INSPECTION

## INSPECT SENSOR




(a) Connect the positive (+) lead from battery to terminal 1 and negative (−) lead to terminal 2.

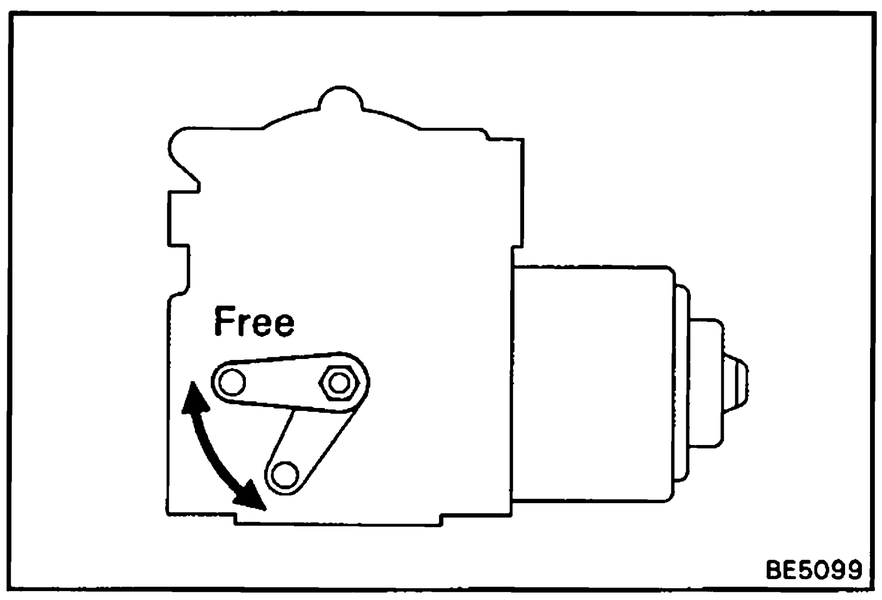
(b) Connect the positive (+) lead from tester to terminal 3 and negative (−) lead to terminal 2.

(c) Revolve shaft.

(d) Check that there is voltage changer from approx. 0 V to 11 V or more between terminal 3 and 2.

HINT: The voltage change should be 20 times per each revolution of the speed sensor shaft.

If operation is not as specified, replace the sensor.

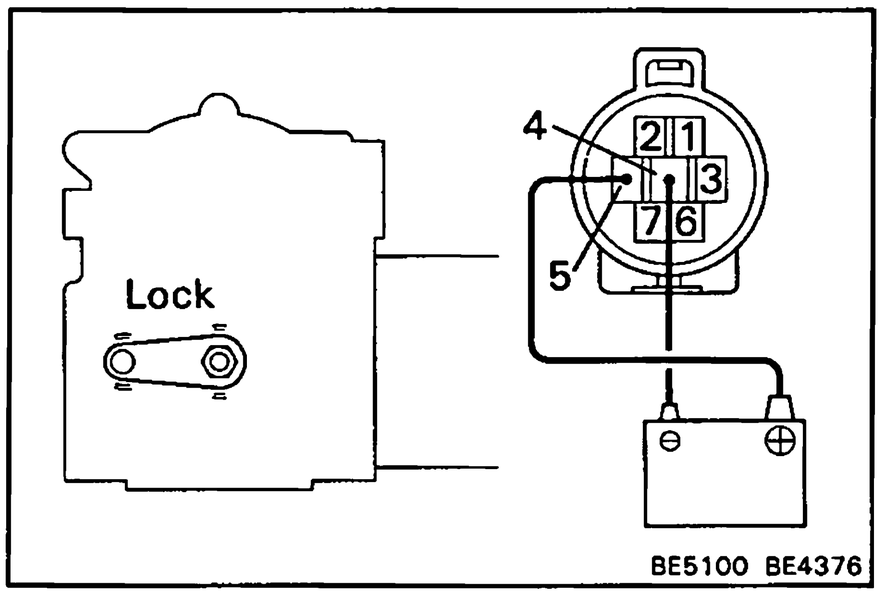



# CRUISE CONTROL ACTUATOR INSPECTION

## INSPECT ACTUATOR

**(Magnet Clutch)**

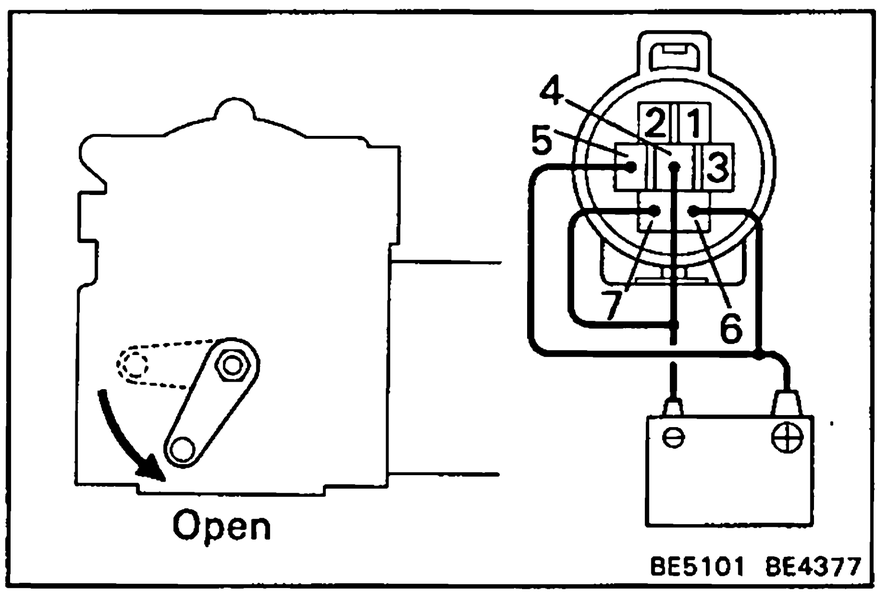
(a) Check that the arm moves smoothly by hand.




(b) Connect the positive (+) lead from the battery to terminal 5 and the negative (−) lead to terminal 4. (magnet clutch turned ON)

(c) Check that the arm does not move by hand.

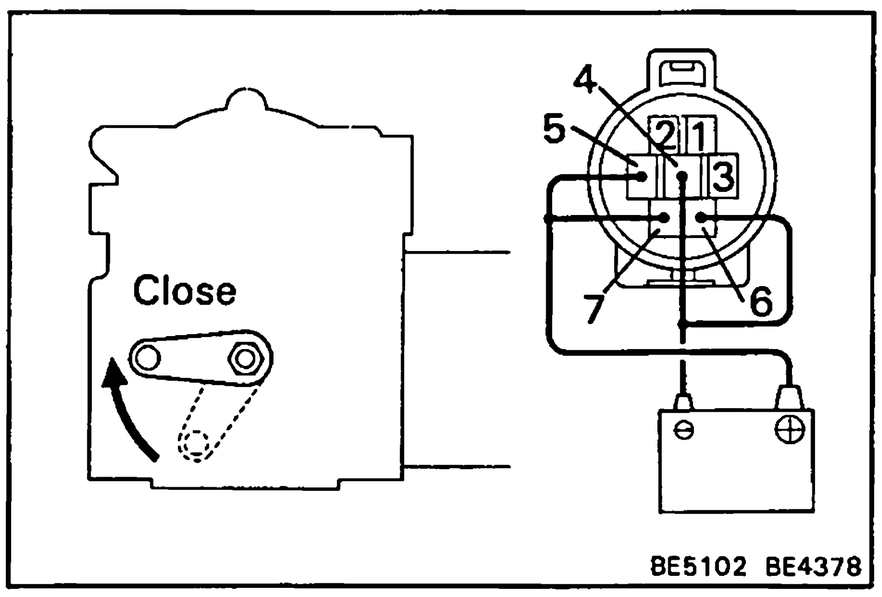
If operation is not as specified, replace the motor.




**(Motor)**

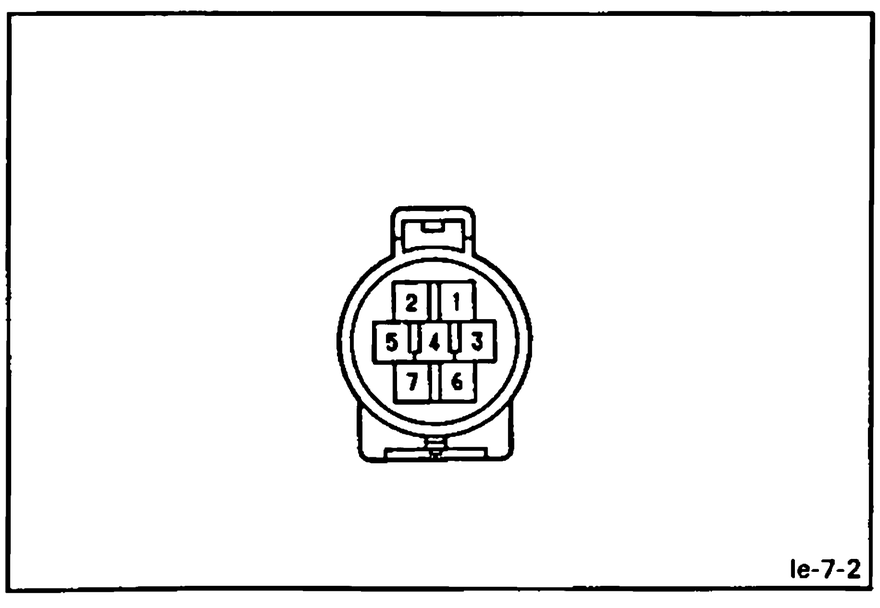
(a) With the magnetic clutch ON, connect the positive (+) lead from the battery to terminal 6 and the negative (−) lead to terminal 7, check that the arm moves to the open side.

(b) When the arm reached to the open position, check that the motor operation stops.




(c) With the magnetic clutch ON, connect the positive (+) lead from the battery to terminal 7 and the negative (−) lead to terminal 6, check that the arm moves to the close side.

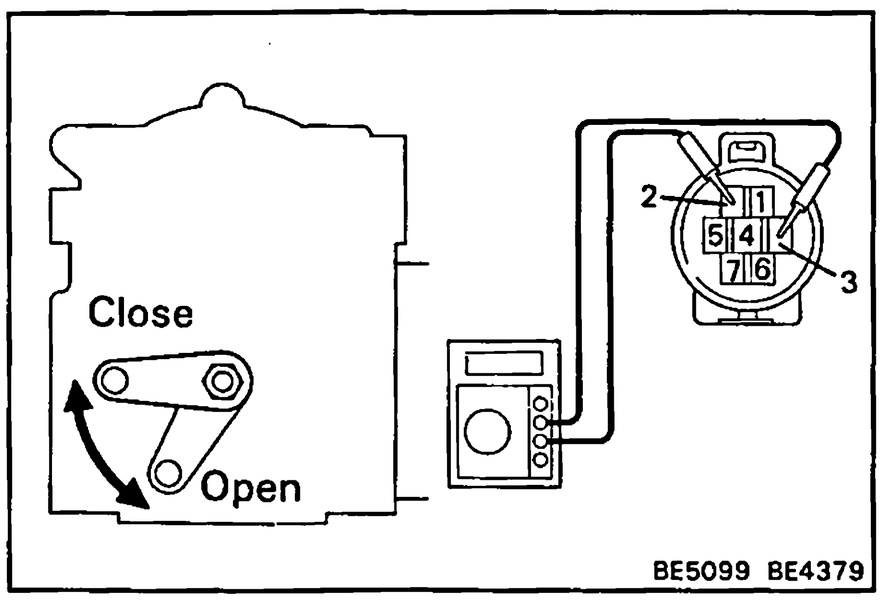
(d) When the arm reaches to the closed position, check that the motor operation stops.




**(Position Sensor)**

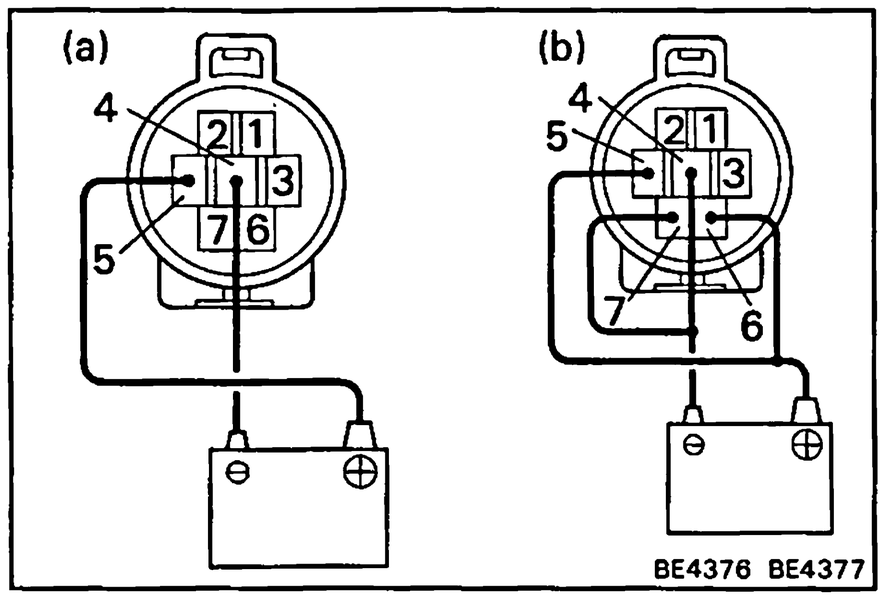
(a) Measure the resistance between terminals 1 and 3.

**Resistance: Approx. 2 kΩ**




(b) When the arm is moving from the closed to open position, check that resistance between terminals 2 and 3 increases from approx. 0.5 to 1.7 kΩ.

If operation is not as specified, replace the motor.




## CONTROL LINK ASSEMBLY ADJUSTMENT

### ADJUST CONTROL LINK ASSEMBLY

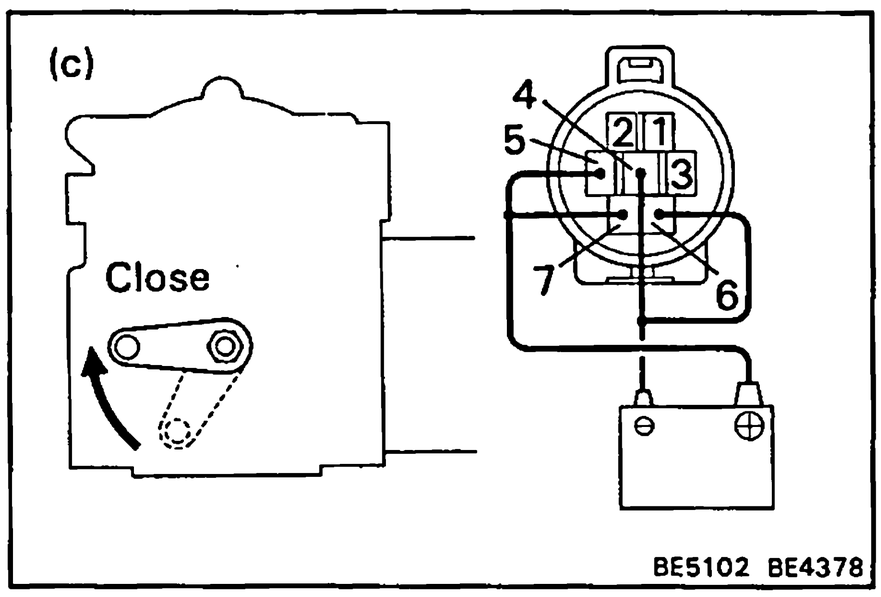
(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (−) lead to terminal 4 of the actuator.
(magnet clutch turned ON)

**NOTICE: Keep the magnet clutch ON until adjustment of control link assembly is completed.**

(b) With the magnetic clutch ON, connect the positive (+) lead from the battery to terminal 6 and the negative (−) lead to terminal 7.
(Arm moves to the open side.)

(c) With the magnetic clutch ON, connect the positive (+) lead from the battery to terminal 7 and the negative (−) lead to terminal 6.
(Arm moves to the close side.)

(d) Install the control link assembly to the actuator.



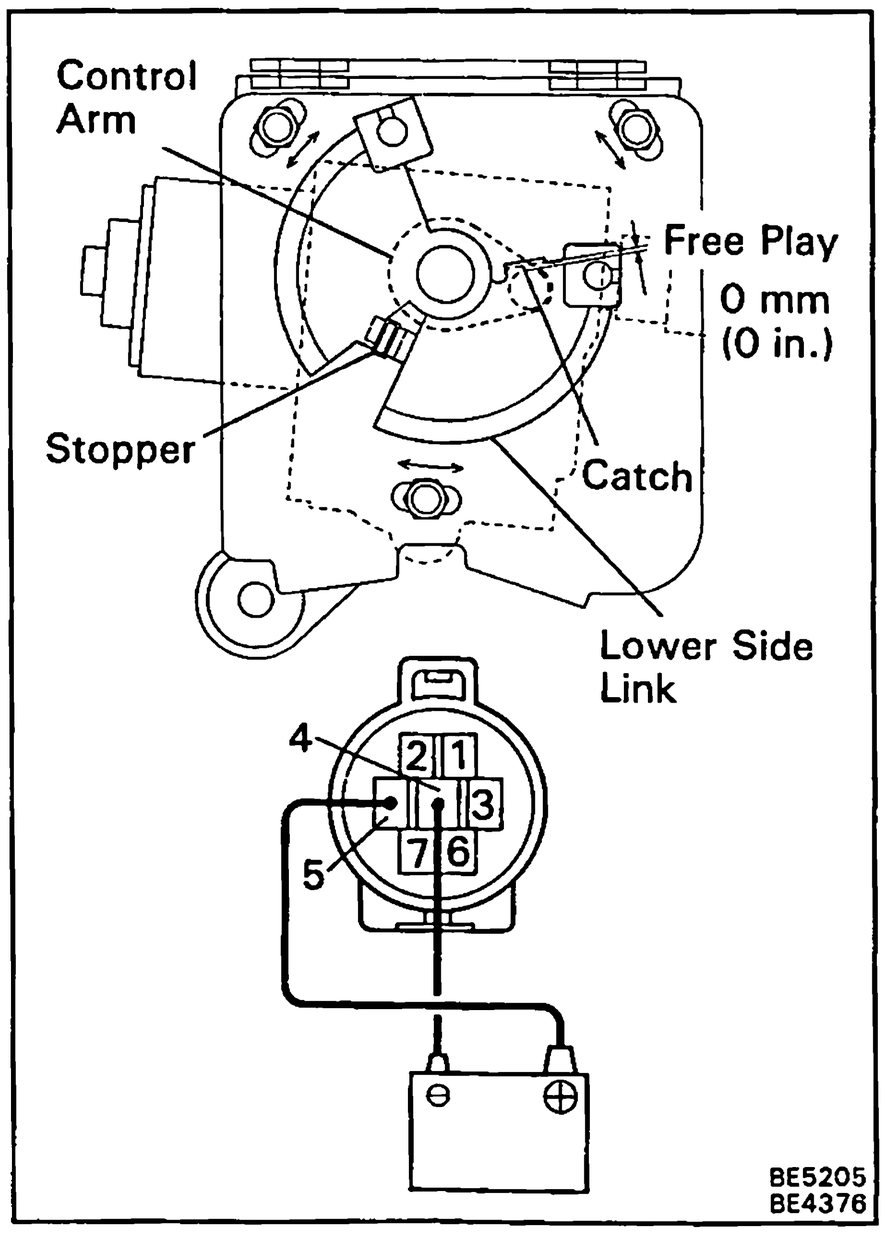

(e) Rotate the control link assembly so that the catch of the control link assembly's lower side link comes in contact with the actuator control arm (Free play 0).

**Free play: 0 mm (0 in.)**

**NOTICE: Rotate the lower side link to the right until it touches the stopper.**

(f) In condition (d), install and torque the three nuts.

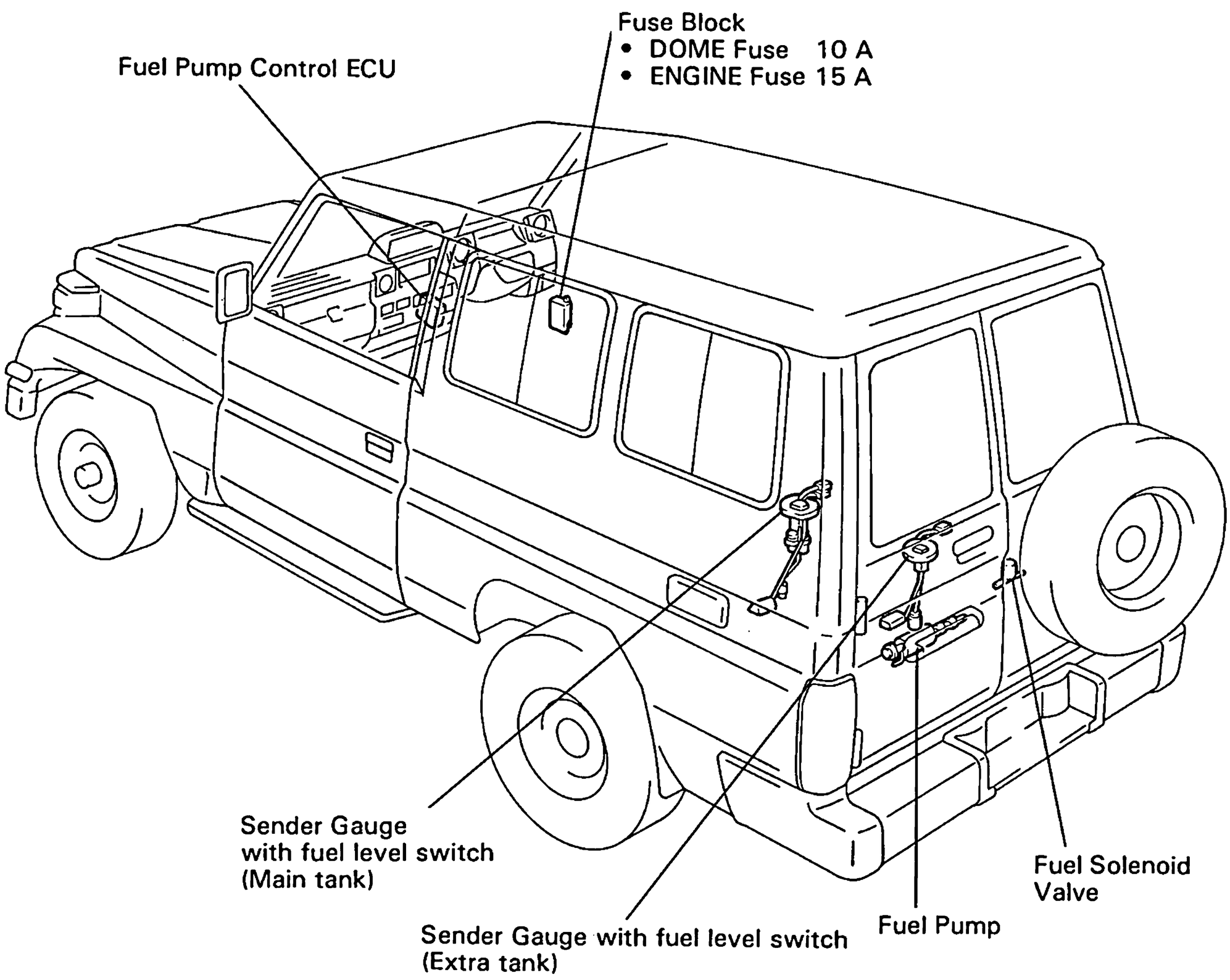
(g) Disconnect lead wire from the actuator.



# EXTRA (SUB) TANK SYSTEM

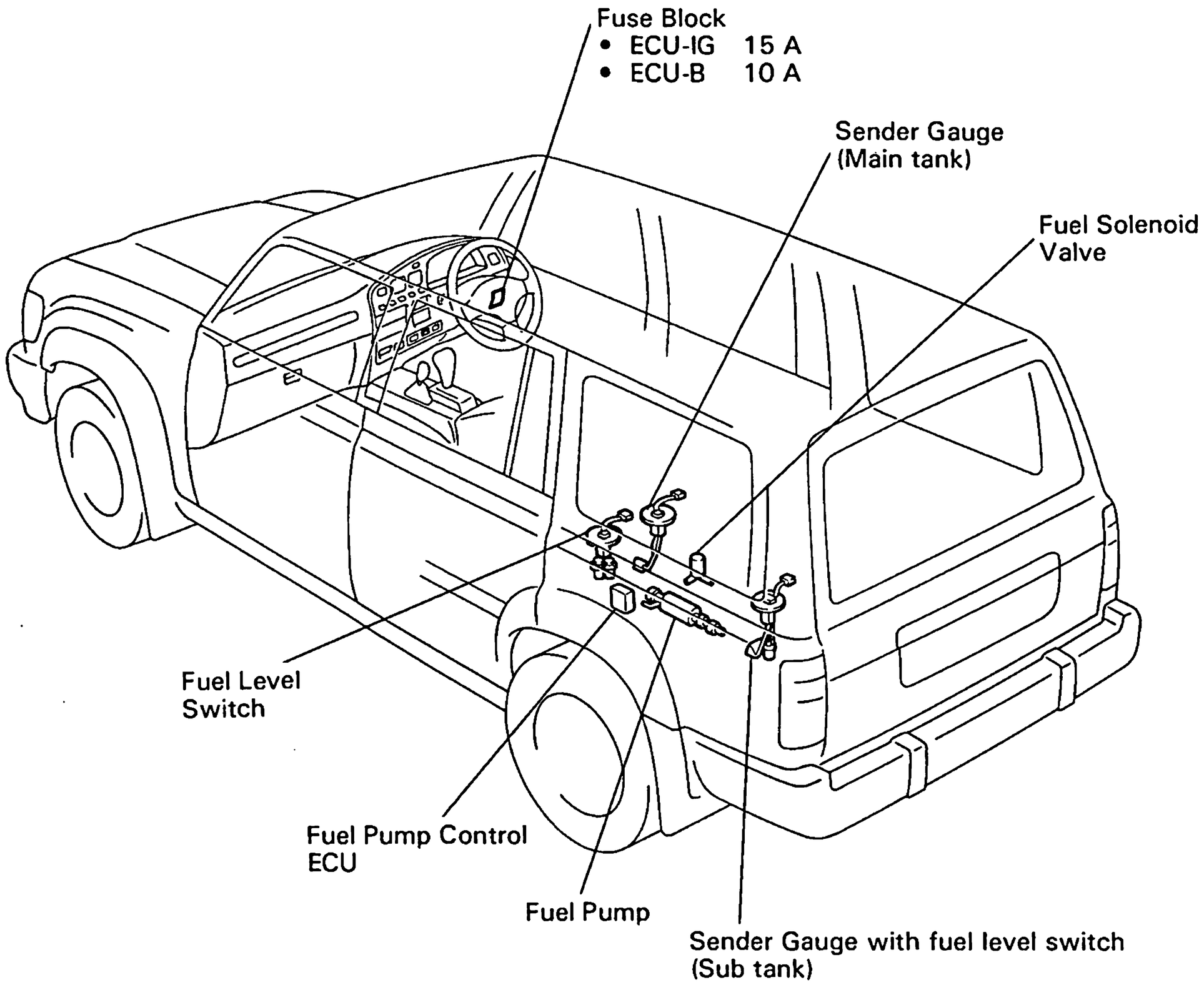
## PARTS LOCATION

**FZJ70 type**




N06931

**FZJ80 type**



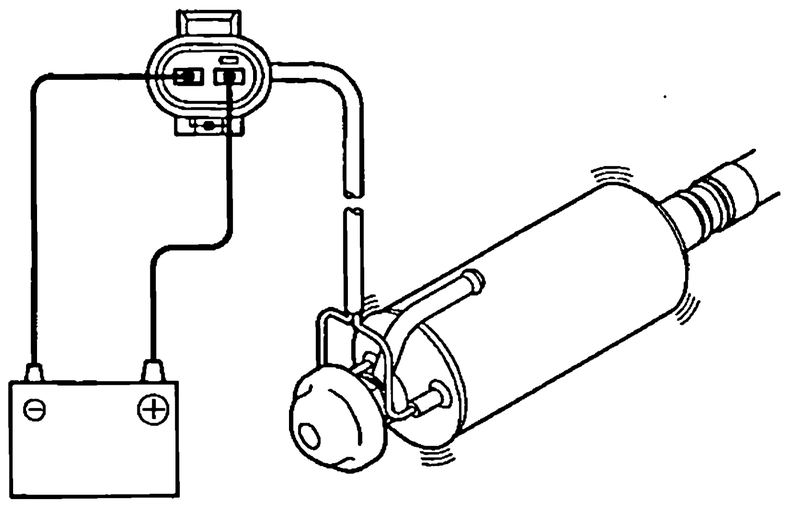

N06716

# TROUBLESHOOTING

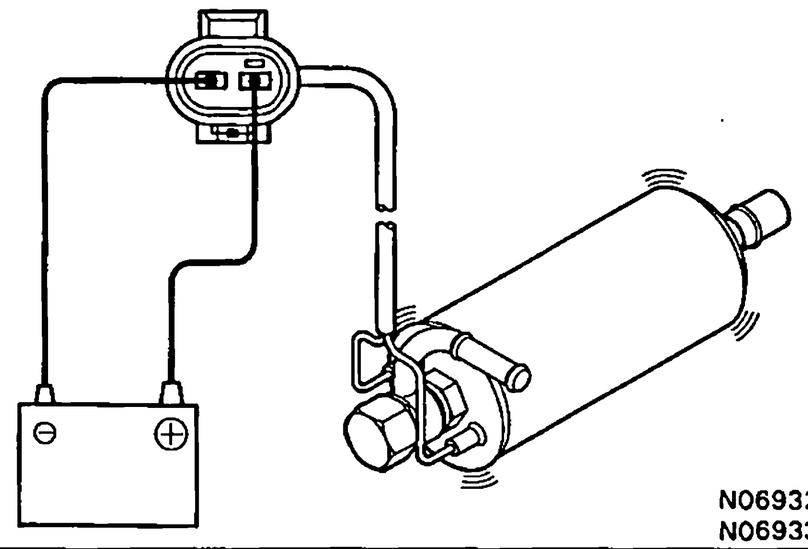
First use the diagnosis system to check for malfunctions. Repair any malfunctions found. Then check for malfunction in the parts shown in the table below.
The most likely causes of malfunction are shown in the order of their probability.
Inspect each part in the order shown, and replace the part when it is found to be faulty.

| Trouble | Part name | See page |
|---|---|---|
| EXTRA (SUB) TANK system does not operate | 1. Fuse<br>FZJ70 type<br>• DOME FUSE<br>• ENGINE Fuse<br>FZJ80 type<br>• ECU-IG Fuse<br>• ECU-B Fuse | — |
| | 2. Fuel Pump | BE-53 |
| | 3. Sub Fuel Switch | BE-53 |
| | 4. Fuel Solenoid Valve | BE-55 |
| | 5. Fuel Level Switch (Main tank or Extra (sub) tank) | BE-54 |
| | 6. Sender Gauge | BE-54 |
| | 7. Fuel Pump Control ECU | BE-56 |
| | 8. Wire Harness | — |

FZJ70 type



FZJ80 type



N06932
N06933

# FUEL PUMP

## INSPECT FUEL PUMP OPERATION

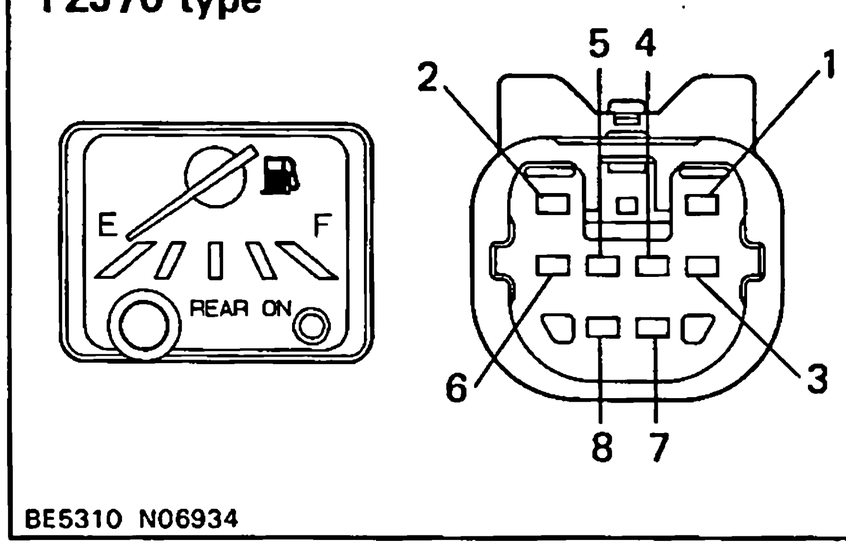
Connect the positive (+) lead from the battery to terminal 1 of the connector, and the negative (—) lead to terminal 2. Check that the fuel pump operates.

**NOTICE:**

- **These tests must be performed quickly (within 10 seconds) to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always perform switching at the battery side.**

If operation is not as specified, replace the fuel pump.

FZJ70 type

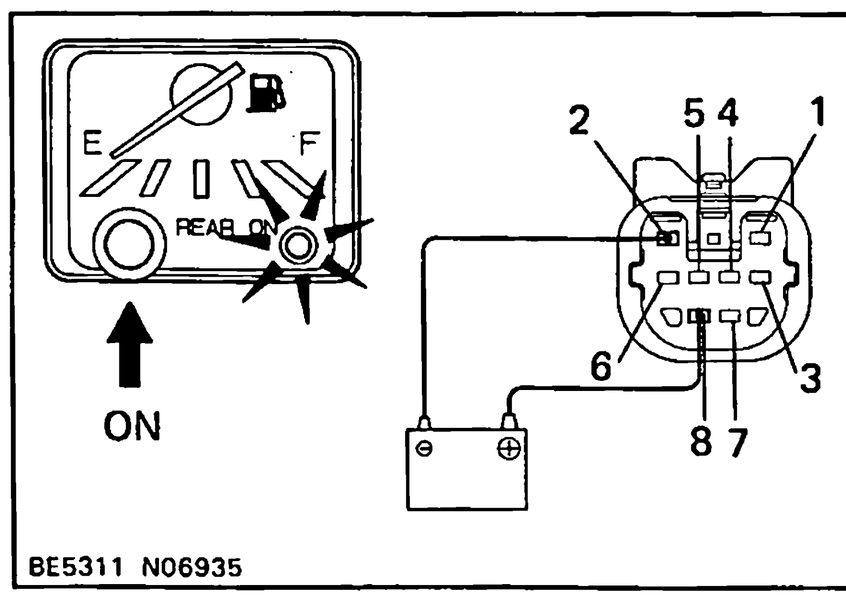



BE5310 N06934

# SUB FUEL SWITCH

## INSPECT SUB FUEL SWITCH

| Terminal / SW Position | 4 | 7 | Illumination | |
|---|---|---|---|---|
| | | | 1 | 3 |
| OFF | | | | |
| ON | ○—— | ——○ | | |




BE5311 N06935

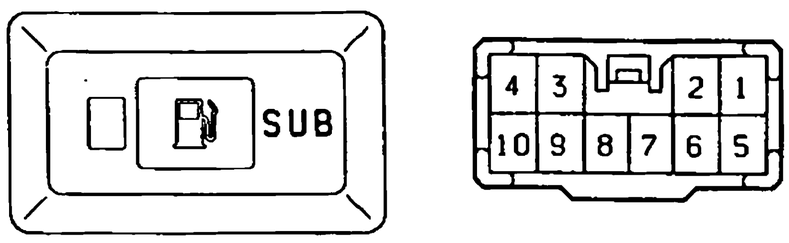
## INSPECT INDICATOR LIGHT

(a) Connect the positive (+) lead from the battery to terminal 8 and the negative (—) lead to terminal 2.

(b) Set the switch ON, check that the indicator light lights up.

If the indicator light does not light up, replace the accessory meter.

FZJ80 type



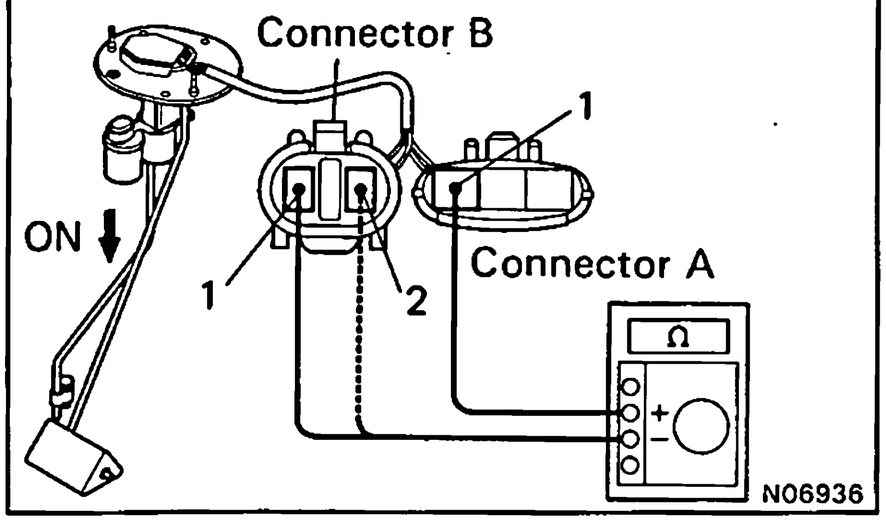

N06707 S-10-2

# INSPECT SUB FUEL SWITCH

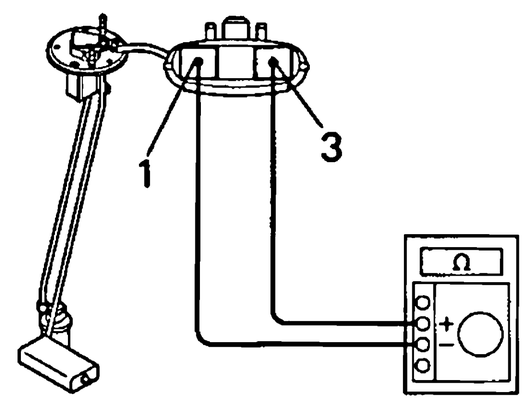
| Terminal / SW Position | 6 | 9 | Illumination | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| OFF | | | | | | |
| ON | ○—— | ——○ | | | | |

If continuity is not as specified, check the bulb or replace the switch.

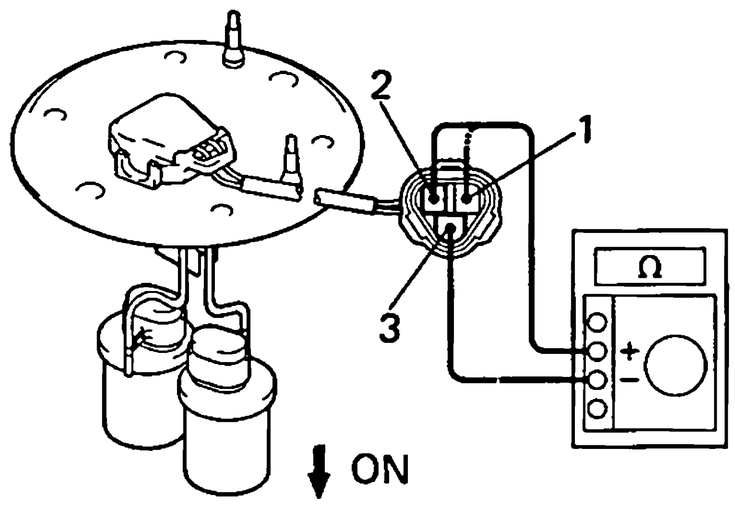
FZJ70 type (Main Tank)



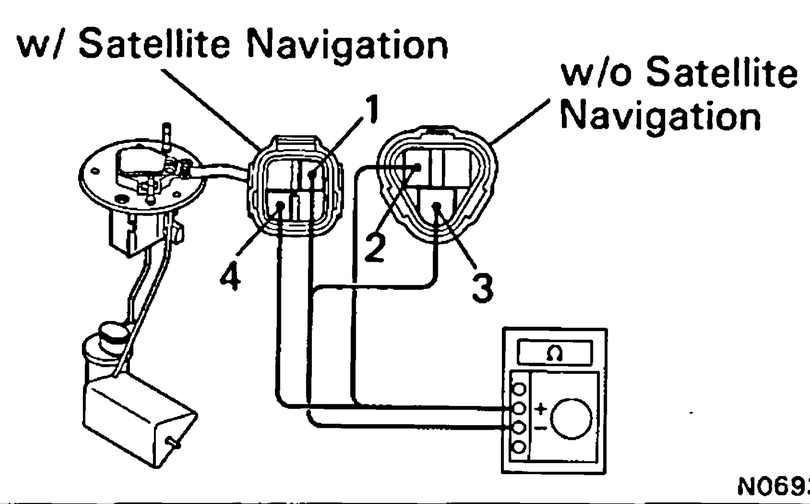

FZJ70 type (Extra Tank)




FZJ80type (Main Tank)




FZJ80 type (Sub Tank)




# FUEL LEVEL SWITCH

## INSPECT FUEL LEVEL SWITCH

(Continuity)

FZJ70 type (Main Tank)

| Terminal / Switch Position | Connector A | Connector B | |
|---|---|---|---|
| | 1 | 1 | 2 |
| ON (Float down) | ○—○ | ○—○ | ○—○ |
| OFF (Float up) | | | |

FZJ70 type (Extra Tank)

| Terminal / Switch position | 1 | 3 |
|---|---|---|
| ON (Float down) | ○—○ | ○—○ |
| OFF (Float up) | | |

FZJ80 type (Main Tank)

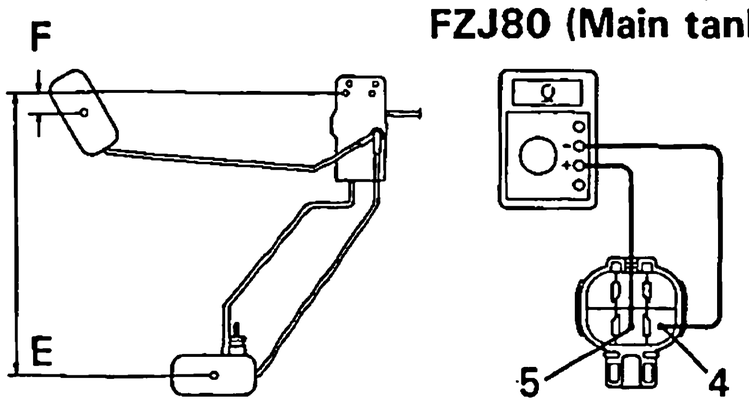
| Terminal / Switch position | 1 | 2 | 3 |
|---|---|---|---|
| ON (Float down) | ○—○ | ○—○ | ○—○ |
| OFF (Float up) | | | |

FZJ80 type (Sub Tank)

| Terminal / Switch position | w/ Satellite Navigation | | w/o Satellite Navigation | |
|---|---|---|---|---|
| | 1 | 4 | 2 | 3 |
| ON (Float down) | ○—○ | | ○—○ | |
| OFF (Float up) | | | | |

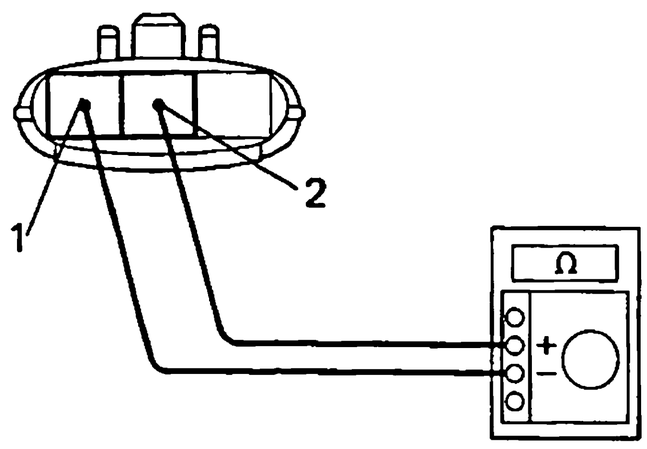
If continuity is not as specified, replace the switch.

FZJ80 (Main tank)




BE4977 BE5084

FZJ70 type (Main tank)




N06944

# FUEL SENDER GAUGE

## INSPECT FUEL SENDER GAUGE

Measure the resistance.

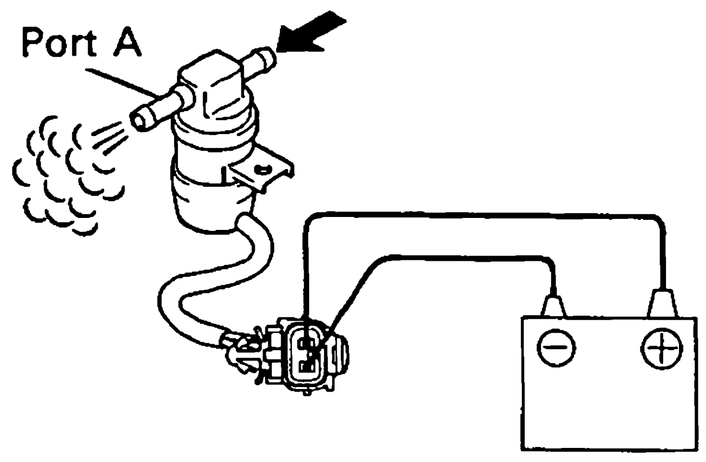
FZJ80 type (Main tank)

| Float position mm (in.) | Resistance (Ω) |
|---|---|
| F approx. 71 (2.80) | approx. 3 |
| E approx. 256 (10.08) | approx. 110 |

FZJ70 type (Main tank)

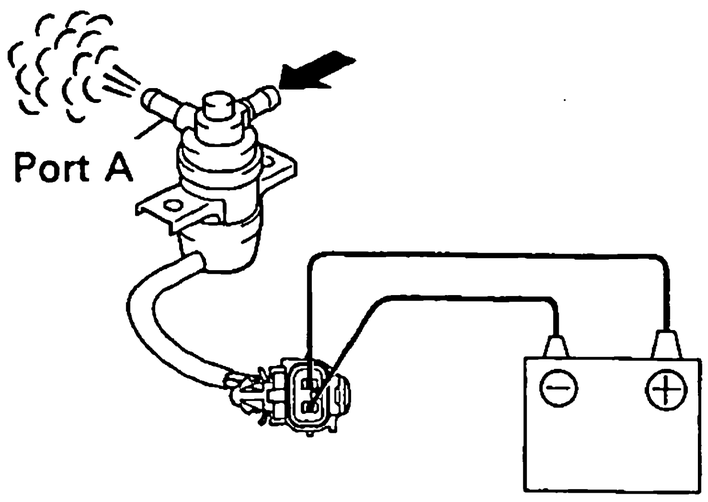
| Float position mm (in.) | Resistance (Ω) |
|---|---|
| F approx. 39 (1.54) | approx. 3 |
| E approx. 303 (11.93) | approx. 110 |

FZJ70 type




N06821

FZJ80 type



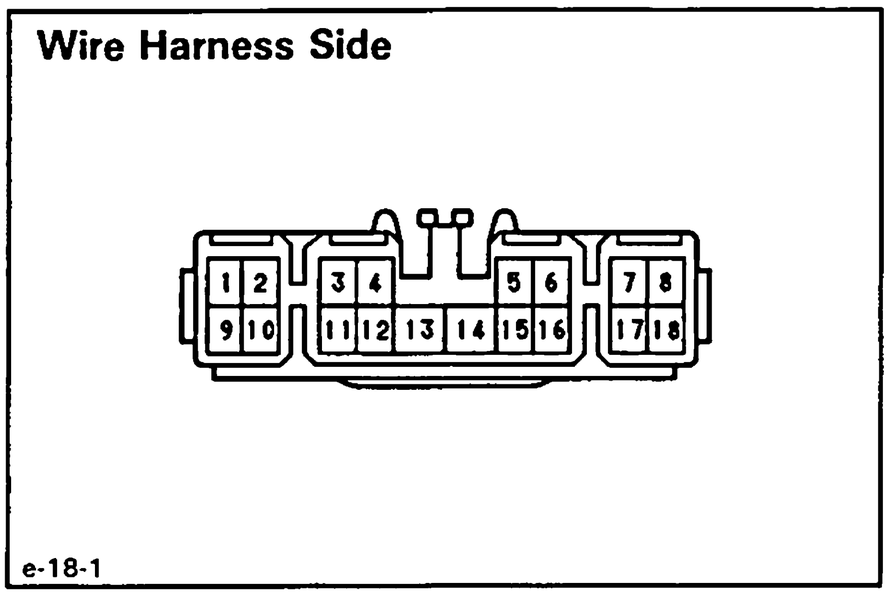

N06939

# FUEL SOLENOID VALVE

## INSPECT FUEL SOLENOID VALVE

1. Check that air flows out port A when battery voltage is applied across the terminals.
2. Check that air does not flow out port A when battery voltage is not applied across the terminal.

Replace the valve if either test is not successful.




# FUEL PUMP CONTROL ECU

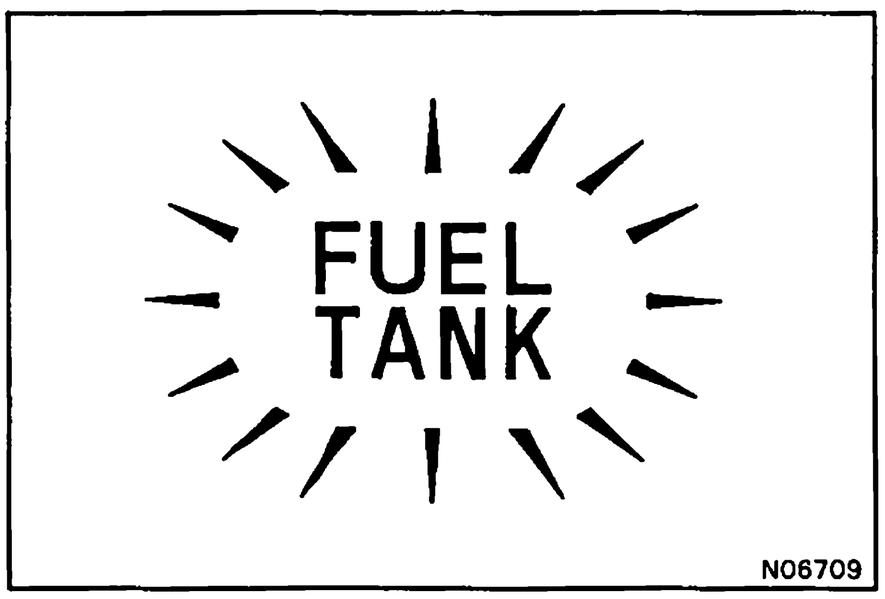
## FUEL PUMP CONTROL ECU INSPECTION

### ECU CIRCUIT

Disconnect the connector from the ECU and inspect the connector on the wire harness side as shown in the chart.

| Check for | Tester Connection | Condition | | Specified value |
|---|---|---|---|---|
| Continuity | 3 — Ground<br>11 — Ground | Main Tank Fuel Level | Full | No Continuity |
| | | | Below 3/4 | Continuity |
| | 6 — Ground | Constant | | Continuity |
| | 7 — Ground | Sub-Fuel Switch | OFF | No Continuity |
| | | | ON (Pushed) | Continuity |
| | 13 — Ground | Sub Tank Fuel Level | Empty | Continuity |
| | | | above 1/4 | No Continuity |
| | 15 — Ground | Constant | | No Continuity |
| | | Terminals $T_C$ and $E_1$ connected | | Continuity |
| | 16 — Ground | Constant | | Continuity |
| | 17 — Ground | Constant | | Continuity |
| | 18 — Ground | Constant | | Continuity |
| | 2 — Ground | Constant | | Battery Voltage |
| | 4 — Ground<br>5 — Ground | Ignition Switch Position | Lock or ACC | No Voltage |
| | | | ON | Battery Voltage |
| | 10 — Ground | Ignition Switch Position | Lock or ACC | No Voltage |
| | | | ON | Battery Voltage |
| | 12 — Ground | Ignition Switch: ON and Main Tank Fuel Level | Full | Below 1V |
| | | | Below 1/4 | Above 3 V |
| | 14 — Ground | Ignition Switch Position | ON | Approx 1 V |
| | | | ON (Engine running) | Battery Voltage |

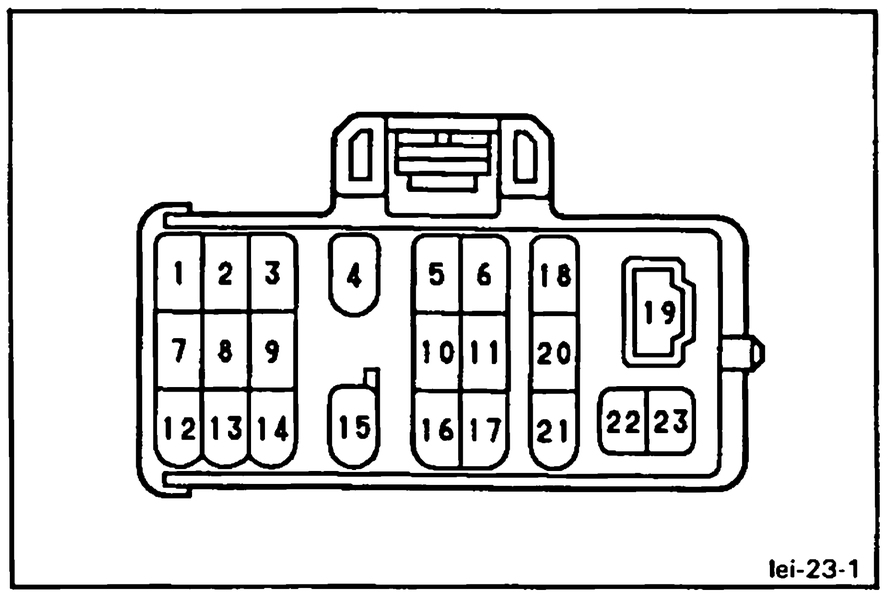
If circuit is as specified, try other ECU.




# DIAGNOSIS SYSTEM

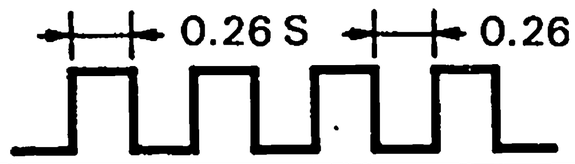
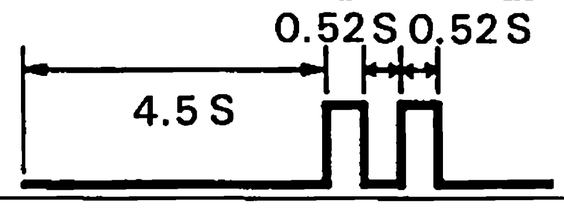
## READ DIAGNOSTIC CODE

When there is a malfunction in the extra (sub) tank system, the warning light light up.



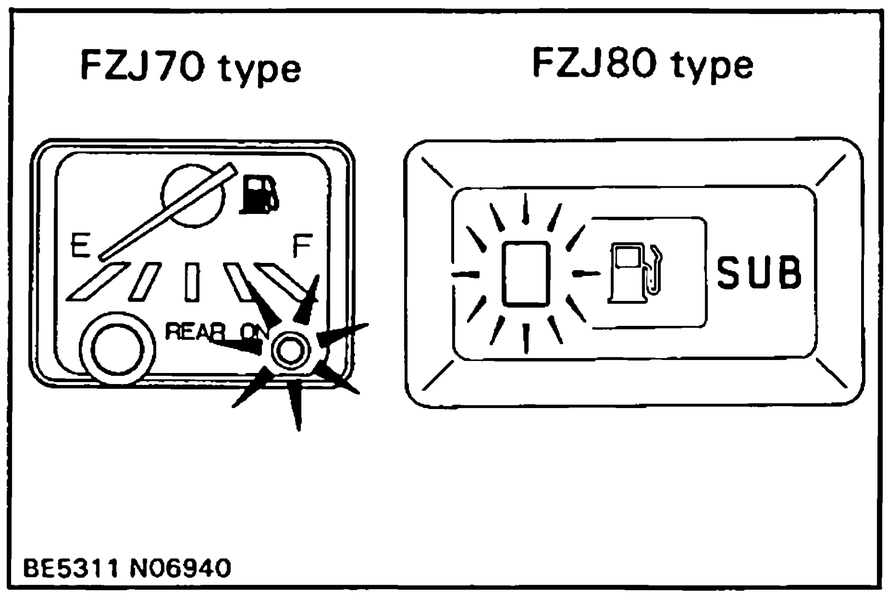

### OUTPUT OF DIAGNOSTIC CODE

1. Turn the ignition switch ON.
2. Connect terminals $T_C$ and $E_1$ of the check connector.
3. Read the diagnostic code from the warning light.

| | Indication Code | Diagnosis |
|---|---|---|
| | 0.26 S 0.26 S  N06713 | Normal |
| 2 | 0.52S 0.52S 4.5 S  N06746 | • Fuel level switch malfunction (Main tank)<br>• Open in switch circuit |
| 3 |  N06747 | • Main tank sender gauge malfunction |
| 4 |  N06748 | • Fuel pump malfunction<br>• Open or short in pump circuit |
| 5 |  N06749 | • Fuel solenoid valve malfunction<br>• Open or short in solenoid valve circuit |

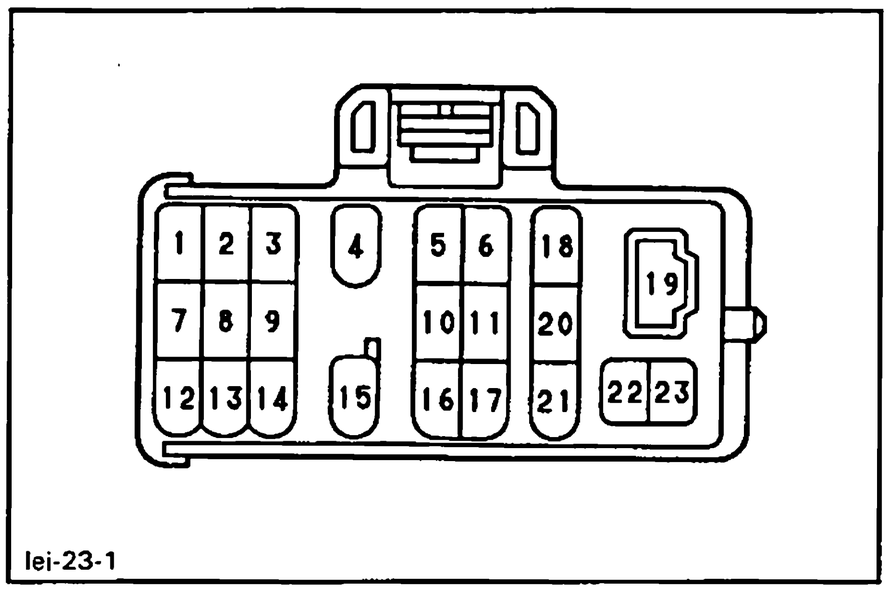
### Diagnostic code clearance

1. After completing repairs the diagnostic code retained in memory can be cleared by removing the battery terminal (—) for 10 seconds or more,with the ignition switch off.
2. Check that the normal code is displayed after connecting the battery terminal (—).



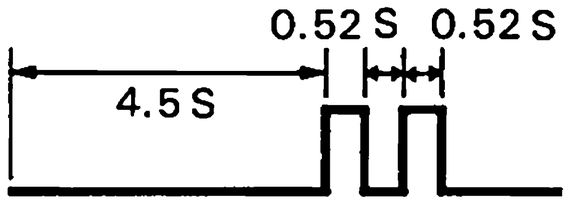

## READ TEST CODE

The indicator light outputs the indication codes shown below in conformity with signals input or output by the extra (sub) tank system.



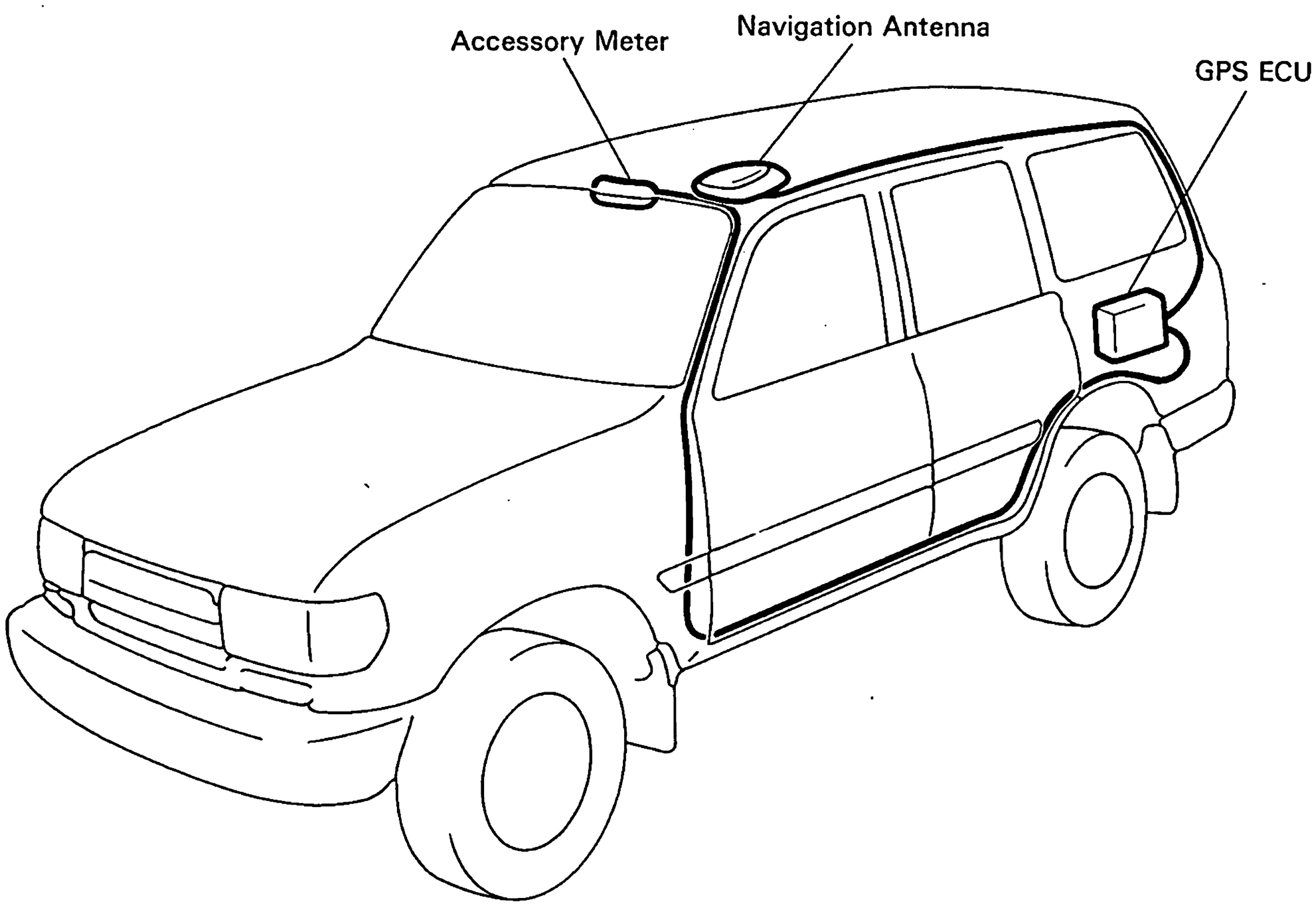

## OUT PUT OF TEST CODE

1. Turn the ignition switch ON.
2. Connect terminals $T_C$ and $E_1$ of the check connector.
3. Read the test code from the indicator light.

| | Indication code | Condition indicated by signal input/output |
|---|---|---|
| 2 |   N06746 | • Fuel level switch signal open or (Main tank) fuel level high. |
| 3 |  N06747 | • Fuel sender gauge signal open or fuel level high. |
| 4 |  N06748 | • Open or short in fuel pump circuit. |
| 5 |  N06749 | • Open or short in fuel solenoid valve circuit. |
| 6 |  N06941 | • Fuel level switch open or fuel level high. (Extra or sub tank) |
| — |  N06713 | • Condition other than the above. |

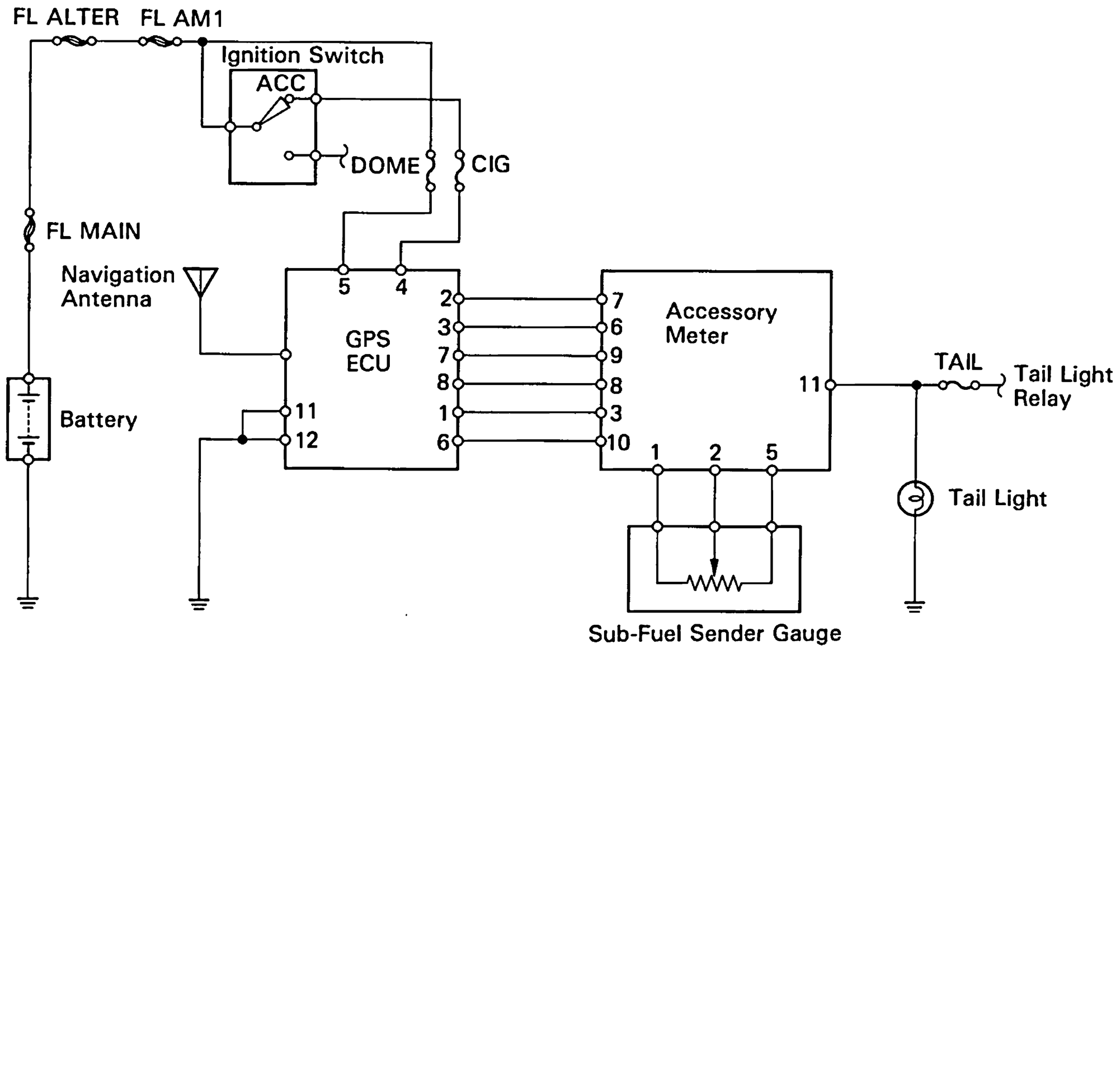
# SATELLITE NAVIGATION SYSTEM

## PARTS LOCATION



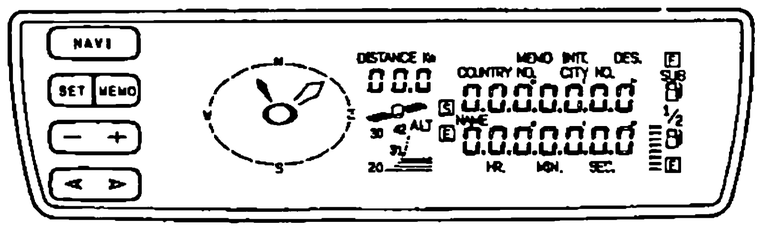

N06717

# WIRING DIAGRAMS



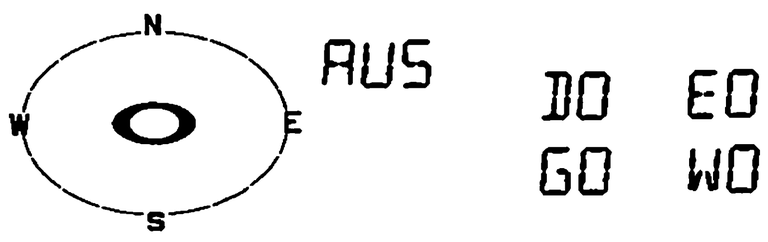

N06718

Display




N06710

Display example




N06711

# DIAGNOSIS SYSTEM

## OUTPUT OF DIAGNOSTIC CODE

## READ DIAGNOSTIC CODE

## DO THE FOLLOWING STEPS TO READ DIAGNOSTIC CODE

(a) Turn the ignition switch ACC or ON.

(b) Push "NAVI" or "SET".

(c) Push "NAVI" and "SET" simultaneously for 5 seconds.

(d) Display the condition of each system on the screen.
If a malfunction code is displayed, check it again using other parts.

| Display | Diagnosis |
|---|---|
| $D_0$<br>$E_0$<br>$G_0$<br>$W_0$ | Normal |
| $D_1$ | • Display malfunction |
| $E_1$ | • GPS ECU malfunction |
| $G_1$ | • GPS antenna malfunction<br>• Antenna cable faulty |
| $W_1$ | • Malfunction in wire harness between GPS ECU and display. |

# AIR CONDITIONING SYSTEM

**REFER TO FOLLOWING REPAIR MANUALS:**

| Manual Name | Pub. No. |
|---|---|
| • Land Cruiser (Hardtop and Canvas Top) Chassis and Body Repair Manual | RM183E |
| • Land Cruiser (Station Wagon) Chassis and Body Repair Manual | RM184E |
| • Land Cruiser (Hardtop, Canvas Top & Station Wagon) Chassis and Body Supplement Repair Manual | RM290E |

NOTE: The following pages contain only the points which differ from the above listed manuals.

**(HARDTOP & CANVAS TOP)**
DESCRIPTION ..... AC- 2
DRIVE BELT ..... AC-10
REFRIGERATION LINES ..... AC-11
COMPRESSOR ..... AC-12
COOLING UNIT ..... AC-14
AIR CONDITIONER AMPLIFIER ..... AC-15
**(STATION WAGON)**
DESCRIPTION ..... AC-18
DRIVE BELT ..... AC-22
COMPRESSOR ..... AC-23
AIR CONDITIONER AMPLIFIER ..... AC-25

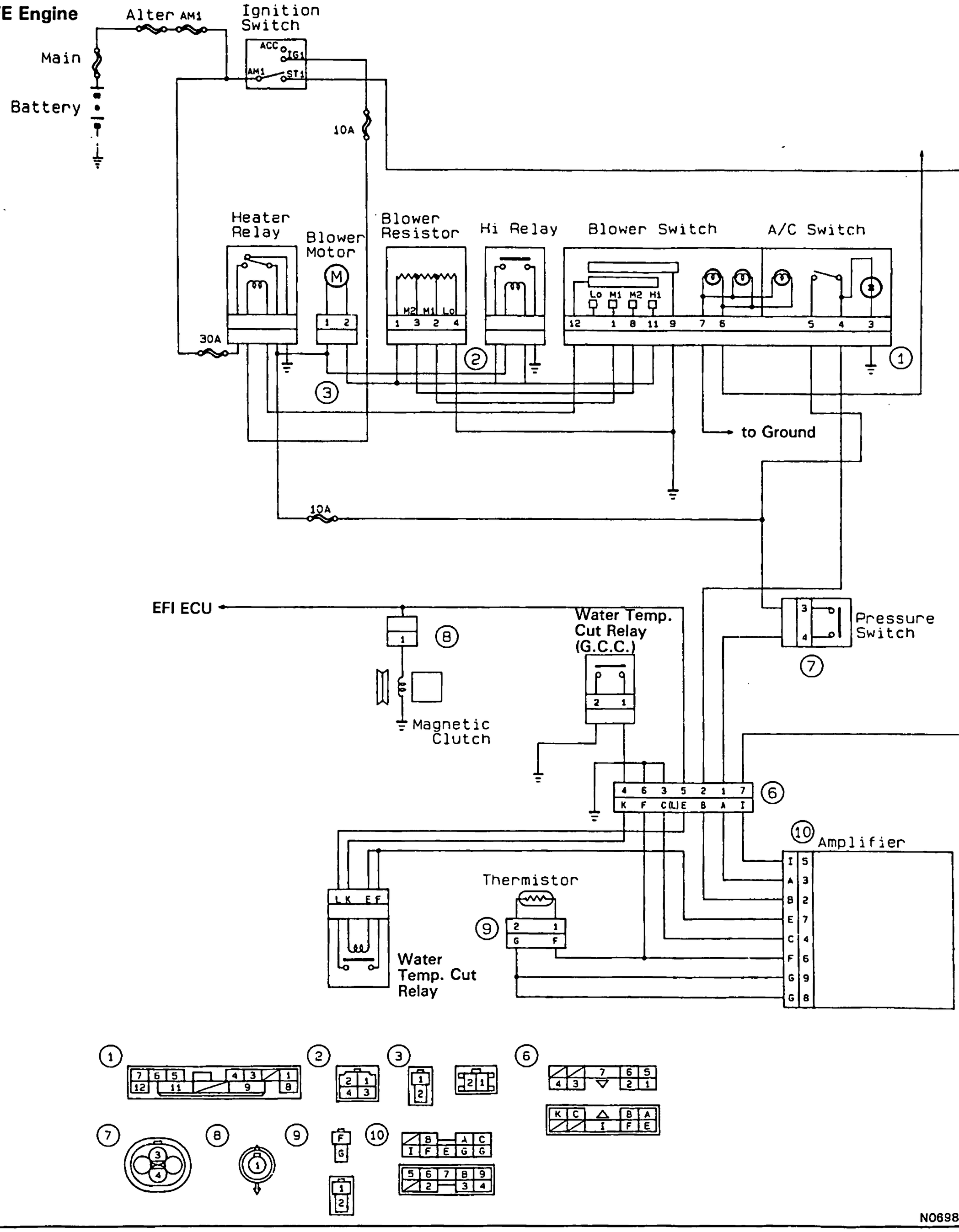
AC

# (Hardtop & Canvas Top)

## DESCRIPTION

### ELECTRICAL WIRING DIAGRAM

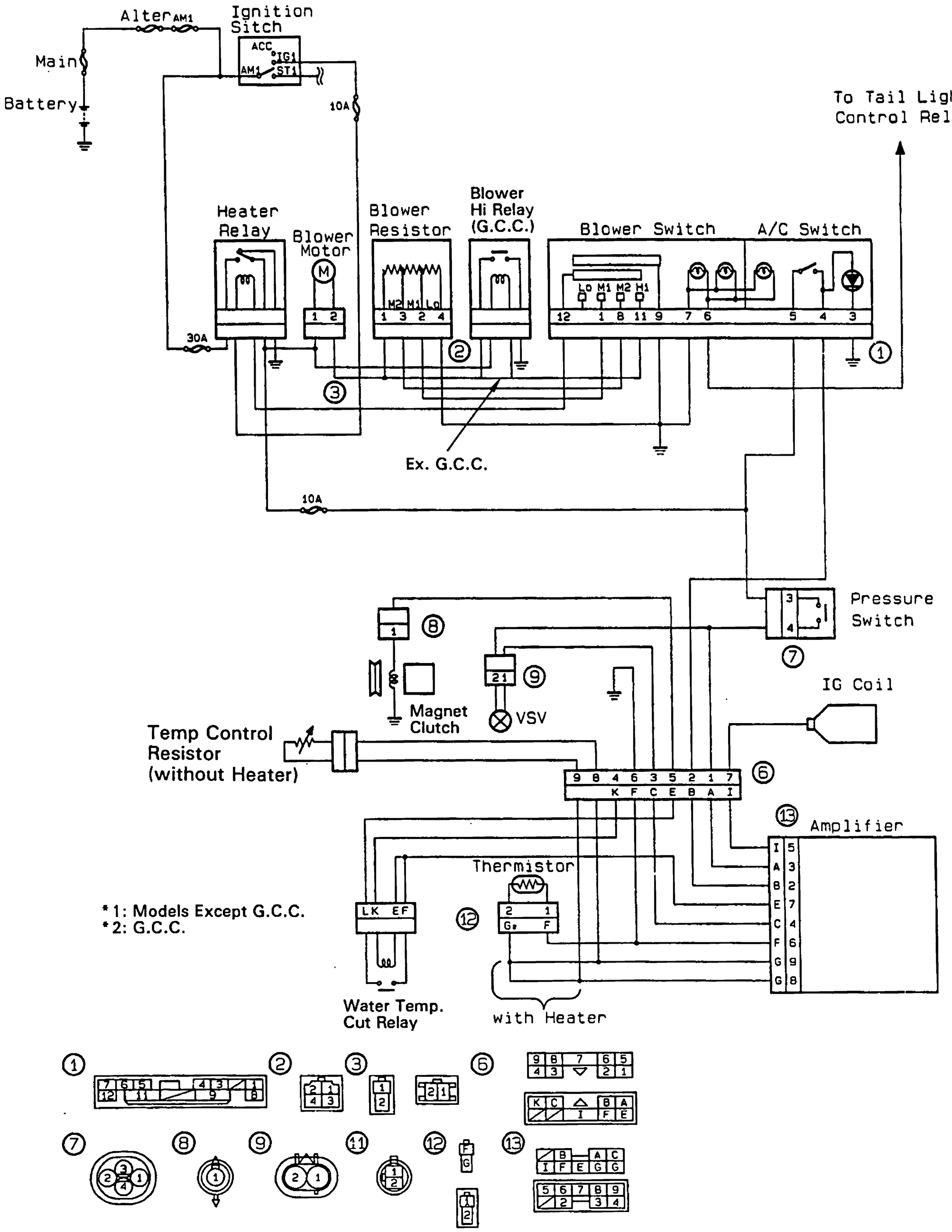
**SINGLE A/C (Lever Type A/C Control Assembly)**




N06986

## SINGLE A/C (Lever Type A/C Control Assembly)

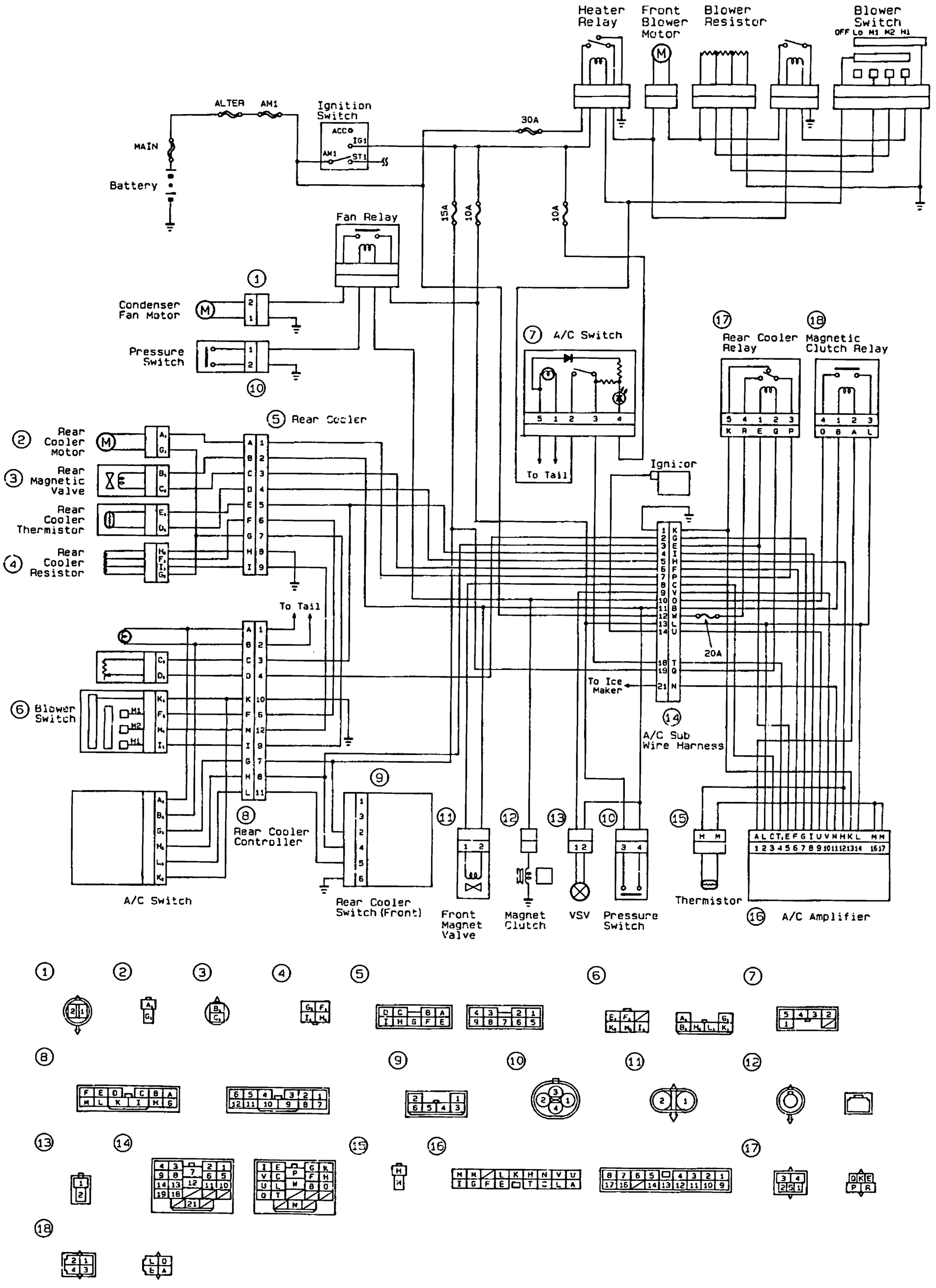
### 1FZ Engine




N06987

## DUAL A/C (Lever Type A/C Control Assembly)

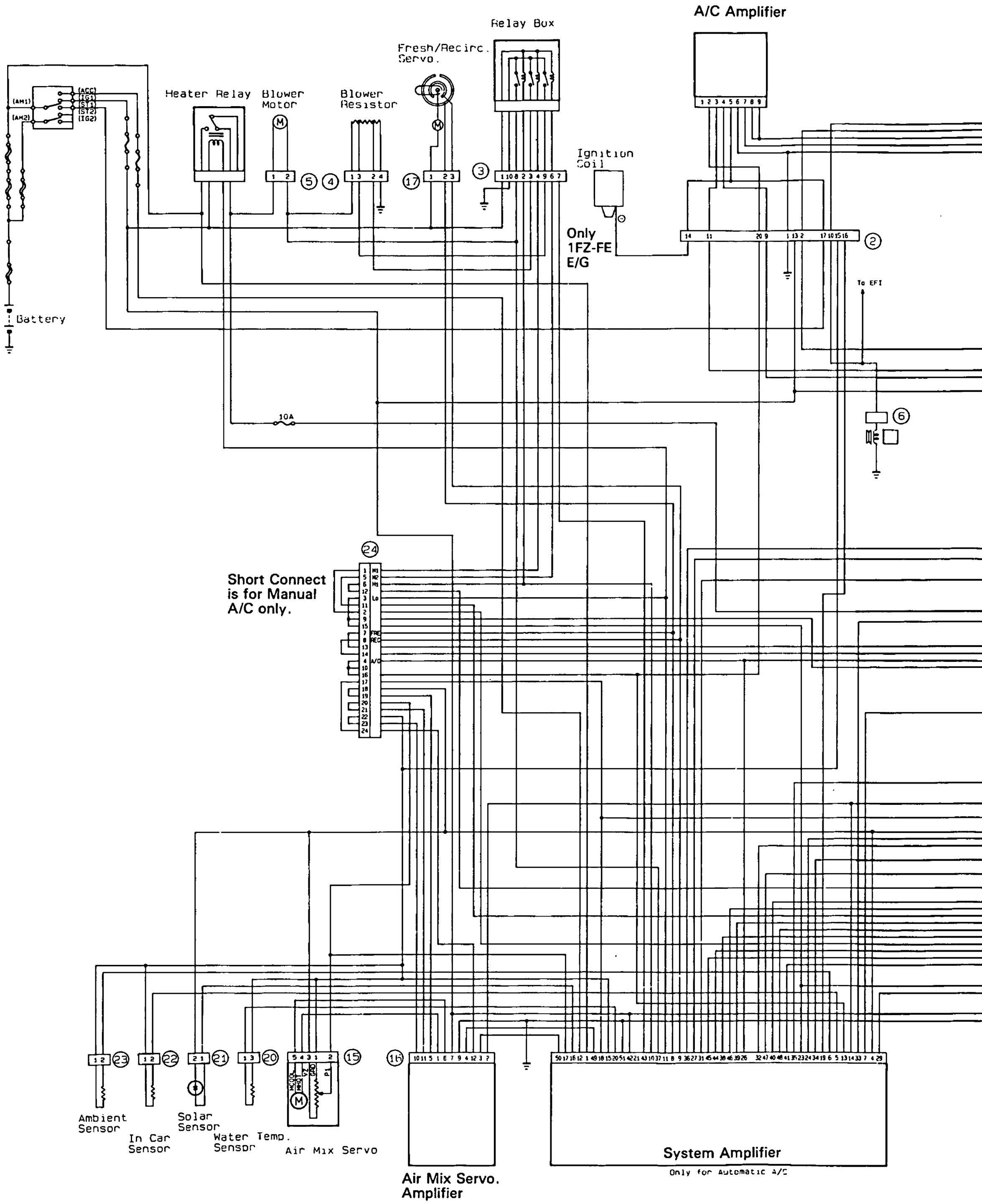
### FZ Series Engine

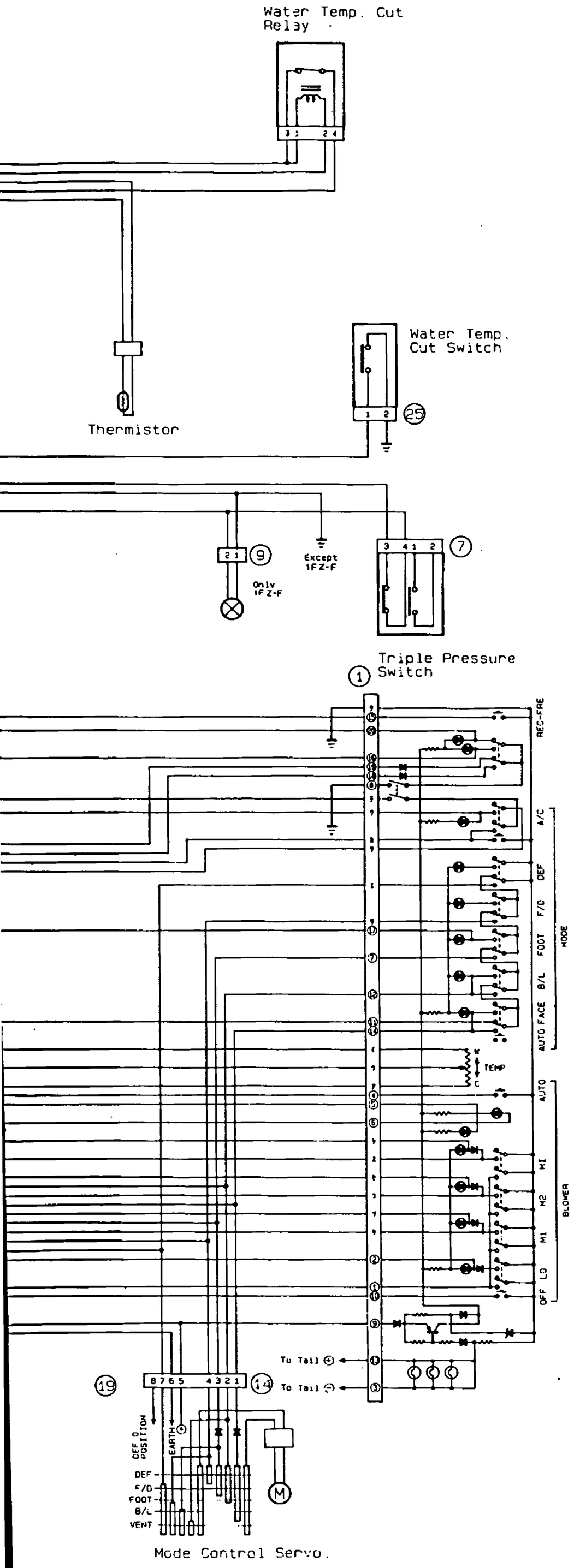


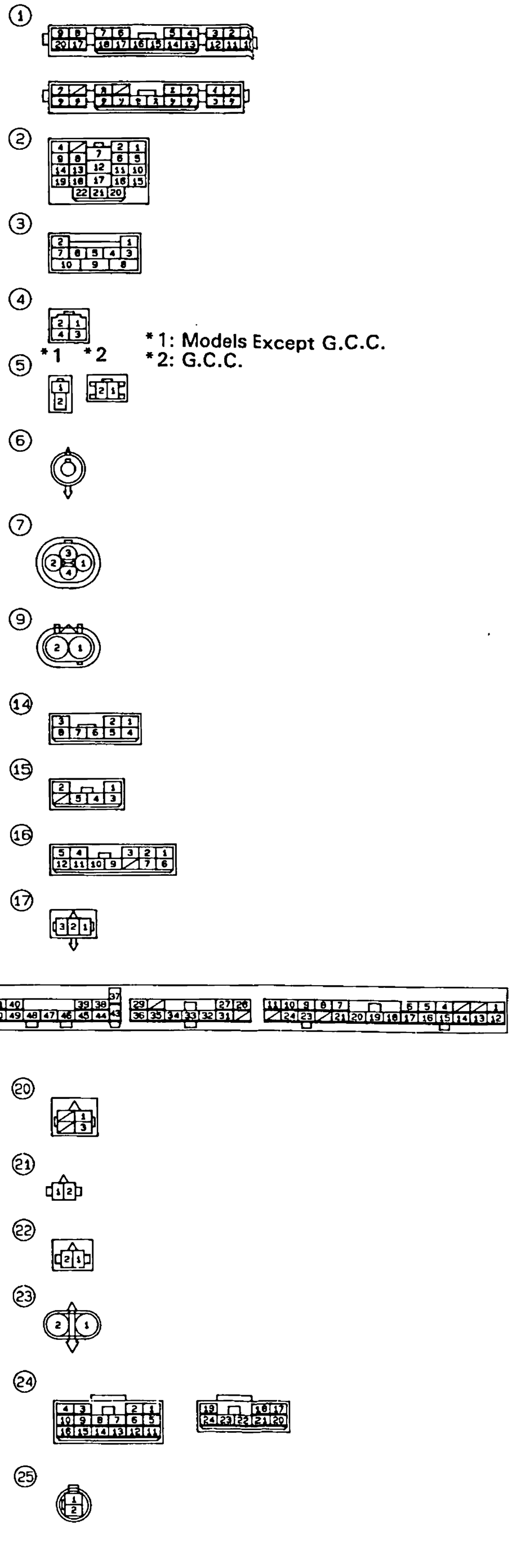
— MEMO —

## SINGLE A/C (Push Type A/C Control Assembly)

### FZ Series Engine





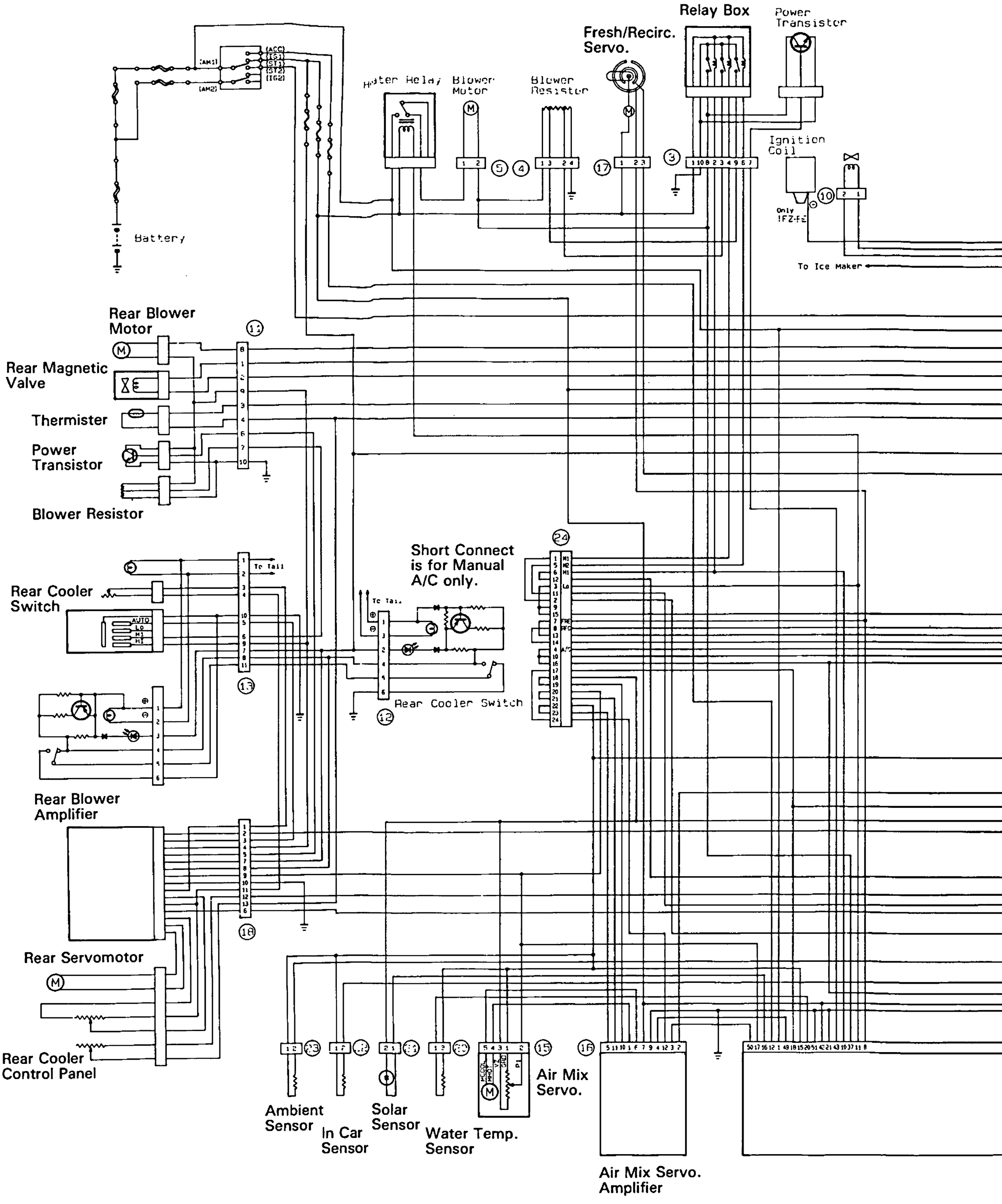



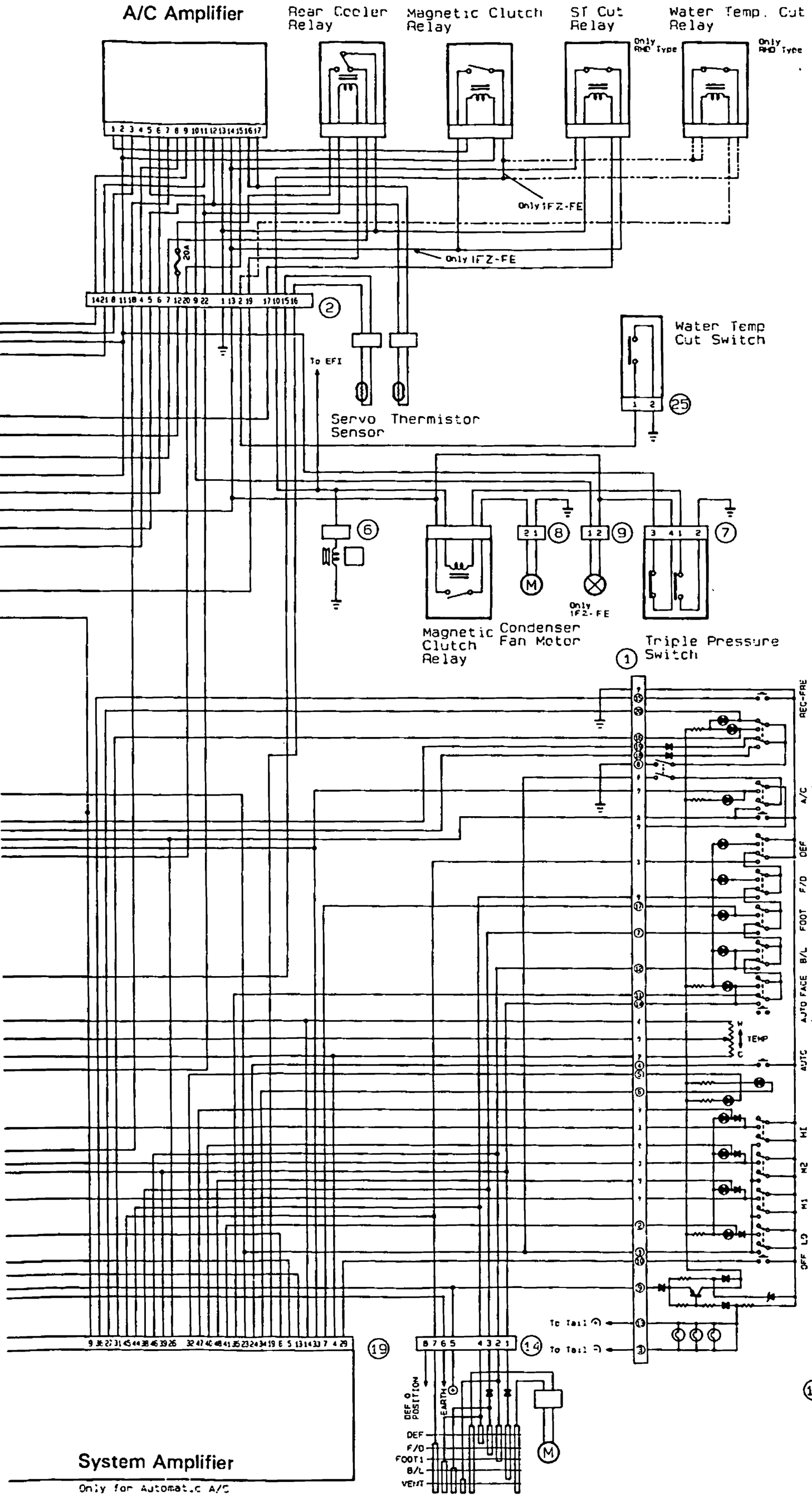

*1: Models Except G.C.C.
*2: G.C.C.

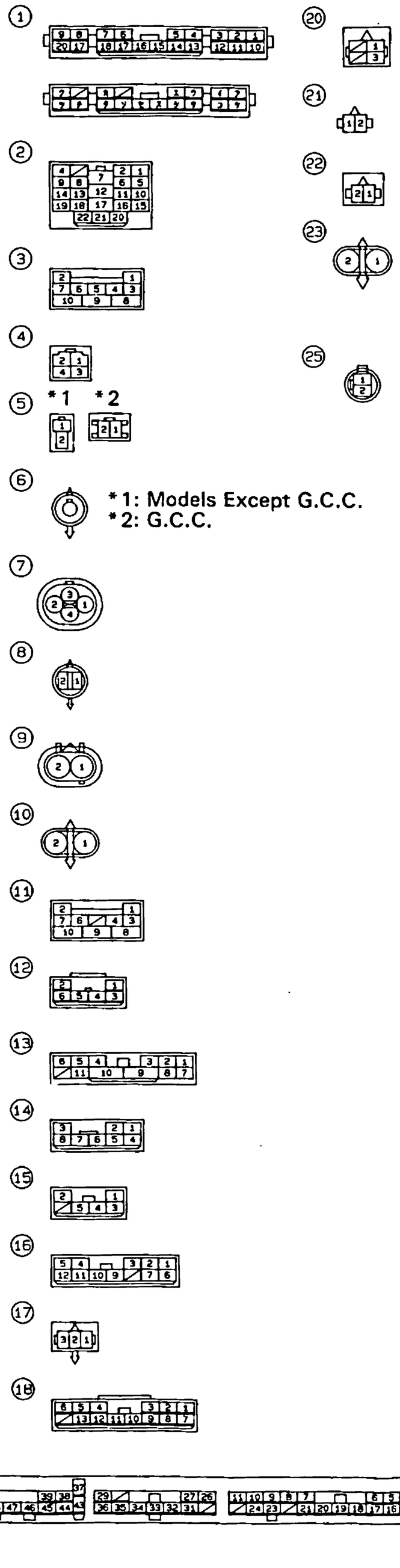
N06984

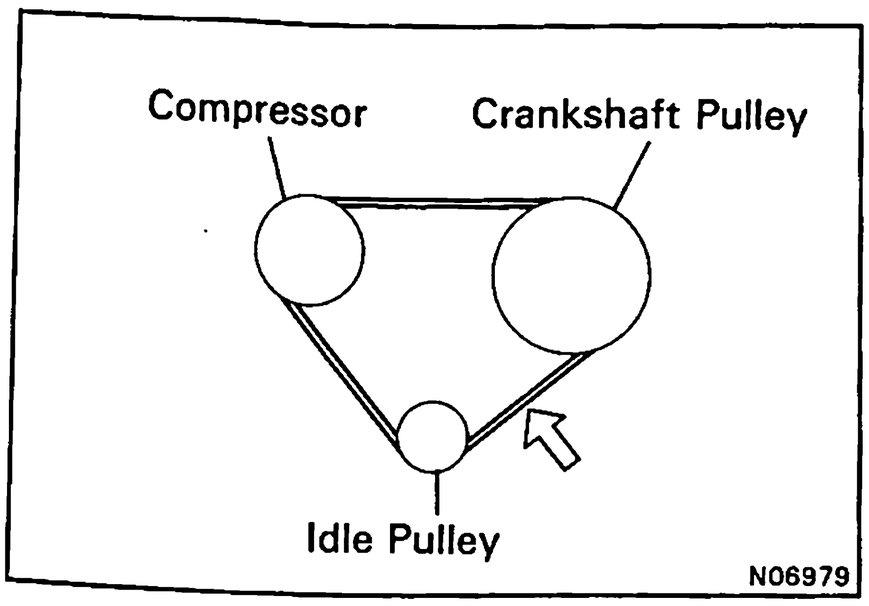
## DUAL A/C (Push Type A/C Control Assembly)

### FZ Series Engine




A/C Amplifier
Rear Cooler Relay
Magnetic Clutch Relay
ST Cut Relay
Water Temp. Cut Relay
Only RHD Type
Only RHD Type
Only 1FZ-FE
Only 1FZ-FE
To EFI
Water Temp Cut Switch
Servo Thermistor Sensor
Magnetic Clutch Relay
Condenser Fan Motor
Only 1F2-FE
Triple Pressure Switch
REC-FRE
A/C
DEF
F/D
FOOT
B/L
AUTO FACE
MODE
TEMP
AUTO
HI
M2
M1
LO
OFF
BLOWER
To Tail
To Tail
DEF
F/D
FOOT
B/L
VENT
DEF POSITION
EARTH
System Amplifier
Only for Automatic A/C
Mode Control Servo.


*1: Models Except G.C.C.
*2: G.C.C.




# DRIVE BELT

## ON-VEHICLE INSPECTION

### INSPECT DRIVE BELT TENSION

**Drive belt tension at 10 kg (22.0 lb, 98N):**
**FZ Series Engine**

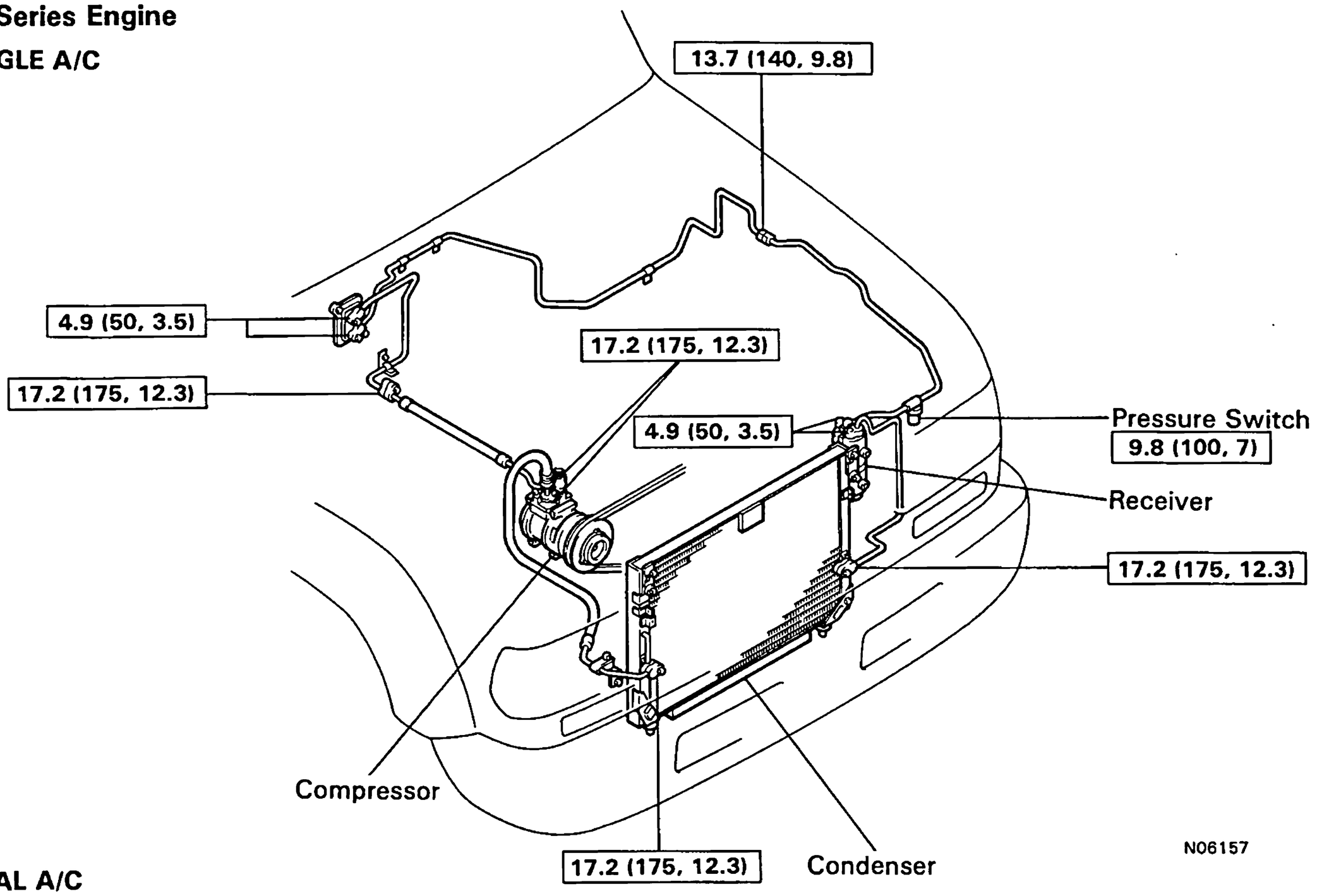
**New belt**
**5 — 7 mm (0.20 — 0.28 in.)**
**Used belt**
**7 — 9.5 mm (0.28 — 0.37 in.)**

# REFRIGERATION LINES

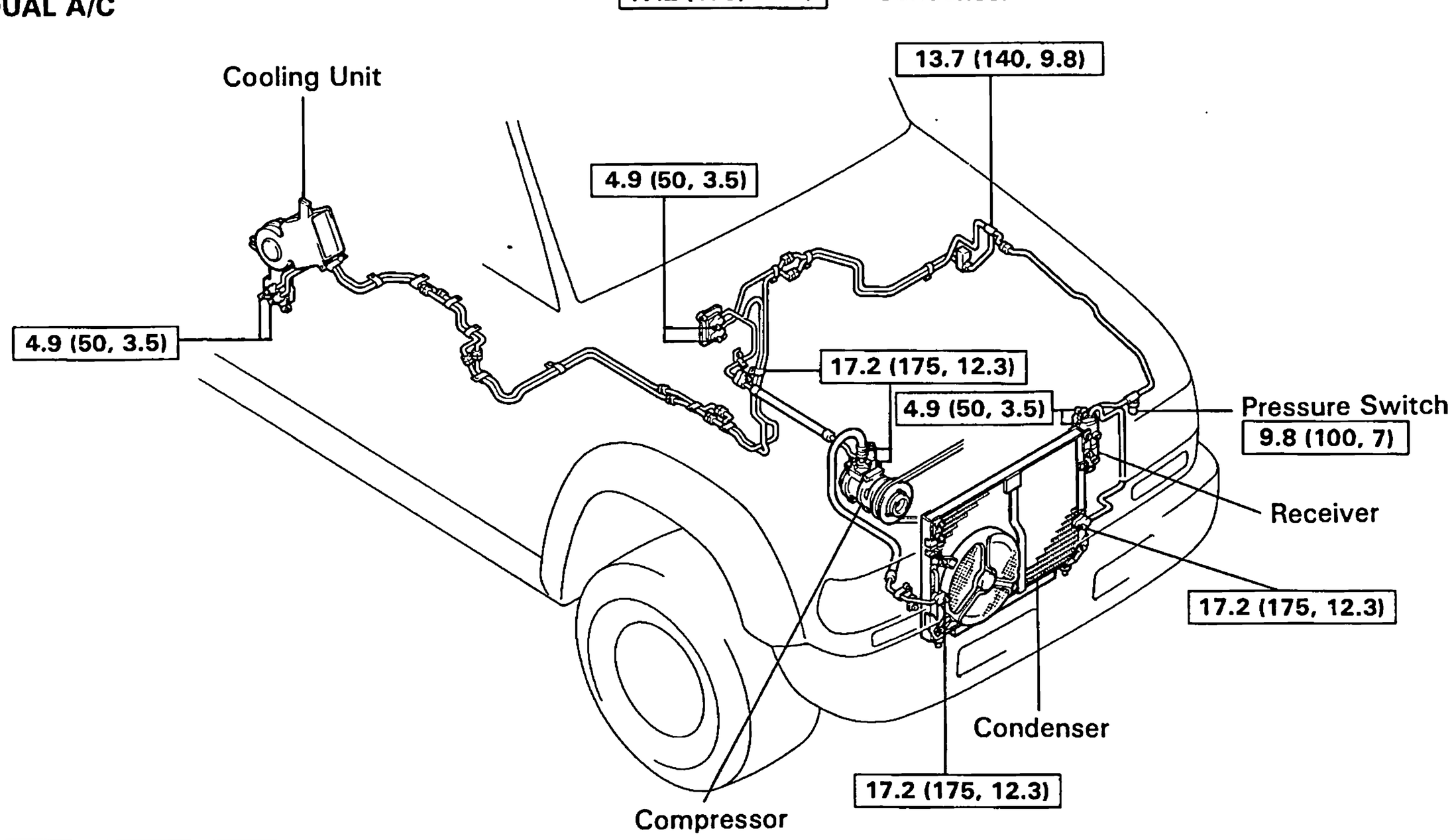
## TIGHTENING

**FZ Series Engine**

**SINGLE A/C**




**DUAL A/C**



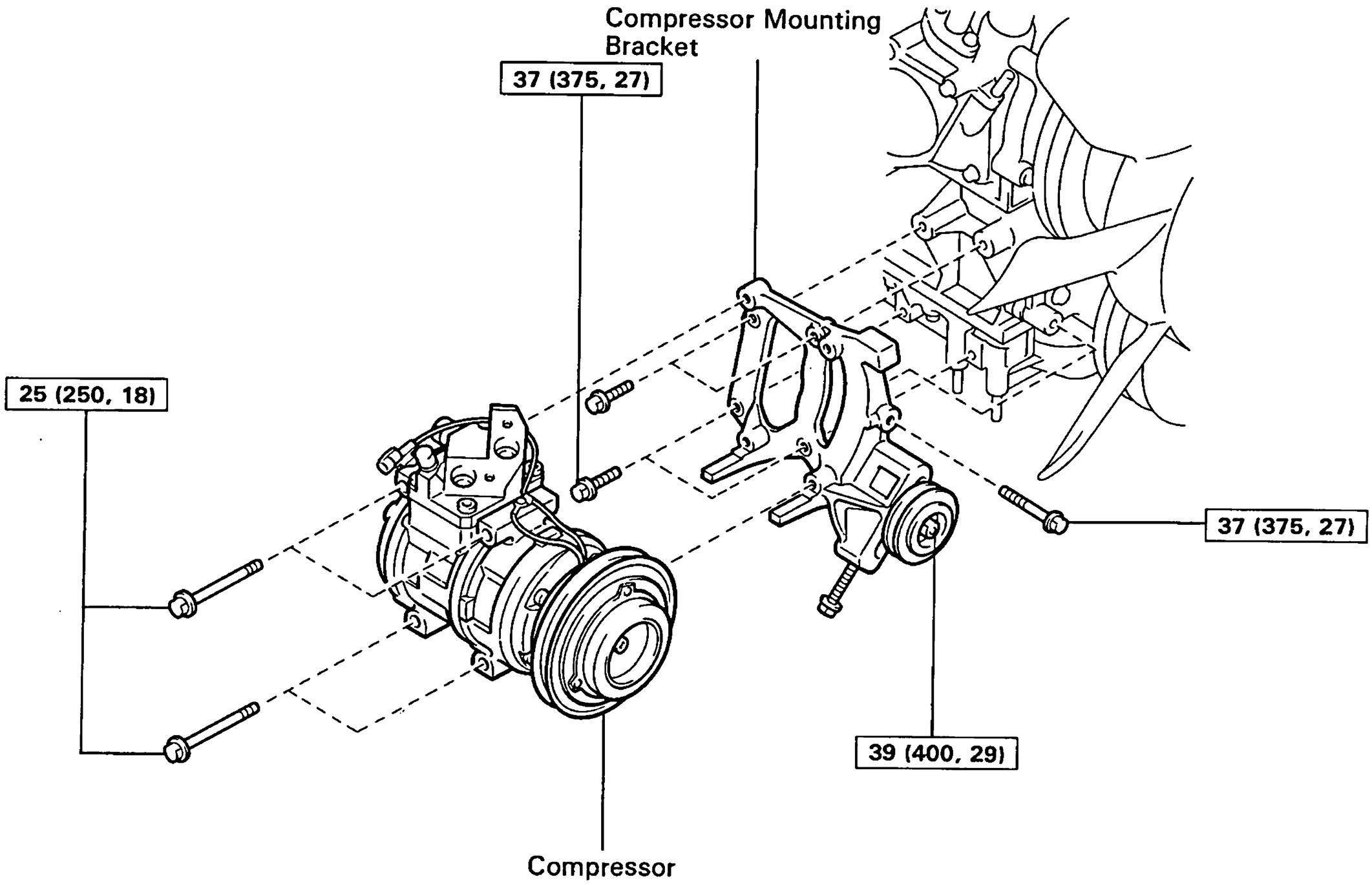

N·m (kgf·cm, ft·lbf) : Specified torque

N06981

# COMPRESSOR

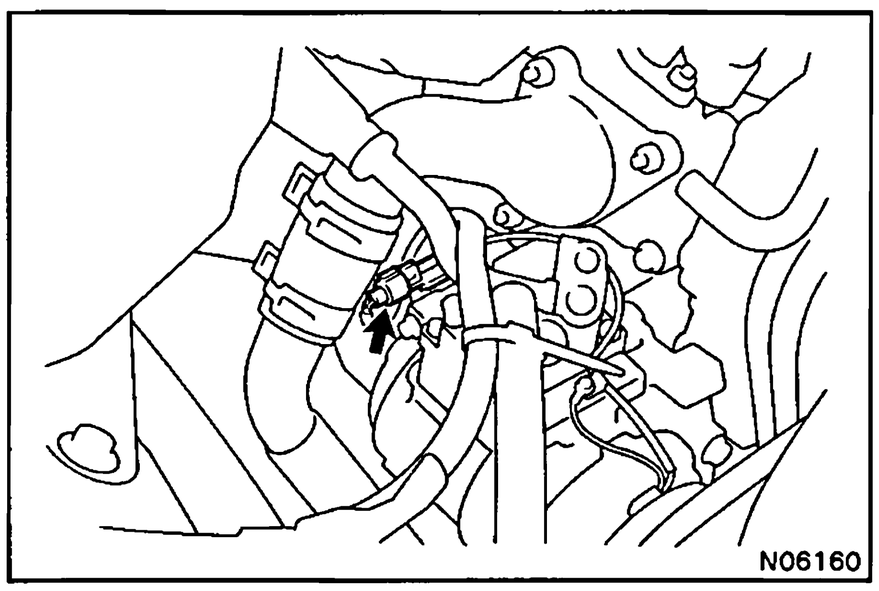
## COMPRESSOR REMOVAL

**FZ Series Engine**



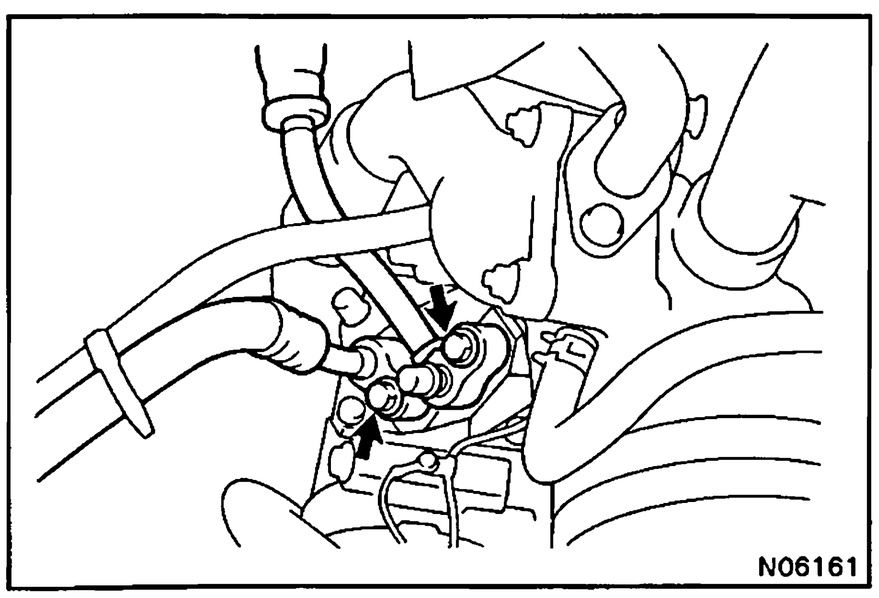

N·m (kgf·cm, ft·lbf) : Specified torque

N06159



N06160

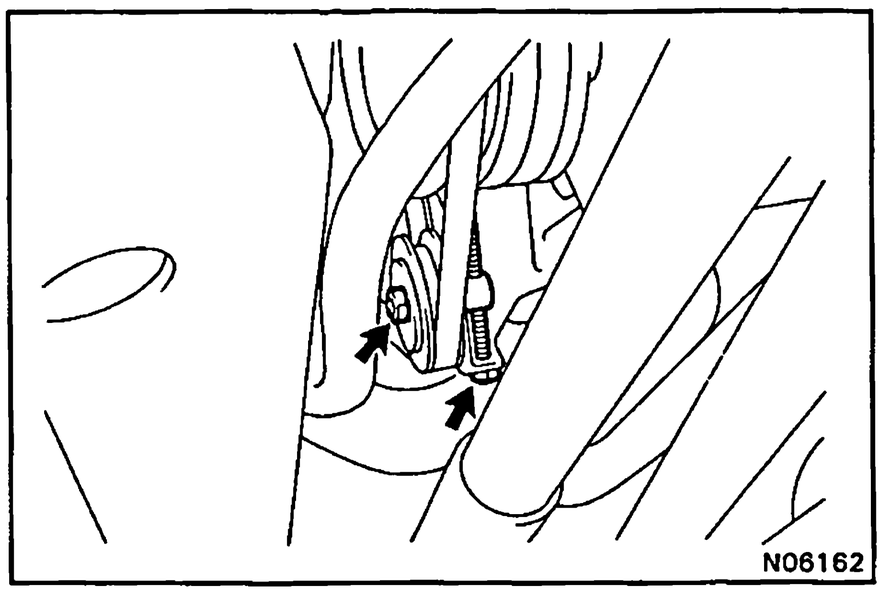
1. **RUN ENGINE AT IDLE SPEED WITH A/C ON FOR TEN MINUTES**
2. **STOP ENGINE**
3. **DISCONNECT NEGATIVE CABLE FROM BATTERY**
4. **DISCONNECT CONNECTOR FROM MAGNET CLUTCH**
5. **RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM**



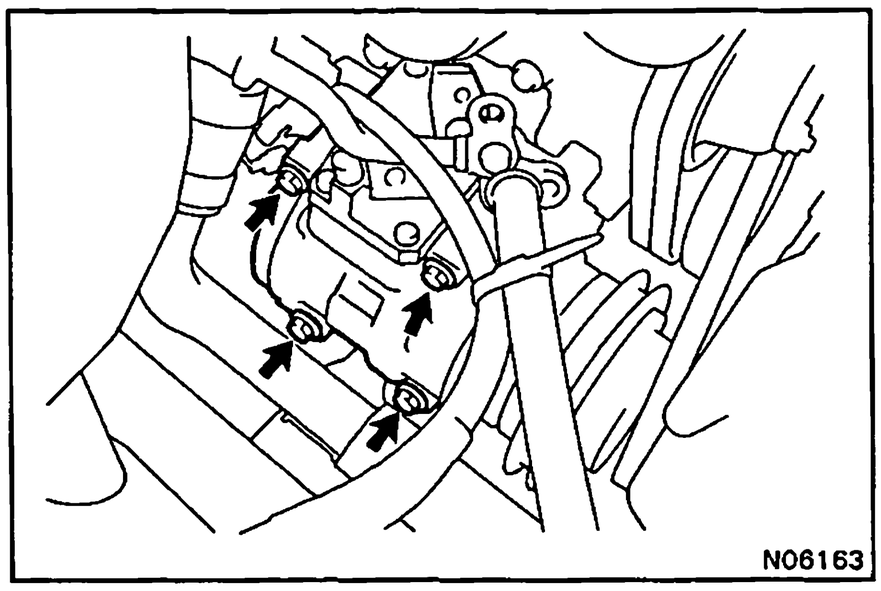
N06161

6. **DISCONNECT TWO HOSES FROM COMPRESSOR SERVICE VALVES**

   Cap the open fittings immediately to keep the moisture and dust out of the system.
7. **REMOVE ENGINE UNDER COVER**




**8. LOOSEN IDLE PULLEY LOCK NUT AND COMPRESSOR DRIVE BELT**

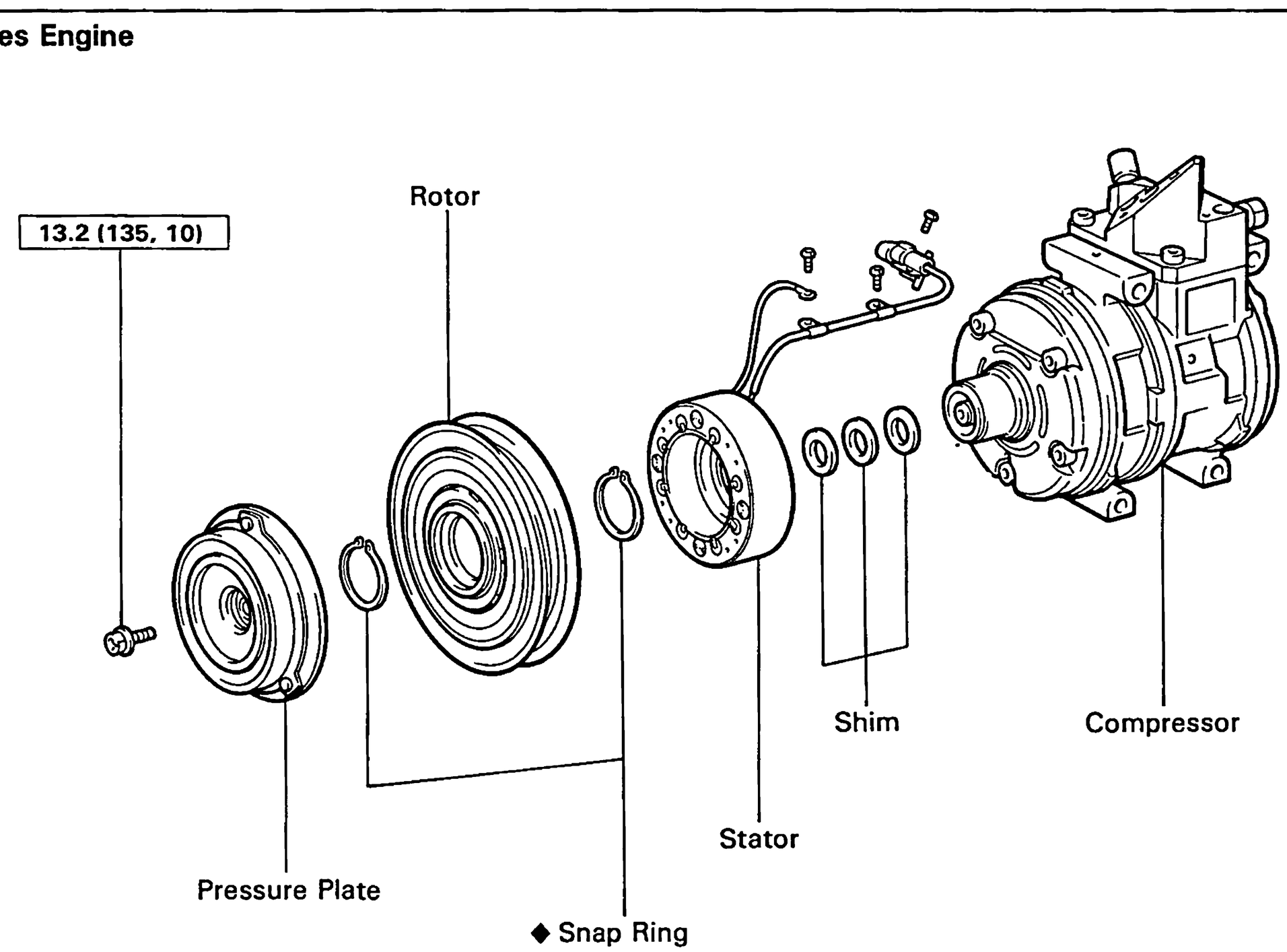



**9. REMOVE COMPRESSOR**

Remove the four bolts and pull the compressor upward.

## MAGNET CLUTCH DISASSEMBLY

**FZ Series Engine**




N·m (kgf·cm, ft·lbf) : Specified torque

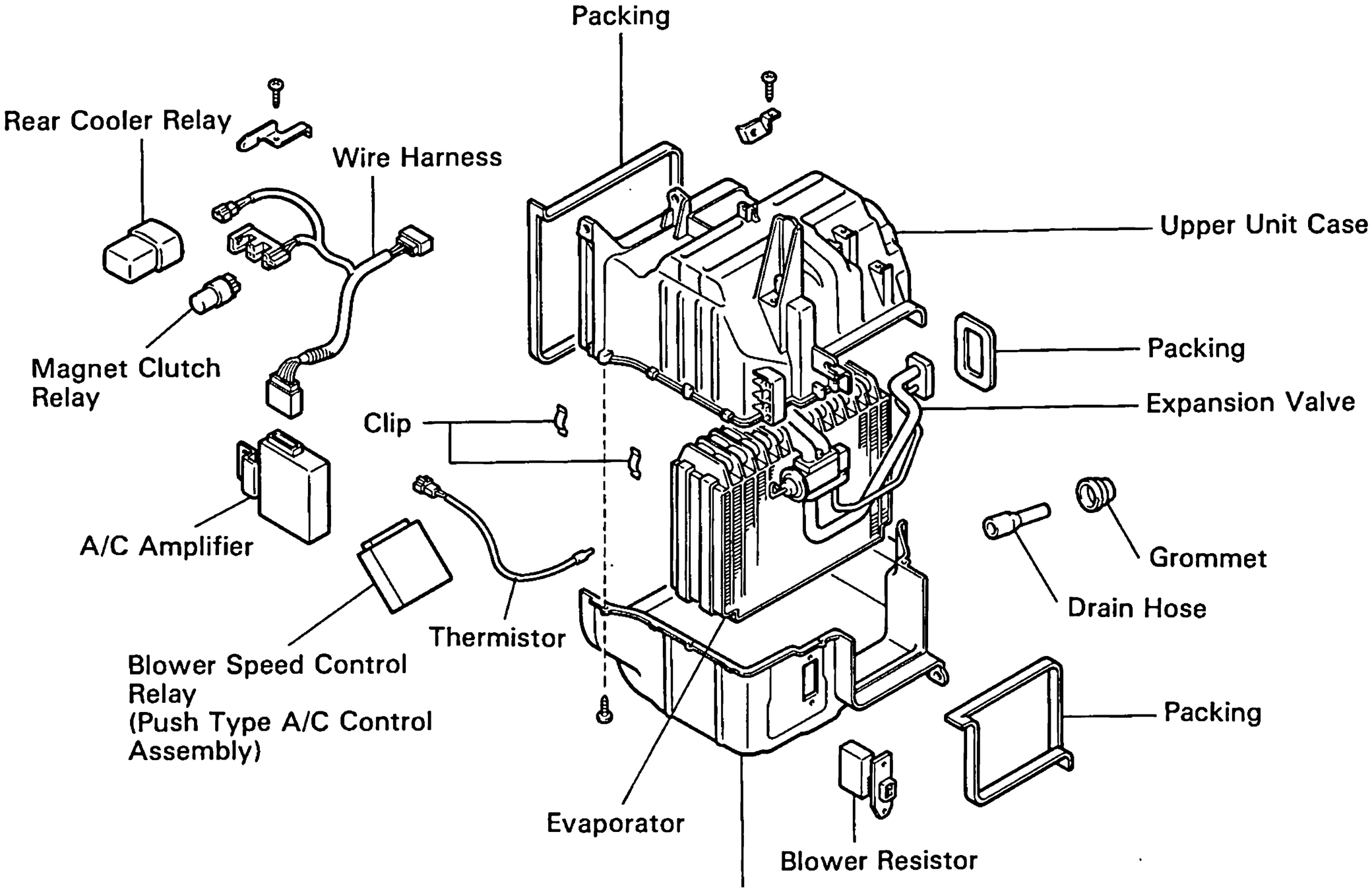
◆ Non-reusable part

N06164

# COOLING UNIT

## COOLING UNIT DISASSEMBLY

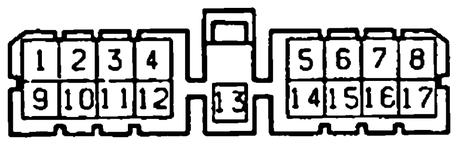
**FZ Series Engine**




N06982

**WIRE HARNESS**

A/C Amplifier (Dual A/C)




K-17-1

# AIR CONDITIONER AMPLIFIER

## (Dual A/C : 1FZ-F Engine)

### INSPECT AMPLIFIER CIRCUIT

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

Test conditions:

(1) Ignition switch: ON

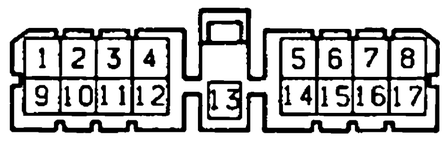
(2) Temperature control lever: MAX COOL

(3) Blower switch: HI

| Check for | Tester connection | Condition | Specified value |
|---|---|---|---|
| Continuity | 5 — 13 | Turn rear A/C switch on. | Continuity |
| | | Turn rear A/C switch off. | No continuity |
| | 13 — Ground | Constant | Continuity |
| | 16 — 17 | Constant | Continuity |
| Voltage | 1 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 2 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 3 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 4 — 13 | Turn A/C switch on. | Battery voltage |
| | | Turn A/C switch off. | No voltage |
| | 5 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 6 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 9 — 13 | Start the engine. | Approx. 10 to 14 V |
| | | Stop the engine. | No voltage |
| | 10 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 14 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| Resistance | 7 — 8 | Variable | Approx. 0 to 3 kΩ |
| | 8 — 12 | Constant (thermistor) | Approx. 100 — 4,000 Ω |
| | 16 — 12 | Constant (thermistor) | Approx. 100 — 4,000 Ω |

If circuit is as specified, replace the amplifier.

**WIRE HARNESS**
A/C Amplifier (Dual A/C)




K-17-1

## (Dual A/C : 1FZ-FE Engine)

### INSPECT AMPLIFIER CIRCUIT

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

Test conditions:

(1) Ignition switch: ON
(2) Temperature control lever: MAX COOL
(3) Blower switch: HI

| Check for | Tester connection | Condition | Specified value |
|---|---|---|---|
| Continuity | 5 — 13 | Turn rear A/C switch on. | Continuity |
| | | Turn rear A/C switch off. | No continuity |
| | 13 — Ground | Constant | Continuity |
| | 16 — 17 | Constant | Continuity |
| Voltage | 1 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 2 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 3 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 4 — 13 | Turn A/C switch on. | Battery voltage |
| | | Turn A/C switch off. | No voltage |
| | 5 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 6 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| | 14 — 13 | Turn ignition switch on. | Battery voltage |
| | | Turn ignition switch off. | No voltage |
| Resistance | 7 — 8 | Variable | Approx. 0 to 3 kΩ |
| | 8 — 12 | Constant (thermistor) | Approx. 100 — 4,000 Ω |
| | 16 — 12 | Constant (thermistor) | Approx. 100 — 4,000 Ω |

If circuit is as specified, replace the amplifier.

— MEMO —

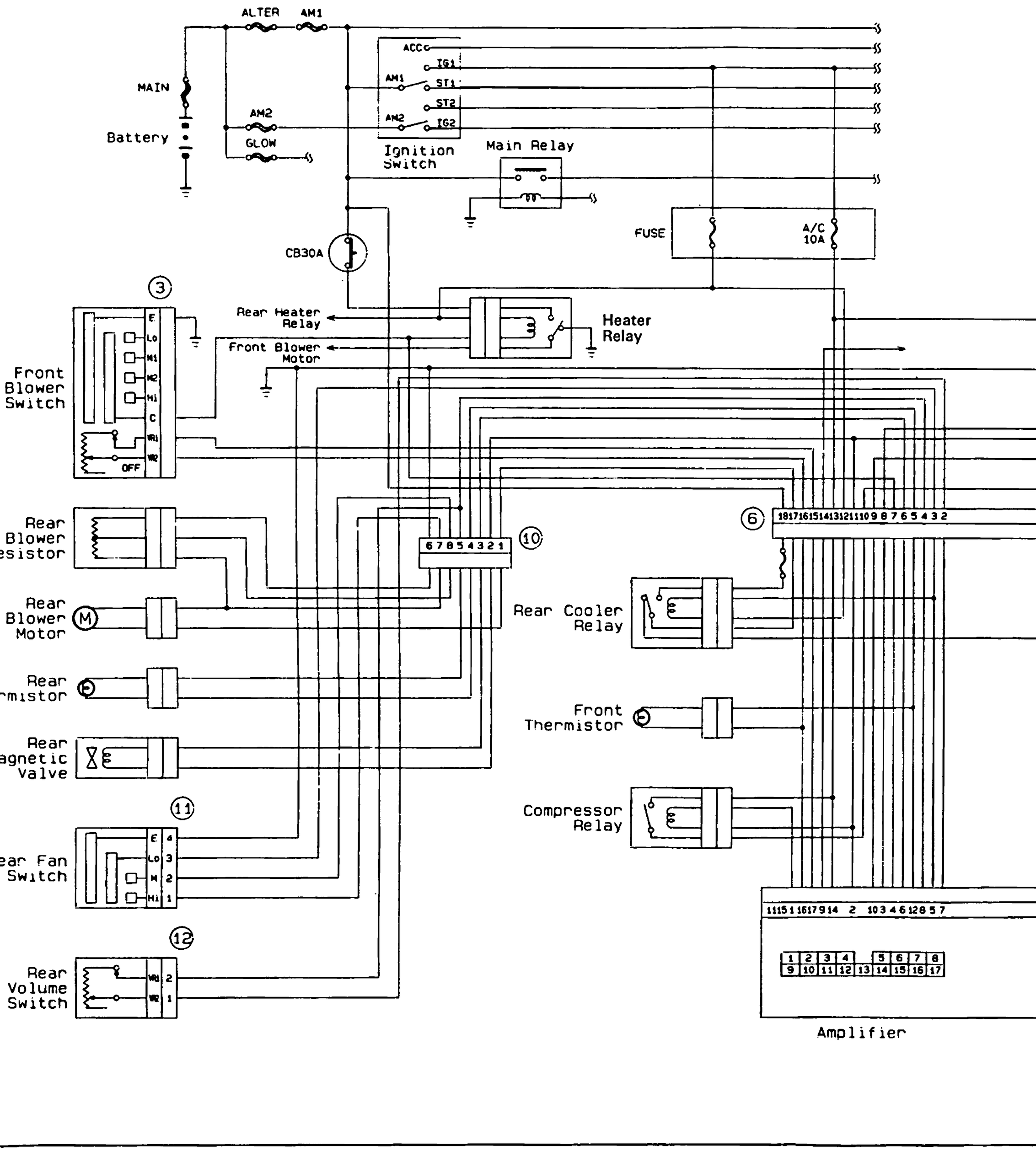
# (Station Wagon)

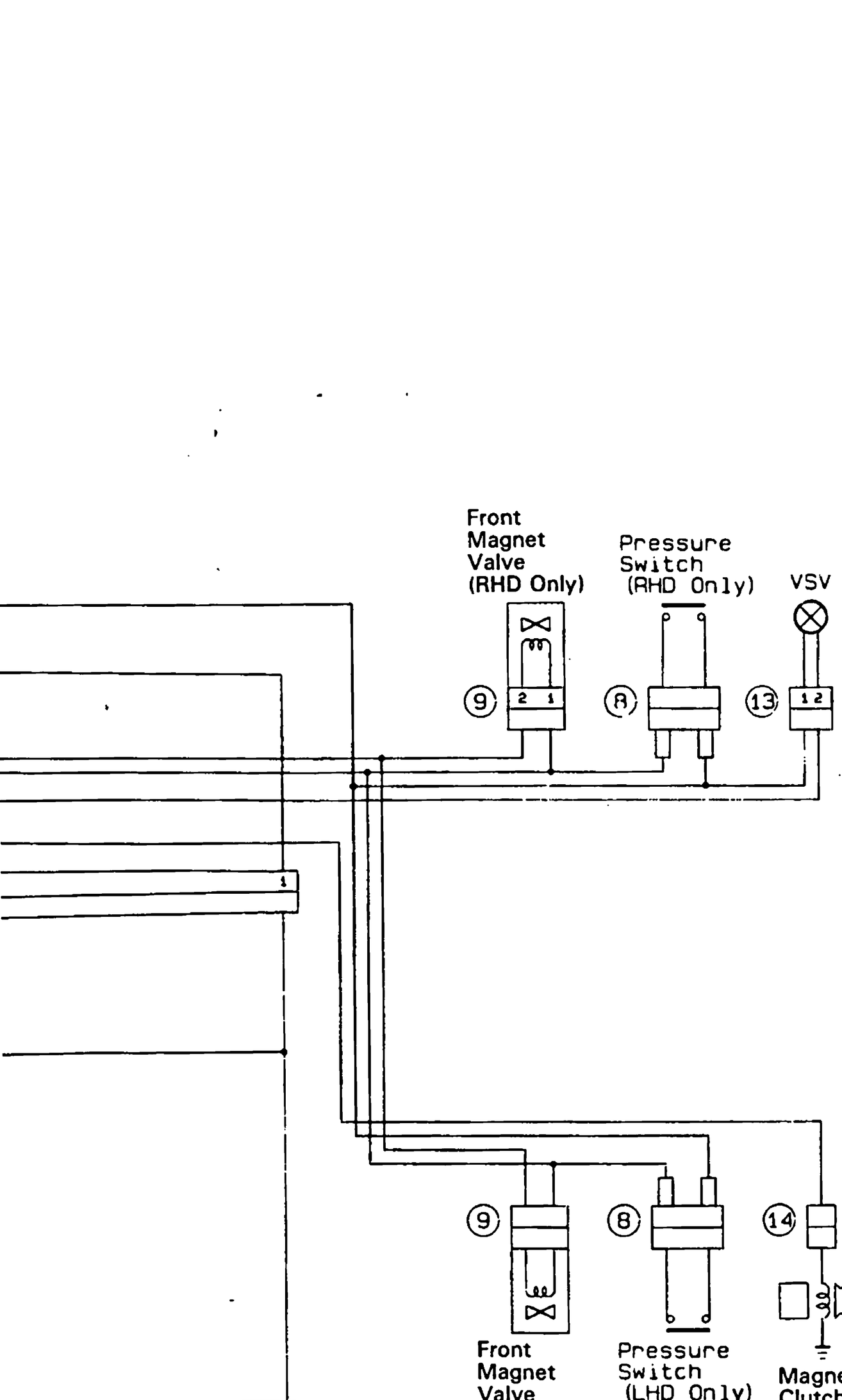
## DESCRIPTION

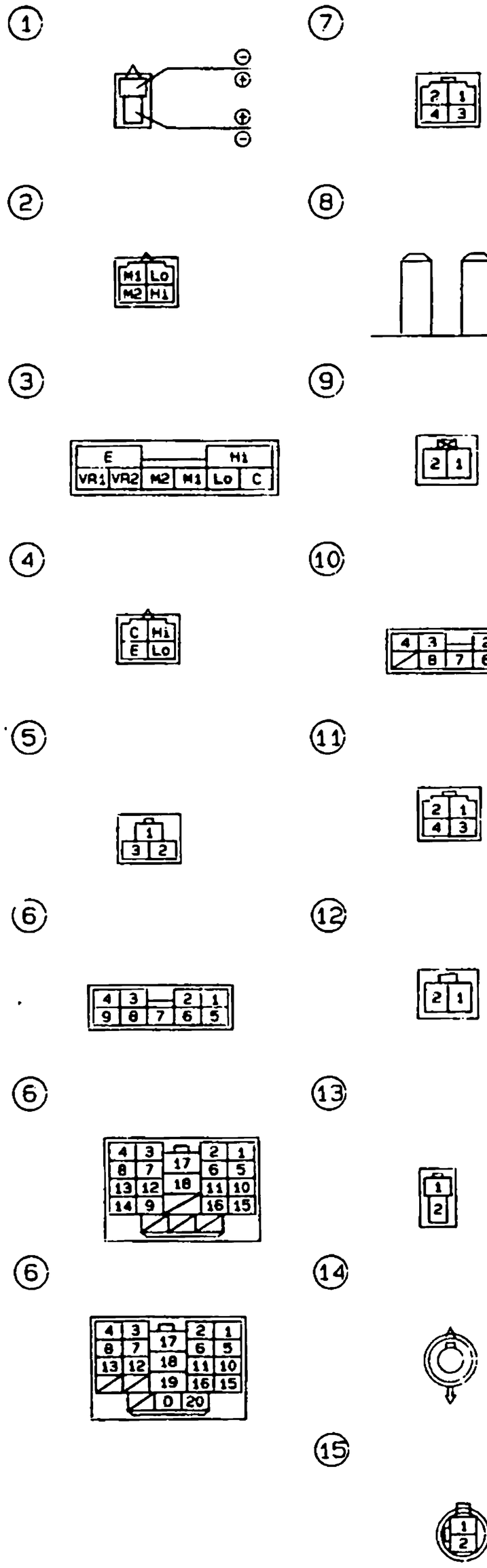
### ELECTRICAL WIRING DIAGRAM

**FZ Series Engine**

**Dual A/C**



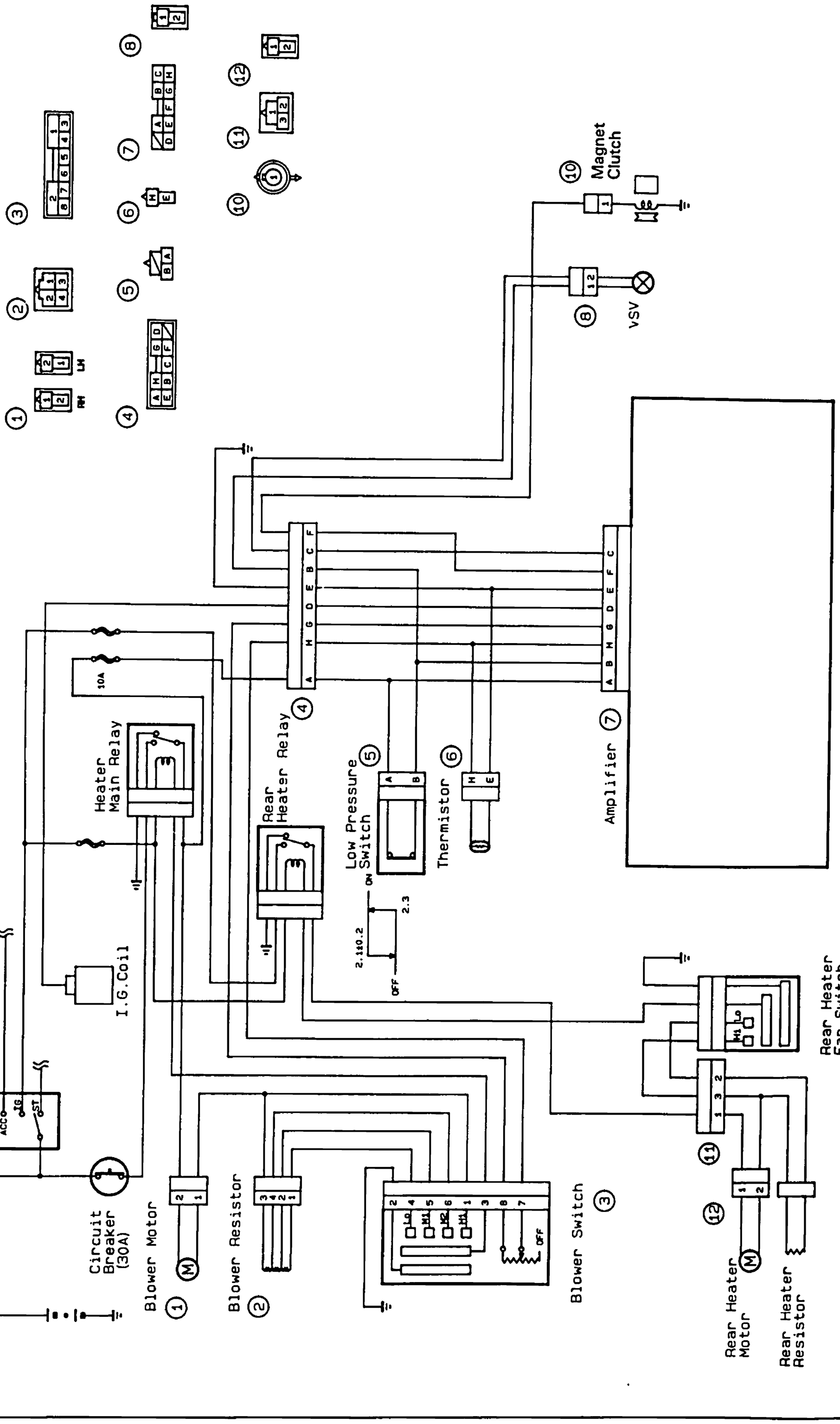

Front Magnet Valve (RHD Only)
Pressure Switch (RHD Only)
VSV
9
2 1
8
13
1 2
1
13
9
8
14
Front Magnet Valve (LHD Only)
Pressure Switch (LHD Only)
Magnet Clutch


1
7
2
8
3
E
VR1 VR2 M2 M1 Lo C
Hi
9
4
C Hi E Lo
10
5
11
6
12
6
13
6
14
15

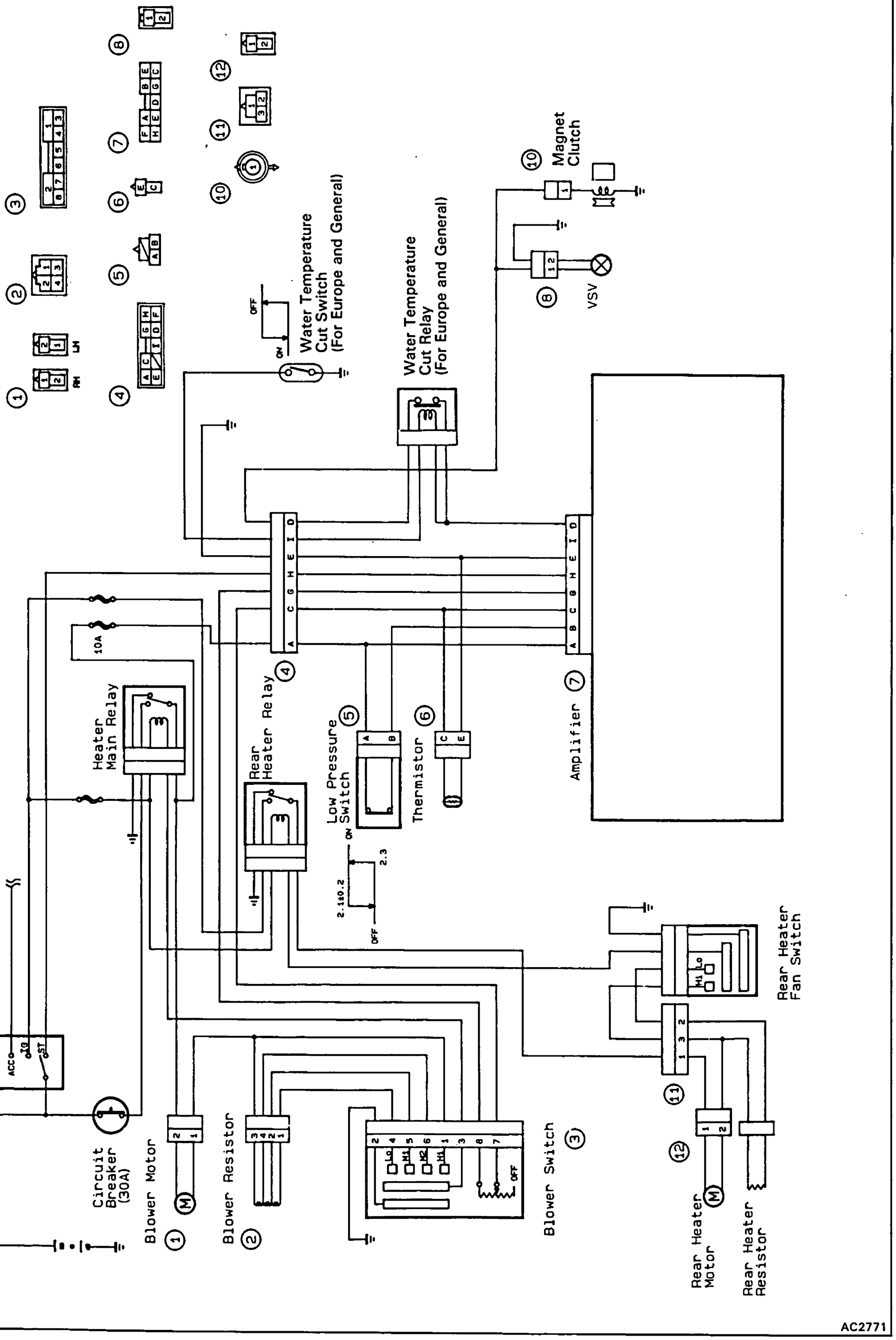
AC2773

**FZ Series Engine**

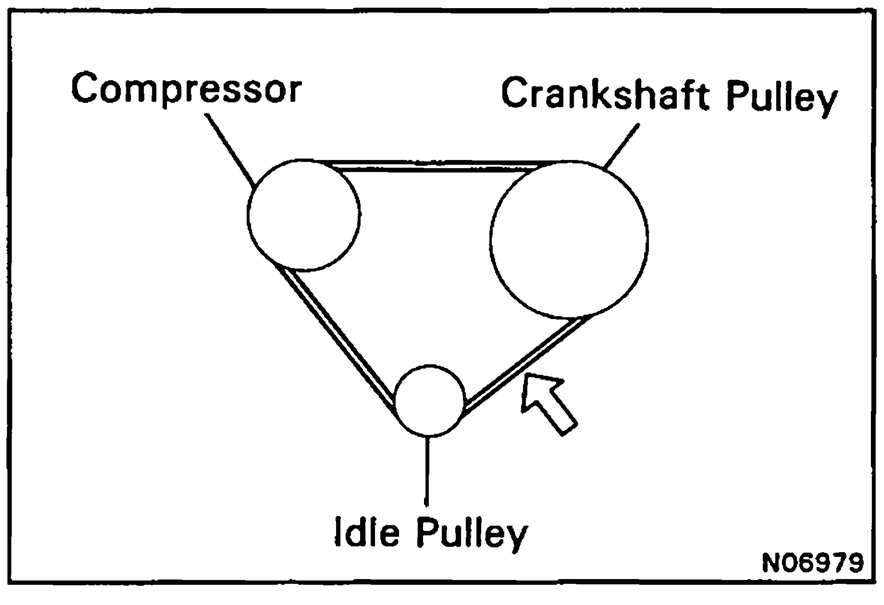
**Single A/C**




AC2770


Magnet Clutch
VSV
Water Temperature Cut Switch (For Europe and General)
Water Temperature Cut Relay (For Europe and General)
Amplifier
Heater Main Relay
Rear Heater Relay
Low Pressure Switch
Thermistor
Rear Heater Fan Switch
Circuit Breaker (30A)
Blower Motor
Blower Resistor
Blower Switch
Rear Heater Motor
Rear Heater Resistor
10A
ACC
IG
ST
ON
OFF
2.1
2.3
Lo
H1
H2
H4

AC2771




# DRIVE BELT

## ON-VEHICLE INSPECTION

### INSPECT DRIVE BELT TENSION

**Drive belt tension at 10 kg (22.0 lb, 98 N):**
**FZ Series Engine**

**New belt**
**5 — 7 mm (0.20 — 0.28 in.)**
**Used belt**
**7 — 7.5 mm (0.28 — 0.37 in.)**

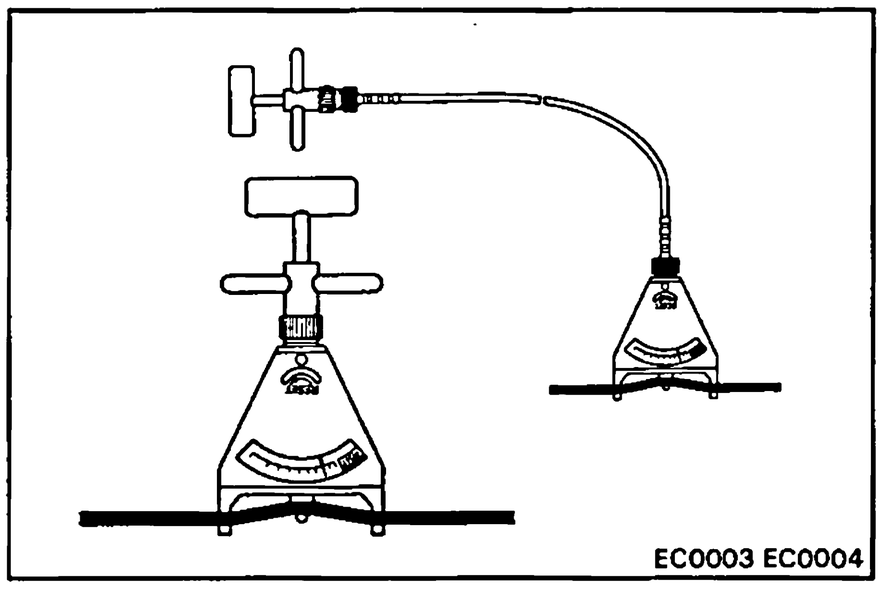
**(Reference)**

Using SST, check the drive belt tension.

SST 09216-00020 and 09216-00030

**New belt: 40 — 60 kg**

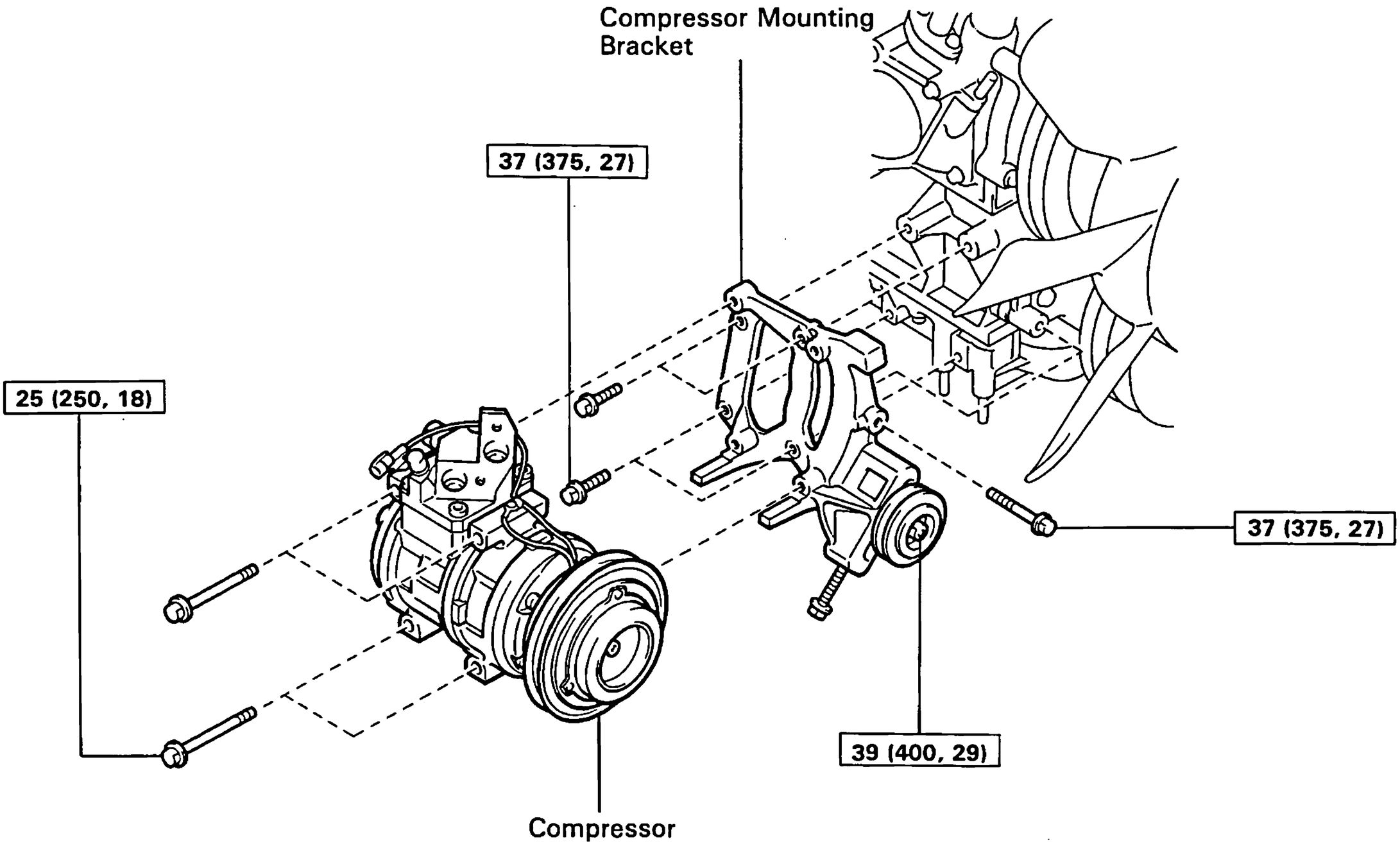
**Used belt: 20 — 40 kg**



# COMPRESSOR

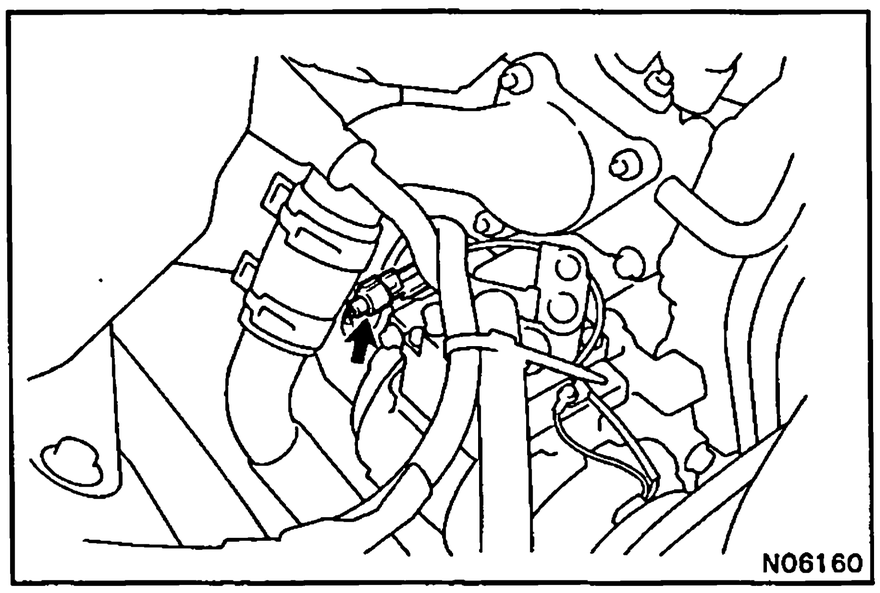
## COMPRESSOR REMOVAL

**FZ Series Engine**



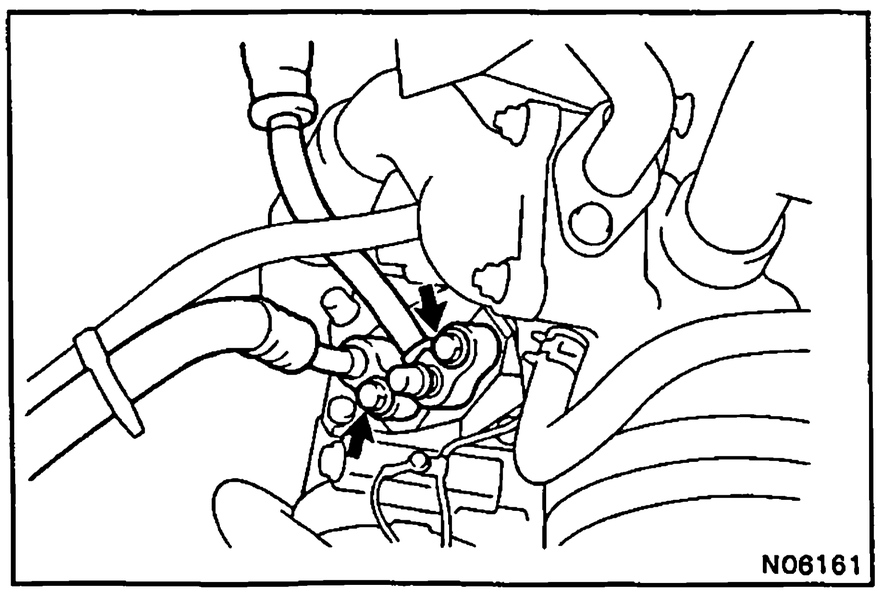

N·m (kgf·cm, ft·lbf) : Specified torque

N06159



N06160

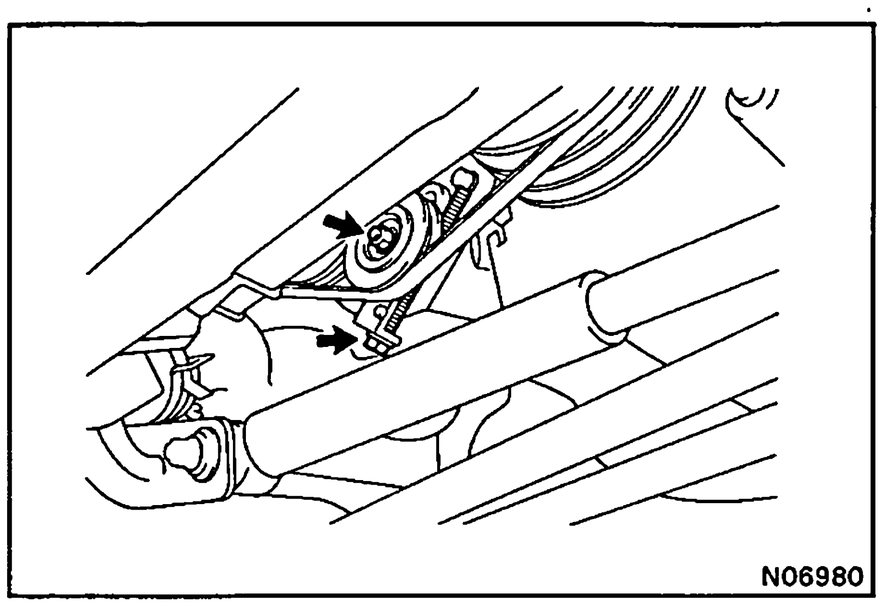
1. **RUN ENGINE AT IDLE SPEED WITH A/C ON FOR TEN MINUTES**
2. **STOP ENGINE**
3. **DISCONNECT NEGATIVE CABLE FROM BATTERY**
4. **DISCONNECT CONNECTOR FROM MAGNET CLUTCH**
5. **RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM**



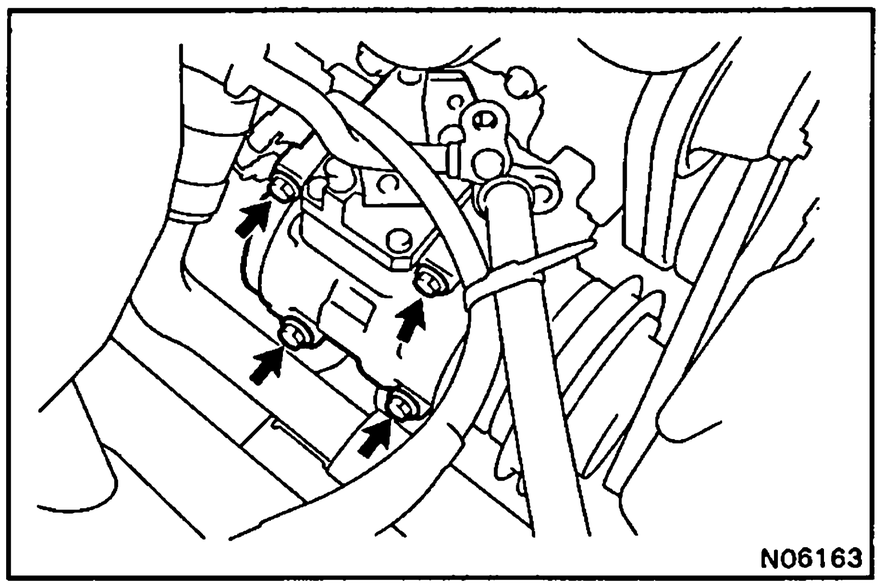
N06161

6. **DISCONNECT TWO HOSES FROM COMPRESSOR SERVICE VALVES**

   Cap the open fittings immediately to keep the moisture and dust out of the system.
7. **REMOVE ENGINE UNDER COVER**




8. **LOOSEN IDLE PULLEY LOCK NUT AND COMPRESSOR DRIVE BELT**

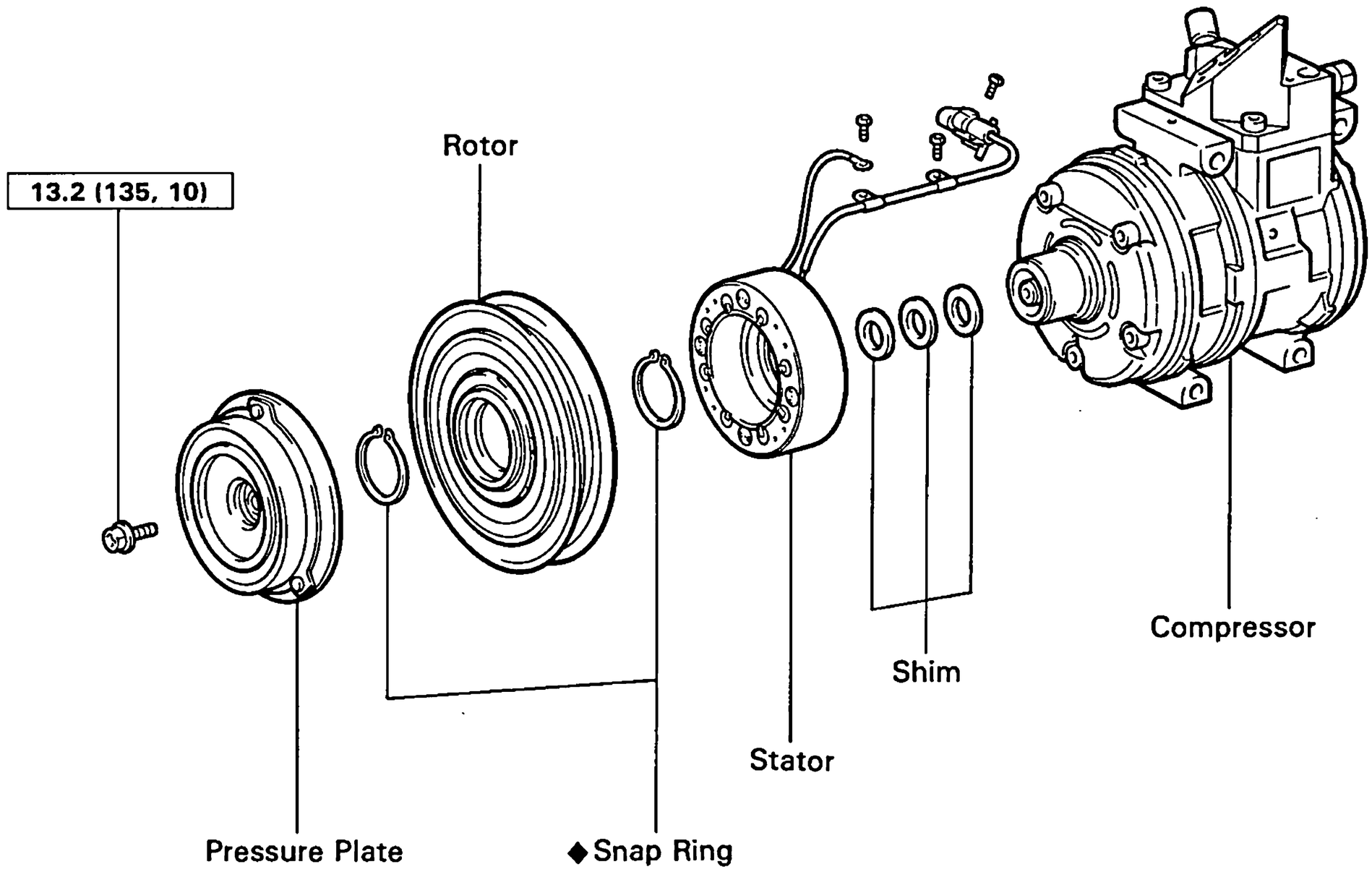



9. **REMOVE COMPRESSOR**

Remove the four bolts and pull the compressor upward.

## MAGNET CLUTCH DISASSEMBLY

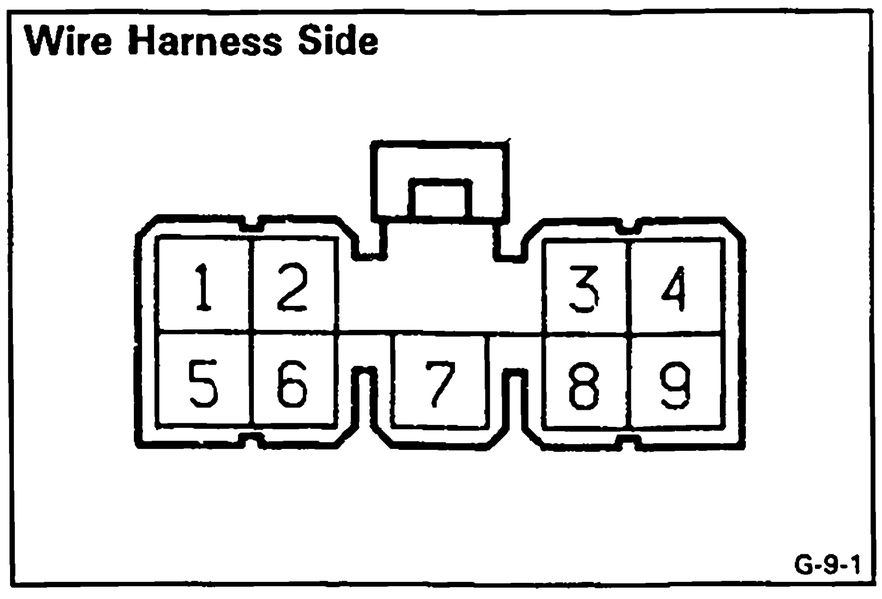
**FZ Series Engine**




N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

N06164




# AIR CONDITIONER AMPLIFIER

## INSPECT AMPLIFIER CIRCUIT

Disconnect the amplifier and inspect the connector on the wire harness side as shown in the chart below.

Test conditions:

(1) Ignition: ON

(2) Temperature control lever: MAX. COOL

(3) Blower switch: HI

**FZ Series Engine**

| Check for | Tester connection | Condition | Specified value |
|---|---|---|---|
| Voltage | 2 – 6 | Turn A/C switch on | No voltage |
| | | Turn A/C switch off | Battery voltage |
| | 3 – 6 | Turn A/C switch on | No voltage |
| | | Turn A/C switch off | Battery voltage |
| | 5 – 6 | Start engine | Approx. 10 to 14 V |
| | | Stop engine | No voltage |
| Resistance | 3 – 4 | Constant | Approx. 40 Ω at 25°C (77°F) |
| | 6 – 7 | Constant | Approx. 3.8 Ω |
| | 8 – 9 | Max. cool | Apporx. 0 Ω |
| | | Min. cool | Apporx. 3 kΩ |
| | 6 – 9 | Constant | Approx. 1.5 kΩ at 25°C (77°F) |

If circuit is as specified, replace the amplifier.

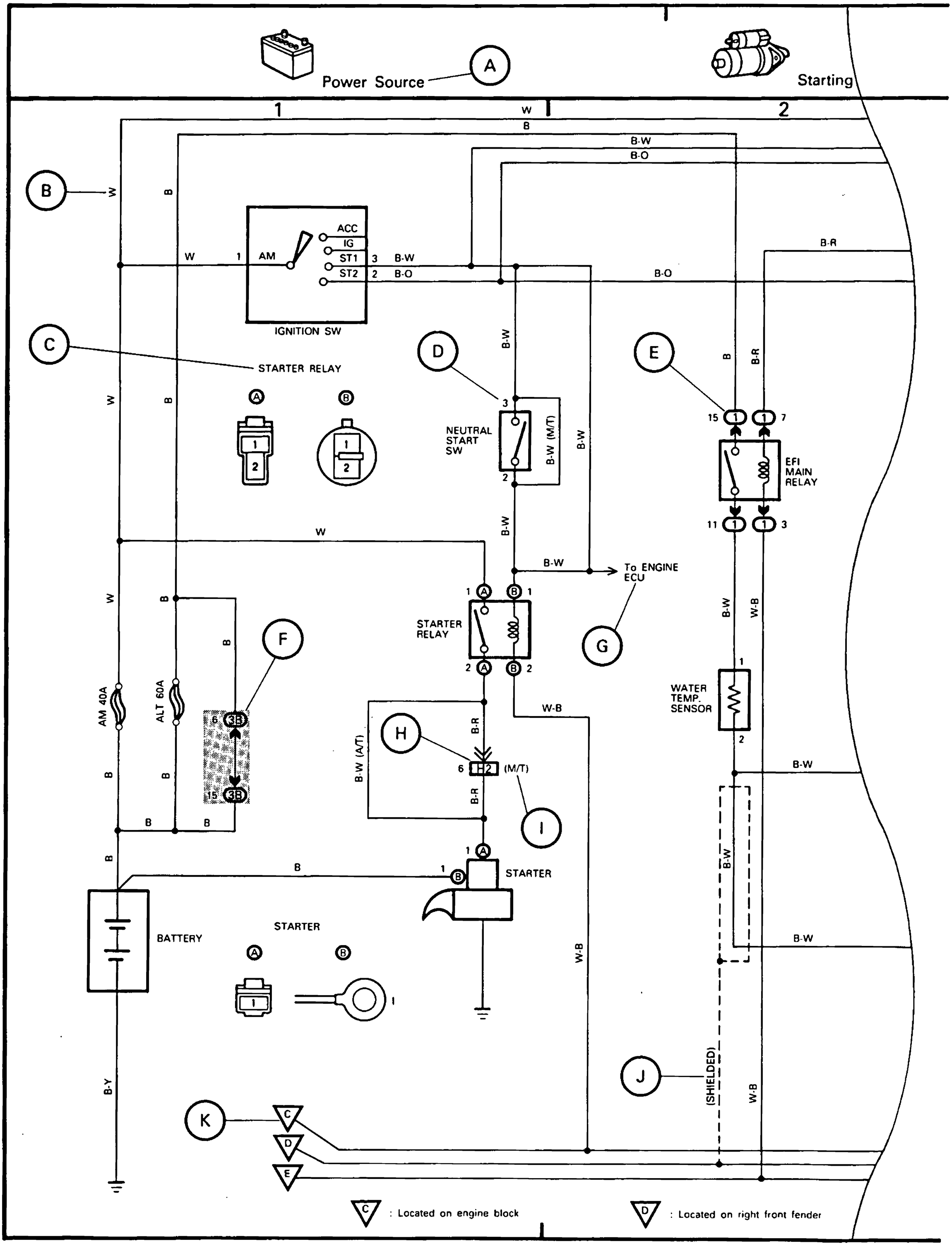
# ELECTRICAL WIRING DIAGRAMS

## ABBREVIATION

The following abbreviations are used in this wiring diagram.

| | | |
|---|---|---|
| ABS | = | Anti-Lock Brake System |
| A/C | = | Air Conditioner |
| AS | = | Air Suction |
| A/T | = | Automatic Transmission |
| CD | = | Compact Disc |
| COMB. | = | Combination |
| ECT | = | Electronic Controlled Transmission |
| ECU | = | Electronic Control Unit |
| EFI | = | Electronic Fuel Injection |
| EGR | = | Exhaust Gas Recirculation |
| Ex. | = | Except |
| FL | = | Fusible Link |
| ISC | = | Idle Speed Control |
| J/B | = | Junction Block |
| LH | = | Left-Hand |
| M/T | = | Manual Transmission |
| PPS | = | Progressive Power Steering |
| RH | = | Right-Hand |
| SW | = | Switch |
| TEMP. | = | Temperature |
| TP | = | Throttle Positioner |
| VSV | = | Vacuum Switching Valve |
| w/ | = | With |
| w/o | = | Without |
| W/G | = | Wagon |
| 2WD | = | Two Wheel Drive Vehicles (4 × 2) |
| 4WD | = | Four Wheel Drive Vehicles (4 × 4) |

# HOW TO READ THIS SECTION



Ⓐ: System Title

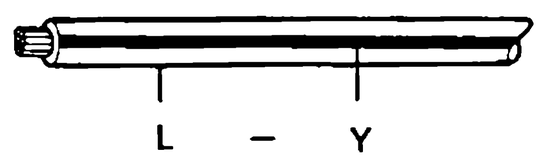
Ⓑ: Indicates the wiring color.

Wire colors are indicated by an alphabetical code.

| | | | | | |
|---|---|---|---|---|---|
| B | = Black | L | = Blue | R | = Red |
| BR | = Brown | LG | = Light Green | V | = Violet |
| G | = Green | O | = Orange | W | = White |
| GR | = Gray | P | = Pink | Y | = Yellow |

The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

Example: L—Y




Ⓒ: Indicates the connector to be connected to a part (the numeral indicates the pin No.)

Ⓓ: Indicates the pin number of the connector. The numbering system is different for female and male connectors.

Example: Numbered in order from upper left to lower right / Numbered in order from upper right to lower left




Female Male

BE0832

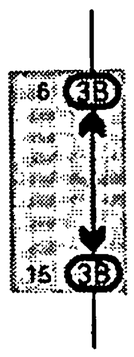
The numbering system for the overall wiring diagram is the same as above.

Ⓔ: Indicates a Relay Block. No shading is used and only the Relay Block No. is shown to distinguish it from the J/B.

Example: ① Indicates Relay Block No.1.

Ⓕ: Junction Block (The number in the circle is the J/B No. and the connector code is shown beside it). Junction Blocks are shaded to clearly separate them from other parts (different junction blocks are shaded differently for further clarification).

Example:

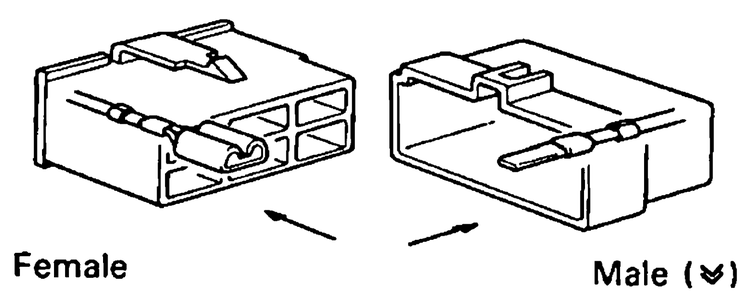



3B indicates that it is inside Junction Block No.3.

Ⓖ: Indicates related system.

Ⓗ: Indicates the wiring harness and wiring harness connector. The wiring harness with male terminal is shown with arrows (≫). Outside numerals are pin numbers.

- All connectors are shown from the open end, and the lock is on top.



Female Male (≫)

BE0B33

Ⓘ: ( ) are used to indicate different wiring and connector, etc. when the vehicle model, engine type, or specification is different.

Ⓙ: Indicates a shielded cable.



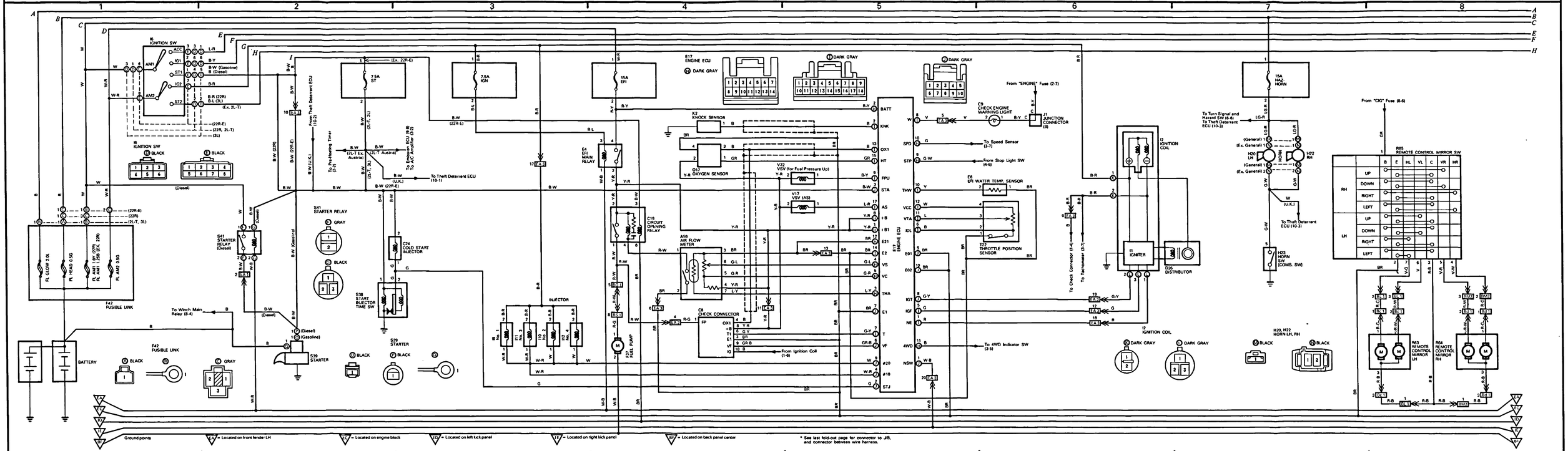
Ⓚ: Indicates a ground point.

# SYSTEM INDEX

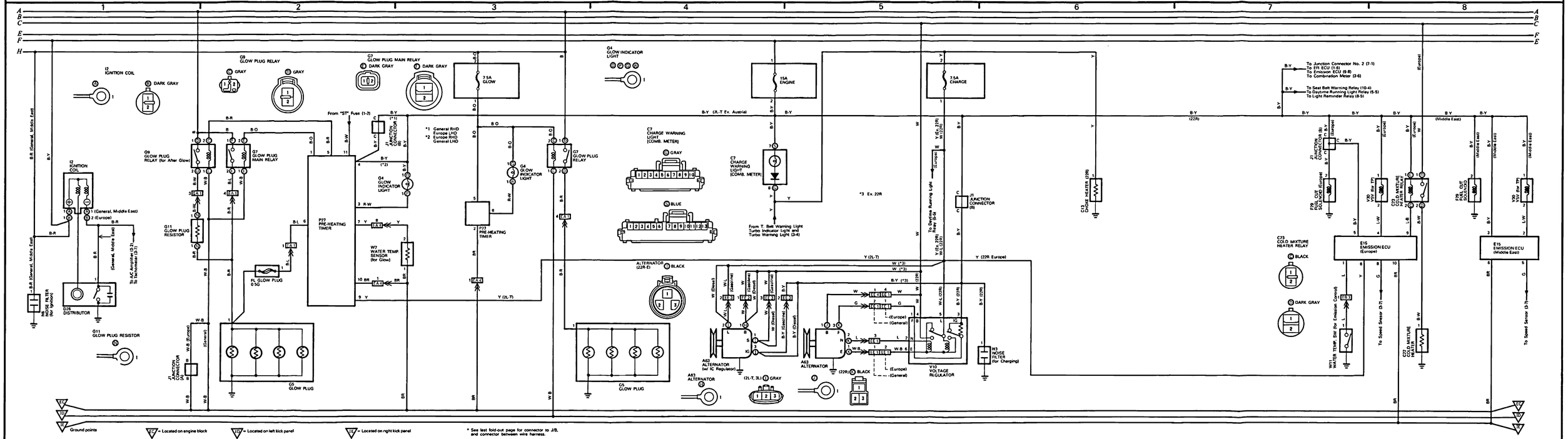
LAND CRUISER 70 (Light-Duty) (Location No. 1 to 11)

| SYSTEMS | LOCATION | SYSTEMS | LOCATION |
|---|---|---|---|
| Accessory Meter | 4-7 | Light Reminder | 8-5 (Europe) |
| Air Conditioner, Cooler and Heater | 3-2 | Moon Roof | 9-5 |
| Back-Up Light | 4-5 | Power Source | 1-1 |
| Charging | 2-5 | Power Window | 9-2 |
| Cigarette Lighter | 8-6 | Radio and Player | 8-7 |
| Clock | 8-5 | Rear Fog Light | 3-8 |
| Combination Meter | 3-5 | Rear Window Defogger | 4-1 |
| Door Lock | 7-6 | Rear Wiper and Washer | 4-4 |
| Emission Control | 2-7 (22R) | Remote Control Mirror | 1-8 |
| Engine Control | 1-4 (22R-E) | | |
| Front Fog Light | 5-1 (General Ex. Australia) | Starting | 1-2 |
| Front Wiper and Washer | 4-2 | Stop Light | 4-5 |
| Fuel Heater | 7-8 (2L-T Europe) | Taillight and Illumination | 5-2 (Ex. Europe) 6-2 (Europe) |
| Glow and Emission Control | 9-7 (2L-T Austria) | Theft Deterrent | 10-1 (U.K.) |
| Glow Plug | 2-2 (2L-T Ex. Austria) 2-3 (3L) | Trailer Socket | 8-8 |
| Headlight | 5-3 (Ex. Europe) 5-5 (Europe) | Turn Signal and Hazard | 6-7 |
| Headlight Beam Level Control | 8-2 | Unlock and Seat Belt Warning | 10-4 |
| Headlight Cleaner | 4-3 (Europe) | Winch | 8-4 |
| Horn | 1-7 | 4WD | 7-3 |
| Ignition | 1-6 (22R-E) 2-1 (22R) | Connector Joining Wire Harness and Wire Harness | 11-4 |
| Interior Light | 5-8 | Junction Connector | 11-8 |

Power Source | Starting | Engine Control (22R-E) | Ignition (22R-E) | Horn | Remote Control Mirror



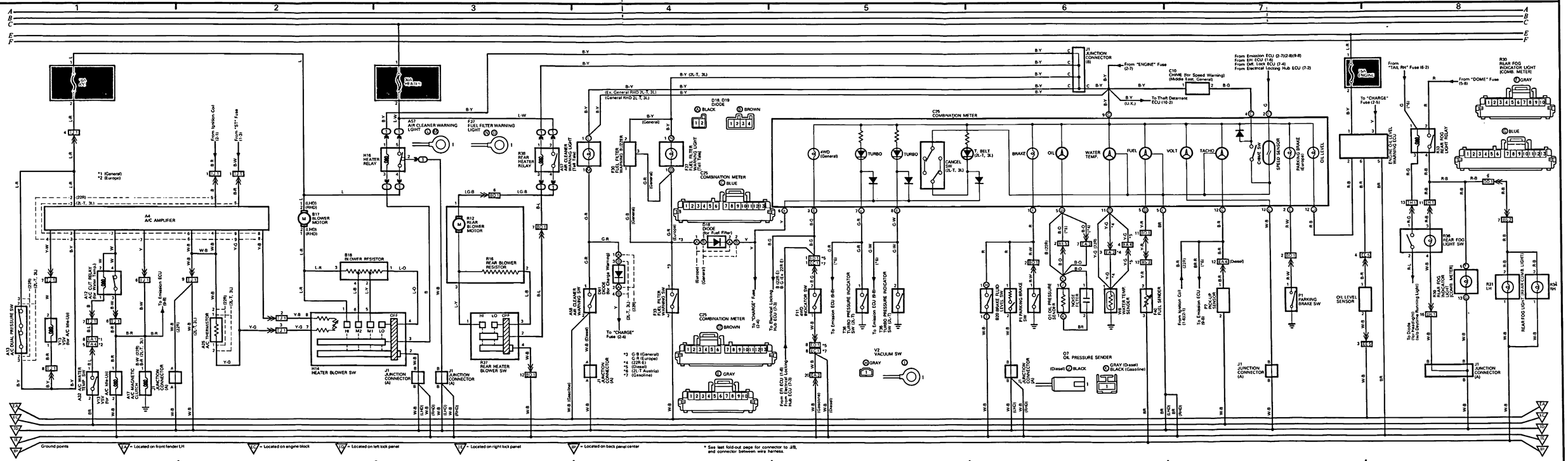
Ignition (22R) | Glow Plug (2L-T Ex. Austria) | Glow Plug (3L) | Charging | Emission Control (22R)

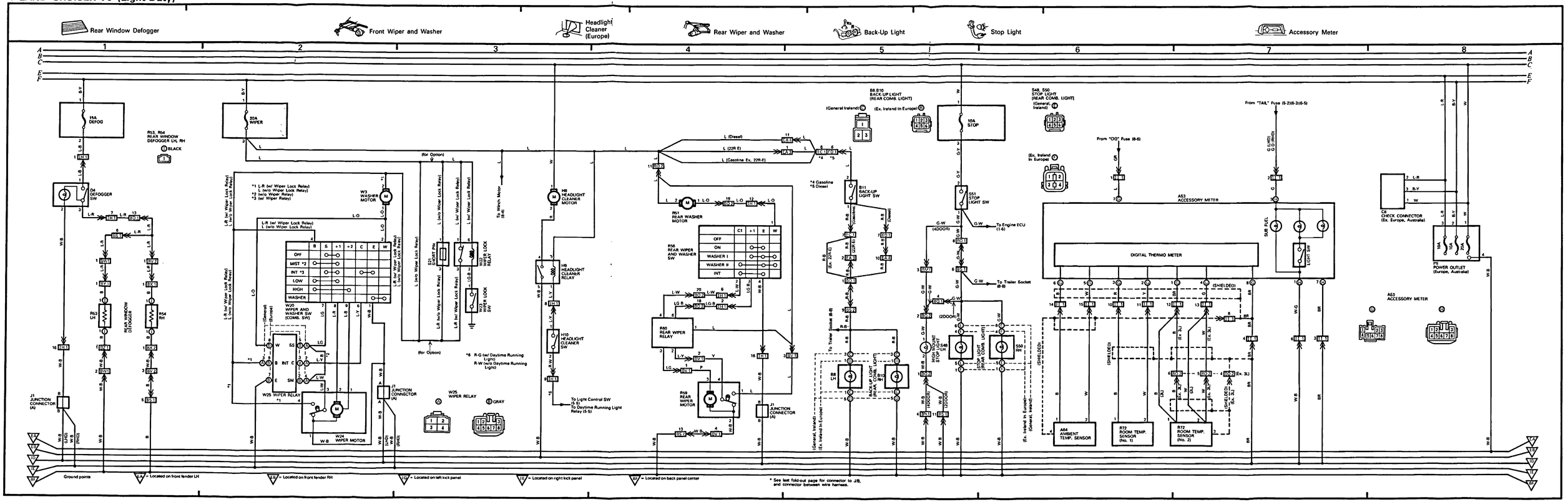


Air Conditioner, Cooler and Heater

Combination Meter

Rear Fog Light




Rear Window Defogger
Front Wiper and Washer
Headlight Cleaner (Europe)
Rear Wiper and Washer
Back-Up Light
Stop Light
Accessory Meter
15A DEFOG
20A WIPER
10A STOP
D4 DEFOGGER SW
R53, R54 REAR WINDOW DEFOGGER LH, RH
REAR WINDOW DEFOGGER
W3 WASHER MOTOR
W20 WIPER AND WASHER SW (COMB. SW)
W25 WIPER RELAY
W24 WIPER MOTOR
S31 INT. PIN
W26 WIPER LOCK RELAY
W27 WIPER LOCK SW
H8 HEADLIGHT CLEANER MOTOR
H9 HEADLIGHT CLEANER RELAY
H10 HEADLIGHT CLEANER SW
R91 REAR WASHER MOTOR
R56 REAR WIPER AND WASHER SW
R60 REAR WIPER RELAY
R59 REAR WIPER MOTOR
B8, B10 BACK-UP LIGHT (REAR COMB. LIGHT)
B11 BACK-UP LIGHT SW
S51 STOP LIGHT SW
S48, S50 STOP LIGHT (REAR COMB. LIGHT)
HIGH MOUNTED STOP LIGHT
A53 ACCESSORY METER
DIGITAL THERMO METER
A84 AMBIENT TEMP. SENSOR
R72 ROOM TEMP. SENSOR (No. 1)
R72 ROOM TEMP. SENSOR (No. 2)
C8 CHECK CONNECTOR (Ex. Europe, Australia)
P2 POWER OUTLET (Europe, Australia)
J1 JUNCTION CONNECTOR (A)
Ground points
*1 L-R (w/ Wiper Lock Relay) L (w/o Wiper Lock Relay)
*2 (w/o Wiper Relay)
*3 (w/ Wiper Relay)
*4 Gasoline
*5 Diesel
*6 R-G (w/ Daytime Running Light) R-W (w/o Daytime Running Light)
*7 To Daytime Running Light Relay (5-5)
*8 To Trailer Socket (8-8)
* See last fold-out page for connector to J/B, and connector between wire harness.

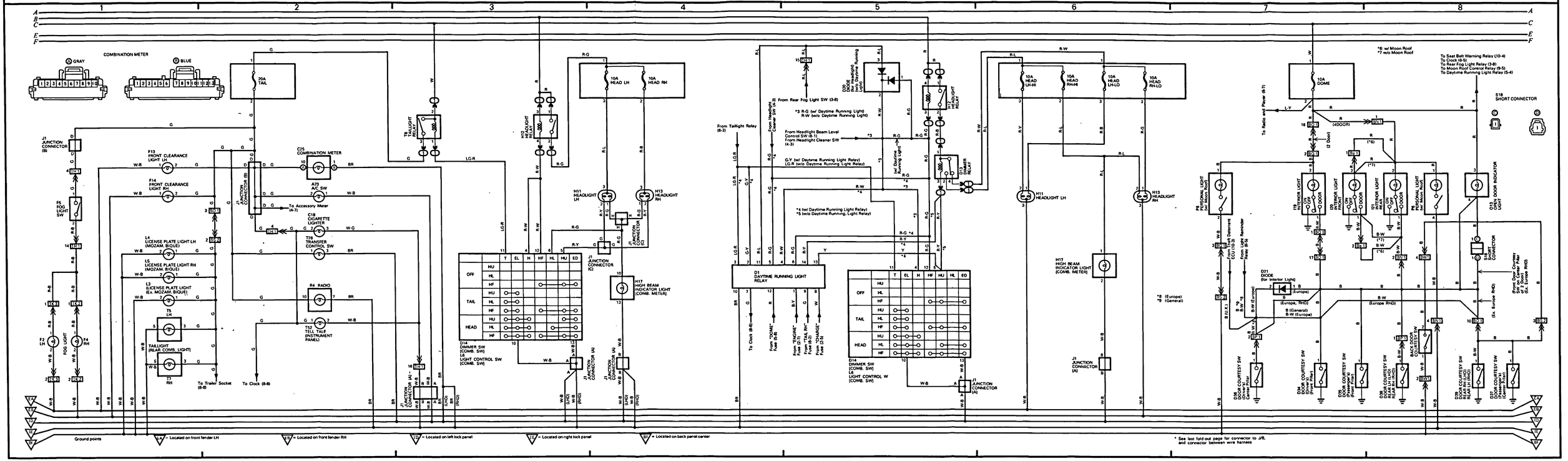
Front Fog Light (General)

Taillight and Illumination (Ex. Europe)

Headlight (Ex. Europe)

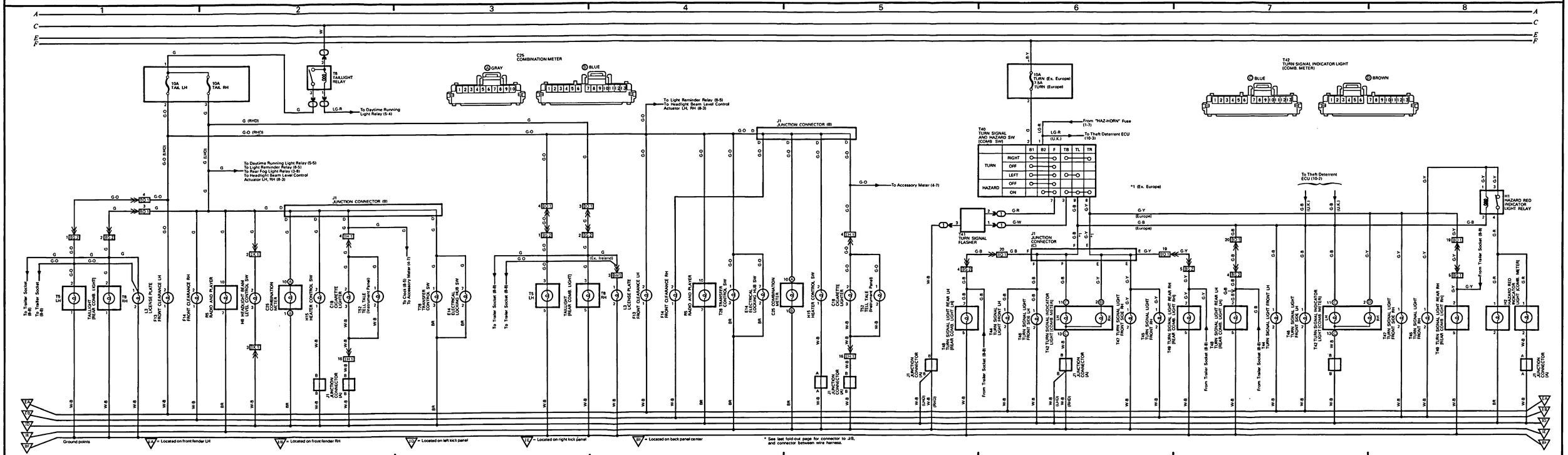
Headlight (Europe)

Interior Light



Taillight and Illumination (Europe)

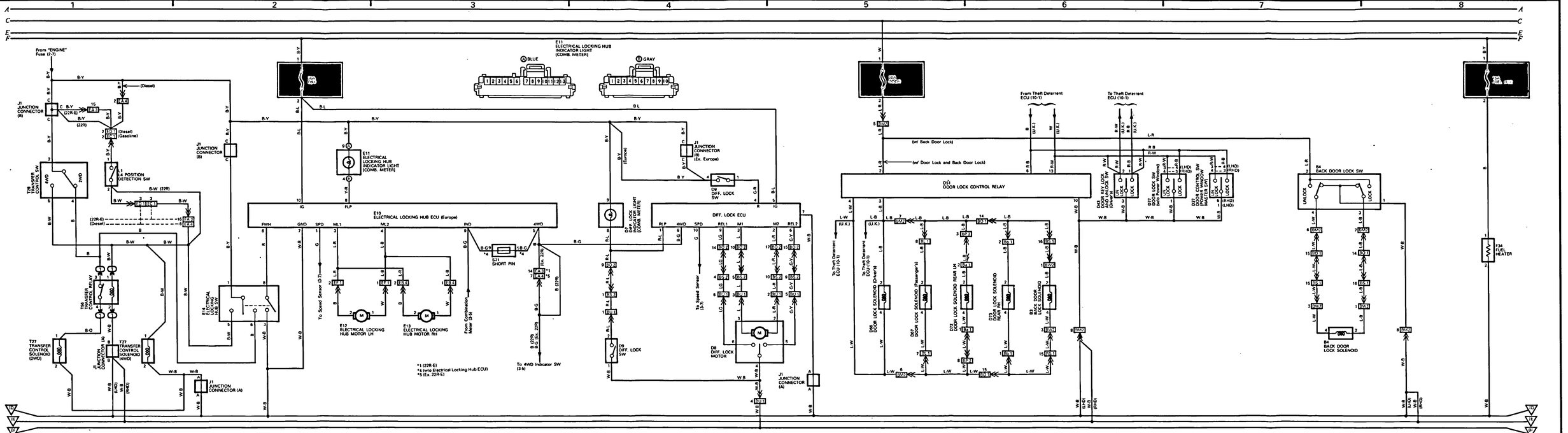
Turn Signal and Hazard



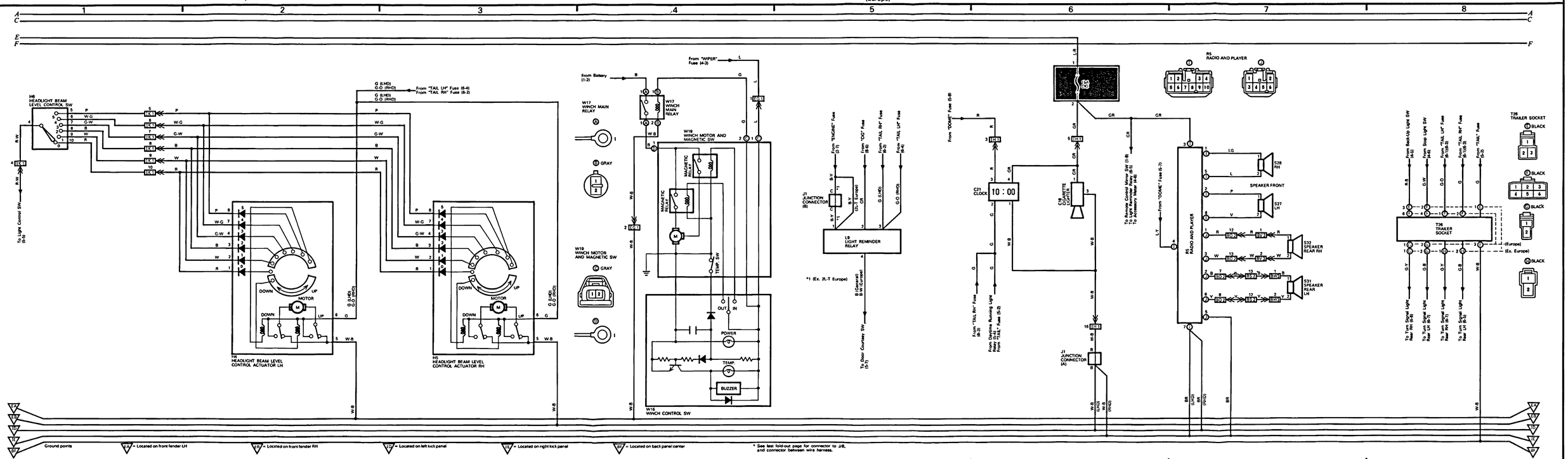
4WD

Door Lock

Fuel Heater (2L-T Europe)



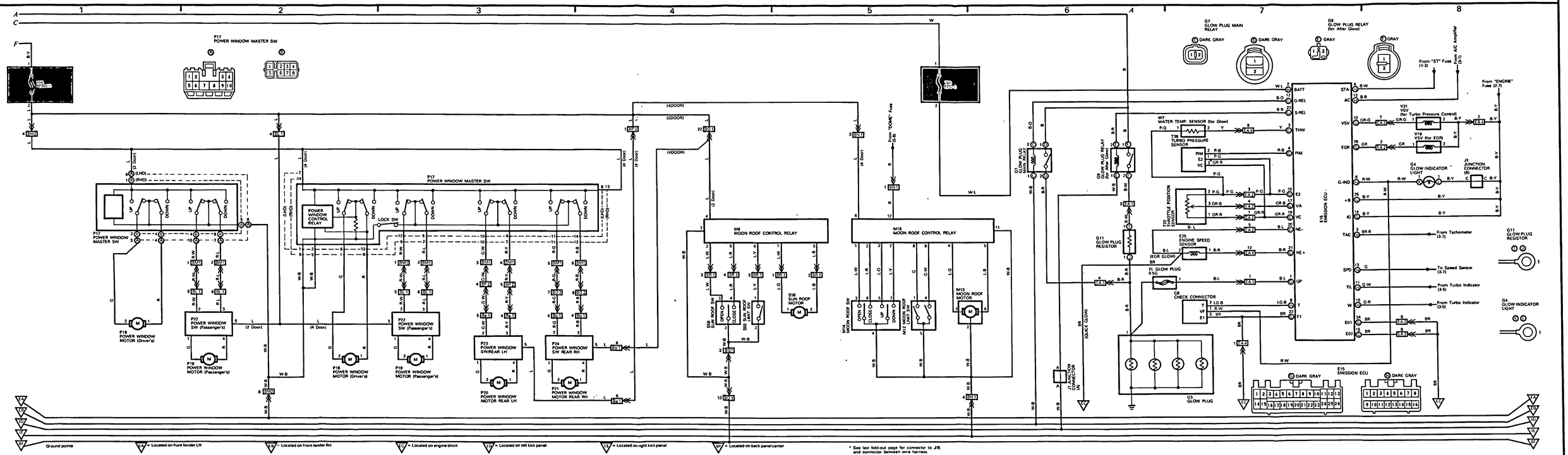
Headlight Beam Level Control | Winch | Light Reminder (Europe) | Clock | Cigarette Lighter | Radio and Player | Trailer Socket



Power Window

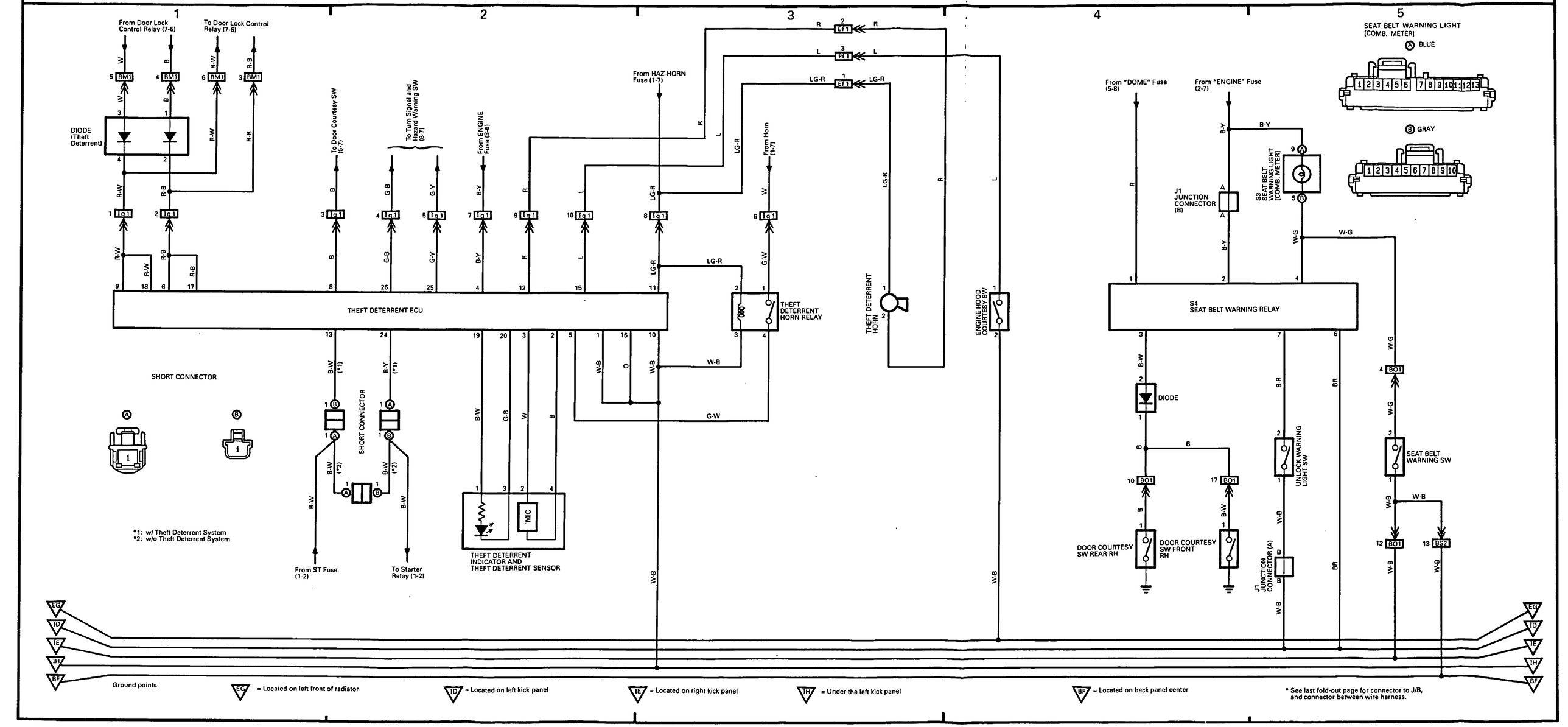
Moon Roof

Glow and Emission Control (2L-T Austria)

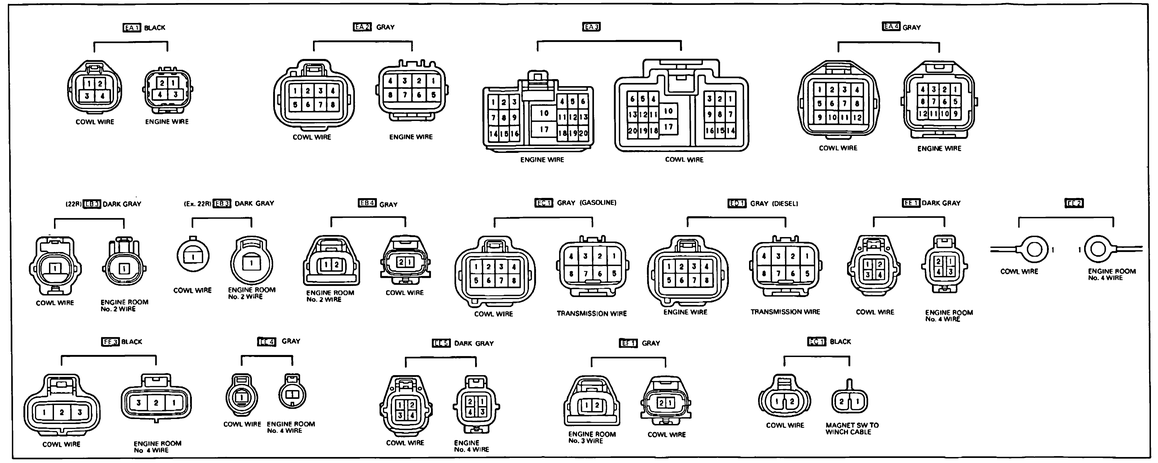


## Theft Deterrent System (U.K.)

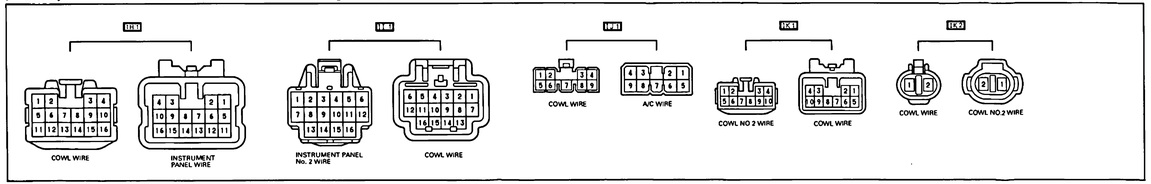
## Unlock and Seat Belt Warning



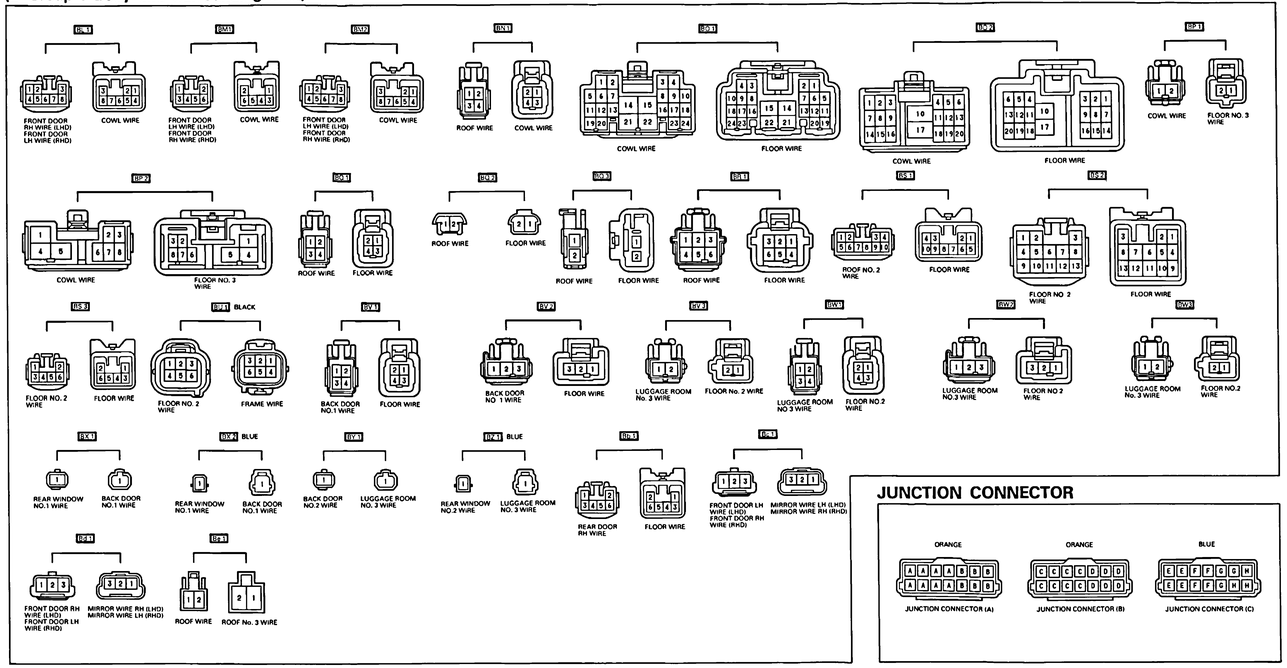
## Connector Joining Wire Harness and Wire Harness
## (E Group : Engine Compartment area)




## (I Group : Instrument Panel and Surrounding area)




## (B Group : Body and Surrounding area)



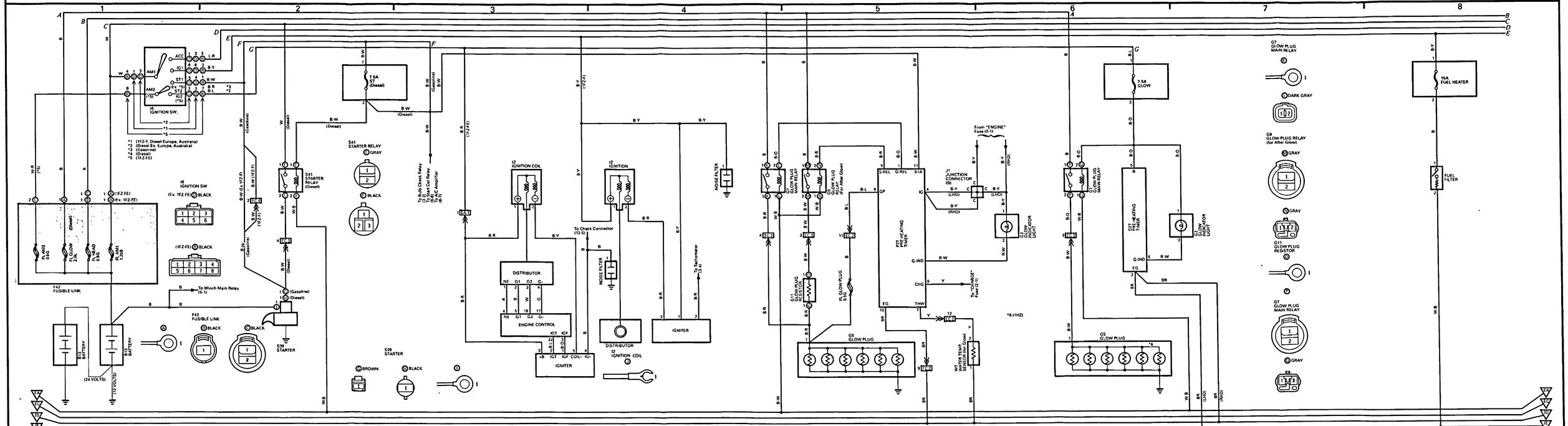

## JUNCTION CONNECTOR

# SYSTEM INDEX

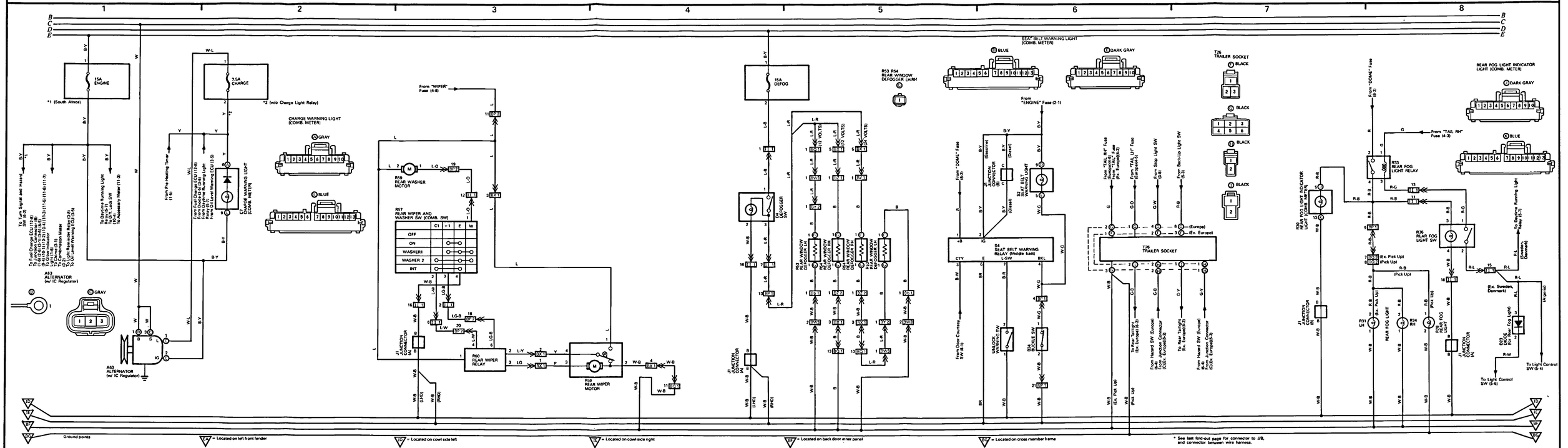
LAND CRUISER 70 (Heavy-Duty) (Location No. 1 to 14)

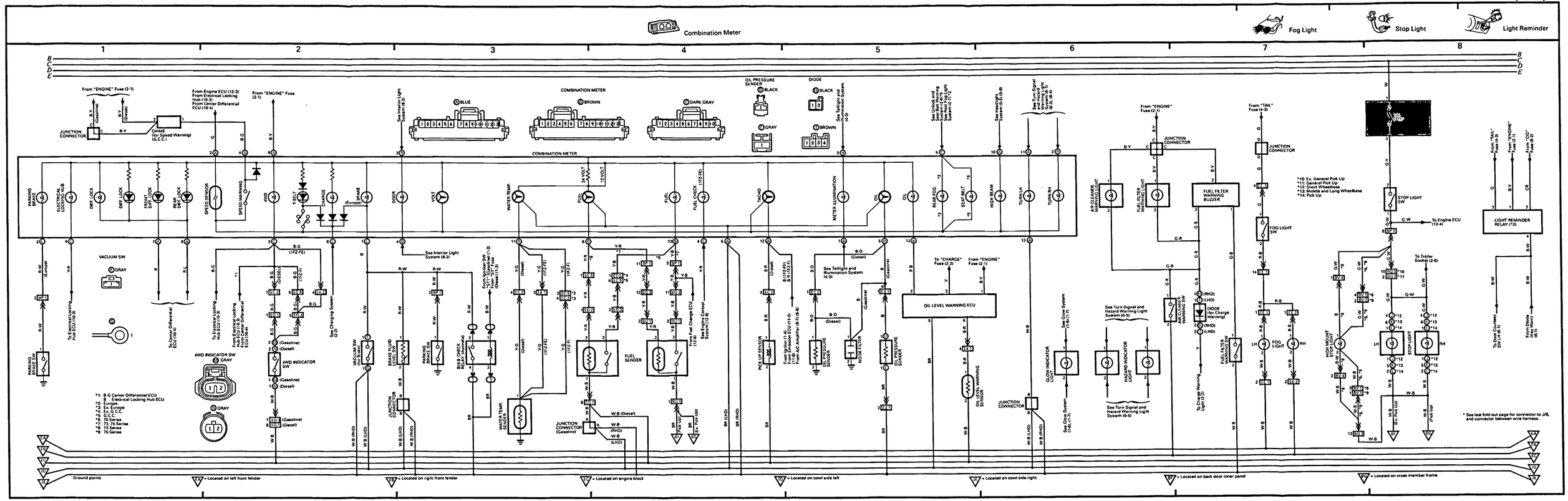
| SYSTEMS | LOCATION | SYSTEMS | LOCATION |
|---|---|---|---|
| Accessory Meter | 11-2 | Light Reminder | 3-8 |
| Air Conditioner, Cooler and Heater | 8-6 (Single Type)<br>9-6 (Dual Type) | Moon Roof | 7-1 |
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| Charging | 2-1 | Power Window | 7-3 |
| Cigarette Lighter | 9-1 | Radio and Player | 9-3 |
| Clock | 9-1 | Rear Fog Light | 2-8 |
| Combination Meter | 3-4 | Rear Window Defogger | 2-4 |
| Door Lock | 7-7 | Rear Wiper and Washer | 2-3 |
| Emission Control | 11-5 (1FZ-F) | Remote Control Mirror | 9-2 |
| Engine Control | 12-5 (1FZ-FE) | Starting | 1-2 |
| Glow | 1-5 (Europe, Australia)<br>1-6 (Ex. Europe, Australia) | Stop Light | 3-8 |
| Fog Light | 3-7 | Taillight and Illumination | 4-3 |
| Front Wiper and Washer | 4-7 | Trailer Socket | 2-6 |
| Fuel Heater | 1-8 | Turn Signal and Hazard | 6-3 |
| Headlight | 5-4 (Ex. Europe)<br>5-6 (Europe) | Unlock and Seat Belt Warning | 2-6 |
| Headlight Cleaner | 5-1 | Winch | 5-1 |
| Ignition | 1-3 | 4WD | 10-3 (Ex. Gasoline)<br>11-7 (Gasoline) |
| Horn | 8-3 | Connection Joining Wire Harness and Wire Harness | 13-4 |
| Interior Light | 8-1 | Junction Connector | 14-7 |

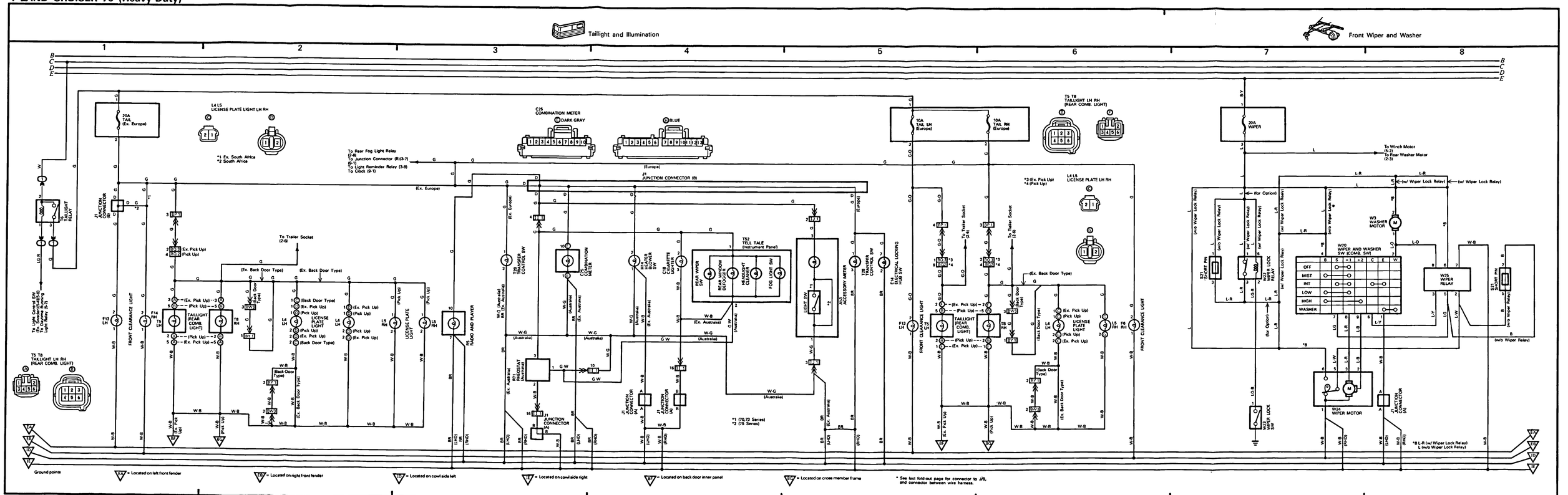
Power Source | Starting | Ignition | Glow (Europe, Australia) | Glow (Ex. Europe, Australia) | Fuel Heater



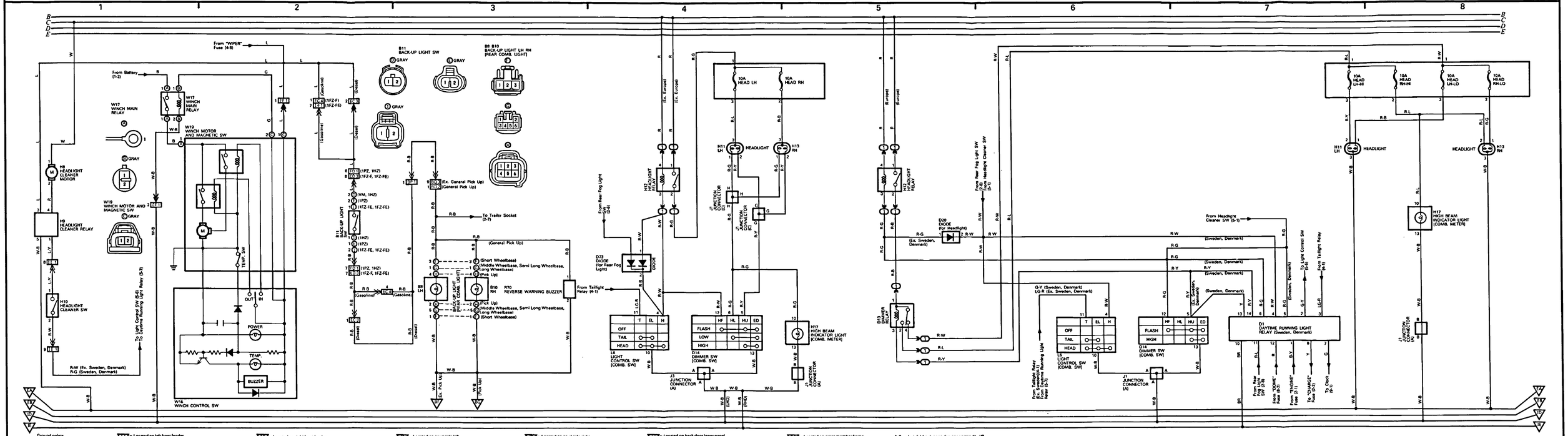
Charging | Rear Wiper and Washer | Rear Window Defogger | Unlock and Seat Belt Warning | Trailer Socket | Rear Fog Light

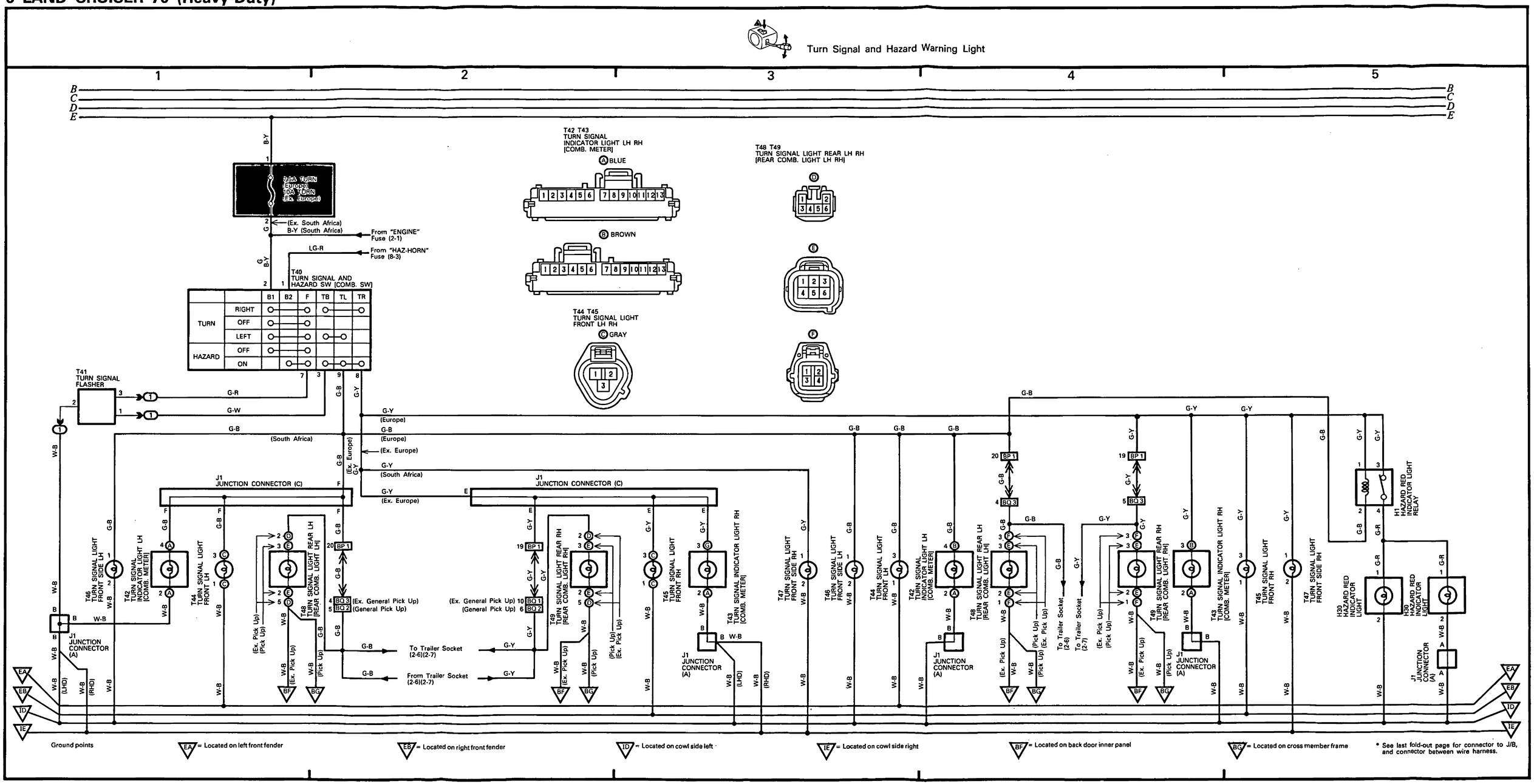



Combination Meter
Fog Light
Stop Light
Light Reminder
1
2
3
4
5
6
7
8
B
C
D
E
From "ENGINE" Fuse (2-1)
JUNCTION CONNECTOR
CHIME (for Speed Warning) (G.C.C.)
From Engine ECU (12-3)
From Electrical Locking Hub (10-2)
From Center Differential ECU (10-4)
SPEED SENSOR
SPEED WARNING
See Interior Light System (8-2)
COMBINATION METER
A BLUE
B BROWN
C DARK GRAY
OIL PRESSURE SENDER
M BLACK
DIODE
D BLACK
D GRAY
D BROWN
See Illumination System (4-8)
See Lock and Seat Belt Warning System (7-1) See Starter (2G) Light System (7-5)
See Headlight System (4-5, 6-8)
See Turn Signal and Hazard Warning Light System (6-5, 6-8)
PARKING LIGHT
ELECTRICAL LOCKING HUB
DIFF. LOCK
FRONT DIFF. LOCK
REAR DIFF. LOCK
4WD
T-BELT
CHARGE
BRAKE (Europe)
DOOR
VOLT
WATER TEMP.
FUEL
24 VOLT
12 VOLT
FUEL CHECK (1FZ-FE)
TACHO
METER ILLUMINATION
OIL
REAR FOG
SEAT BELT
HIGH BEAM
TURN LH
TURN RH
VACUUM SW
4WD INDICATOR SW
To Center Differential ECU (10-4)
To Electrical Locking Hub ECU (10-2)
From Electrical Locking Hub ECU (10-2) From Center Differential ECU (10-4)
See Charging System (2-2)
VACUUM SW (for 4WD)
BRAKE FLUID LEVEL SW
PARKING BRAKE SW
BULB CHECK (Gasoline)
WATER TEMP. SENDER GAUGE
FUEL SENDER
See Fuel Charge ECU (12-8)
See Engine Control System (12-6)
JUNCTION CONNECTOR (Gasoline)
PICK UP SENSOR
From Ignitor (1-6) From Emission ECU (11-5) From A/C Amplifier (8-7) (8-8)
OIL PRESSURE SENSOR
NOISE FILTER
See Taillight and Illumination System (4-3)
To "CHARGE" Fuse (2-2)
From "ENGINE" Fuse (2-1)
OIL LEVEL WARNING ECU
OIL LEVEL WARNING SENSOR
JUNCTION CONNECTOR
GLOW INDICATOR LIGHT
See Glow System (1-6, 11-7)
See Turn Signal and Hazard Warning Light System (6-5)
HAZARD INDICATOR LIGHT
AIR CLEANER WARNING LIGHT
FUEL FILTER WARNING LIGHT
FUEL FILTER WARNING BUZZER
To Engine ECU (12-4)
To Charging System Ignitor (2-2)
FUEL FILTER WARNING SW
From "TAIL" Fuse (4-3)
FOG LIGHT SW
FOG LIGHT
HIGH MOUNT STOP LIGHT
STOP LIGHT SW
STOP LIGHT
To Trailer Socket (2-6)
From "TAIL" Fuse (4-3)
From "ENGINE" Fuse (2-1)
From "IGT" Fuse (9-2)
LIGHT REMINDER RELAY (*2)
To Door Courtesy SW (10-6, 9-1)
From Diode (for Key Warn) (8-1)
*10: Ex. General Pick Up
*11: General Pick Up
*12: Short Wheelbase
*13: Middle and Long Wheelbase
*14: Pick Up
*1: B-G Center Differential ECU
B Electrical Locking Hub ECU
*2: Europe
*3: Ex. Europe
*4: Ex. G, C.C.
*5: G.C.
*6: 70 Series
*7: 73, 75 Series
*8: 73 Series
*9: 75 Series
* See last fold-out page for connector to J/B, and connector between wire harness.
Ground points
= Located on left front fender
= Located on right front fender
= Located on engine block
= Located on cowl side left
= Located on cowl side right
= Located on back door inner panel
= Located on cross member frame


Taillight and Illumination
Front Wiper and Washer
20A TAIL (Ex. Europe)
L4 L5 LICENSE PLATE LIGHT LH RH
*1 Ex. South Africa
*2 South Africa
C25 COMBINATION METER
D DARK GRAY
B BLUE
To Rear Fog Light Relay (2-A)
To Junction Connector (B)(3-7)
(B-2)
To Light Reminder Relay (3-B)
To Clock (B-1)
(Europe)
J1 JUNCTION CONNECTOR (B)
(Ex. Europe)
To Trailer Socket (2-A)
(Ex. Back Door Type)
(Back Door Type)
(Ex. Pick Up)
(Pick Up)
TAILLIGHT (REAR COMB. LIGHT)
LICENSE PLATE LIGHT
T5 T8 TAILLIGHT LH RH (REAR COMB. LIGHT)
FRONT CLEARANCE LIGHT
To VSK Control ECU (Ex. Europe)(3-15)(4) (Europe)(3-4) Light Relay (3-7)
TRANSFER CONTROL SW
CIGARETTE LIGHTER
HEATER BLOWER SW
T52 TELL TALE (Instrument Panel)
REAR WIPER SW
REAR WINDOW DEFOGGER
HEADLIGHT LEVELING
FOG LIGHT SW
LIGHT SW
RHEOSTAT (Illumination)
ACC ACCESSORY METER
ELECTRICAL LOCKING HUB SW
10A TAIL LH (Europe)
10A TAIL RH (Europe)
T5 T8 TAILLIGHT LH RH (REAR COMB. LIGHT)
*3 (Ex. Pick Up)
*4 (Pick Up)
20A WIPER
To Winch Motor (5-3)
To Rear Washer Motor (2-3)
(w/ Wiper Lock Relay)
(w/o Wiper Lock Relay)
(for Option)
S21 SHORT PIN
W3 WASHER MOTOR
W20 WIPER AND WASHER SW (COMB. SW)
OFF
MIST
INT
LOW
HIGH
WASHER
W25 WIPER RELAY
W24 WIPER MOTOR
W23 WIPER LOCK SW
J1 JUNCTION CONNECTOR (A)
*8 L-R (w/ Wiper Lock Relay)
L (w/o Wiper Lock Relay)
Ground points
= Located on left front fender
= Located on right front fender
= Located on cowl side left
= Located on cowl side right
= Located on back door inner panel
= Located on cross member frame
* See last fold-out page for connector to J/B, and connector between wire harness.

Headlight Cleaner | Winch | Back-Up Light | Headlight (Ex. Europe) | Headlight (Europe)

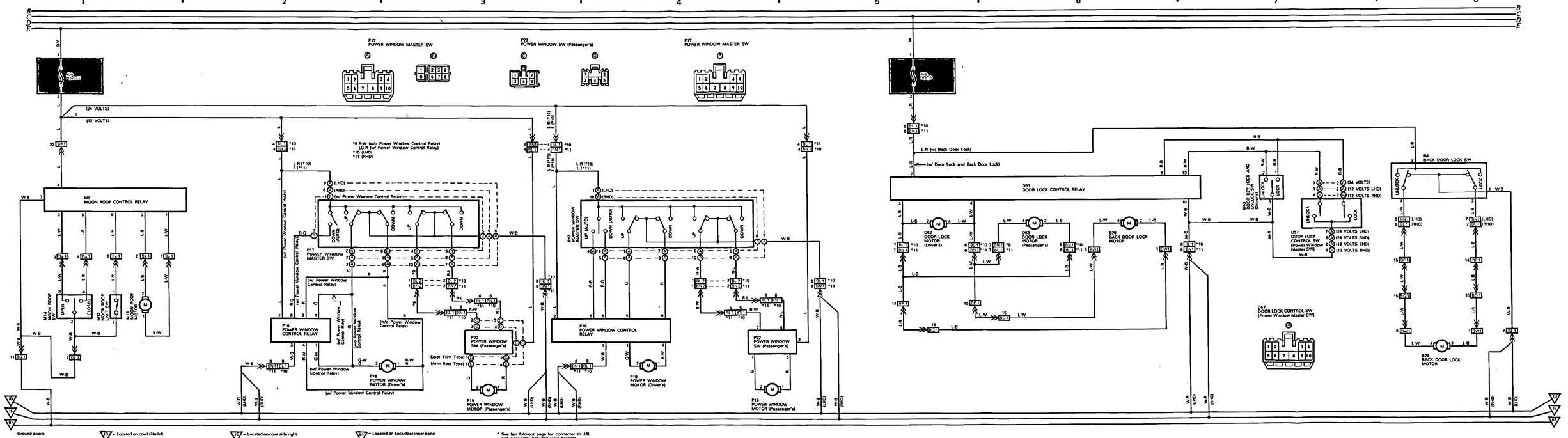



Turn Signal and Hazard Warning Light
1
2
3
4
5
B
C
D
E
B-Y
7.5A TURN (Europe)
10A TURN (Ex. Europe)
(Ex. South Africa)
B-Y (South Africa)
From "ENGINE" Fuse (2-1)
LG-R
From "HAZ-HORN" Fuse (8-3)
T40
TURN SIGNAL AND HAZARD SW [COMB. SW]
B1
B2
F
TB
TL
TR
TURN
RIGHT
OFF
LEFT
HAZARD
OFF
ON
T41
TURN SIGNAL FLASHER
G-R
G-W
G-B
G-Y
(Europe)
(South Africa)
(Ex. Europe)
W-B
J1
JUNCTION CONNECTOR (C)
T46
TURN SIGNAL LIGHT FRONT SIDE LH
T42
TURN SIGNAL INDICATOR LIGHT [COMB. METER]
T44
TURN SIGNAL LIGHT FRONT LH
T48
TURN SIGNAL LIGHT REAR LH [REAR COMB. LIGHT LH]
(Ex. Pick Up)
(Pick Up)
BP 1
BQ 3
(Ex. General Pick Up)
(General Pick Up)
BQ 1
BQ 2
To Trailer Socket (2-6)(2-7)
From Trailer Socket (2-6)(2-7)
T49
TURN SIGNAL LIGHT REAR RH [REAR COMB. LIGHT RH]
T45
TURN SIGNAL LIGHT FRONT RH
T43
TURN SIGNAL INDICATOR LIGHT RH [COMB. METER]
T47
TURN SIGNAL LIGHT FRONT SIDE RH
J1
JUNCTION CONNECTOR (A)
(LHD)
(RHD)
T42 T43
TURN SIGNAL INDICATOR LIGHT LH RH [COMB. METER]
A BLUE
B BROWN
T44 T45
TURN SIGNAL LIGHT FRONT LH RH
C GRAY
T48 T49
TURN SIGNAL LIGHT REAR LH RH [REAR COMB. LIGHT LH RH]
D
E
F
H1
HAZARD RED INDICATOR LIGHT RELAY
H30
HAZARD RED INDICATOR LIGHT
Ground points
EA = Located on left front fender
EB = Located on right front fender
ID = Located on cowl side left
IE = Located on cowl side right
BF = Located on back door inner panel
BG = Located on cross member frame
* See last fold-out page for connector to J/B, and connector between wire harness.

Moon Roof

Power Window

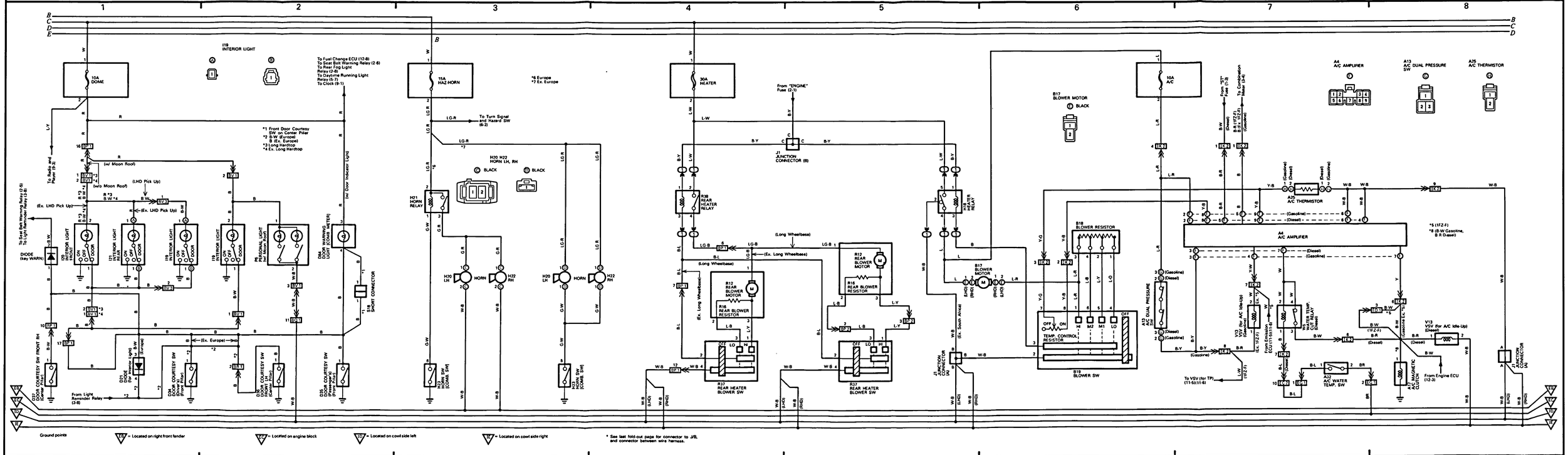
Door Lock



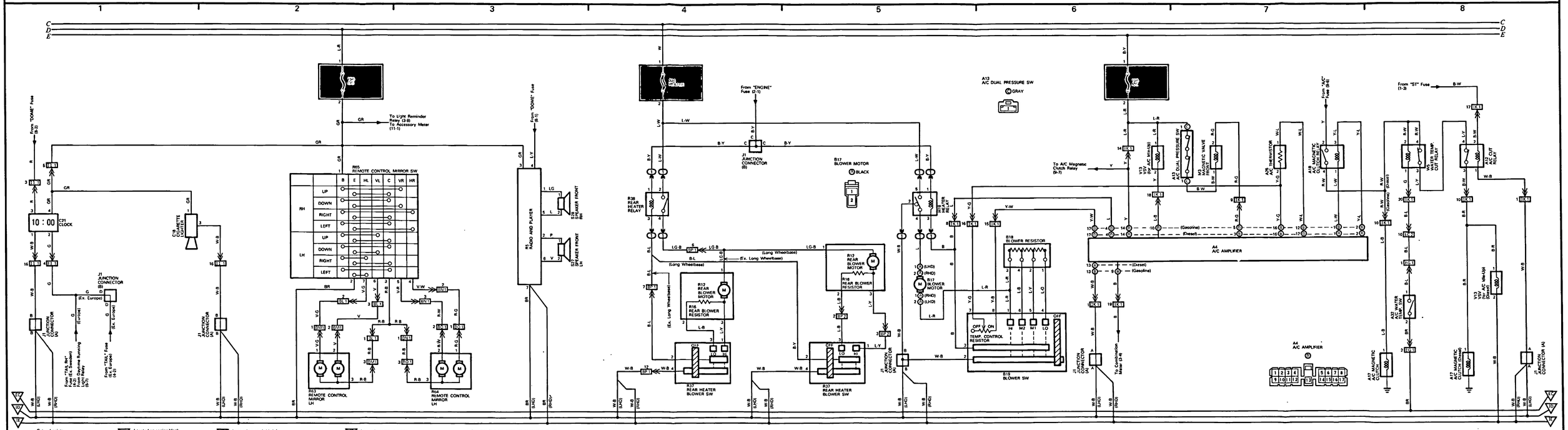
Interior Light

Horn

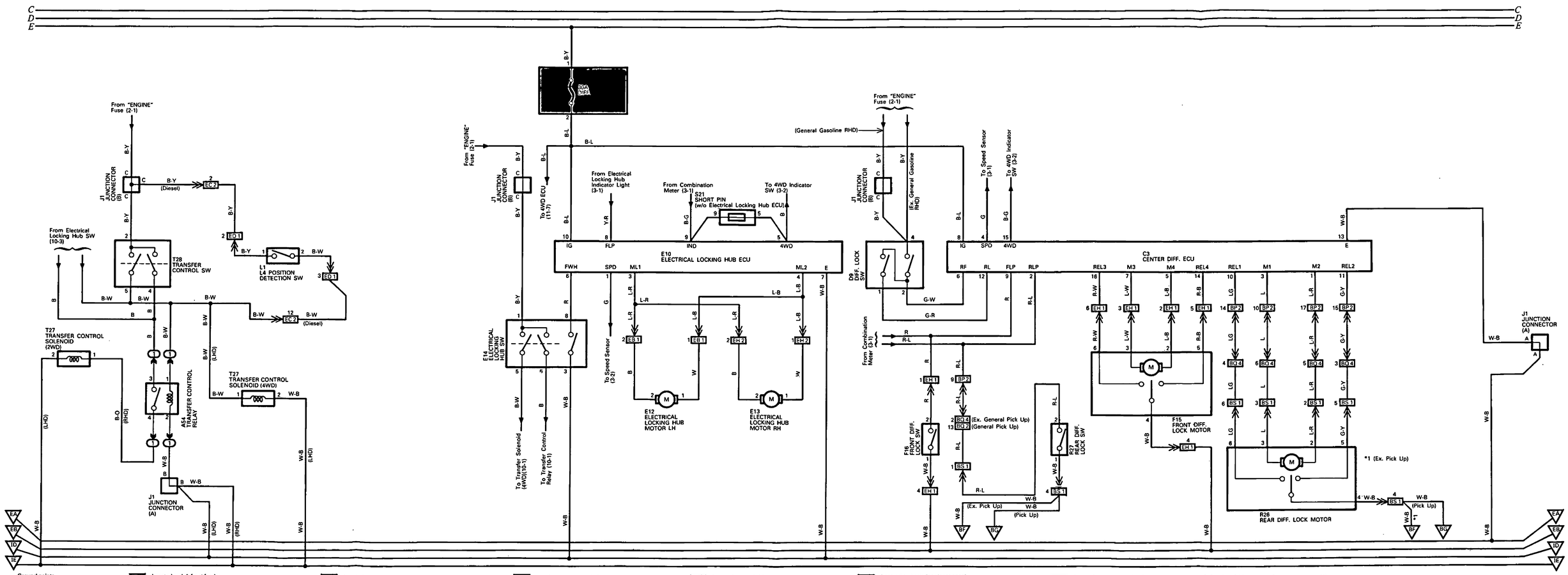
Air Conditioner, Cooler and Heater (Single Type)



Clock | Cigarette Lighter | Remote Control Mirror | Radio and Player | Air Conditioner, Cooler and Heater (Dual Type)



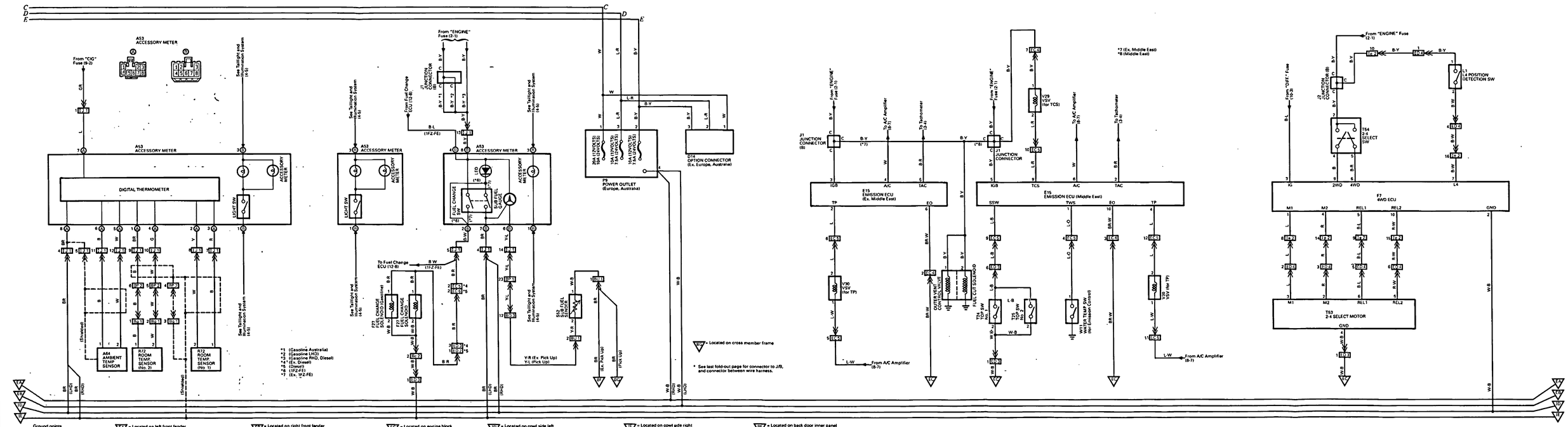
4WD (Ex. Gasoline)

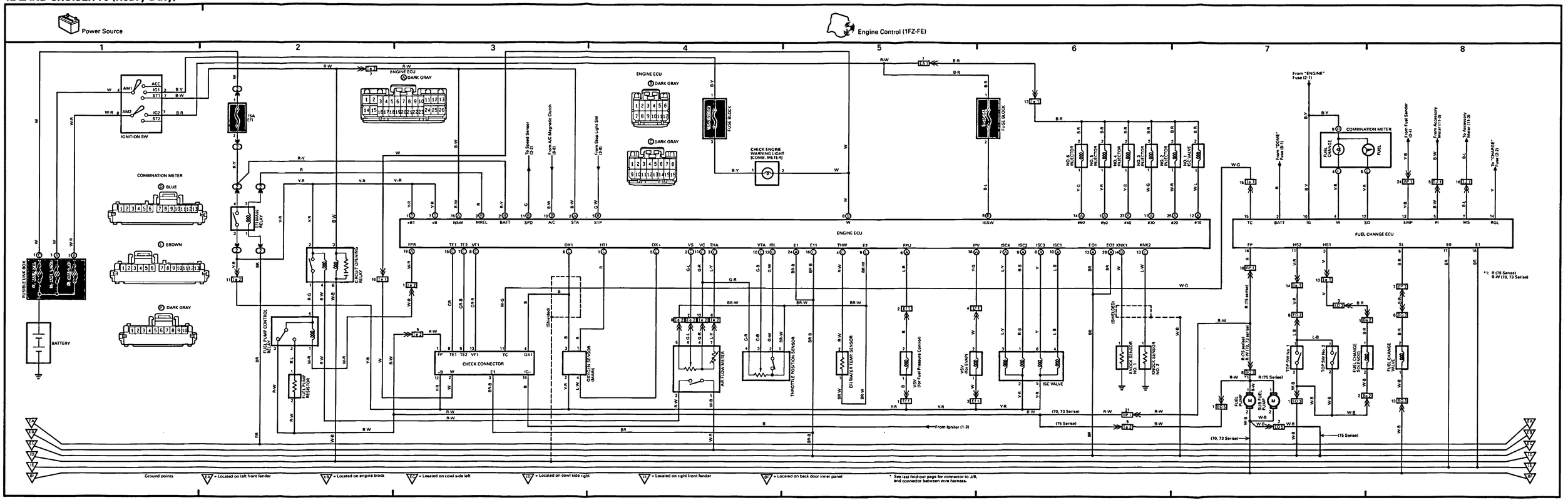


Accessory Meter

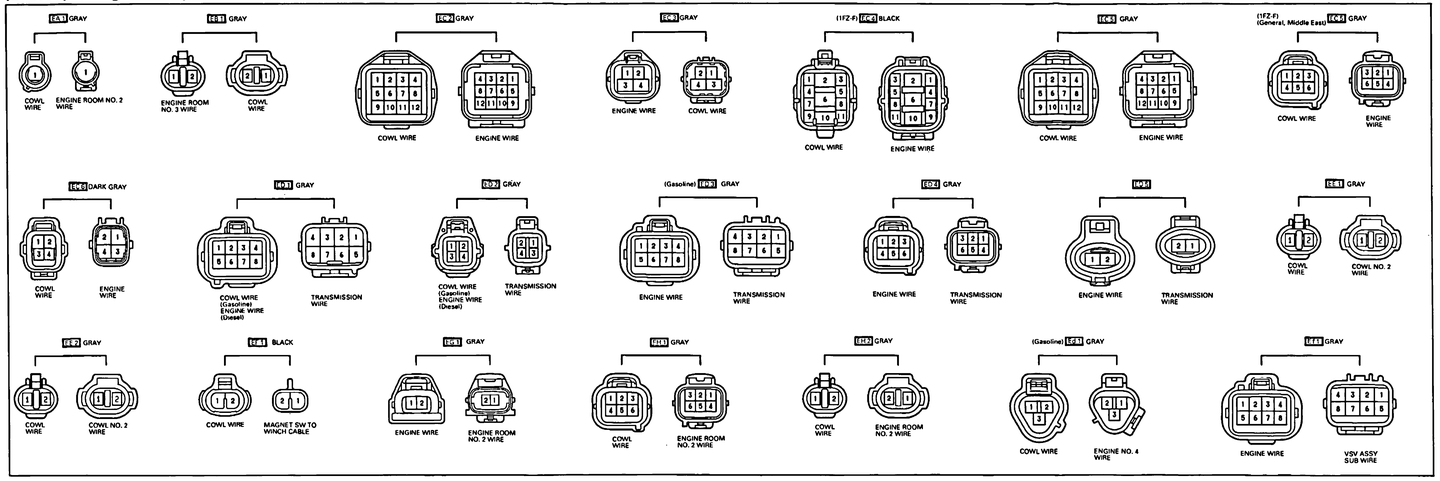
Emission Control (1FZ-F)

4WD (Gasoline)

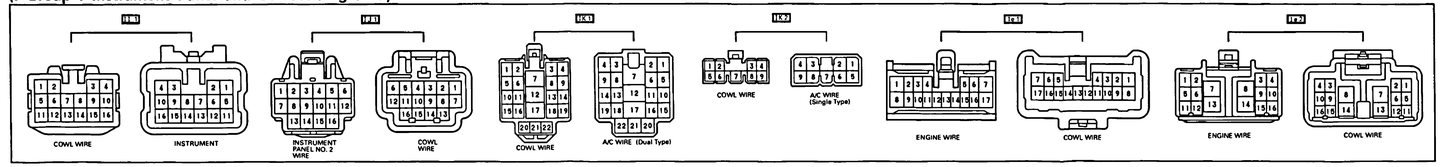



Power Source
Engine Control (1FZ-FE)
1
2
3
4
5
6
7
8
IGNITION SW
ACC
IG1
ST1
AM1
AM2
IG2
ST2
15A EFI
EFI MAIN RELAY
ENGINE ECU
A DARK GRAY
B DARK GRAY
C DARK GRAY
COMBINATION METER
B BLUE
B BROWN
B DARK GRAY
A FUSIBLE LINK BOX
BATTERY
FUEL PUMP CONTROL RELAY
RESISTOR
CHECK CONNECTOR
CHECK ENGINE WARNING LIGHT (COMB. METER)
FUSE BLOCK
To Speed Sensor (3-2)
From A/C Magnetic Clutch (3-9)
From Stop Light SW (3-8)
+B1
+B
NSW
MREL
BATT
SPD
A/C
STA
STP
IGSW
W
FPR
TE1
TE2
VF1
TC
OX1
HT1
OX+
VS
VC
THA
VTA
IDL
E1
E11
THW
E2
FPU
IPV
ISC4
ISC2
ISC3
ISC1
EO1
EO2
KNK1
KNK2
OXYGEN SENSOR (MAIN)
(Shielded)
AIR FLOW METER
THROTTLE POSITION SENSOR
EFI WATER TEMP. SENSOR
VSV (for Fuel Pressure Control)
VSV (for EVAP)
ISC VALVE
KNOCK SENSOR NO.1
KNOCK SENSOR NO.2
(SHIELDED)
#60
#50
#40
#30
#20
#10
NO.6 INJECTOR
NO.5 INJECTOR
NO.4 INJECTOR
NO.3 INJECTOR
NO.2 INJECTOR
NO.1 INJECTOR
ISC VALVE
From "ENGINE" Fuse (2-1)
From "DOME" Fuse (3-5)
COMBINATION METER
FUEL GAUGE
FUEL
From Fuel Sender (3-4)
From Accessory Meter (1-10)
To Accessory Meter (11-3)
To "CHARGE" Fuse (2-2)
FUEL CHANGE ECU
TC
BATT
IG
W
SD
EMP
PI
MS
RGL
FP
HS2
HS1
SL
E0
E1
R (75 Serise)
R (75 Serise) W/O (70 Serise)
TOP SW No.1
TOP SW No.2
FUEL CHANGE SOLENOID
FUEL CHANGE VALVE
MAIN FUEL PUMP
SUB FUEL PUMP
(70, 73 Serise)
(75 Serise)
From Igniter (1-3)
*1: R (75 Serise)
R-W (70, 73 Serise)
Ground points
= Located on left front fender
= Located on engine block
= Located on cowl side left
= Located on cowl side right
= Located on right front fender
= Located on back door inner panel
* See last fold-out page for connector to J/B, and connector between wire harness.

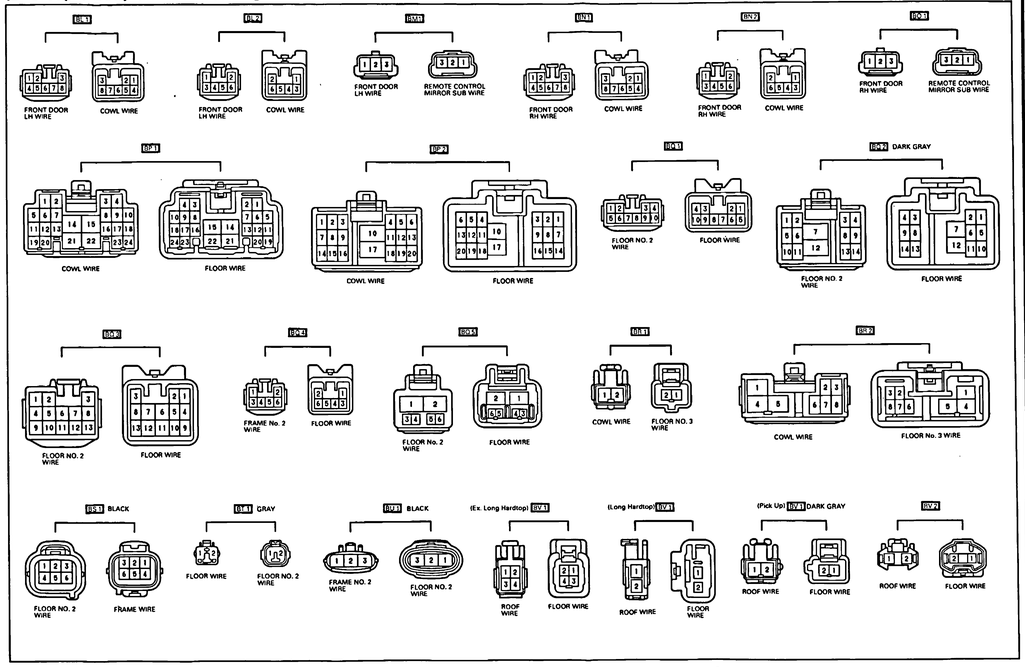
## Connector Joining Wire Harness and Wire Harness
## (E Group : Engine Compartment area)




## (I Group : Instrument Panel and Surrounding area)

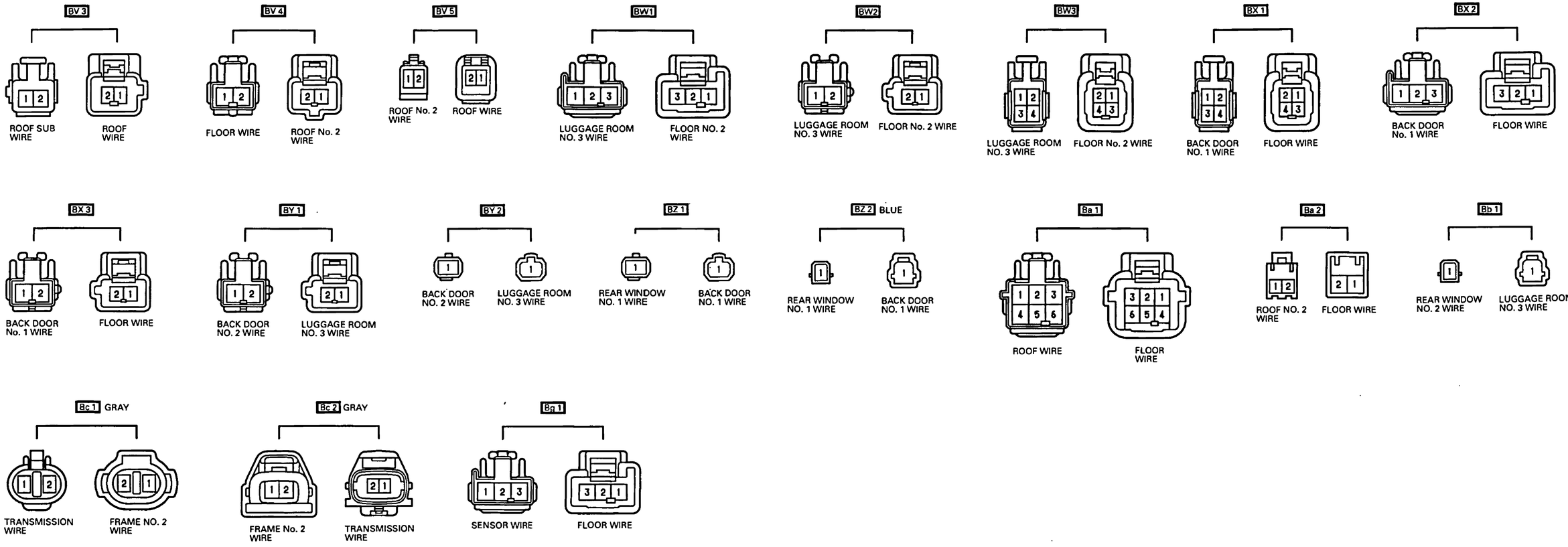



## (B Group : Body and Surrounding area)

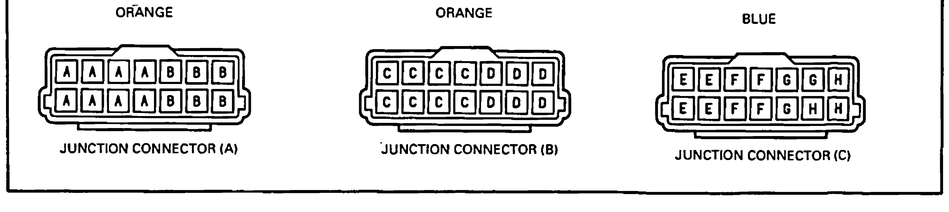


1 2 3 4

## Connector Joining Wire Harness and Wire Harness (B Group : Body and Surrounding area)




## JUNCTION CONNECTOR



# SYSTEM INDEX

LAND CRUISER (W/G) (Location No. 1 to 43)

| SYSTEMS | LOCATION |
|---|---|
| ABS (Anti-Lock Brake System) | 41-3 |
| Accessory Meter | 20-3 |
| Air Conditioner, Cooler and Heater | 30-4 (Push SW Type)<br>34-4 (Manual Dual A/C Type)<br>36-4 (Manual Single A/C Lever SW Type) |
| Auto Antenna | 13-2 (Australia)<br>13-4 (Ex. Australia) |
| Automatic Transmission Indicator | 21-2 |
| Back-Up Light | 21-3 |
| Charging | 2-3 |
| Cigarette Lighter | 24-3 |
| Clock | 24-2 |
| Combination Meter | 28-4 |
| Condenser Fan | 34-2 |
| Cool/Ice Box | 33-6 |
| Cruise Control | 23-3 |
| ECT (Electronic Controlled Transmission) | 39-3 |
| Emission Control | 37-2 (1FZ-FLHD)<br>37-3 (1FZ-FRHD) |
| Engine Control | 27-4 |
| Front Wiper and Washer | 17-2 (1HZ, 1HD-T)<br>38-2 (1FZ-FE, 1FZ-F) |
| Fuel Heater | 19-5 |
| Fuel Tank Changeover | 29-6 |
| Glow Plug | 4-3 |
| Headlight Beam Level Control | 6-3 |
| Headlight Cleaner | 3-4 |
| Headlight | 7-2 (w/ Daytime Running Light)<br>8-2 (LHD in Europe w/o Daytime Running Light)<br>9-2 (U.K.)<br>10-2 (Ex. LHD in Europe) |
| Horn | 12-4 |
| Ignition | 37-4 (1FZ-F) |
| Interior Light | 11-3 |

| SYSTEMS | LOCATION |
|---|---|
| Light Auto Turn Off | 40-4 |
| Light Reminder | 24-3 |
| Moon Roof | 19-2 |
| Power Seat | 19-3 |
| Power Source | 1 ~ 30, 34, 36 ~ 41-1 |
| Power Window | 15-3 |
| PPS (Progressive Power Steering) | 5-3 |
| Radio and Player | 26-3 (w/o CD Player)<br>26-5 (w/ CD Player) |
| Rear Air Conditioner | 33-3 (Auto)<br>35-4 (Manual) |
| Rear Fog Light | 14-3 |
| Rear Window Defogger | 18-2 |
| Rear Wiper and Washer | 17-3 (1HZ, 1HD-T)<br>38-4 (1FZ-FE, 1FZ-F) |
| Remote Control Mirror | 20-2 |
| Satellite Navigation | 3-2 (Australia) |
| Seat Belt Warning | 21-4 |
| Seat Heater | 18-4 |
| Starting | 1-3 |
| Stop Light | 24-4 |
| Sub Fuel Tank | 40-2 (1FZ-FE) |
| Taillight and Illumination | 25-4 |
| Theft Deterrent and Door Lock | 16-3 |
| Turn Signal and Hazard Warning Light | 12-2 |
| Winch | 5-4 |
| 4WD | 22-3 |
| 12-24 Volt Switchover System | 1-2 |
| Connector Joining Wire Harness and Wire Harness | 42, 43 |

Power Source

12-24 Volt Swichover System

Starting

1 2 3 4

(Europe)

(Ex. Europe)

50A AM1

POWER JUNCTION BOX

F14 Ⓓ, F15 Ⓒ, F19 Ⓑ, F20 Ⓐ FUSIBLE LINK

EL STA 05G

EL MAIN 20L

EL AM1 125B

EA1 (*3)

EA2 (*4)

I14 IGNITION SW

ACC

IG1

ST1

AM1

AM2

IG2

ST2

10A GAUGE

F26 FUSE BLOCK

To Speed Sensor (28-4)

To Fuel Filter Warning Buzzer (28-4)

S6 Ⓐ GRAY

S7 Ⓑ BLACK

STARTER RELAY

To A/C Amplifier (36-4)

To Bulb Check Relay (28-5)

To A/C Cut Relay (32-3)(34-4)

T8 Ⓑ GRAY

T9 Ⓐ

12-24 VOLT SWITCHOVER RELAY

From "CHARGE" Fuse (2-3)

T12 12-24 VOLT SWITCHOVER TIMER RELAY

JUNCTION CONNECTOR

S6 Ⓐ, S7 Ⓑ STARTER RELAY (Diesel)

N1 NEUTRAL START SW (A/T)

From Engine ECU (27-3)

IG1 (1FZ-FE)

IG1 (1FZ-F)

IG1 (1HD-T, 1HZ)

To Engine ECU (27-3)

To Bulb Check Relay (28-5)

To Circuit Opening Relay (27-2)

To A/C Cut Relay (32-3)(34-4)

To A/C Amplifier (36-4)

T13 24 VOLT HOLD WARNING RELAY

FL 0.3P

T8 Ⓑ, T9 Ⓐ 12-24 VOLT SWITCHOVER RELAY

JUNCTION CONNECTOR

J3 JUNCTION CONNECTOR

S4 Ⓐ BLACK Ⓑ BLACK

S5 Ⓒ

STARTER

S4 Ⓐ Ⓑ, S5 Ⓒ STARTER

BATTERY LH

BATTERY RH

F14 Ⓓ GRAY

F15 Ⓒ, F19 Ⓑ, F20

FUSIBLE LINK

*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE
*3 1FZ-F, RHD
*4 Ex. 1FZ-F, RHD

Ground points

ID = Located on right kick panel

IE = Located on left kick panel

# 2 LAND CRUISER (W/G)

Power Source

Charging

1 2 3 4

B-G

AM1 ACC IG1 ST1 AM2 IG2 ST2

B 3 4

6 EA 2 (*3)
1 EA11 (*4)

I14
IGNITION SW.

*3 Ex. 1FZ-F RHD
*4 1FZ-F RHD

B B

2 2

50A AM1

1

2 W 2

3

4

2

B-L

W *2

1 B (1FZ-FE)
2 C (Diesel)

1 D

1 E

F14 C GRAY

2 1

F15 B , F19 D , F20 E

1

FUSIBLE LINK

F16 A GRAY

1

A13 B BLACK

1 2 3

A14 A

1

*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE

ALTERNATOR (w/ IC Regulator)

(Ex. Europe Diesel)

W

W

(Europe Diesel)

FL AM1 1.25B

FL MAIN 2.0L

FL ST 0.5G

*1

F14 C F15 B
F16 A F19 D F20 E
FUSIBLE LINK

B

(Europe Diesel)

(Ex. Europe Diesel)

BATTERY RH

BATTERY LH

1 A
B

L B 1
S B 3
IG B 2

Y-W W B B-L

A13 B , A14 A
ALTERNATOR
(w/ IC Regulator)

B-G

B-L

5 A

CHARGE WARNING LIGHT [COMB. METER]

5 B

Y-L

Y-L

4 EA 1

Y-L

2

1

7.5A CHARGE

2

2

Y-W
(w/ IC Regulator)

B-L
(w/ IC Regulator)

To Daytime Running Light Relay (7-3)

To Pre-Heating Timer (4-3)

To Choke Heater (37-2) (37-3)

To 24 Volt Hold Warning Relay (1-1)

B-L

1

7.5A IGN

F26 FUSE BLOCK

2

B-L

B-L

5 EA 1

B-L
(w/ IC Regulator)

CHARGE WARNING LIGHT [COMB. METER]

A GRAY

1 2 3 4 5 6 7 8 9 10

B BLUE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Power Source

Satellite Navigation

Headlight Cleaner

1 2 3 4

W W W

Power Source

Glow Plug

1 2 3 4

I14 IGNITION SW

ACC IG1 ST1 IG2 ST2 AM1 AM2

GLOW PLUG RELAY (SUB)

G5 GRAY G6

GLOW PLUG RELAY

G2 DARK GRAY

G3, G4

50A AM1

POWER JUNCTION BOX

EA2 EC2

FL MAIN 2.0L FL GLOW 1.25B

F17, F19 FUSIBLE LINK

BATTERY

FUSIBLE LINK F17, F19

B-Y B-G B-W B B-R B-L B-O W-B W Y Y-W Y-L BR

(SUPER GLOW TYPE) (FIXED DELAY TYPE)

IG1 IG4

7.5A IGN 10A GAUGE

F26 FUSE BLOCK

C10 GLOW INDICATOR LIGHT [COMB. METER]

(Europe) (Ex. Europe)

From "CHARGE" Fuse (2-3)

S-REL STA B G-IND CHG

G-REL GP EG THW

P4, P5 PRE-HEATING TIMER

(SUPER GLOW TYPE) (FIXED DELAY TYPE)

G5, G6 GLOW PLUG RELAY (SUB)

G2, G3 GLOW PLUG RELAY

G7, G8 GLOW PLUG RESISTOR

F18 FUSIBLE LINK

FL GLOW PLUG

G1 GLOW PLUG

J3 JUNCTION CONNECTOR

W-B (LHD) W-B (RHD)

W4 WATER TEMP. SENSOR (for Glow Plug)

F11 FUEL CUT SOLENOID

PRE-HEATING TIMER

P4 P5

GLOW INDICATOR LIGHT [COMB. METER]

GRAY BLUE

Ground points

EC = Located on engine block

ID = Located on right kick panel

IE = Located on left kick panel

Power Source

PPS (Progressive Power Steering)

Winch

1 2 3 4

I14 IGNITION SW

FUSIBLE LINK *

F14 C GRAY

F15 B, F19 A

F16 D GRAY

F14 C , F15 B , F16 D , F19 A FUSIBLE LINK

50A TAM1

30A MAIN 20A

EFI 4M 15A

EFI 2B

POWER JUNCTION BOX

Winch Main Relay (5-4)

BATTERY

*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE
*3 1FZ-F, RHD
*4 Ex. 1FZ-F, RHD

F26 FUSE BLOCK

15A ECU-IG

J6 JUNCTION CONNECTOR

P3 PPS ECU

P1 PPS SOLENOID

To Speed Meter (Comb. Meter) (28-3)

J4 JUNCTION CONNECTOR

From Battery (5-1)

WINCH MAIN RELAY

WINCH MOTOR AND MAGNETIC SW

W6 D GRAY

W11 E

7.5A IGN

MAGNETIC RELAY

TEMP. SW

WINCH CONTROL SW

OUT IN

POWER

TEMP.

BUZZER

Ground points

IE = Located on left kick panel

Power Source

Headlight Beam Level Control

1 2 3 4

TAILLIGHT RELAY

F26 FUSE BLOCK

10A TAIL RH

10A TAIL LH

2 EA 2 (LHD)
5 EA 7 (RHD)

6 EA 7

C15 LIGHT CONTROL SW [COMB. SW]

| | T | EL | H |
|---|---|---|---|
| OFF | | | |
| TAIL | ○ | ○ | |
| HEAD | ○ | ○ | ○ |

F19 FUSIBLE LINK

4L MAIN 40A

BATTERY

J2 JUNCTION CONNECTOR

H1 HEADLIGHT BEAM LEVEL CONTROL ACTUATOR LH

H2 HEADLIGHT BEAM LEVEL CONTROL ACTOATOR RH

UP

DOWN

M MOTOR

UP RELAY

DOWN RELAY

H12 HEADLIGHT BEAM LEVEL CONTROL SW

Ground points

EA = Located on right front fender.

EB = Located on left front fender

ID = Located on right kick panel

IE = Located on left kick panel

Power Source

Headlight (w/ Daytime Running Light)

1 2 3 4

*1: 1FZ-FE
*2: Ex. 1FZ-FE

B-Y
B 9 AM1 ACC IG1 ST1 6 B-Y
AM2 IG2 ST2
I14 IGNITION SW
W (*1) R (*2)
6 EA 2
B
2 50A AM1 1
W
2
POWER JUNCTION BOX
3
4
2
B-L
R (*2)
W (*1)
(1FZ-FE) 1 A
(Diesel) 2 B
1 B
1 C
FL AM1 1.25B
FL HEAD 1.0Y
FL MAIN 2.0L
F14 B, F15 A, F19 C FUSIBLE LINK
BATTERY
3 EA 3
W
FUSIBLE LINK
F14 B GRAY
2 1
F15 A, F19 C
1
W
W
From Taillight Relay (14-1)(25-1)
R-B
3
B-R
12
1 10A ECU-B 2
F26 FUSE BLOCK
W (*1) R (*2)
W (*1) R (*2)
3 1
2 2
HEADLIGHT RELAY
4 2
R-B
11 EA 1
R-B
5
R-Y
Y
1 10A GAUGE 3
F26 FUSE BLOCK
Y
Y
R-Y
R-Y
1
3 2 4 DIMMER RELAY
R-Y
4 EA 2
R-Y
14
R-W
R-L
R-W
R-L
15A HEAD (LH-UPR)
15A HEAD (RH-UPR)
15A HEAD (LH-LWR)
15A HEAD (RH-LWR)
R-Y
R-Y
R-W
R-L
R-W
R-G
R-L
R-W
R-W
R-Y
R-Y
R-W
R-G
R-W
5 EA 2
H7 No. 2
LH
H5 No. 1
H6 No. 1
HEADLIGHT
RH
H8 No. 2
W-B
W-B
W-B
W-B
W-B
W-B
5 A
C11 HIGH BEAM INDICATOR LIGHT [COMB. METER]
10 B
HIGH BEAM INDICATOR LIGHT [COMB. METER]
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
B GRAY
1 2 3 4 5 6 7 8 9 10
W-B
3 J2 JUNCTION CONNECTOR 11
5 J2 JUNCTION CONNECTOR 14
D2 DAYTIME RUNNING LIGHT RELAY
2 4 R-L
R-G
R-L
R-L
From Headlight Cleaner SW (3-4)
2 13
T EL H
OFF
TAIL
HEAD
C15 LIGHT CONTROL SW [COMB. SW]
11
W-B
13
J2 JUNCTION CONNECTOR
11 5
J2 JUNCTION CONNECTOR
14
W-B
6 13 R-W R-Y
14 12
HF HU HL ED
FLASH
LOW
HIGH
C15 DIMMER SW [COMB. SW]
9
W-B
10 11 7 8 R G Y-L
From Rear Fog Light SW (14-2)
To Clock (24-2)
From "CHARGE" Fuse (2-3)
3 J1 JUNCTION CONNECTOR 11
W-B
5 J1 JUNCTION CONNECTOR 14
W-B
W-B
W-B
EA EB IE
EA EB IE
Ground points
EA = Located on right front fender
EB = Located on left front fender
IE = Located on left kick panel

Power Source

Headlight (LHD in Europe w/o Daytime Running Light)

*1: 1FZ-FE
*2: Ex. 1FZ-FE

W (1FZ-FE)
R (Ex. 1FZ-FE)
W
R
F26 FUSE BLOCK
10A TAIL RH
TAILLIGHT RELAY
HEADLIGHT RELAY
DIMMER RELAY
W (*1)
R (*2)
R-Y
R-W
R-L
R-B
R-G
G
W-B
From Rear Fog Light SW (14-2)
To Clock (24-2)
D2 SHORT CONNECTOR
EA 1
EA 2
EA 3
15A HEAD (LH-UPR)
15A HEAD (RH-UPR)
15A HEAD (LH-LWR)
15A HEAD (RH-LWR)
H7 No. 2 LH
H5 No. 1
H6 No. 1
RH
H8 No. 2
HEADLIGHT
FL HEAD 1.0Y
FL MAIN 2.0L
F14 B, F19 C
FUSIBLE LINK
BATTERY
C15 LIGHT CONTROL SW [COMB. SW]
T EL H
OFF
TAIL
HEAD
From Headlight Cleaner SW (3-4)
D6 DIODE
C15 DIMMER SW [COMB. SW]
HF HU HL ED
FLASH
LOW
HIGH
HIGH BEAM INDICATOR LIGHT [COMB. METER]
C11 HIGH BEAM INDICATOR LIGHT [COMB. METER]
J2 JUNCTION CONNECTOR
B GRAY
SHORT CONNECTOR (for Except Daytime Running Light)
Ground points
EA = Located on right front fender
EB = Located on left front fender
IE = Located on left kick panel

Power Source

Headlight (U.K.)

1 2 3 4

R

F14 FUSIBLE LINK

BATTERY

HEADLIGHT RELAY

DIMMER RELAY

15A HEAD (LH-UPR)

15A HEAD (RH-UPR)

15A HEAD (LH-LWR)

15A HEAD (RH-LWR)

R-Y

R-W

R-L

R-B

R-G

W-B

From Diode (for Rear Fog Light) (14-2)

From Headlight Cleaner SW (3-4)

To Diode (for Rear Fog Light) (14-2)

11 EA1

2 EA7

3 EA7

H7 No. 2 LH

H5 No. 1

H6 No. 1

H8 No. 2 RH

HEADLIGHT

HIGH BEAM INDICATOR LIGHT [COMB. METER]

C11 HIGH BEAM INDICATOR LIGHT [COMB. METER]

C15 LIGHT CONTROL SW [COMB. SW]

| | T | EL | H |
|---|---|---|---|
| OFF | | | |
| TAIL | ○ | ○ | |
| HEAD | ○ | ○ | ○ |

C15 DIMMER SW [COMB. SW]

| | HF | HU | FL | ED |
|---|---|---|---|---|
| FLASH | ○ | ○ | | ○ |
| LOW | | | ○ | ○ |
| HIGH | | ○ | | ○ |

J2 JUNCTION CONNECTOR

GRAY

Ground points

EA = Located on right front fender

EB = Located on left front fender

ID = Located on right kick panel

Power Source

Headlight (Ex. LHD in Europe)

1 2 3 4

*1: 1FZ-FE LHD
*2: 1FZ-FE RHD, 1FZ-F, 1HZ LHD, 1HD-T LHD
*3: 1HZ RHD, 1HD-T RHD
*4: 1FZ-FE RHD, 1FZ-F RHD

W
W (1FZ-FE)
W (Ex. 1FZ-FE)
POWER JUNCTION BOX
F19 FUSIBLE LINK
FL MAIN 2.0L
BATTERY
HEADLIGHT RELAY
R-G (*1)
R-W (*2)
R-B (*3)
R-Y
15A HEAD (LH)
15A HEAD (RH)
R-L
R-W
H5 No. 1
HEADLIGHT LH
H7 No. 2
(*4)
(Ex. *4)
H6 No. 1
HEADLIGHT RH
H8 No. 2
R-G
R-Y
From Light Retainer Relay (40-4)
To Light Retainer Relay (40-4)
B-L (Australia)
B-O (Australia)
R-W (Australia)
EA 1
From Headlight Cleaner SW (3-4)
EA 2 (LHD)
EA 7 (RHD Ex. *4)
EA 8 (*4)
C15 LIGHT CONTROL SW [COMB. SW]
T EL H
OFF
TAIL
HEAD
C15 DIMMER SW [COMB. SW]
HF HU HL ED
FLASH
LOW
HIGH
HIGH BEAM INDICATOR [COMB. METER]
W-B
J2 JUNCTION CONNECTOR
W-B (RHD)
W-B (LHD)
HIGH BEAM INDICATOR LIGHT [COMB. METER]
A
B GRAY
*1 (Ex. w/o Tachometer in Middle East)
*2 (w/o Tachometer in Middle East)
1D
1E
Ground points
1D = Located on right kick panel
1E = Located on left kick panel

Power Source

Interior Light

FUSIBLE LINK

F14 C GRAY

F15 B, F19 A

10A DOME

POWER JUNCTION BOX

FL HEAD 1.0Y

FL MAIN 2.0L

FL AM1 1.25B

F14 C, F15 B, F19 A FUSIBLE LINK

BATTERY

*1: Europe Ex. 1FZ-FE
*2: Ex. Europe, 1FZ-FE

(1FZ-FE LHD)

(Ex. 1FZ-FE LHD)

(Ex. Europe)

(Europe)

(*1)

(*2)

(1FZ-FE)

C13 OPEN DOOR WARNING LIGHT (COMB. METER)

L3 LUGGAGE COMPARTMENT LIGHT

D8 DIODE (for Interior Light)

(w/ Rear Wiper)

(w/o Rear Wiper)

B11 BACK DOOR COURTESY SW

B10 BACK DOOR COURTESY SW

B9 BACK DOOR COURTESY SW

(Swing Out Type Back Door)

J3 JUNCTION CONNECTOR

J4 JUNCTION CONNECTOR

(w/ Moon roof)

M3 PERSONAL LIGHT

(w/o Moon Roof)

(w/ Moon Roof)

F31 (w/o Moon Roof)
F32 (w/ Moon Roof)
FRONT INTERIOR LIGHT

R28 REAR INTERIOR LIGHT

L (w/o Moon Roof)

D7 DIODE (for Interior Light)

(RHD)
(LHD)

From Door Lock Relay (16-2)

From Light Reminder Relay (24-3)

From Seat Belt Warning Relay (21-4)

From Light Retainer Relay (40-4)

(Australia)

D10 FRONT LH (LHD) D11 FRONT RH (RHD)

D11 FRONT RH (LHD) D10 FRONT LH (RHD)

D13 REAR RH

D12 REAR LH

DOOR COURTESY SW

I12 IGNITION KEY CYLINDER LIGHT RELAY

I13 IGNITION KEY CYLINDER LIGHT

J2 JUNCTION CONENCTOR

(U.K.)

Ground points

1D = Located on right kick panel

1E = Located on left kick panel

BF = Located on floor panel center

Power Source

Turn Signal and Hazard Warning Light

Horn

1 2 3 4

F14 C GRAY F15 B, F19 A

FUSIBLE LINK

I14 IGNITION SW

*4 1FZ-FE RHD
*5 Ex. 1FZ-FE RHD

W (Ex. 1HZ IHD-T Europe)
R (1HZ IHD-T Europe)

F26 FUSE BLOCK 7.5A TURN

15A HAZ-HORN

INDICATOR LIGHT [COMB. METER]

D GRAY E BLUE

*3 (Ex. w/o Tachometer in Middle East)
*4 (w/o Tachometer in Middle East)

50A AM1

H11 HAZARD SW

HAZARD OFF ON

B1 F B2 TL TB TR T1

To Theft Deterrent ECU (16-3)

G-Y (U.K.)
G-B (U.K.)

TURN SIGNAL FLASHER

HORN RELAY

POWER JUNCTION BOX

B-L

(1FZ-FE) (Diesel)

FL MAIN 2.0L
FL AM1 1.25B
FL HEAD 1.0Y
(Europe, Diesel)

F14 C, F15 B, F19 A FUSIBLE LINK

BATTERY

*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE
*3 Ex. 1FZ-FE LHD
*6 Ex. 1HZ IHD-T Europe

J1 JUNCTION CONNECTOR

F3 FRONT SIDE TURN SIGNAL LIGHT LH

F5 FRONT TURN SIGNAL LIGHT LH

T15 A BLACK

T16 B BLACK

TRAILER SOCKET (FOR TURN SIGNAL LIGHT)

T15 A, T16 B TRAILER SOCKET (for Turn Signal Light)

(w/o Trailer Socket)

R17 REAR TURN SIGNAL LIGHT LH (REAR COMB. LIGHT LH)

C15 TURN SIGNAL SW [COMB. SW]

R18 REAR TURN SIGNAL LIGHT RH (REAR COMB. LIGHT RH)

F6 FRONT TURN SIGNAL LIGHT RH

F4 FRONT SIDE TURN SIGNAL LIGHT RH

J3 JUNCTION CONNECTOR

INDICATOR LIGHT [COMB. METER]

H9 H10 HORN

C15 HORN SW [COMB. SW]

From Theft Deterrent ECU (16-3)

Ground points

EA = Located on right front fender

EB = Located on left front fender

ID = Located on right kick panel

IE = Located on left kick panel

BG = Located on back panel center

Power Source

Auto Antenna (Australia)

Auto Antenna (Ex. Australia)

1 2 3 4

W (Ex. Europe Diesel)
R (Europe Diesel)

I14 IGNITION SW
ACC, IG1, ST1, IG2, ST2, AM1, AM2

1 EA1 (1FZ-F RHD)
6 EA2 (Ex. 1FZ-F RHD)

50A AM1

W (1FZ-FE LHD)
W (Ex. 1FZ-FE LHD, Ex. Europe Diesel)

POWER JUNCTION BOX

R (Europe Diesel)
W
B-L
1 B (1FZ-FE)
2 C (Diesel)

F14 C, F15 B, F19 A FUSIBLE LINK
EL HEAD 40A
EL MAIN 20A
EL ADD 125A

BATTERY

*1 Europe, 1FZ-FE
*2 Ex. Europe 1FZ-FE

10A DOME

F26 FUSE BLOCK
15A EFI
15A IG

From Stereo Component Amplifier (w/ CD Player) (26-5)
From Radio and Player (w/o CD Player) (26-5)

A41 AUTO ANTENNA ECU

(From Radio and Player) (26-5) (26-6)

From Stereo Component Amplifier (w/ CD Player) (26-5)
From Radio and Player (w/o CD Player) (26-5)

A17 AUTO ANTENNA SENSOR

(Shielded)
(LHD)
(RHD)

A15 AUTO ANTENNA CONTROL MOTOR

J4 JUNCTION CONNECTOR

GR (Ex. Australia)
GR (Australia)
GR

TH 1

L-W

A40 AUTO ANTENNA CONTROL SW
AUTO, UP, DOWN

W-B (Australia)
W-B (Ex. Australia)

J2 JUNCTION CONNECTOR

W-B (LHD)
W-B (RHD)

A15 AUTO ANTENNA CONTROL MOTOR LH

A16 AUTO ANTENNA CONTROL MOTOR RH

FUSIBLE LINK
F14 C, GRAY
F15 B, F19 A

Ground points
ID = Located on right kick panel
IE = Located on left kick panel

Power Source

Rear Fog Light

1 2 3 4

W
W
W
W
G
G
G
B-R
B-R
W
R
R-B
R-L
R-W
R-W
R-W
G-R
R-W
R-W
B-R
W-B
W-B
W-B

Power Source

Power Window

1 2 3 4

B B B-Y B B 9 AM1 ACC IG1 ST1 AM2 IG2 ST2 6 B-Y 1 3 3 4 10A GAUGE 30A POWER F26 FUSE BLOCK I14 IGNITION SW 1 EA1 (1FZ-F RHD) 6 EA2 (Ex. 1FZ-F RHD) B 2 2 50A AM1 1 2 W 2 3 POWER JUNCTION BOX 4 2 W B-L 1 B (1FZ-FE) 2 C (Diesel) 1 A EFI MAIN 20A EFI ASV 15A F14 C , F15 B , F19 A FUSIBLE LINK BATTERY

FUSIBLE LINK

F14 C GRAY

2 1

F15 B , F19 A

1

*1 Europe, 1FZ-FE
*2 Ex. Europe 1FZ-FE

Y Y (U.K.) J6 JUNCTION CONNECTOR 1 10 Y (Ex. U.K.) Y Y (U.K.) Y L 3 4 1 2 POWER MAIN RELAY W-B L-B 1 1 1 To Moon Roof Control Relay (19-2) To Power Seat SW (19-2) L-B L-B L-B L-B L-B 3 BM1 1 BL 2 L-B L-B 1 BJ 1 3 BN1 3 BO 1 L-B L-B L-B 3 JUNCTION CONNECTOR 11 W-B 5 JUNCTION CONNECTOR 14 W-B (RHD) W-B (LHD)

L-B To Door Lock Control Relay (16-2) L-B L-B 7 8 (LHD) 14 13 (RHD) P9 POWER WINDOW MASTER SW UP DOWN WINDOW LOCK SW POWER WINDOW RELAY 1 2 6 13 (LHD) 6 5 1 8 (RHD) W-B W-B B R 11 1 1 W-B 3 M 1 P10 (DRIVER'S)

12 5 11 14 10 9 (LHD) 9 2 11 12 10 7 (RHD) B-G R-G B-L R-L B-Y R-Y 2 1 1 5 1 1 12 1 1 15 1 1 16 1 1 17 1 1 2 BJ 1 5 BJ 1 2 BM1 1 BM1 5 BL 2 11 BL 2 2 BN1 1 BN1 2 BO 1 1 BO 1 L-B L-B L-B 5 2 3 B-G R-G L-B B-L R-L L-B B-L R-L L-B B-L R-L UP DOWN 1 4 B R 3 M 1 P14 POWER WINDOW SW (PASSENGER'S) P16 POWER WINDOW SW REAR RH P15 POWER WINDOW SW REAR LH P11 POWER WINDOW MOTOR (PASSENGER'S) P13 REAR RH P12 REAR LH

1D 1E 1D 1E

Ground points

1D = Located on right kick panel

1E = Located on left kick panel

Power Source

Theft Deterrent and Door Lock

1 2 3 4

2 EA 1
1 EA1 (1FZ-F RHD)
6 EA 2 (Ex. 1FZ-F RHD)
G-O
B
15A HAZ-HORN
50A AM1
W
POWER JUNCTION BOX
R (U.K.)
B-L
1 B (1FZ-FE)
2 C (Diesel)
1 C
1 A
FL HEAD 1.0Y
FL MAIN 2.0L
FL AM1 1.25B
*2
*1
F14 C , F15 B , F19 A FUSIBLE LINK
*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE)
BATTERY
FUSIBLE LINK
F14 C GRAY
F15 B F19 A
2 1
1
3 30A POWER
4
F26 FUSE BLOCK
20 I I 1
L
L-B
From Power Main Relay (15-3)
D19 DOOR LOCK CONTROL RELAY
8 2 16 10 12 11 7 6 3 4
R-G
W-B
L-B
L-O
L-Y
R-B
L-G
L-R
L-W
3 I I 1
4 I I 1
To Door Courtesy SW Front RH (11-3)
To Seat Belt Warning Relay (21-4)
P9 DOOR LOCK CONTROL SW [POWER WINDOW MASTER SW]
LOCK
UNLOCK
4 3 (LHD)
3 4 (RHD)
1 6 (LHD) (RHD)
D14 DOOR KEY LOCK AND UNLOCK SW (DRIVER'S)
I14 UNLOCK WARNING SW [IGNITION SW]
D15 DOOR LOCK CONTROL MOTOR (DRIVER'S)
M
11 I I 1
(RHD)
(LHD)
From Hazard SW (12-3)
G-O (U.K.)
G-Y
G-B
To Horn SW (12-4)
G-L (U.K.)
5 3 4
THEFT DETERRENT HORN AND ENGINE HOOD COURTESY SW
6 G-R 2
5 G-W 1
THEFT DETERRENT SW
18 I I 1
1 I I 2
19 I I 1
13 I I 1
14 I I 1
3 I J 1
4 I J 1
D16 DOOR LOCK CONTROL MOTOR (PASSENGER'S)
11 BM1
12 BM1
7 BL 2
8 BL 2
7 BN 1
8 BN 1
D18 DOOR LOCK CONTROL MOTOR REAR RH
7 BO 1
8 BO 1
D17 DOOR LOCK CONTROL MOTOR REAR LH
3 BT 2
4 BT 2
1 BV 1
3 BV 1
3 BW1
1 BW1
B13 BACK DOOR LOCK CONTROL MOTOR (Tail Gate)
3 BU 2
4 BU 2
B12 BACK DOOR LOCK CONTROL MOTOR (Swing Out)
ID
IE

Ground points

ID = Located on right kick panel

IE = Located on left kick panel

Power Source

Front Wiper and Washer (1HZ, IHD-T)

Rear Wiper and Washer (1HZ, IHD-T)

1 2 3 4

B-Y

B

9 AM1 ACC IG1 ST1 6 B-Y

AM2 IG2 ST2

I14 IGNITION SW

1 WIPER 20A F26 FUSE BLOCK 2

6 EA 2

B

2 2 50A AM1 1

FUSIBLE LINK

F14 C 2 1

F19 A 1

W

2 3 POWER JUNCTION BOX 4

2 W B-L

1 A 2 C

1 MAIN 120A 2 AM1 1 25A 2

F14 C, F19 A FUSIBLE LINK

*1 Europe
*2 Ex. Europe

BATTERY

L L L L L

C16 FRONT WIPER AND WASHER SW (COMB. SW) 18

| | B | S | +1 | +2 | B1 | INT1 | INT2 | E | W |
|---|---|---|---|---|---|---|---|---|---|
| OFF | | | | | | | | | |
| INT | | | | | | | | | |
| LOW | | | | | | | | | |
| HIGH | | | | | | | | | |
| WASHER | | | | | | | | | |

WIPER RELAY

INT

4 7 13 16 8

L-G L-R L-Y L-W

F7 FRONT WASHER MOTOR 2 M 1

REAR WIPER AND WASHER SW (COMB. SW)

| | L | C | E | W |
|---|---|---|---|---|
| WASHER | | | | |
| OFF | | | | |
| INT | | | | |
| LOW | | | | |
| WASHER | | | | |

1 10 16 2

L-G L-B W-B L-O

R1 REAR WASHER MOTOR 2 M 1

2 BL 2 12 BL 2 6 BL 2

L-G L-B

W-B

(RHD) (LHD) 13 JUNCTION CONNECTOR 5

W-B 11 J2 JUNCTION CONNECTOR 14

1 BT 2 5 BT 1 2 BT 1

L-G L-B

6 BV 1 4 BV 1 5 BV 1

R38 REAR WIPER CONTROL RELAY (Tail Gate)

L-B 5 BW1 L-B 4 3 L-R

L-G 6 BW1 L-G 6 2 L-W

L 4 BW1 L 1

L-W L-R

L 1 4 3

R35 REAR WIPER CONTROL MOTOR (Tail Gate) M

4 BT 1 W-B 1 BV 2 W-B 2 BW2 W-B 2

W-B

J3 JUNCTION CONNECTOR 11 13 W-B 1

W-B 5 14 W-B

F8 FRONT WIPER CONTROL MOTOR 6 5 3 2 M

W-B (RHD) W-B (LHD)

R39 REAR WIPER CONTROL RELAY (Swing Out)

5 L-G 6 L-B 7 BX 1

L-G L-B 18 BQ 1 19 BQ 1

1 L 3 L-Y 7 L-O 2 L-W 4 L-R

L

8 BX 1 4 BX 1 5 BX 1

L L-Y L-O

20 BQ 1 7 BQ 1 8 BQ 1

L L-Y L-O

1 BU 2 6 BU 1 2 BU 1

L L-Y L-O

R36 REAR WIPER CONTROL MOTOR LH (Swing Out) 1 4 3 M 2

W-B 4 BU 1 W-B

L L-W L-R

R37 REAR WIPER CONTROL MOTOR RH (Swing Out) 1 4 3 M 2

W-B 1 BX 1 W-B

ID IE BF BG

ID IE BF BG

Ground points

ID = Located on right kick panel

IE = Located on left kick panel

BF = Located on floor panel center

BG = Located on back panel center

Power Source

Rear Window Defogger

Seat Heater

1 2 3 4

W

3 EA3 (LHD)
6 EA7 (RHD)

W

30A AM1

W

2

POWER JUNCTION BOX

W

W *2

1 A
2 B (1FZ-FE)
2 C (Diesel)

B

1 EA1 (1FZ-F RHD)
6 EA2 (Ex. 1FZ-F RHD)

B 9 AM1
AM2
ACC
IG1
ST1
IG2
ST2
6 B-Y

I14 IGNITION SW

B-Y

10A GAUGE
F26 FUSE BLOCK

Y

Y

J6 JUNCTION CONNECTOR

Y

8 1H1

Y

D3 DEFOGGER SW

3
6
L-O

9 1H1

W-B

J2 JUNCTION CONNECTOR

11

W-B

5

J2 JUNCTION CONNECTOR

14

W-B

W-B (LHD)

W-B (RHD)

W

20A DEFOG
F26 FUSE BLOCK

Y

L-O

Y

1 1

DEFOGGER RELAY

3 2

L-O

7 1H1

L-O

L-G

17 BL1

L-G

(Ex. Swing Out Type Back Door)

L-G

2 BT2

L-G

2 BV1

L-G

2 BW1

B

1 Be1

B

R29 A , R30 B
REAR WINDOW DEFOGGER

W-B

4 BT1

W-B

1 BV2

W-B

2 BW2

W-B

1 Be2

(Swing Out Type Back Door)

L-G

11 BQ1

L-G

2 BU2

L-G

1 Bf1

B

R31 A , R32 B
LH

B

2 Bf1

W-B

4 BU1

W-B

W-B

17 BQ1

W-B

L-G

2 BX1

L-G

1 Bq1

B

R33 A , R34 B
RH

B

2 Bq1

W-B

1 BX1

W-B

REAR WINDOW DEFOGGER

REAR WINDOW DEFOGGER

R29 A , R30 B , R31 A , R32 B , R33 A , R34 B

1

B-Y

F26 FUSE BLOCK

2

20A REAR-HTR

L-W

2 BM2

L-W

L-W

2 Ba1

L-W

2

L-W

1

LOW HIGH

S17 SEAT HEATER SW LH

HIGH LOW

S18 SEAT HEATER SW RH

6 5 7

B-L 1 R-L 2

5 3 4

L-O 2 L-B 1

W-B

W-B

W-B

W-B

W-B

3 Ba1

W-B

W-B

W-B

S15 SEAT HEATER LH

LO HI

SEAT HEATER (Seat Cushion)

SEAT HEATER (Seat Back)

S16 SEAT HEATER RH

HI LO

SEAT HEATER (Seat Cushion)

SEAT HEATER (Seat Back)

FUSIBLE LINK

F14 C GRAY

F15 B , F19 A

2 1

1

F14 C , F15 B , F19 A FUSIBLE LINK

30A MAIN 2

30A ALT NO.2

30A ALT NO.1

*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE

BATTERY

ID
IE
BF
BG

Ground points

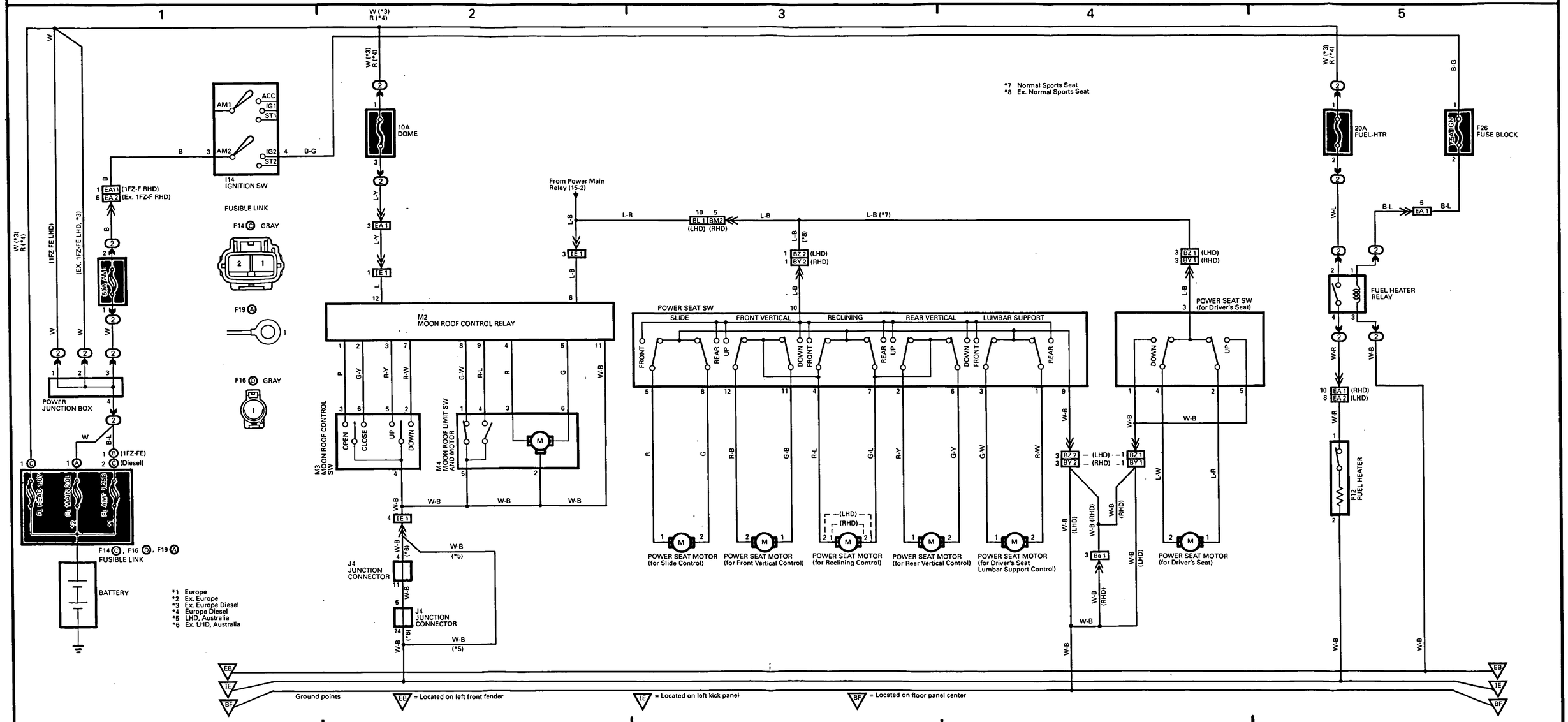
ID = Located on right kick panel

IE = Located on left kick panel

BF = Located on floor panel center

BG = Located on back panel center

Power Source | Moon Roof | Power Seat | Fuel Heater



# 20 LAND CRUISER (W/G)

Power Source

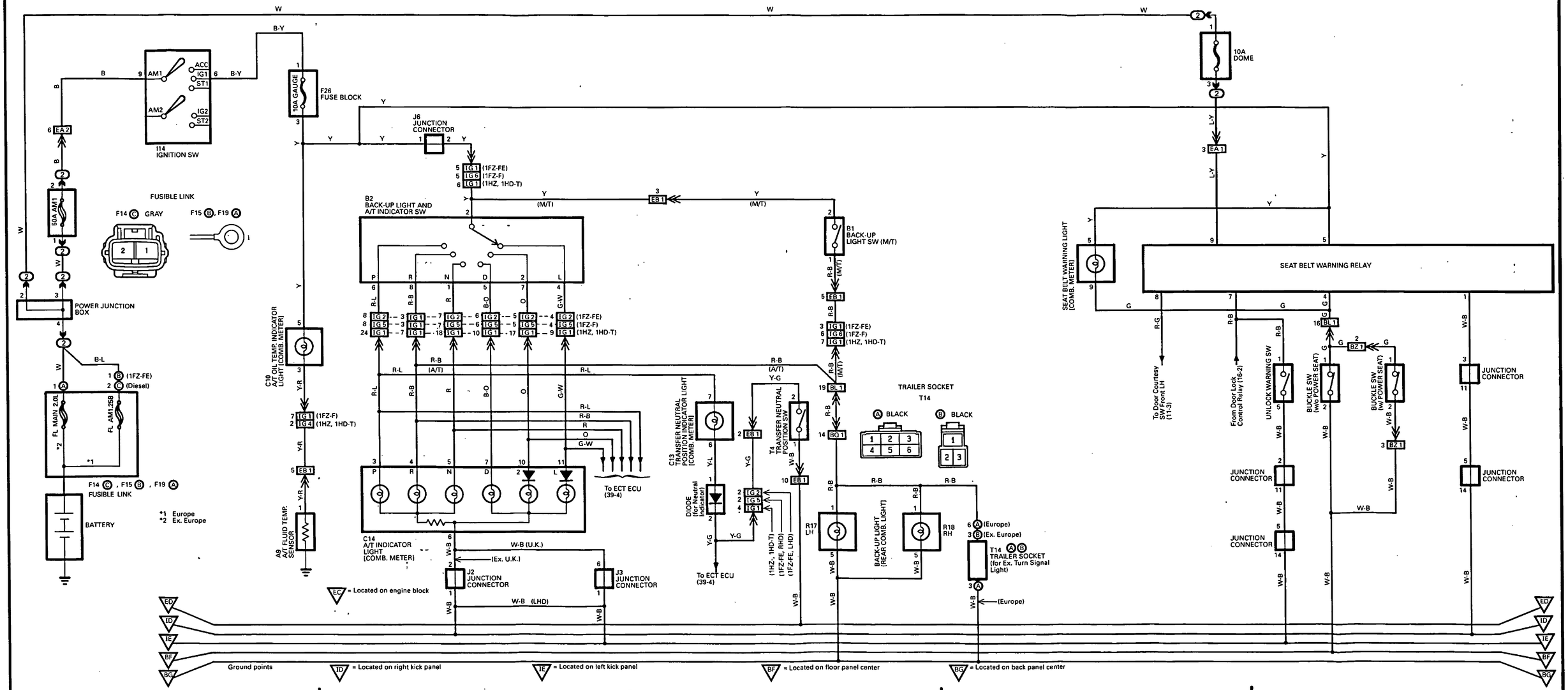
Remote Control Mirror

Accessory Meter

1 2 3 4

W
B
9 AM1
ACC 7
IG1 6
ST1
AM2
IG2
ST2
I14 IGNITION SW
L-R
B-Y
3 EA3 (LHD)
6 EA7 (RHD)
1 EA1 (1FZ-F RHD)
6 EA2 (Ex. 1FZ-F RHD)
FUSIBLE LINK
50A ALT
F14 C GRAY
2 1
F19 A
1
POWER JUNCTION BOX
B-L
*2
1 B (1FZ-FE)
2 C (Diesel)
1 A
IG MAIN 20A
IG ALT 125A
F14 C, F15 B, F19 A FUSIBLE LINK
BATTERY
*1 Europe 1FZ-FE
*2 Ex. Europe 1FZ-FE
15A CIG
F26 FUSE BLOCK
GR
R11 REMOTE CONTROL MIRROR SW
B E H1 V1 C V2 H2
RH UP DOWN RIGHT LEFT
LH UP DOWN RIGHT LEFT
W-B
G-R
Y-R
W
Y
G
(RHD)
(LHD)
JUNCTION CONNECTOR
11
12
2
5
14
1I 1 1J 1
R40 LH
R41 RH
M
REMOTE CONTROL MIRROR
10A GAUGE
F26 FUSE BLOCK
To Sub Fuel Sender (28-3)
Y-L
BR
1E2
A43 A , A44 B ACCESSORY METER
(SHIELDED)
B BR R W G L Y O V LG
M1 MAGNETIC FIELD SENSOR
1E1
IG ACC +B
P2 POWER OUTLET
ACCESSORY METER
A43 A
1 2 3 4 5 6
A44 B
1 2 3 4 5 6 7 8 9 10
1D = Located on right kick panel
1E = Located on left kick panel
Ground points

Power Source | Automatic Transmission Indicator | Back-Up Light | Unlock and Seat Belt Warning



Power Source

4WD

1 2 3 4

DIFF. LOCK INDICATOR LIGHT [COMB. METER]

C GRAY

D

I14 IGNITION SW

ACC IG1 ST1 AM1 AM2 IG2 ST2

30A DIFF

F26 FUSE BLOCK

10A GAUGE

F26 FUSE BLOCK

FUSIBLE LINK

F14 B GRAY

A, E

50A AM1

EA1 *3 EA2 *4

POWER JUNCTION BOX

B-L

1 E (1FZ-FE)
2 B (Diesel)

FL MAIN 2.0L

FL AM1 1.25B

F14 B , F19 A FUSIBLE LINK

BATTERY

*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE
*3 1FZ-F (RHD)
*4 Ex. 1FZ-F (RHD)
*5 1FZ-F
*6 Ex. 1FZ-F

T10 TRANSFER CONTROL RELAY

T2 TRANSFER 2-4 CONTROL MOTOR ACTUATOR

T3 TRANSFER L4 POSITION SW

T11 TRANSFER CONTROL SW

2WD 4WD

To ECT ECU (39-5)

(1HZ, 1HD-T) (1FZ-F) (1FZ-FE)

J6 JUNCTION CONNECTOR

(1FZ-FE) 5 IG1
(1FZ-F) 5 IG6
(1HZ, 1HD-T) 6 IG1

EB1 IH1

J1 JUNCTION CONNECTOR

W-B (LHD)
W-B (RHD)

C10 C , C13 D [COMB. METER]

4WD INDICATOR LIGHT

4WD FRONT REAR

DIFF. LOCK INDICATOR LIGHT

IG5 (1FZ-FE)
IG6 (1FZ-F)
IG1 (1HZ, 1HD-T)

F21 4WD INDICATOR SW

F28 FRONT DIFF. LOCK POSITION SW

R20 REAR DIFF. LOCK POSITION SW

BP1 BS1 BL2 BQ1

F27 FRONT DIFF. LOCK CONTROL MOTOR ACTUATOR

R19 REAR DIFF. LOCK CONTROL MOTOR ACTUATOR

J1 JUNCTION CONNECTOR

J3 JUNCTION CONNECTOR

J4 JUNCTION CONNECTOR

D5 FRONT REAR DIFF. LOCK CONTROL SW

FRONT REAR

To Speed Meter [Comb. Meter] (28-3)

D4 DIFF. LOCK ECU

RLP FLP 4WD IG FR R SPD

M3 REL3 REL4 M4 M1 REL2 REL1 M2 E

EC 1D 1E BG

Ground points

EC = Located on engine block
1D = Located on right kick panel
1E = Located on left kick panel
BG = Located on back panel center

Power Source

Cruise Control

1 2 3 4

6 EA 7

6 EA 2

B 9 AM1

ACC

IG1 6 B-Y

ST1 10 B-W

AM2

IG2

ST2

I14
IGNITION SW

W

B

2

2

50A AM1

1

2

W

2

3

POWER
JUNCTION BOX

4

2

B-L

W

1 A

1 C

EL MAIN 30A

EL AM1 5A

F14 C , F19 A
FUSIBLE LINK

BATTERY

FUSIBLE LINK

F14 C , F19 A

1

B-Y

1

15A EFI-MAIN

F26
FUSE BLOCK

3

B-W (1FZ-FE)

B-W (1HZ, 1HD-T)

5

J6
JUNCTION CONNECTOR

12

B-W (1FZ-FE)

14

B

W

1

10A STOP

F26
FUSE BLOCK

2

G-L

1

STP+

From Stop Light SW (24-4)

G-W

16

STP-

B-Y

1

10A GAUGE

F26
FUSE BLOCK

3

Y

5

C10
CRUISE CONTROL INDICATOR LIGHT
[COMB. METER]

8

G-Y

5

P1

B-W

2

N & C

W

1

10A ECU-B

FUSE BLOCK

2

B-R

15

VIR

To Engine ECU (27-5)

G-W

20 IG1

G-W (1FZ-FE)

23

IDL

From ECT ECU (39-4)

G-O (1FZ-FE)

9

OD

From ECT ECU (39-2)

G-R (1FZ-FE)

22

ECT

C20
CRUISE CONTROL ECU

SPD 20

B-R

To Speed Meter [Comb. Meter] (28-3)

CMS 4

Y-R

CCS 18

B-G

15

5

RESUME/ ACCEL

SET/ COAST

CANSEL

MAIN

CRUISE CONTROL SW [COMB. SW] 20

BR

VR3 26

Y-L

VR2 25

Y-G

VR1 24

Y

MC 11

L-R

MO 12

L

L 10

R

3

S14
CRUISE CONTROL STOP SW

4

R-G

3 2 1 7 6 5

C4
CRUISE CONTROL ACTUATOR

PKB 3

R-W

To Parking Brake SW (28-4)

4

W-B

7

JUNCTION CONNECTOR

11

W-B

5

JUNCTION CONNECTOR

14

W-B

TC 8

B-L

12 IG4 (1HZ, 1HD-T)

21 IG5 (1FZ-FE)

B-L (1FZ-FE)

B-L

11

TC

C1
CHECK CONNECTOR

E1

3

W-B

From Fuel Change ECU (40-2)

ERT 13

BR

EC

ID

IE

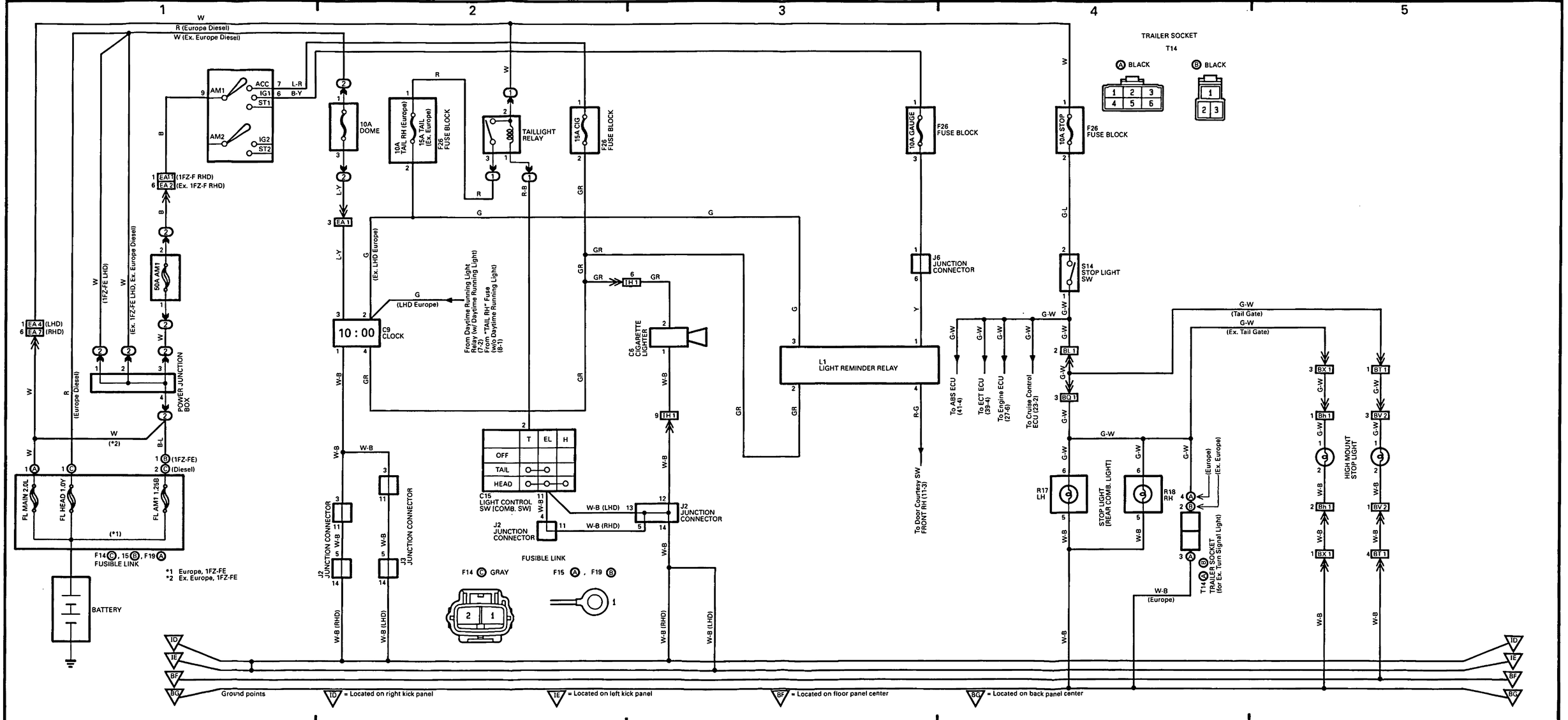
Ground points

EC = Located on engine block

ID = Located on right kick panel

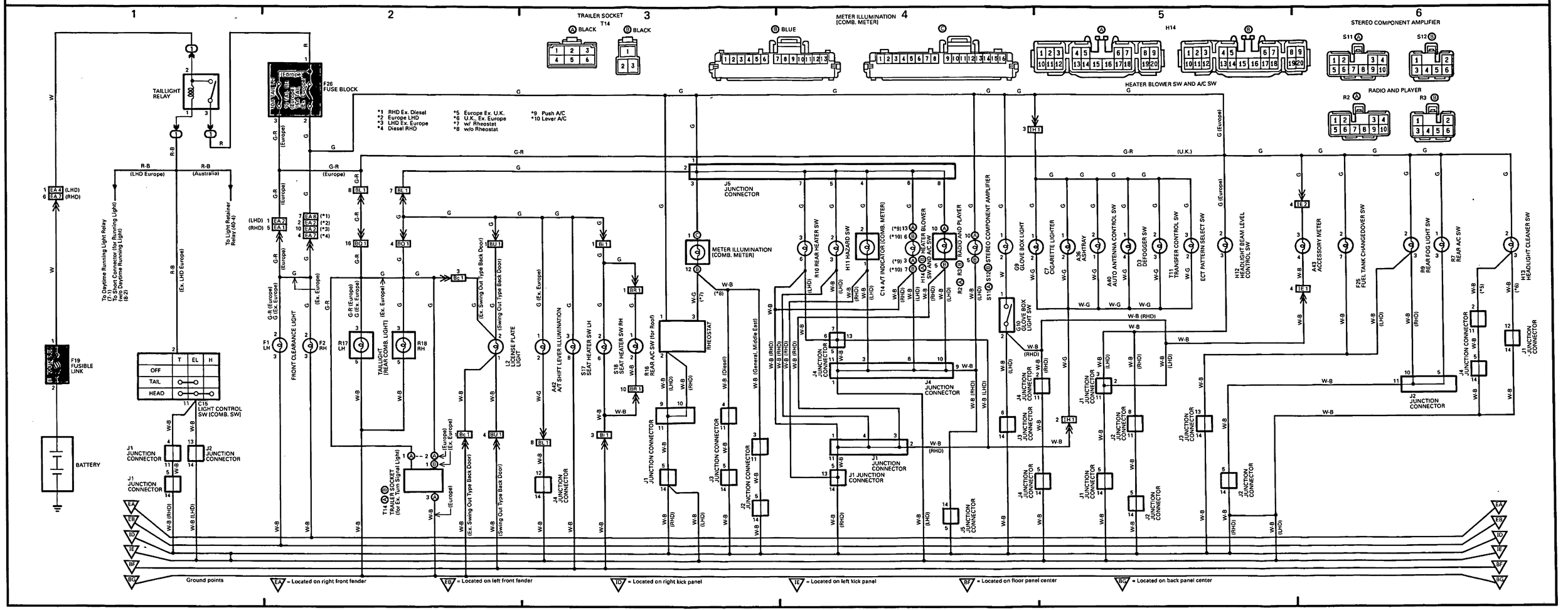
IE = Located on left kick panel

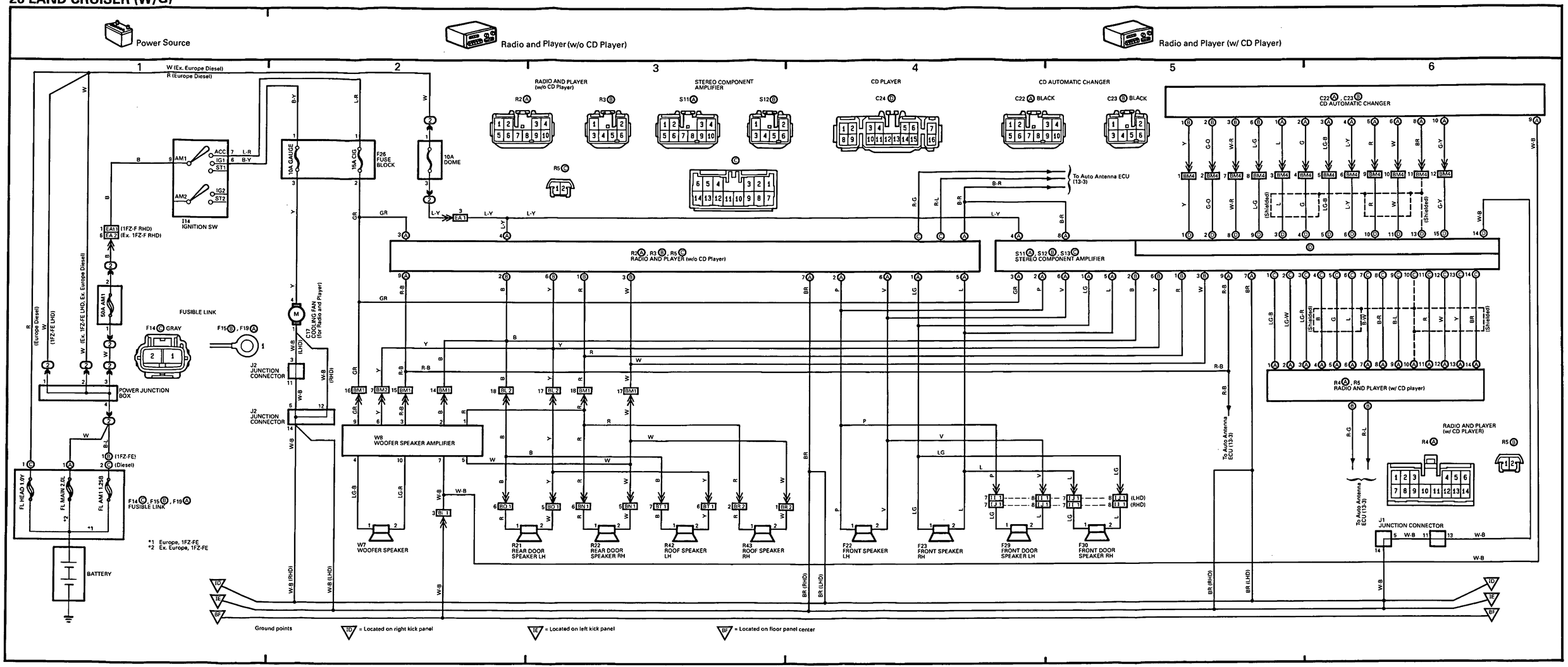
Power Source | Clock | Cigarette Lighter | Light Reminder | Stop Light



Power Source

Taillight and Illumination



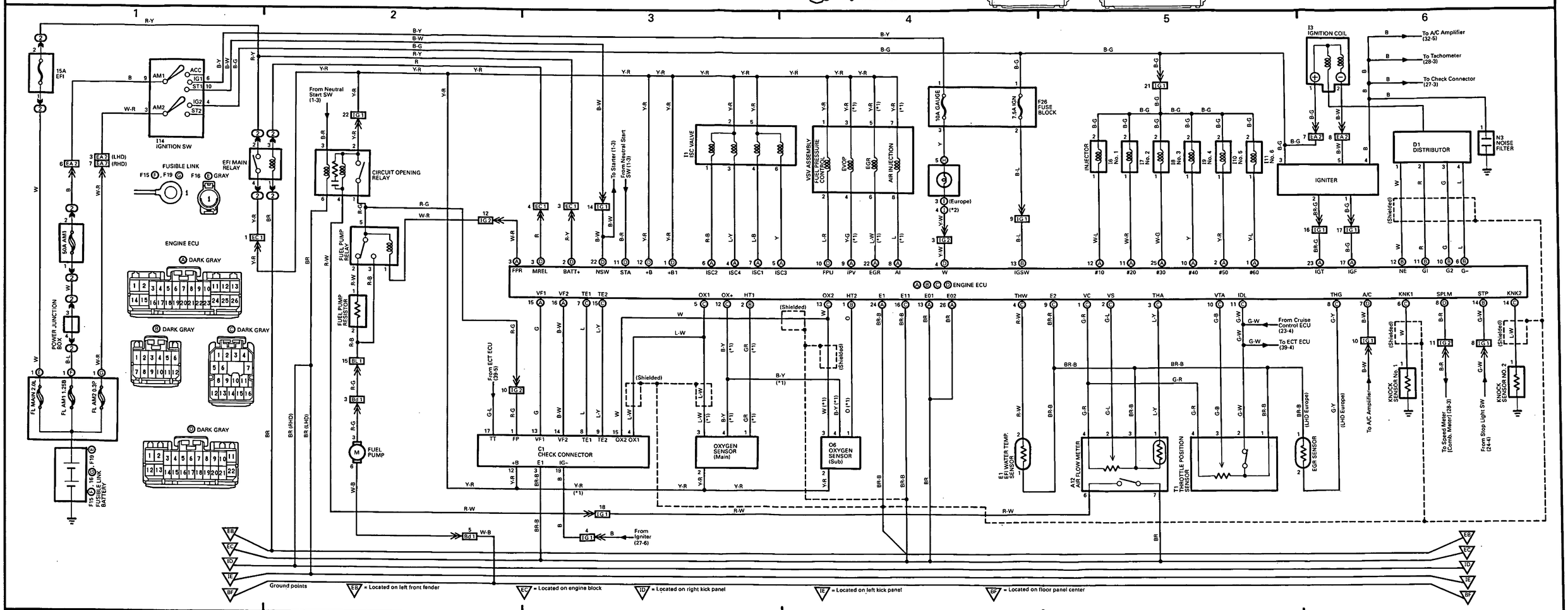

Power Source
Radio and Player (w/o CD Player)
Radio and Player (w/ CD Player)
1
2
3
4
5
6
W (Ex. Europe Diesel)
R (Europe Diesel)
RADIO AND PLAYER (w/o CD Player)
STEREO COMPONENT AMPLIFIER
CD PLAYER
CD AUTOMATIC CHANGER
C22 BLACK
C23 BLACK
C22, C23 CD AUTOMATIC CHANGER
R2, R3, S11, S12, C24
R5
C
To Auto Antenna ECU (13-3)
ACC
IG1
ST1
IG2
ST2
AM1
AM2
114 IGNITION SW
10A GAUGE
15A CIG
F26 FUSE BLOCK
10A DOME
EA1 (1FZ-F RHD)
EA2 (Ex. 1FZ-F RHD)
50A AM1
FUSIBLE LINK
F14 GRAY
F15, F19
C17 COOLING FAN (for Radio and Player)
J2 JUNCTION CONNECTOR
POWER JUNCTION BOX
R3, R5 RADIO AND PLAYER (w/o CD Player)
S11, S12, S13 STEREO COMPONENT AMPLIFIER
R4, R5 RADIO AND PLAYER (w/ CD player)
RADIO AND PLAYER (w/ CD PLAYER)
W8 WOOFER SPEAKER AMPLIFIER
W7 WOOFER SPEAKER
R21 REAR DOOR SPEAKER LH
R22 REAR DOOR SPEAKER RH
R42 ROOF SPEAKER LH
R43 ROOF SPEAKER RH
F22 FRONT SPEAKER LH
F23 FRONT SPEAKER RH
F29 FRONT DOOR SPEAKER LH
F30 FRONT DOOR SPEAKER RH
J1 JUNCTION CONNECTOR
FL HEAD 1.0Y
FL MAIN 2.0L
FL AM1 1.25B
F14, F15, F19 FUSIBLE LINK
BATTERY
*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE
Ground points
1D = Located on right kick panel
1E = Located on left kick panel
BF = Located on floor panel center

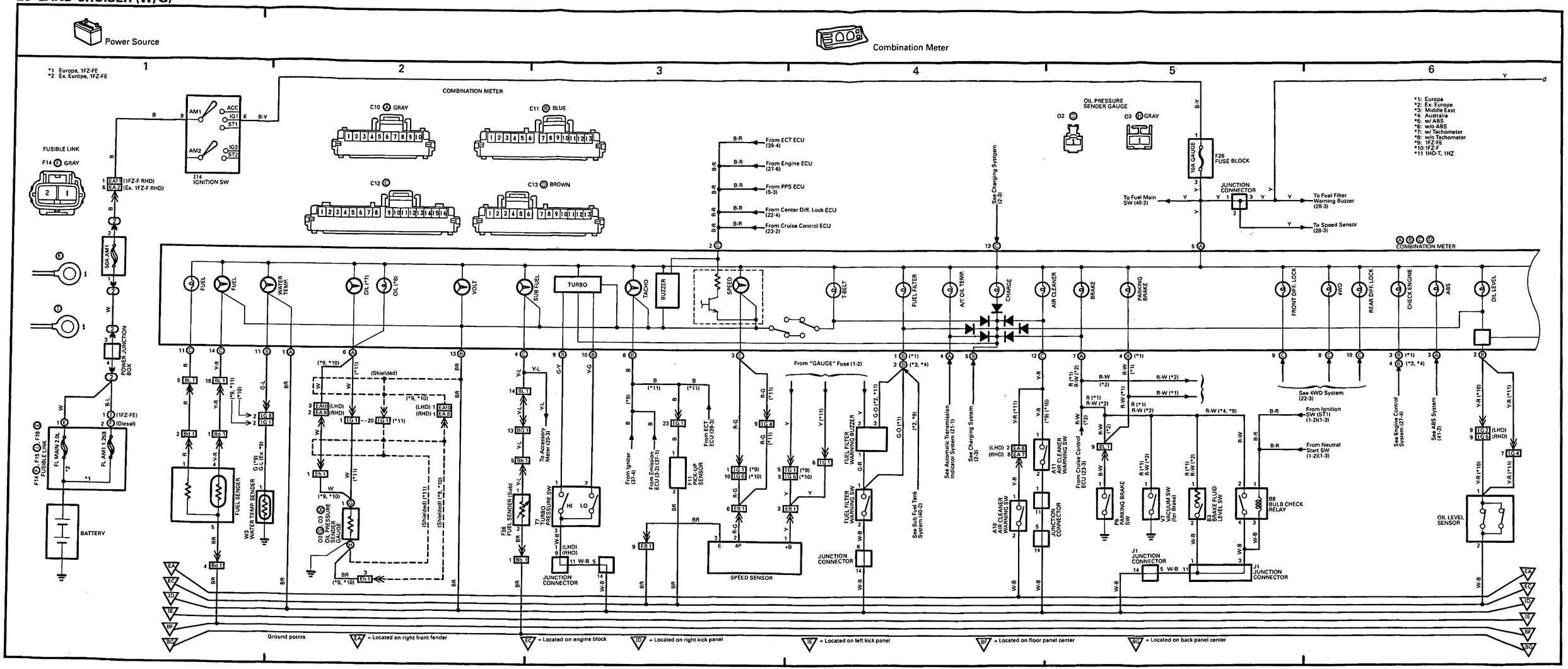
Power Source

Engine Control

H GRAY CHECK ENGINE WARNING LIGHT I BLUE (COMB. METER)

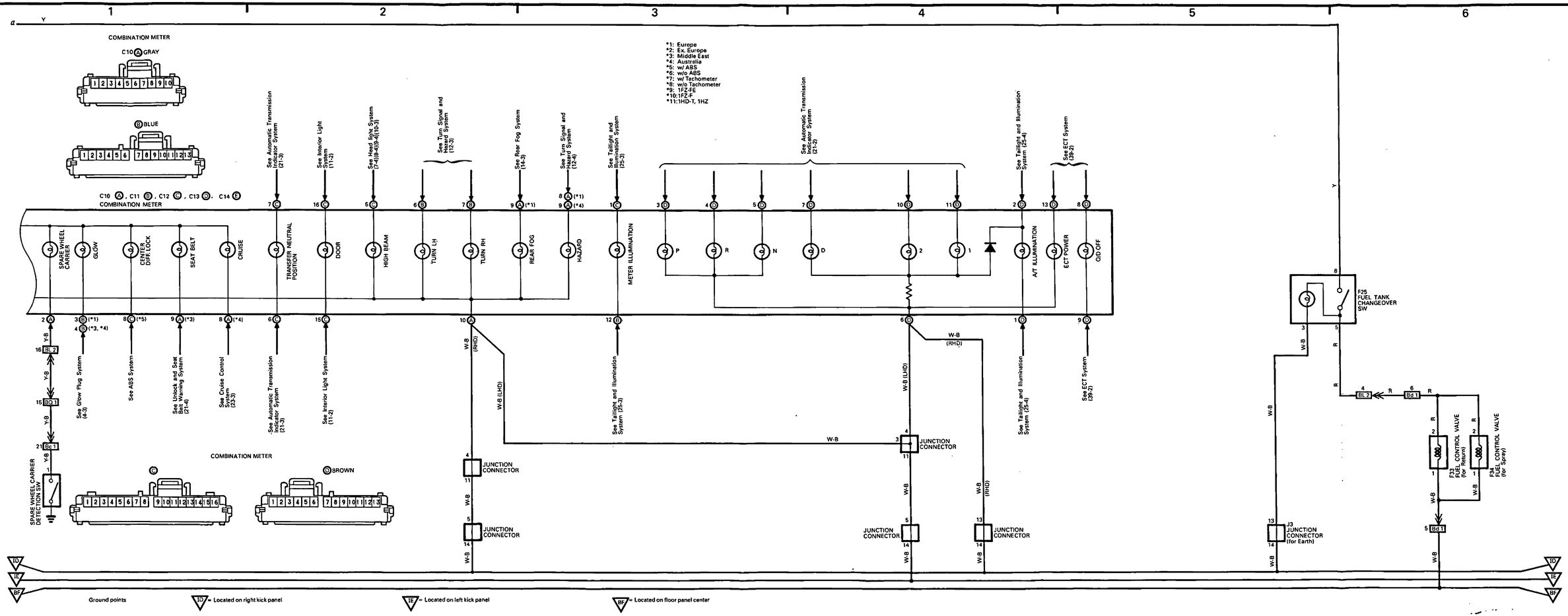
*1: LHD Europe, Australia
*2: Middle East, Australia

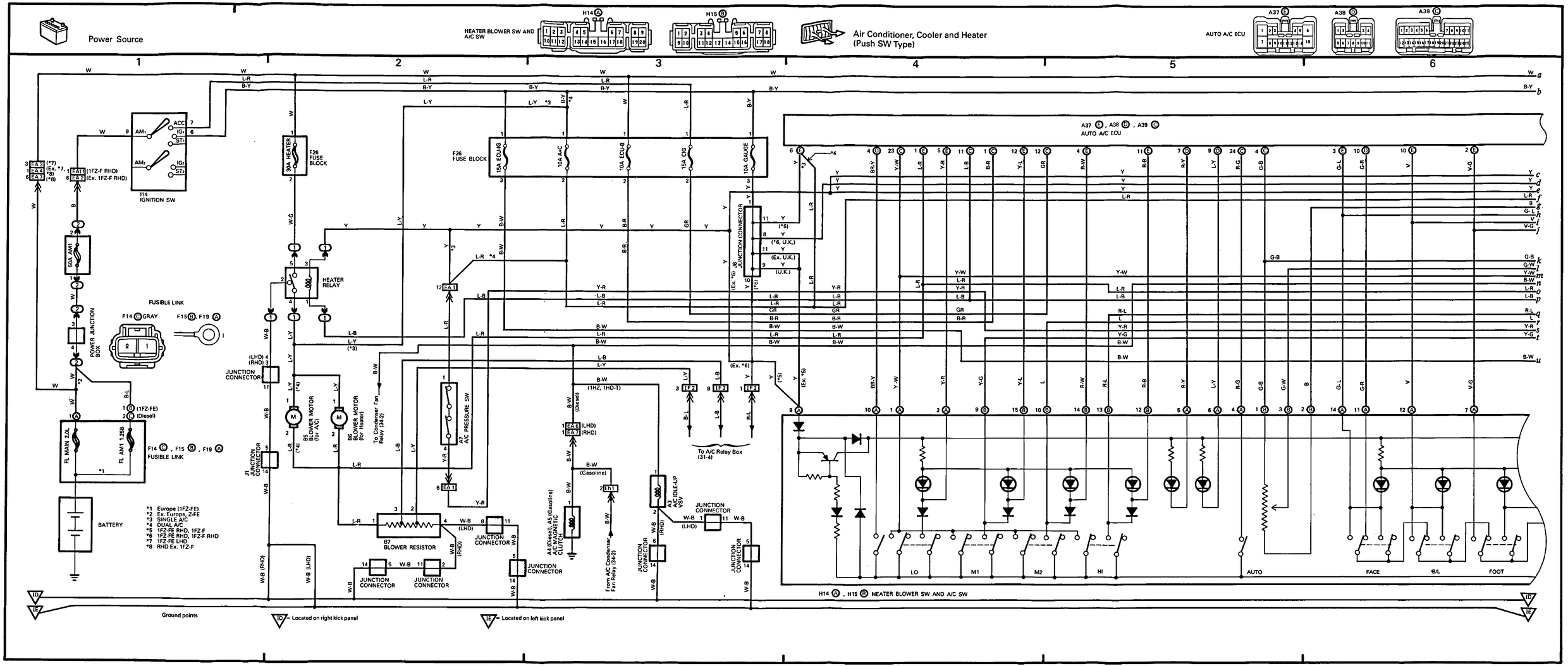



Power Source
Combination Meter
*1: Europe, 1FZ-FE
*2: Ex. Europe, 1FZ-FE
*1: Europe
*2: Ex. Europe
*3: Middle East
*4: Australia
*5: w/ ABS
*6: w/o ABS
*7: w/ Tachometer
*8: w/o Tachometer
*9: 1FZ-FE
*10: 1FZ-F
*11: 1HD-T, 1HZ
COMBINATION METER
FUSIBLE LINK
F14 GRAY
I14 IGNITION SW
AM1
AM2
ACC
IG1
ST1
IG2
ST2
50A AM1
POWER-JUNCTION BOX
FL MAIN 2.0L
FL AM1 1.2SB
BATTERY
FUEL SENDER
W3 WATER TEMP. SENDER
O3 OIL PRESSURE SENDER GAUGE
F36 FUEL SENDER (Sub)
T7 TURBO PRESSURE SW
F11 PICK-UP
SPEED SENSOR
JUNCTION CONNECTOR
FUEL FILTER WARNING BUZZER
FUEL FILTER WARNING SW
A10 AIR CLEANER WARNING SW
A11 AIR CLEANER WARNING SW
PARKING BRAKE SW
V7 VACUUM SW (for Brake)
B3 BRAKE FLUID LEVEL SW
B8 BULB CHECK RELAY
OIL LEVEL SENSOR
J1 JUNCTION CONNECTOR
O2 OIL PRESSURE SENDER GAUGE
F26 FUSE BLOCK
10A GAUGE
JUNCTION CONNECTOR
To Fuel Main SW (40-2)
To Fuel Filter Warning Buzzer (28-3)
To Speed Sensor (28-3)
From ECT ECU (39-4)
From Engine ECU (27-6)
From PPS ECU (5-3)
From Center Diff. Lock ECU (22-4)
From Cruise Control ECU (23-2)
See Charging System (2-3)
FUEL
WATER TEMP.
OIL (*7)
OIL (*8)
VOLT
SUB FUEL
TURBO
TACHO
BUZZER
SPEED
T-BELT
FUEL FILTER
A/T OIL TEMP.
CHARGE
AIR CLEANER
BRAKE
PARKING BRAKE
FRONT DIFF. LOCK
4WD
REAR DIFF. LOCK
CHECK ENGINE
ABS
OIL LEVEL
From "GAUGE" Fuse (1-2)
From Ignition SW (ST1) (1-2/1-3)
From Neutral Start SW (1-2/1-3)
See 4WD System (22-3)
See Automatic Transmission Indicator System (21-1)
See Charging System (2-3)
See Sub Fuel Tank System (40-2)
From Ignitor (37-4)
From Emission ECU (3-2/ 37-1)
From ECT ECU (39-3)
From Cruise Control ECU (23-3)
To Tachometer (37-4)
See Engine Control System (27-4)
See ABS System (34-2)
Ground points
EA = Located on right front fender
EC = Located on engine block
ID = Located on right kick panel
IE = Located on left kick panel
BF = Located on floor panel center
BG = Located on back panel center

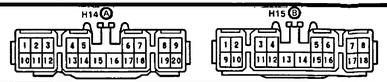
Combination Meter

Fuel Tank Changeover



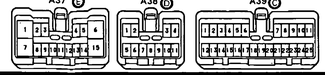

Power Source
HEATER BLOWER SW AND A/C SW
H14 A
H15 B
Air Conditioner, Cooler and Heater (Push SW Type)
AUTO A/C ECU
A37 E
A38 D
A39 C
1
2
3
4
5
6
I14 IGNITION SW
F26 FUSE BLOCK
30A HEATER
15A ECU-IG
10A A/C
10A ECU-B
15A CIG
10A GAUGE
HEATER RELAY
50A AM1
POWER JUNCTION BOX
FUSIBLE LINK
F14 C GRAY
F15 B, F19 A
FL MAIN 2.0L
FL AM1 1.25S
F14 C, F15 B, F19 A FUSIBLE LINK
BATTERY
B5 BLOWER MOTOR (for A/C)
B6 BLOWER MOTOR (for Heater)
B7 BLOWER RESISTOR
To Condenser Fan Relay (34-2)
A/C PRESSURE SW
A4 (Diesel), A5 (Gasoline) A/C MAGNETIC CLUTCH
A3 A/C IDLE-UP VSV
From A/C Condenser Fan Relay (34-2)
To A/C Relay Box (31-4)
JUNCTION CONNECTOR
J6 JUNCTION CONNECTOR
*1 Europe (1FZ-FE)
*2 Ex. Europe, Z-FE
*3 SINGLE A/C
*4 DUAL A/C
*5 1FZ-FE RHD, 1FZ-F
*6 1FZ-FE RHD, 1FZ-F RHD
*7 1FZ-FE LHD
*8 RHD Ex. 1FZ-F
LO
M1
M2
HI
AUTO
FACE
B/L
FOOT
H14 A, H15 B HEATER BLOWER SW AND A/C SW
Ground points
1D Located on right kick panel
1E Located on left kick panel

HEATER BLOWER SW AND A/C SW

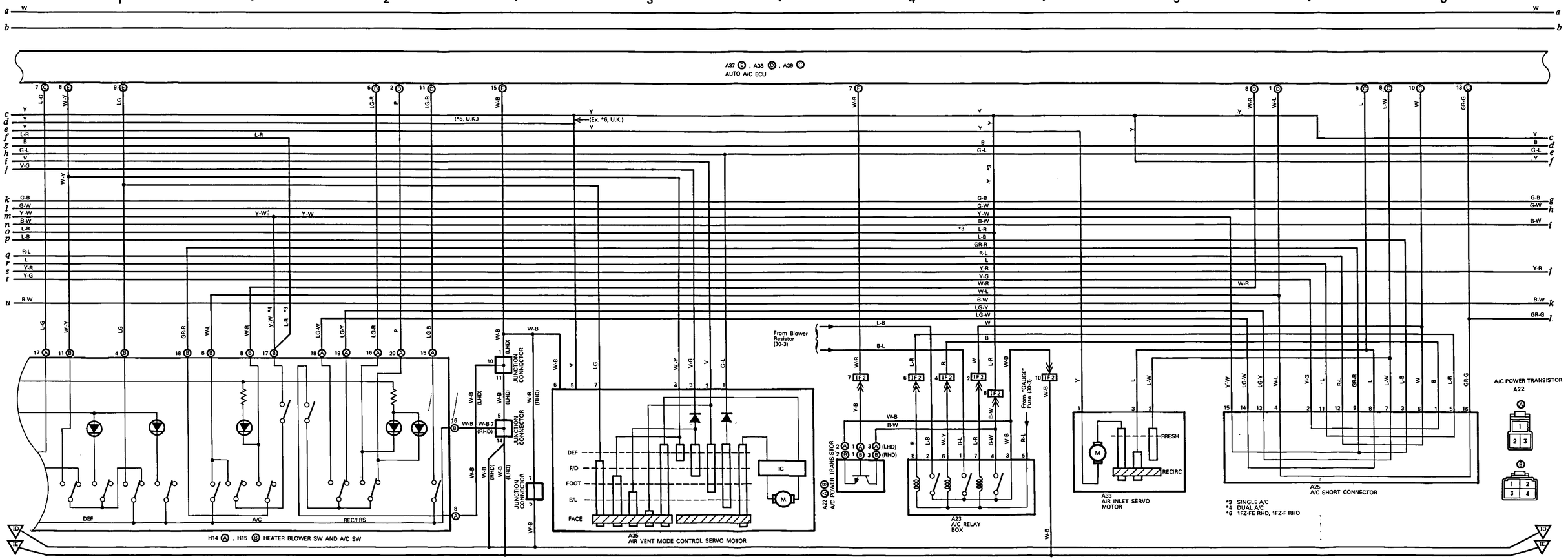


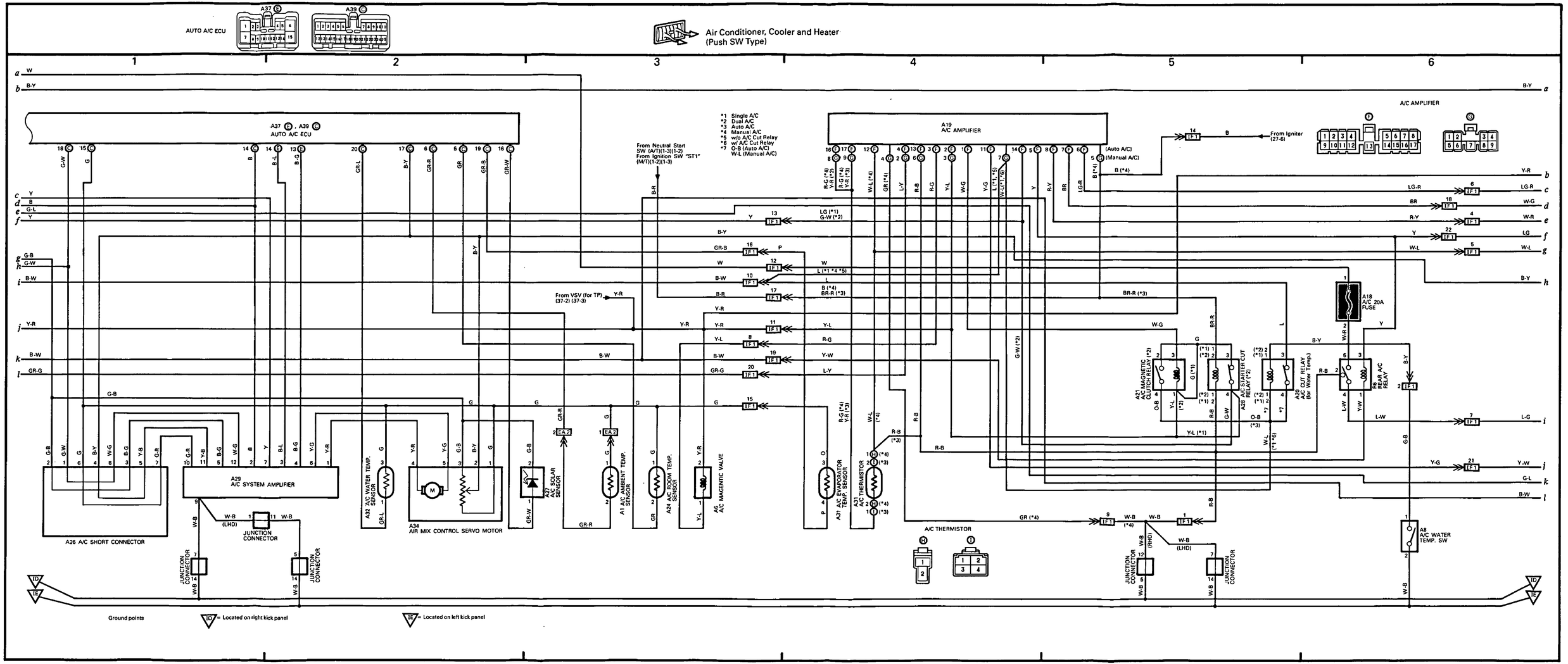

Air Conditioner, Cooler and Heater (Push SW Type)

AUTO A/C ECU



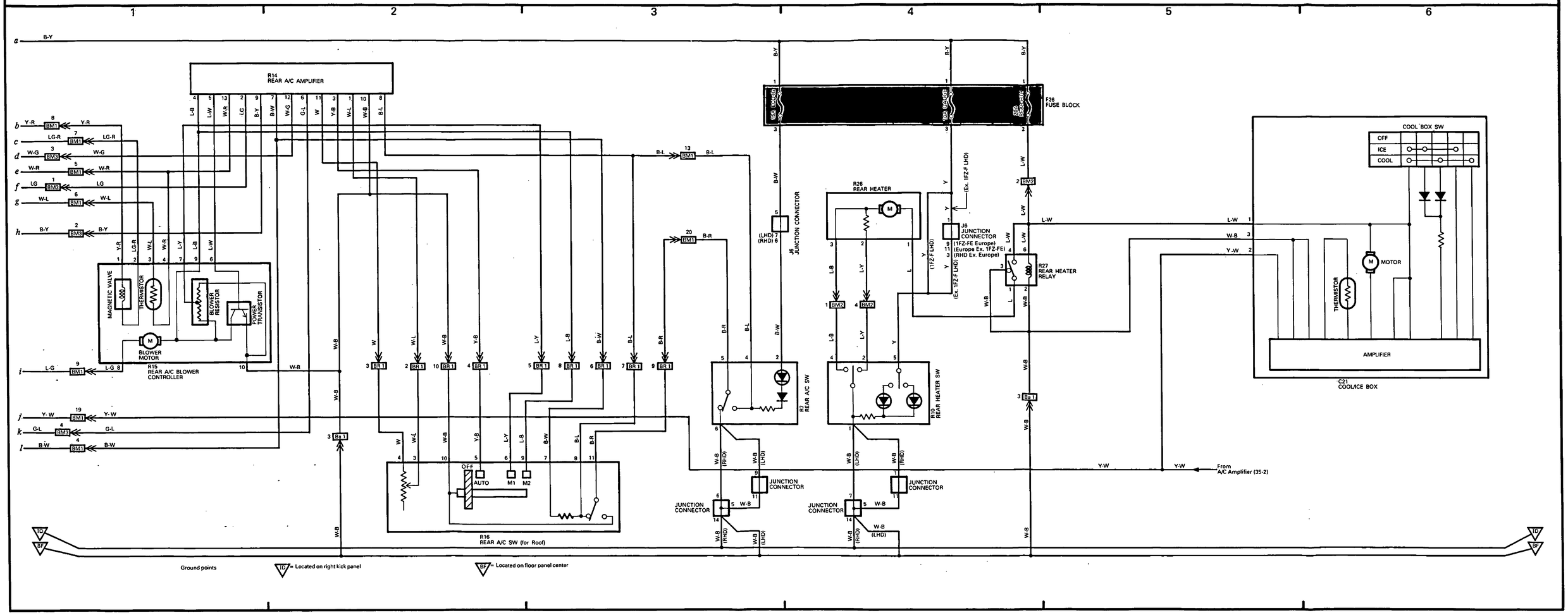

1 2 3 4 5 6

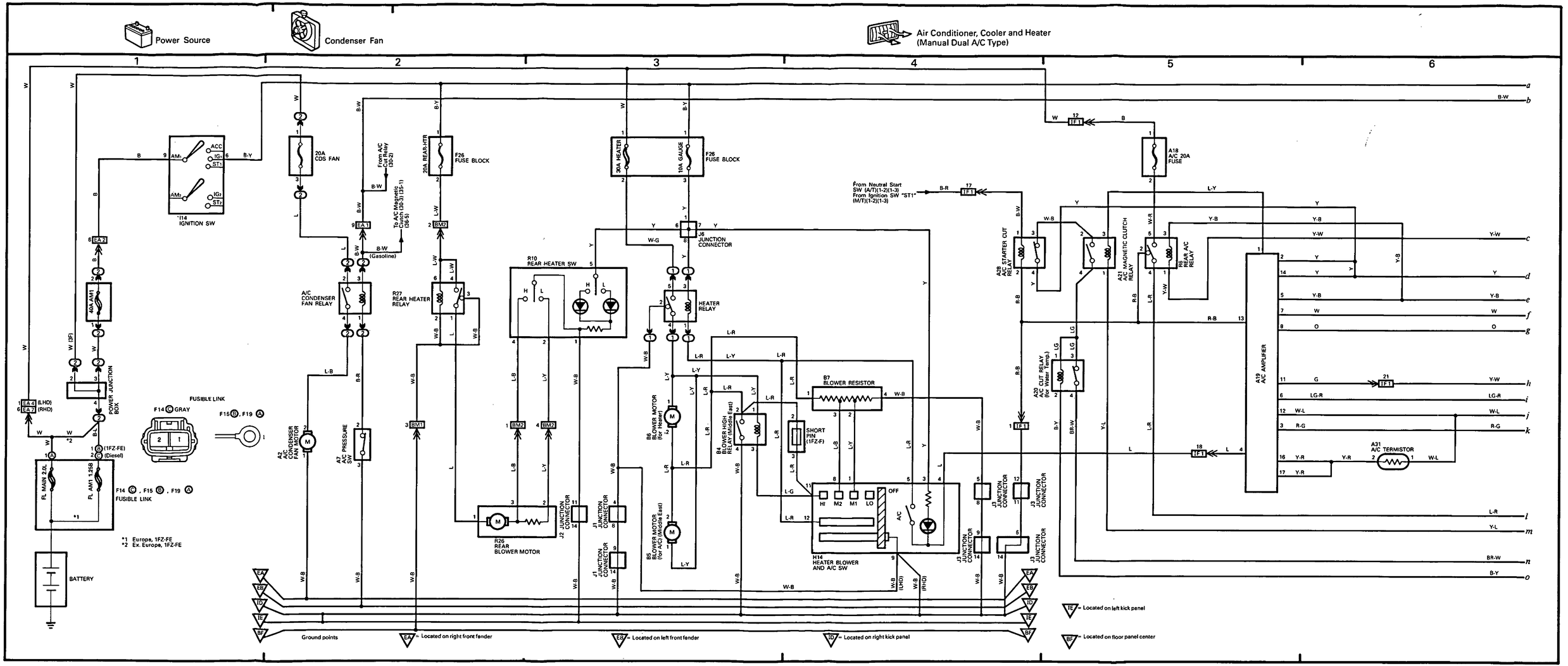



AUTO A/C ECU
A37 E
A39 C
Air Conditioner, Cooler and Heater (Push SW Type)
1
2
3
4
5
6
*1 Single A/C
*2 Dual A/C
*3 Auto A/C
*4 Manual A/C
*5 w/o A/C Cut Relay
*6 w/ A/C Cut Relay
*7 O-B (Auto A/C)
W-L (Manual A/C)
A37 E , A39 C
AUTO A/C ECU
From Neutral Start SW (A/T)(1-3)(1-2) From Ignition SW "ST1" (M/T)(1-2)(1-3)
A19
A/C AMPLIFIER
From Igniter (27-6)
(Auto A/C)
(Manual A/C)
A/C AMPLIFIER
From VSV (for TP) (37-2) (37-3)
A18
A/C 20A FUSE
A21
A/C MAGNETIC CLUTCH RELAY
A28
A/C STARTER CUT RELAY (*2)
A20
A/C CUT RELAY (for Water Temp.)
R6
REAR A/C RELAY
A29
A/C SYSTEM AMPLIFIER
A32
A/C WATER TEMP. SENSOR
A34
AIR MIX CONTROL SERVO MOTOR
A27
A/C SOLAR SENSOR
A1
A/C AMBIENT TEMP. SENSOR
A24
A/C ROOM TEMP. SENSOR
A5
A/C MAGENTIC VALVE
A31
A/C EVAPORATOR TEMP. SENSOR
A/C THERMISTOR
A8
A/C WATER TEMP. SW
A26
A/C SHORT CONNECTOR
JUNCTION CONNECTOR
Ground points
1D = Located on right kick panel
1E = Located on left kick panel

Rear Air Conditioner (Auto)

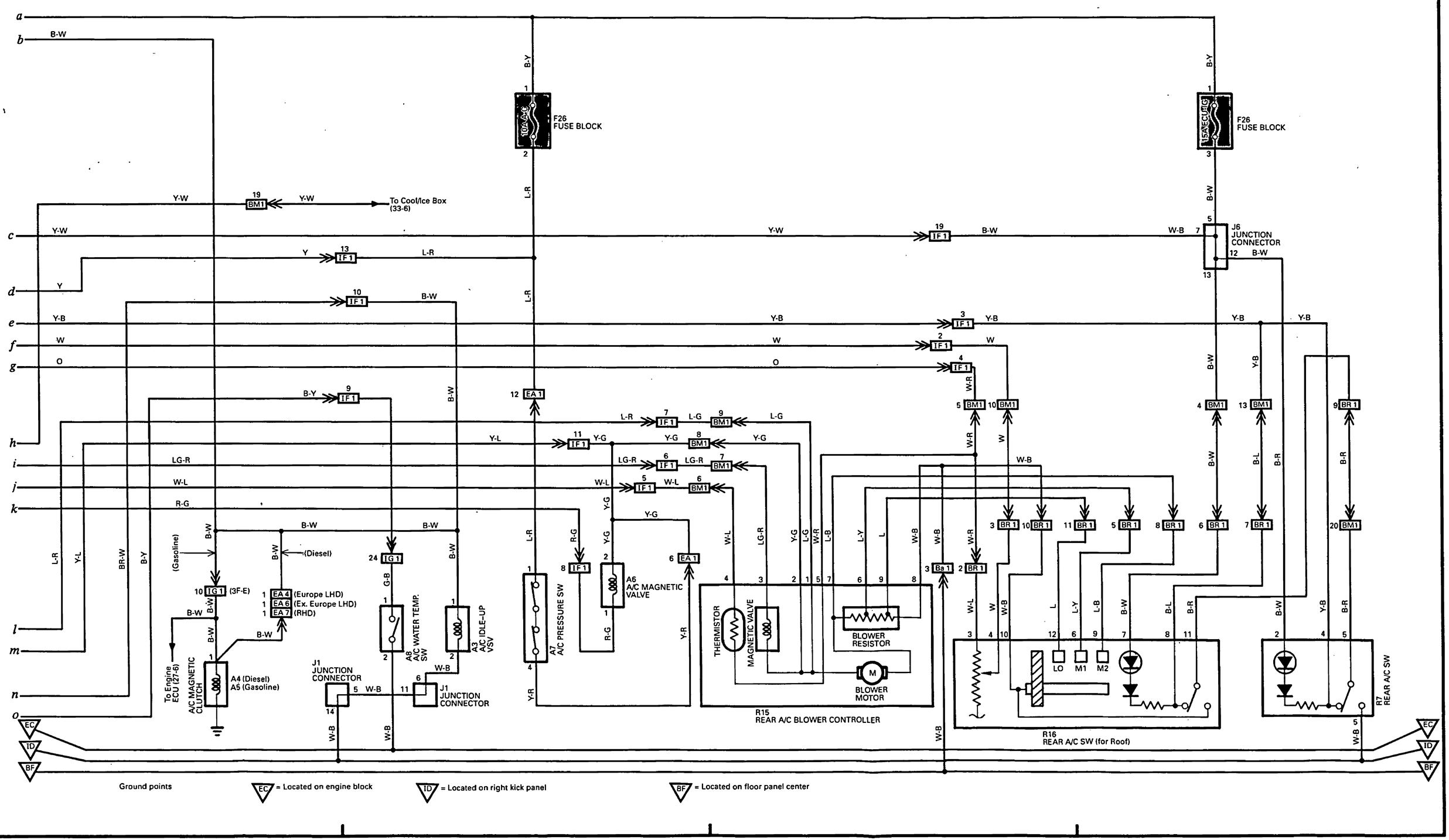
Cool/Ice Box




Power Source
Condenser Fan
Air Conditioner, Cooler and Heater (Manual Dual A/C Type)
1
2
3
4
5
6
*114 IGNITION SW
20A CDS FAN
From A/C Cut Relay (30-2)
To A/C Magnetic Clutch (30-3,135-1) (35-5)
20A REAR-HTR
F26 FUSE BLOCK
30A HEATER
10A GAUGE
J6 JUNCTION CONNECTOR
From Neutral Start SW (A/T)(1-2)(1-3) From Ignition SW "ST1" (M/T)(1-2)(1-3)
A18 A/C 20A FUSE
A28 A/C STARTER CUT RELAY
A21 A/C MAGNETIC CLUTCH RELAY
R8 REAR A/C RELAY
A19 A/C AMPLIFIER
A20 A/C CUT RELAY (for Water Temp.)
A31 A/C THERMISTOR
R10 REAR HEATER SW
R27 REAR HEATER RELAY
HEATER RELAY
A/C CONDENSER FAN RELAY
A2 A/C CONDENSER FAN MOTOR
A7 A/C PRESSURE SW
R26 REAR BLOWER MOTOR
B6 BLOWER MOTOR (for Heater)
B5 BLOWER MOTOR (for A/C) (Middle East)
B4 BLOWER HIGH RELAY (Middle East)
B7 BLOWER RESISTOR
SHORT PIN (1FZ-F)
H14 HEATER BLOWER AND A/C SW
HI M2 M1 LO OFF A/C
J1 JUNCTION CONNECTOR
J2 JUNCTION CONNECTOR
J3 JUNCTION CONNECTOR
40A AM1
POWER JUNCTION BOX
FUSIBLE LINK
F14 C GRAY
F15 B, F19 A
F14 C, F15 B, F19 A FUSIBLE LINK
FL MAIN 20L
FL AM1 1.25B
(1FZ-FE)
(Diesel)
*1 Europe, 1FZ-FE
*2 Ex. Europe, 1FZ-FE
BATTERY
Ground points
EA = Located on right front fender
EB = Located on left front fender
ID = Located on right kick panel
IE = Located on left kick panel
BF = Located on floor panel center
a
b
c
d
e
f
g
h
i
j
k
l
m
n
o

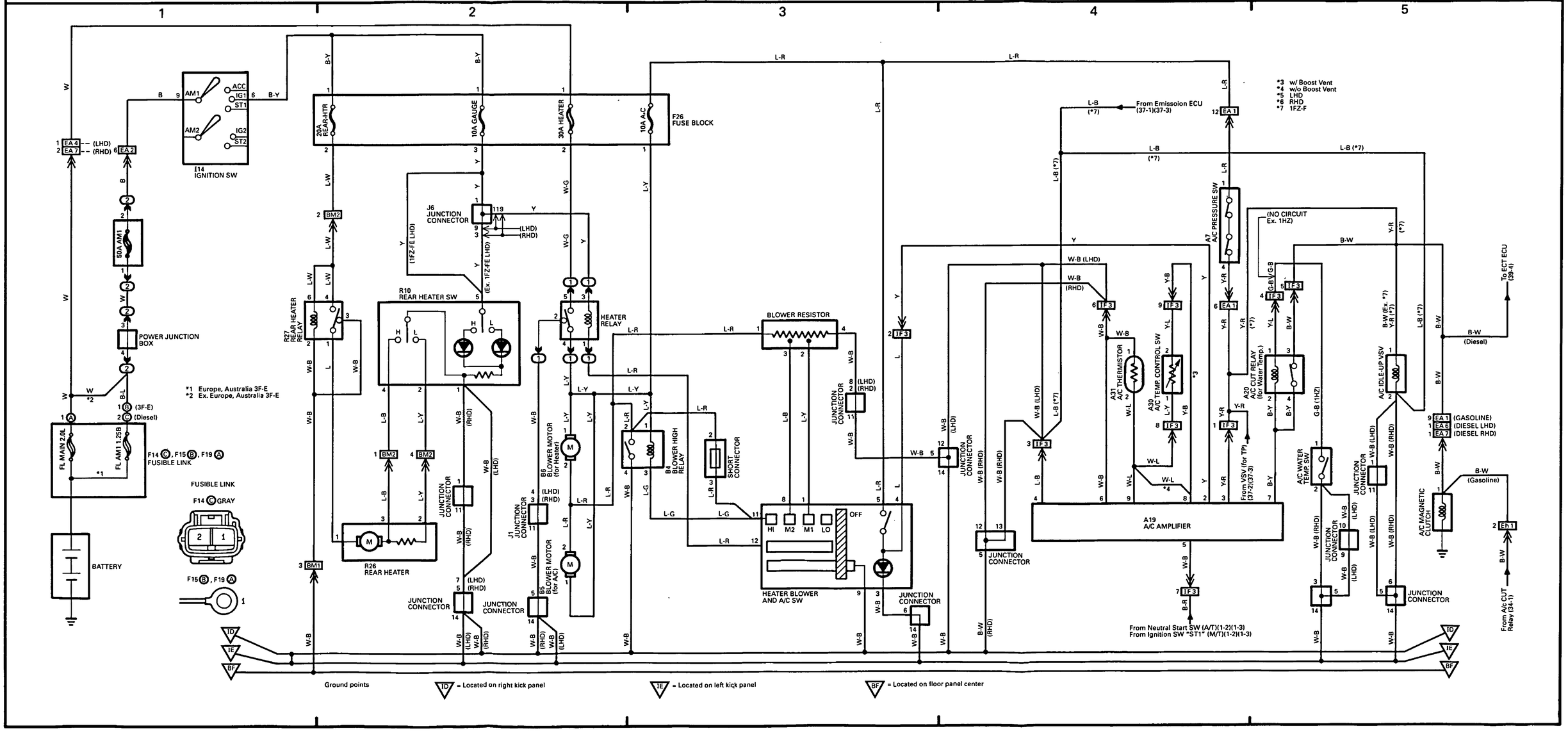
Air Conditioner, Cooler and Heater (Manual Dual A/C Type)

Rear Air Conditioner (Manual)



Power Source

Air Conditioner, Cooler and Heater
(Manual Single A/C Lever SW Type)



Power Source | Emition Control (1FZ-F LHD) | Emission Control (1FZ-F RHD) | Ignition (1FZ-F)

1 | 2 | 3 | 4

*1: 4 Speed
*2: 5 Speed

IGNITION SW (AM1, AM2, ACC, IG1, ST1, IG2, ST2)

1 EA1 (RHD)
6 EA2 (LHD)

50A AM1

POWER JUNCTION BOX

F19 FUSIBLE LINK (4L MAIN 24R)

BATTERY

F26 FUSE BLOCK (7.5A IGN)

EMISSION ECU
A DARK GRAY
B DARK GRAY

To Tachometer (28-3)
To A/C Amplifier (36-4)

E3 EMISSION ECU

From Charge Warning Light (Comb. Meter) (2-3)(2-3)

DISTRIBUTOR

I3 IGNITION COIL

I2 IGNITER

N3 NOISE FILTER (for Ignition)

To Tachometer (28-3)

W1 WATER TEMP. SW (for Emission Control)

T17 TOP SW (*2)

TOP SW (*1)

V6 VSV (for TP)

V10 VSV (for TCS)

V4 VSV (for OVCV)

C22 CHOKE HEATER

F9 FUEL CUT SOLENOID

Y-G (Dual A/C)
Y-R (Single A/C)
To A/C Amplifier (32-3) (35-2) (36-4)

Ground points

EC = Located on engine block

IE = Located on left kick panel

Power Source

Front Wiper and Washer (1FZ-FE, 1FZ-F)

Rear Wiper and Washer (1FZ-FE, 1FZ-F)

1 2 3 4

B
9 AM1
ACC
IG1
ST1
6 B-Y
AM2
IG2
ST2
I14
IGNITION SW

1 EA1 (1FZ-F RHD)
6 EA2 (Ex. 1FZ-F RHD)
B
2
50A AM1
1
2
W
2
3
POWER JUNCTION BOX
4
2
W
B-L
1 A
1 B
FL MAIN 2.0L
FL AM1 1.25B
*2
*1
15 B, F19 A
FUSIBLE LINK
BATTERY

FUSIBLE LINK
F15 B, F19 A
1

*1 Europa, 1FZ-FE
*2 Ex. Europe, 1FZ-FE

B-Y
1
20A WIPER
F26
FUSE BLOCK
2
L
18

C16
FRONT WIPER AND WASHER SW [COMB. SW]

| | B | S | +1 | +2 | B1 | INT1 | INT2 | E | W |
|---|---|---|---|---|---|---|---|---|---|
| OFF | | ○ | | | ○ | | | | |
| INT | | ○ | | | ○ | | ○ | | |
| LOW | ○ | | | | | | | | |
| HIGH | ○ | | | ○ | | | | | |
| WASHER | | | | | | | | ○ | ○ |

WIPER RELAY
INT
4 7 13 16 8
L-G L-R L-Y W-B L-W

4 EA10 (LHD)
5 EA8 (RHD)
WASHER MOTOR
WASHER CHANGE VALVE
L-O
L-B
5 EA10 (LHD)
6 EA8 (RHD)
L-B
DIODE (for Front Washer)
DIODE (for Rear Washer)

REAR WIPER AND WASHER SW [COMB. SW]

| | L | C | E | W |
|---|---|---|---|---|
| WASHER | | | ○ | |
| OFF | | | | |
| INT | | ○ | | |
| LOW | ○ | | | |
| WASHER | | ○ | ○ | |

10 16 2

2 BL 2
12 BL 2
6 BL 2
L-G L-B
1 BT 2
5 BT 1
2 BT 1
6 BV 1
4 BV 1
5 BV 1
4 BW1
6 BW1
5 BW1

R38
REAR WIPER CONTROL RELAY (Tail Gate)
L-B 4
3 L-R
L-G 6
2 L-W
L 1
4
3
R35
REAR WIPER CONTROL MOTOR (Tail Gate)

W-B
L-G L-R L-Y
5 2
6
F8
FRONT WIPER CONTROL MOTOR

J3
JUNCTION CONNECTOR
3 W-B (LHD) 1
W-B
5
J3
JUNCTION CONNECTOR
14
W-B

W-B
4
11
W-B
5
14
J1
JUNCTION CONNECTOR
W-B (RHD)
W-B (LHD)
13
14
J2
JUNCTION CONNECTOR
W-B (RHD)
W-B (LHD)

4 BT 1
W-B
1 BV 2
W-B
2 BW2
W-B 2

R39
REAR WIPER CONTROL RELAY (Swing Out)
6 L-B
5 L-G
1 L
3 L-Y
7 L-O
2 L-W
4 L-R
7 BX 1
6 BX 1
19 BQ 1
18 BQ 1
8 BX 1
4 BX 1
5 BX 1
20 BQ 1
7 BQ 1
8 BQ 1
1 BU 2
6 BU 1
2 BU 1
4 BU 1
W-B

R36
REAR WIPER CONTROL MOTOR LH (Swing Out)
R37
REAR WIPER CONTROL MOTOR RH (Swing Out)
1 BX 1

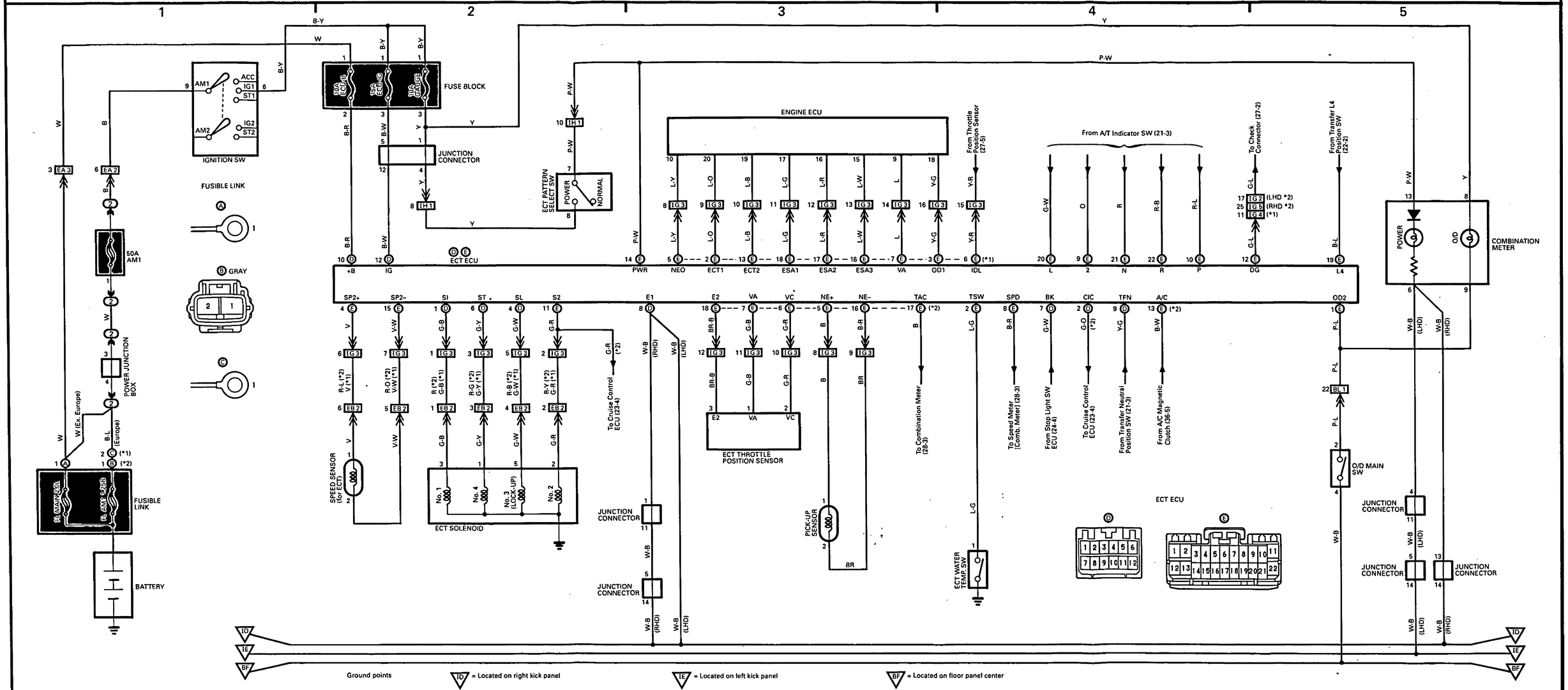
ID
IE
BF
BG
Ground points

ID = Located on right kick panel
IE = Located on left kick panel
BF = Located on floor panel center
BG = Located on back panel center

Power Source

ECT ECT (Electronic Controlled Transmission)

*1: Diesel
*2: Gasoline



Power Source

Sub Fuel Tank (1FZ-FE)

Light Auto Turn Off

1 2 3 4

IGNITION SW

ACC
IG1
ST1
IG2
ST2

F26 FUSE BLOCK

See Combination Meter System (28-2)(28-4)

COMBINATION METER

FUEL FILTER
FUEL
CHARGE

JUNCTION CONNECTOR

To Check Connector (23-4)

COMBINATION METER

C

D BLUE

E GRAY

To Door Courtesy Light Front RH (11-3)

From Headlight Relay (10-2)

From Taillight Relay (25-1)

DIODE (for Cornering Light)

IG
B
DCTY
HRLY
TRLY

LIGHT RETAINER RELAY

To Light Control SW [Comb. SW] (10-1)

FUSIBLE LINK

POWER JUNCTION BOX

50A AM1
40A MAIN
40A ALT

FUSIBLE LINK

BATTERY

BAT
W
SD
RGL
IGB
TC

FUEL CHANGE ECU

HS1
HS2
P1
MS
EMP
FP
E
E1
SL

TOP SW

FUEL MAIN SW

SUB FUEL SW

SUB FUEL PUMP

FUEL CHANGE VALVE

From "GAUGE" Fuse (28-5)

JUNCTION CONNECTOR

Ground points

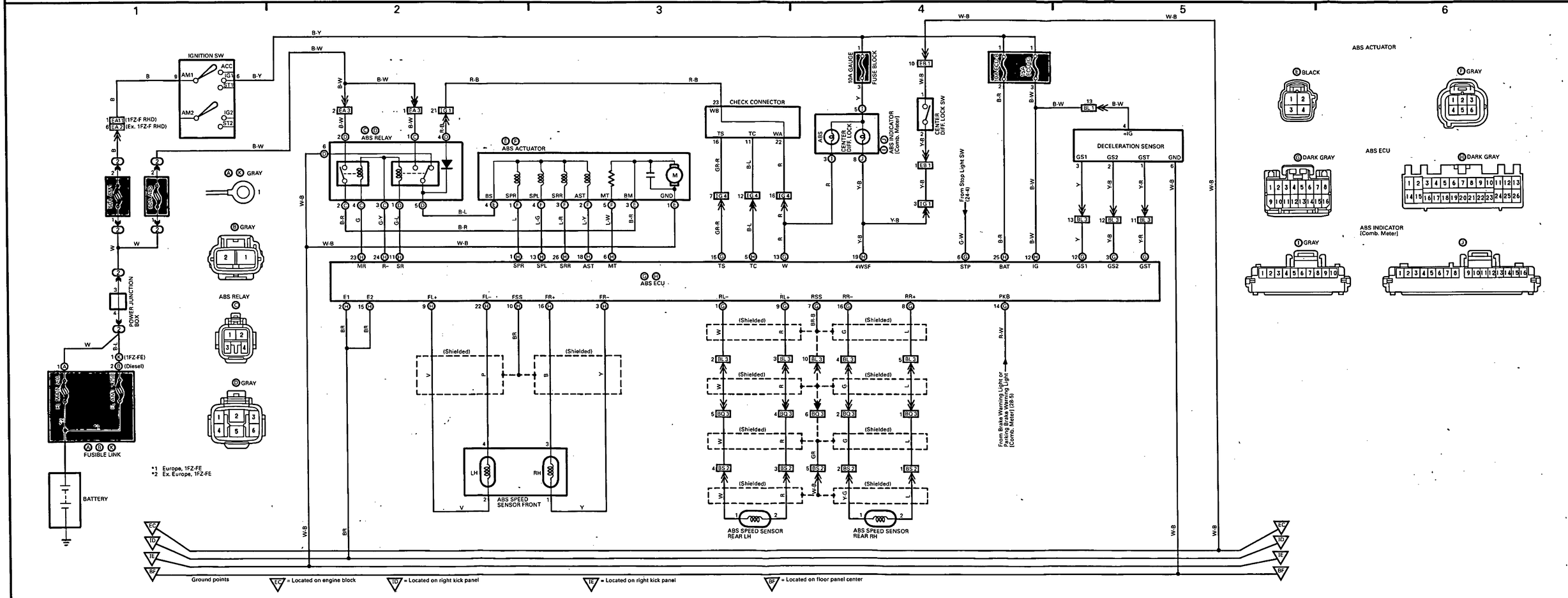
1D = Located on right kick panel

BF = Located on floor panel center

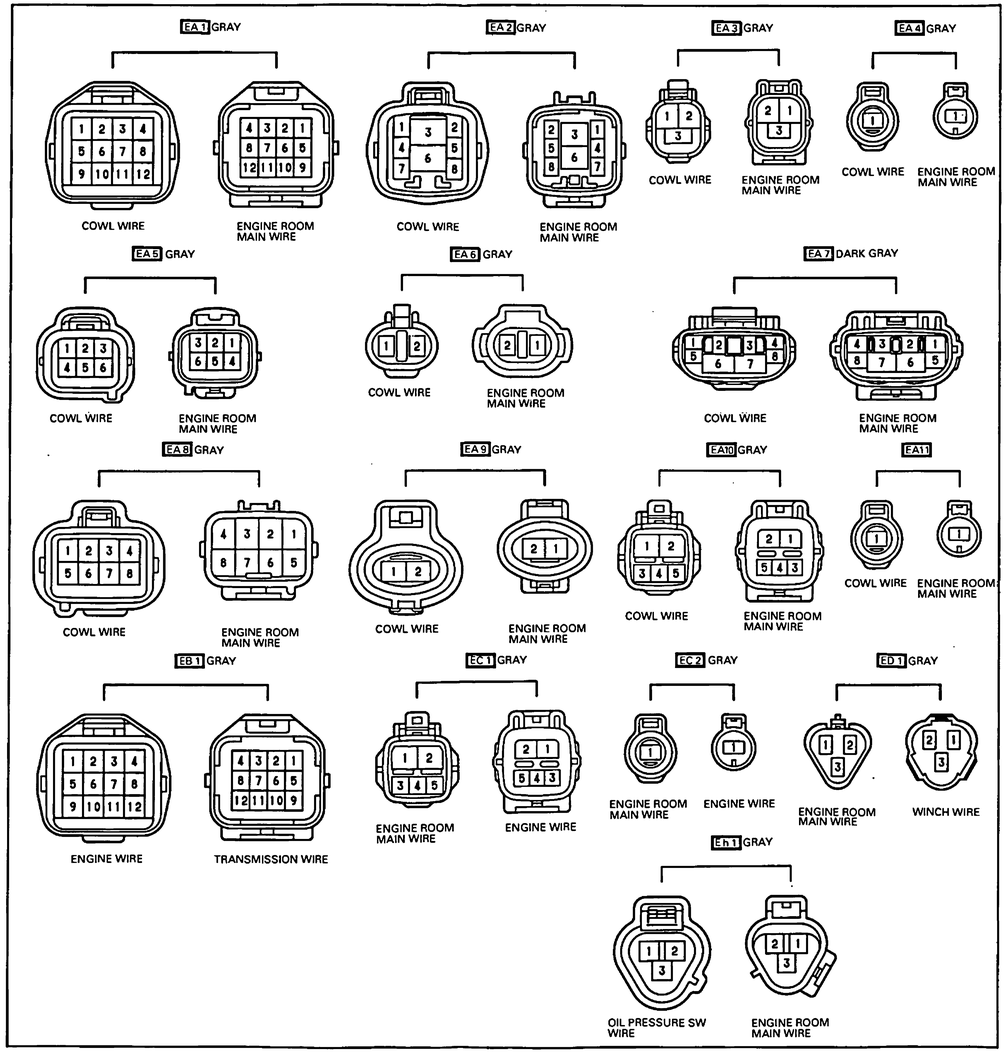
BG = Located on back panel center

Power Source

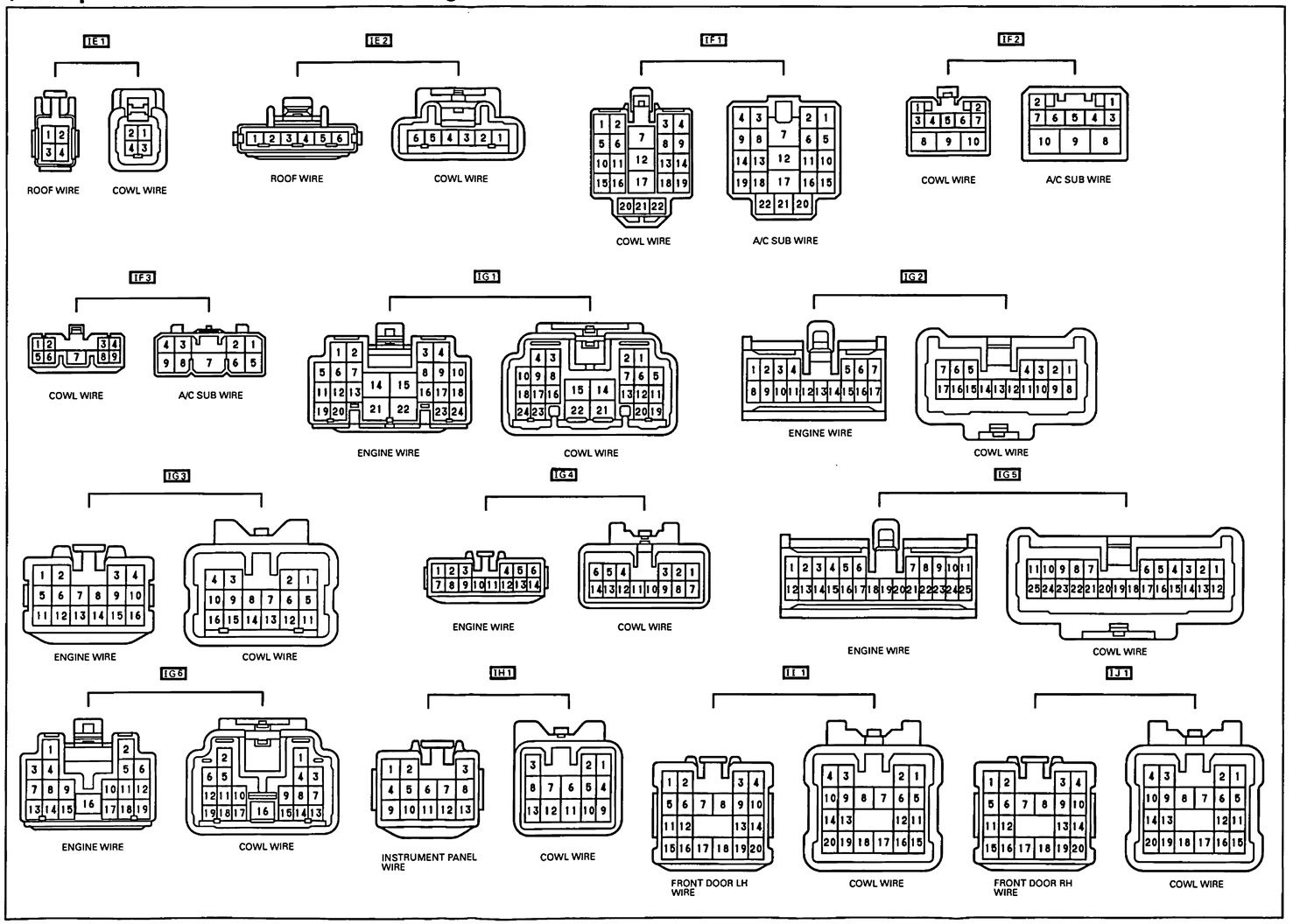
ABS (Anti-Lock Brake System)



## Connector Joining Wire Harness and Wire Harness
### (E Group: Engine Compartment Area)




## (I Group: Instrument Panel and Surounding Area)



1 2 3 4

## Connector Joining Wire Harness and Wire Harness
## (B Group: Body Surounding Area)

